



THE HEALTH OF
PACIFIC CHILDREN
AND YOUNG PEOPLE
IN NEW ZEALAND

The Health of Pacific Children and Young People in New Zealand



This Report was prepared for the Ministry of Health by Elizabeth Craig, Seini Taufa, Catherine Jackson and Dug Yeo Han on behalf of the New Zealand Child and Youth Epidemiology Service, July 2008

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This report arose from a contract between the Ministry of Health and Auckland UniServices Ltd (on behalf of the New Zealand Child & Youth Epidemiology Service (a joint venture between the Paediatric Society of NZ and Auckland UniServices Ltd)).

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The Ministry of Education	The Ministry of Social Development
Plunket	Action on Smoking and Health (ASH)
Child, Youth and Family	The New Zealand Police
The National Audiology Centre	Youthline
0800WHATSUP Telephone Counselling Service	
The Blind and Low Vision Education Network New Zealand (BLENNZ)	
Sports and Recreation New Zealand (SPARC)	

Cover Artwork: Elements Taken from a Self Portrait by Michael Lea
"Creating a Spiritual and Cultural Identity in a Colonial Background"
Report Graphics by Imelda Morgan

Table of Contents

List of Contributors.....	ii
Table of Contents	iii
List of Figures	vi
List of Tables	xv
INTRODUCTION.....	1
Introduction	3
DEMOGRAPHY AND THE MEASUREMENT OF ETHNICITY.....	7
The Measurement of Ethnicity	9
Pacific Children & Young People in New Zealand: Demographic Profile	13
SOCIOECONOMIC AND CULTURAL DETERMINANTS.....	25
Cultural Identity	27
Viewpoint: Cultural Determinants of Health	29
by Pefi Kingi	29
Religious Affiliation	34
Pacific Language Retention.....	38
Economic Standard Of Living	43
Viewpoint: Socioeconomic and Family Factors by Seini Taufa	45
Children in Families with Restricted Socioeconomic Resources	48
Children Reliant on Benefit Recipients	56
Young People Reliant on Benefits	61
Household Crowding	67
Education: Knowledge and Skills	73
Participation in Early Childhood Education	75
Educational Attainment at School Leaving	81
Secondary School Retention Rates.....	86
School Stand-Downs, Suspensions, Exclusions and Expulsions	91
Service Provision and Utilisation.....	97
Viewpoint: Support Services Provided by the Non-Regulated Health Workforce by Lana Perese	99
Primary Health Care Provision and Utilisation.....	101
RISK AND PROTECTIVE FACTORS.....	109
Nutrition, Growth and Physical Activity	111
Breastfeeding.....	113
Overweight and Obesity	120
Nutrition	126
Physical Activity	133
Substance Use	141
Exposure to Cigarette Smoke in the Home	143
Tobacco Use in Young People	150
Alcohol Related Harm.....	158
INDIVIDUAL AND WHANAU HEALTH AND WELLBEING	165

Viewpoint: Illness and Hospitalization in New Zealand Pacific Children	167
by Teuila Percival	167
Total Morbidity and Mortality	169
Most Frequent Causes of Hospital Admissions and Mortality	171
Whanau Wellbeing.....	177
Family Composition	179
Perinatal - Infancy.....	185
Low Birth Weight: Small for Gestational Age and Preterm Birth	187
Infant Mortality	194
Well Health	201
Viewpoint: Maternal and Well Child Issues.....	203
by Minnie Strickland	203
Immunisation	206
Hearing Screening.....	212
Oral Health	215
Safety.....	219
Total and Unintentional Injuries	221
Injuries Arising from Assault	238
CYF Notifications.....	246
Family Violence	249
Infectious Disease	255
Serious Bacterial Infections.....	257
Meningococcal Disease.....	263
Rheumatic Fever	268
Serious Skin Infections	273
Tuberculosis	280
Gastroenteritis	285
Respiratory Disease	291
Lower Respiratory Tract Morbidity and Mortality in Children	293
Bronchiolitis	299
Pertussis.....	304
Pneumonia	309
Bronchiectasis	314
Asthma	319
Chronic Conditions	325
Diabetes and Epilepsy.....	327
Cancer	334
Disability.....	339
Disability: An Introduction	341
Prevalence Estimates for Selected Causes of Disability	344
Congenital Anomalies Evident at Birth	349
Blindness and Low Vision.....	354
Permanent Hearing Loss.....	359
Viewpoint: Pacific Youth: Key Messages	367
by Karlo Mila-Schaaf	367
Mental Health	371
Issues Experienced by Callers to Telephone Counselling Services.....	373
Mental Health Inpatient Admissions	378
Self-Harm and Suicide.....	383

Sexual and Reproductive Health.....	389
Teenage Pregnancy	391
Sexually Transmitted Infection.....	396
 THE NEW ZEALAND CHILD AND YOUTH HEALTH INDICATOR FRAMEWORK AND APPENDICES	 399
Introduction to the NZ Child and Youth Health Indicator Framework.....	401
Limitations of Current Indicators	412
Appendix 1: The National Minimum Dataset.....	415
Appendix 2: The Birth Registration Dataset.....	419
Appendix 3: National Mortality Collection	420
Appendix 4: ESR Sexual Health Data	421
Appendix 5: New Zealand Cancer Registry.....	422
Appendix 6: NZ Deprivation Index	423
Appendix 7: Police Boundaries.....	425
Appendix 8: SPARC Regional Sports Trusts.....	428
Appendix 9: National Well Child Tamariki Ora Schedule.....	429
Appendix 10: Statistical Significance Testing and Its Use in This Report.....	431
References	433

List of Figures

Figure 1. Breakdown of Pacific Births by Ethnic Group, New Zealand 2002-2006.....	13
Figure 2. Distribution of Births by Ethnicity and NZ Deprivation Index Decile, New Zealand 2002-2006	16
Figure 3. Proportion of Pacific Births by NZ Deprivation Index Decile Using Two Different Ethnicity Classifications, New Zealand 2002-2006 (1 of 2).....	17
Figure 4. Proportion of Pacific Births by NZ Deprivation Index Decile Using Two Different Ethnicity Classifications, New Zealand 2002-2006 (2 of 2).....	17
Figure 5. Proportion of the New Zealand Population Who Were Under 25 Years of Age by Ethnicity at the 2006 Census	20
Figure 6. Proportion of Pacific Young People Aged 15-24 Years Stating That They Had No Religion by Ethnicity, New Zealand at the 2006 Census	35
Figure 7. Proportion of Pacific Young People Aged 15-24 Years Speaking Pacific Languages by Ethnic Group, New Zealand at the 2006 Census.....	40
Figure 8. Distribution of Births by NZ Deprivation Index Decile (NZDep2001) and Ethnicity, New Zealand 2002-2006.....	50
Figure 9. Distribution of Births by Ethnicity and NZ Deprivation Index Decile, New Zealand 1980-2006	50
Figure 10. Proportion of Population with Incomes Below the Poverty Line (Net-of-Housing-Cost Income <60% Line Benchmarked to 1998 Median) by Family Type, Selected Years 1987-2004	51
Figure 11. Proportion of Economic Family Units with Incomes Below Poverty Line (Net of Housing Cost Incomes <60% Line Benchmarked to 1998 median) by Income Source, Selected Years 1987-2004.....	52
Figure 12. Proportion of Economic Family Units with Incomes Below Poverty Line (Net of Housing Cost Incomes <60% Line Benchmarked to 1998 median) by Ethnicity, Selected Years 1987-2004	52
Figure 13. Distribution of Living Standards for Families with Dependent Children by Family Type and Income Source, NZ Living Standards Survey 2004	53
Figure 14. Distribution of Living Standards for Families with Dependent Children by Family Ethnicity, NZ Living Standards Survey 2004.....	54
Figure 15. Proportion of Children Under 18 Years of Age With a Parent Receiving a Main Income-Tested Benefit by Benefit Type, New Zealand 2000-2007	58
Figure 16. Proportion of Children Under 18 Years of Age with a Parent Receiving a Main Income-Tested Benefit by Age, New Zealand 2007	59
Figure 17. Young People Aged 16-24 Years Receiving a Domestic Purposes Benefit or Emergency Maintenance Allowance by Ethnicity, New Zealand April 2000-2007.....	63
Figure 18. Young People Aged 16-24 Years Receiving Unemployment Benefits by Ethnicity, New Zealand April 2000-2007	64
Figure 19. Young People Aged 16-24 Years Receiving an Invalids or Sickness Benefit by Ethnicity, New Zealand April 2000-2007	65
Figure 20. Young People Aged 16-24 Years Receiving a Sickness Benefit by Cause of Incapacity, New Zealand April 2007 (n= 6,669).....	65

Figure 21. Young People Aged 16-24 Years Receiving an Invalid's Benefit by Cause of Incapacity, New Zealand April 2007 (n= 6,580)	66
Figure 22. Proportion of Crowded Households (including those without children) by Ethnicity, New Zealand at the 1986, 1991, 1996 and 2001 Censuses	69
Figure 23. Proportion of Children and Young People 0-24 Years Living in a Crowded Household by Ethnicity, New Zealand Census 2001, 2006	69
Figure 24. Proportion of Children and Young People 0-24 Years Living in a Crowded Household by NZ Deprivation Index Decile, New Zealand Census 2001, 2006	70
Figure 25. Proportion of Children and Young People 0-24 Years Living in a Crowded Household by Ethnicity and NZ Deprivation Index Decile, New Zealand Census 2001, 2006	71
Figure 26. Licensed and License Exempt Early Childhood Education Enrolments by Service Type, New Zealand 1990-2006	78
Figure 27. Proportion of Primary School New Entrants Who Had Previously Attended Early Childhood Education by Ethnicity, New Zealand 2000-2006	79
Figure 28. Proportion of Primary School New Entrants Who Had Previously Attended Early Childhood Education by School Socioeconomic Decile, New Zealand 2006	79
Figure 29. Highest Educational Attainment of Secondary School Leavers, New Zealand 1993-2006	83
Figure 30. Highest Educational Attainment of Secondary School Leavers by Ethnicity, New Zealand 1993-2006	83
Figure 31. Highest Educational Attainment of Secondary School Leavers by Ethnic Group and School Socioeconomic Decile, New Zealand 2006	84
Figure 32. Apparent Senior Secondary School Retention Rates at 16, 17 and 18 Years by Gender, New Zealand 1986-2006	88
Figure 33. Apparent Senior Secondary School Retention Rates at 16, 17 and 18 Years by Ethnic Group, New Zealand 1995-2006	88
Figure 34. Apparent Senior Secondary School Retention Rates at 16 and 17 Years by Ethnic Group, New Zealand 2002-2006	89
Figure 35. Apparent Senior Secondary School Retention Rates at 16 and 17 Years by School Socioeconomic Decile, New Zealand 2006	89
Figure 36. Age Standardised Tertiary Education Participation Rates by Ethnicity and Type of Qualification, New Zealand 1994-2005 (all age groups)	90
Figure 37. Age Standardised School Stand-Down, Suspension, Exclusion and Expulsion Rates by Ethnicity, New Zealand 2000-2006	93
Figure 38. Age Standardised Stand-Down and Suspension Rates per 1,000 Students, by Gender and Ethnic Group, New Zealand 2006	95
Figure 39. Age Standardised Suspension Rates per 1,000 by Ethnicity and School Socioeconomic Quintile, New Zealand 2006	95
Figure 40. Proportion of Children and Young People Aged 0-24 Years Enrolled with a PHO by Age and Gender, New Zealand October-December 2006	103
Figure 41. Proportion of Children and Young People Aged 0-24 Years Enrolled with a PHO by Age and Ethnicity, New Zealand 2006	103
Figure 42. Proportion of Children Enrolled with Plunket Attending Tamariki Ora Well Child Visits by Core Visit, Plunket Client Information System as at Dec 2006	106

Figure 43. Proportion of Children Enrolled with Plunket Attending Tamariki Ora Well Child Visits 1-5 During 2006 by Ethnicity and NZ Deprivation Index.....	106
Figure 44. Number of Core Tamariki Ora Well Child Visits Undertaken by 1 Year Old Children Enrolled with Plunket During 2006 by NZ Deprivation Index Decile.....	107
Figure 45. Average Number of Tamariki Ora Well Child Core and Additional Visits Undertaken by 1 Year Old Children Enrolled with Plunket During 2006 by NZ Deprivation Index Decile.....	107
Figure 46. Percentage of Babies Who Were Breastfed (Any Breastfeeding) at the Time of First Contact with Plunket, New Zealand 1922-2006.....	115
Figure 47. Percentage of Plunket Babies who were Exclusively or Fully Breastfed at <6 Weeks, 3 Months and 6 Months, New Zealand 1999-2006.....	115
Figure 48. Percentage of Plunket Babies Who Were Exclusively or Fully Breastfed by Age and Ethnicity, New Zealand Year Ending June 2006.....	116
Figure 49. Percentage of Plunket Babies who were Exclusively or Fully Breastfed by Age and NZ Deprivation Index Decile, New Zealand Year ending June 2006.....	116
Figure 50. Proportion of Children Aged 5-14 Years Who Were Either Overweight or Obese by Age and Gender, New Zealand National Children's Nutrition Survey 2002	123
Figure 51. Proportion of Children Aged 5-14 Years Who Were Either Overweight or Obese, by Gender & Ethnicity, New Zealand National Children's Nutrition Survey 2002.....	124
Figure 52. Proportion of Children Aged 5-14 Years Who Were Overweight or Obese by Gender and NZ Deprivation Index Decile, NZ National Children's Nutrition Survey 2002.....	124
Figure 53. Proportion of Children Aged 5-14 Years Who Were Either Overweight or Obese by Gender and School Type (Rural / Urban), New Zealand National Children's Nutrition Survey 2002.....	125
Figure 54. Median Daily Energy Intake (kJ) for Children 5-14 Years by Gender, Age, NZ Deprivation Index and Ethnicity NZ National Children's Nutrition Survey 2002....	128
Figure 55. Mean Percentage of Energy Intake from Total Fat in Children 5-14 Years by Gender, Age, NZ Deprivation Index and Ethnicity, New Zealand National Children's Nutrition Survey 2002.....	128
Figure 56. Source of Most Food Eaten at School for Children 5-14 Years by Gender, Age, and Ethnicity, New Zealand National Children's Nutrition Survey 2002.....	129
Figure 57. Source of Most Food Eaten at School for Children 5-14 Years by Gender, and NZ Deprivation Index, New Zealand National Children's Nutrition Survey 2002.	130
Figure 58. Households with Children 5-14 Years that could Afford to Eat Properly (Always vs. Sometimes) by Number of Children in Household, NZ Deprivation Index and Ethnicity, New Zealand National Children's Nutrition Survey 2002.....	131
Figure 59. Proportion of Households with Children 5-14 Yrs Reporting Food Runs Out Often or Sometimes Due to Lack of Money by Number of Children in Household, NZ Deprivation Index and Ethnicity, NZ National Children's Nutrition Survey 2002.....	131
Figure 60. Proportion of Children 5-14 Years in the Least and Most Active Physical Activity Quartiles by Gender, Age and Ethnicity, NZ National Children's Nutrition Survey 2002.....	135

Figure 61. Proportion of Children 5-14 Years Who Did Not Travel to School by Active Means by Gender, Age, NZ Deprivation Index and Ethnicity, New Zealand National Children's Nutrition Survey 2002	136
Figure 62. Children and Young People 5-17 Years Who Were Sedentary or Relatively Inactive by Gender and Age, NZ Sport and Physical Activity Surveys 1997-2001	138
Figure 63. Children and Young People 5-17 Years Who Were Sedentary or Relatively Inactive by Age and Ethnicity, NZ Sport and Physical Activity Surveys 1997-2001 ...	138
Figure 64. Children and Young People 5-17 Years Who Were Sedentary or Relatively Inactive by Parental Activity Level, NZ Sport and Physical Activity Surveys 1997-2001	139
Figure 65. Proportion of Year 10 Students with Parents Who Smoke or Who Live in a Home with Smoking Inside, New Zealand ASH Surveys 2001-2006.....	145
Figure 66. Proportion of Year 10 Students with Parents Who Smoke or Who Live in a Home with Smoking Inside by Ethnicity, New Zealand ASH Surveys 2001-2006	145
Figure 67. Proportion of Year 10 Students with Parents Who Smoke or Who Live in a Home with Smoking Inside by School Socioeconomic Decile, New Zealand ASH Surveys 2001-2006.....	146
Figure 68. Proportion of Children 0-14 Years Living in a Household with a Smoker by Ethnicity, New Zealand at the 1996 and 2006 Censuses	147
Figure 69. Proportion of Children 0-14 Years Living in a Household with a Smoker by NZ Deprivation Index Decile, New Zealand at the 1996 and 2006 Censuses	148
Figure 70. Proportion of Children 0-14 Years Living in a Household with a Smoker by Ethnicity and NZ Deprivation Index Decile, New Zealand at the 1996 and 2006 Censuses	149
Figure 71. Daily vs. Never Smoking Rates in Year 10 Students, New Zealand ASH Surveys 1999-2006.....	152
Figure 72. Daily Smoking Rates in Year 10 Students by Gender and Ethnicity, New Zealand ASH Surveys 1999-2006	152
Figure 73. Daily vs. Never Smoking Rates in Year 10 Pacific Students by Ethnic Group, NZ ASH Surveys 2004-2006 Combined	153
Figure 74. Daily Smoking Rates in Year 10 Students by Gender and School Socioeconomic Decile, New Zealand ASH Surveys 1999-2006.....	153
Figure 75. Daily Smoking Rates in Year 10 Students by Parents Smoking Status, New Zealand ASH Surveys 2001-2006	154
Figure 76. Proportion of Young People Aged 15-24 Years who were Regular Smokers by Ethnicity, New Zealand at the 1996 and 2006 Censuses	155
Figure 77. Proportion of Young People Aged 15-24 Years who were Regular Smokers by NZ Deprivation Index Decile, New Zealand at the 1996 and 2006 Censuses	155
Figure 78. Proportion of Young People Aged 15-24 yrs who were Regular Smokers by Ethnicity and NZ Deprivation Index Decile, New Zealand at the 1996 & 2006 Censuses	156
Figure 79. Alcohol Related Hospital Admissions in Children and Young People 0-24 Years by Age, New Zealand 2002-2006.....	160
Figure 80. Families with Dependent Children by Family Type, New Zealand at the 1976-2001 Censuses.....	181

Figure 81. Proportion of Children <15 Years Living in One and Two Parent Households by Ethnicity, New Zealand at the 2001 and 2006 Censuses	181
Figure 82. Proportion of Children <15 Years Living in One and Two Parent Households by NZ Deprivation Index Decile, New Zealand at the 2001 and 2006 Censuses	182
Figure 83. Proportion of Children <15 Years Living in One and Two Parent Households by Ethnicity and NZ Deprivation Index Decile, New Zealand at the 2006 Census	183
Figure 84. Rates of Small for Gestational Age, Preterm Birth and Low Birth Weight, New Zealand Singleton Live Births 1980-2006	188
Figure 85. Rates of Small for Gestational Age by Infant's Ethnic Group, New Zealand Singleton Live Births 1996-2006	189
Figure 86. Rates of Preterm Birth by Baby's Ethnic Group, New Zealand Singleton Live Births 1996-2006	191
Figure 87. Infant Mortality by Cause, New Zealand 1988-2004	195
Figure 88. Total, Neonatal and Post-Neonatal Mortality in New Zealand 1988-2004	195
Figure 89. Total Infant Mortality Rates by Ethnicity, New Zealand 1996-2004	196
Figure 90. Neonatal Mortality Rates by Ethnicity, New Zealand 1996-2004	197
Figure 91. Post-Neonatal Mortality Rates by Ethnicity, New Zealand 1996-2004	200
Figure 92. Immunisation Coverage for Children Enrolled on the National Immunisation Register by Milestone Age and Ethnicity, New Zealand 1 April - 1 July 2007	210
Figure 93. Immunisation Coverage for Children Enrolled on the National Immunisation Register by Milestone Age and NZ Deprivation Index, New Zealand 1 April - 1 July 2007	210
Figure 94. Audiometry Failure Rates at School Entry (5 Years), New Zealand Years Ending June 1993-2006	213
Figure 95. Audiometry Failure Rates at School Entry (5 Years) by Ethnicity, New Zealand Years Ending June 1993-2006	214
Figure 96. Percentage of Children Caries Free at 5 Years and Mean DMFT Scores at 12 Years by School Water Fluoridation Status, New Zealand 1990-2006	216
Figure 97. Percentage of Children Caries Free at 5 Years by Ethnicity and the Fluoridation Status of their School's Water Supply, New Zealand 2002-2006	217
Figure 98. Mean DMFT Scores at 12 Years by Ethnicity and the Fluoridation Status of the School's Water Supply, New Zealand 2002-2006	217
Figure 99. Injury Mortality Trends for Children 0-14 Yrs, New Zealand 1990-2004 ...	224
Figure 100. Injury Mortality Trends for Young People 15-24 Yrs, New Zealand 1990-04	224
Figure 101. Deaths from Unintentional Non-Transport Injuries in Children and Young People 0-24 Years, New Zealand 1990-2004	225
Figure 102. Hospital Admissions (2002-2006) and Deaths (2000-2004) due to Unintentional Non-Transport Injuries in New Zealand Children and Young People 0-24 Years by Age and Gender	226
Figure 103. Hospital Admissions for Unintentional Non-Transport Injuries in Children and Young People 0-24 Years by Age and Cause, New Zealand 2002-2006	226
Figure 104. Deaths due to Unintentional Non-Transport Injuries in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2004	227

Figure 105. Deaths from Land Transport Injuries in Children and Young People 0-24 Years, New Zealand 1990-2004	231
Figure 106. Hospital Admissions (2002-2006) and Deaths (2000-2004) due to Land Transport Injuries in New Zealand Children and Young People by Age and Gender.	232
Figure 107. Hospital Admissions for Land Transport Injuries in Children and Young People 0-24 Years by Age and Type, New Zealand 2002-2006	232
Figure 108. Deaths due to Land Transport Injuries in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2004.....	233
Figure 109. Mortality due to Injuries Arising from the Assault, Neglect or Maltreatment of Children 0-14 Years, New Zealand 1990-2004	239
Figure 110. Hospital Admissions (2002-2006) and Deaths (2000-2004) due to Injuries Arising from the Assault, Neglect or Maltreatment of New Zealand Children by Age.	240
Figure 111. Deaths from Assault in Young People 15-24 Years, New Zealand 1990-04	243
Figure 112. Hospital Admissions (2002-2006) and Deaths (2000-2004) due to Assault in New Zealand Young People 15-24 Years by Age and Gender.....	243
Figure 113. Relationship Between the Victim and Offender at Police Attendances for Family Violence Incidents, New Zealand 2006	251
Figure 114. Ethnicity of the Victim at Police Attendances for Family Violence Incidents, New Zealand 2006.....	251
Figure 115. Police Attendances at Family Violence Incidents Where Injuries Were Reported by Injury Type, New Zealand 2006	252
Figure 116. Police Attendances at Family Violence Incidents Where an Offence was Disclosed by Offence Type, New Zealand 2006.....	252
Figure 117. Hospital Admissions for Serious Bacterial Infections in Children and Young People 0-24 Years, New Zealand 1990-2006.....	258
Figure 118. Hospital Admissions for Selected Serious Bacterial Infections in Children and Young People 0-24 Years by Age, New Zealand 2002-2006	258
Figure 119. Hospital Admissions for Serious Bacterial Infections in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2006	260
Figure 120. Hospital Admissions (1990-2006) and Deaths (1990-2004) due to Meningococcal Disease in New Zealand Children and Young People 0-24 Years	264
Figure 121. Hospital Admissions (2002-2006) and Deaths (2000-2004) due to Meningococcal Disease in New Zealand Children & Young People 0-24 Years by Age	264
Figure 122. Hospital Admissions due to Meningococcal Disease in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2006	265
Figure 123. Hospital Admissions (1990-2006) and Deaths (1990-2004) from Acute Rheumatic Fever and Rheumatic Heart Disease in New Zealand Children and Young People 0-24 Years	269
Figure 124. Hospital Admissions due to Acute Rheumatic Fever and Rheumatic Heart Disease in Children and Young People 0-24 Years by Age, New Zealand 2002-2006	269

Figure 125. Hospital Admissions due to Acute Rheumatic Fever and Rheumatic Heart Disease in Children & Young People 0-24 Years by Ethnicity, New Zealand 1996-2006	270
Figure 126. Hospital Admissions due to Serious Skin Infections in Children and Young People 0-24 Years, New Zealand 1990-2006	274
Figure 127. Hospital Admissions due to Serious Skin Infections in Children and Young People 0-24 Years by Age, New Zealand 2002-2006	274
Figure 128. Hospital Admissions due to Serious Skin infections in Children and Young People 0-24 years by Ethnicity, New Zealand 1996-2006.....	276
Figure 129. Hospital Admissions due to Serious Skin Infections in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 1996-2006.....	279
Figure 130. Hospital Admissions for Tuberculosis in Children and Young People 0-24 Years, New Zealand 1990-2006	281
Figure 131. Hospital Admissions for Tuberculosis in Children and Young People 0-24 Years by Age, New Zealand 2002-2006.....	281
Figure 132. Hospital Admissions for Tuberculosis in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2006	282
Figure 133. Hospital Admissions (1990-2006) and Deaths (1990-2004) due to Gastroenteritis in New Zealand Children and Young People 0-24 Years.....	286
Figure 134. Hospital Admissions (2002-2006) and Deaths (2000-2004) due to Gastroenteritis by Age in New Zealand Children and Young People 0-24 Years	286
Figure 135. Hospital Admissions due to Gastroenteritis in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2006	287
Figure 136. Hospital Admissions due to Gastroenteritis in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 1996-2006	289
Figure 137. Hospital Admissions for Selected Lower Respiratory Tract Infections and Asthma in Children 0-14 Years, New Zealand 1990-2006	294
Figure 138. Hospital Admissions due to Selected Lower Respiratory Tract Infections and Asthma in Children 0-14 Years by Age, New Zealand 2002-2006	294
Figure 139. Hospital Admissions due to Lower Respiratory Tract Infections and Asthma in Children 0-14 Years by Ethnicity, New Zealand 1996-2006	296
Figure 140. Hospital Admissions and Deaths due to Bronchiolitis in Infants <1 Year, New Zealand 1990-2006 (Admissions) and 1990-2004 (Deaths)	300
Figure 141. Hospital Admissions and Deaths due to Bronchiolitis in Children 0-5 Years by Age, New Zealand 2002-2006 (Admissions) and 2000-2004 (Deaths)	300
Figure 142. Hospital Admissions due to Bronchiolitis in Infants <1 Year by Ethnicity, New Zealand 1996-2006	301
Figure 143. Hospital Admissions due to Bronchiolitis in Pacific Infants <1 Year by Pacific Group, New Zealand 1996-2006.....	302
Figure 144. Hospital Admissions for Pertussis in Infants <1 Yr, New Zealand 1990-06	305
Figure 145. Hospital Admissions (2002-2006) and Deaths (2000-2004) for Pertussis in New Zealand Children and Young People 0-24 Years by Age.....	305
Figure 146. Hospital Admissions due to Pertussis in Infants <1 Year by Ethnicity, New Zealand 1996-2006	306

Figure 147. Hospital Admissions and Deaths due to Pneumonia in Children and Young People 0-24 Years, New Zealand 1990-2006 (Admissions) and 1990-2004 (Deaths)	310
Figure 148. Hospital Admissions and Deaths from Pneumonia in Children and Young People 0-24 Years by Age, New Zealand 2002-06 (Admissions) and 2000-04 (Deaths)	310
Figure 149. Hospital Admissions due to Pneumonia in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2006	311
Figure 150. Hospital Admissions due to Pneumonia in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 1996-2006	313
Figure 151. Hospital Admissions (1990-2006) and Deaths (1990-2004) due to Bronchiectasis in New Zealand Children and Young People 0-24 Years	315
Figure 152. Hospital Admissions due to Bronchiectasis in Children and Young People 0-24 Years by Age, New Zealand 2002-2006	316
Figure 153. Hospital Admissions due to Bronchiectasis in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2006	316
Figure 154. Hospital Admissions and Deaths due to Asthma in Children and Young People 0-24 Years, New Zealand 1990-2006 (Admissions) and 1990-2004 (Deaths)	320
Figure 155. Hospital Admissions and Deaths due to Asthma in Children and Young People 0-24 Years by Age, New Zealand 2002-06 (Admissions) and 2000-04 (Deaths)	320
Figure 156. Hospital Admissions due to Asthma in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2006	321
Figure 157. Hospital Admissions for Asthma in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 1996-2006	323
Figure 158. Hospital Admissions for Diabetes in Children and Young People 0-24 Years by Age and Type, New Zealand 2002-2006	330
Figure 159. Hospital Admissions for Epilepsy and Status Epilepticus in Children and Young People 0-24 Years by Age, New Zealand 2002-2006	332
Figure 160. Infants with Down Syndrome or Neural Tube Defects Identified at Birth, New Zealand 1980-2005	351
Figure 161. Infants Identified with Down Syndrome at Birth, New Zealand 1996-2006	352
Figure 162. Infants Identified with Neural Tube Defects at Birth, New Zealand 1996-2006	353
Figure 163. Visual Status of Blind and Low Vision Learners Receiving Education Services and Enrolled on the National Database, New Zealand June 2006 (n=1,153)	357
Figure 164. Distribution of Notifications to the Deafness Database by Ethnicity, New Zealand 2004 (n=155)	362
Figure 165. Hospital Admissions for Cochlear Implant Surgery in Children and Young People 0-24 Years by Age, New Zealand 2001-2005	365
Figure 166. Ten Most Frequent Reasons for Calling the 0800WHATSUP Telephone Counselling Service, New Zealand 2006	375
Figure 167. Hospital Admission Rates for Mental Health Issues in Young People 15-24 yrs by Age and Diagnosis, New Zealand 2002-2006	380

Figure 168. Suicide Mortality in Young People 15-24 Years, New Zealand 1990-2004	384
Figure 169. Hospital Admissions (2002-2006) for Self Inflicted Injury and Deaths (2000-2004) from Suicide in New Zealand Children & Young People by Age and Gender ..	384
Figure 170. Suicide Mortality in Young People 15-24 yrs by Ethnicity, New Zealand 1996-2004	386
Figure 171. New Zealand's Teenage Pregnancy Rates, 1980-2006.....	392
Figure 172. Teenage Birth Rates by Maternal Ethnic Group, New Zealand 1996-2006	393
Figure 173. Birth Rates by Maternal Age and Ethnicity, New Zealand 2001-2005.....	393
Figure 174. Teenage Birth Rates by Pacific Group, New Zealand 1996-2006.....	395
Figure 175. Laboratory Notifications for Chlamydia in Young People 15-24 Years, Selected New Zealand Regions 2001-2006	397
Figure 176. Laboratory Notifications for Gonorrhoea in Young People 15-24 Years, Selected New Zealand Regions 2001-2006	398
Figure 177. The New Zealand Child and Youth Health Monitoring Framework	404
Figure 178. Hospital Admissions and Deaths due to Bronchiolitis in Infants < 1 Year, New Zealand 1990-2006 (Admissions) and 1990-2004 (Deaths)	406
Figure 179. Proportion of Children and Young People 0-24 Years Living in Crowded Households by Ethnicity and NZDep Index Decile, New Zealand Census 2001 & 2006	407
Figure 180. Proportion of Year 10 Students with Parents Who Smoke, or Who Live in a Home with Smoking Inside by School SES Decile, NZ ASH Surveys 2001-2006.....	408
Figure 181. Proportion of Children < 15 Years who Live in a Household with a Smoker by Ethnicity and NZDep Index Decile, New Zealand at the 2006 Census.....	408
Figure 182. Mean NZ Deprivation Index Decile of Births by Ethnicity, New Zealand 1980-2006	410
Figure 183. Proportion of Population with Incomes Below the Poverty Line (Net-of-Housing-Cost Income <60 Percent Line Benchmarked to 1998 Median), Selected Years 1988-2004	411
Figure 184. New Zealand Police Area Boundaries in the Auckland Region.....	425
Figure 185. New Zealand Police Area Boundaries in the North Island.....	426
Figure 186. New Zealand Police Area Boundaries in the South Island.....	427
Figure 187. SPARC Regional Sports Trusts	428

List of Tables

Table 1. Proportion of Pacific Births Using Three Different Ethnicity Classifications, New Zealand 1996-2006	14
Table 2. Number of Pacific Births by Ethnic Group, New Zealand 1996-2006	15
Table 3. Distribution of Pacific Births by (Any) Ethnic Group and District Health Board, New Zealand 2002-2006 (1 of 2)	18
Table 4. Distribution of Pacific Births by (Any) Ethnic Group and District Health Board, New Zealand 2002-2006 (2 of 2)	19
Table 5. Distribution of Children and Young People 0-24 Years by Ethnicity, New Zealand at the 2006 Census.....	20
Table 6. Number of Pacific Children and Young People 0-24 Years by Ethnic Group at the 1996, 2001 and 2006 Censuses.....	22
Table 7. Distribution of (Any) Pacific Children and Young People 0-24 Years by Ethnicity and DHB, New Zealand at the 2006 Census (1 of 2).....	23
Table 8. Distribution of (Any) Pacific Children and Young People 0-24 Years by Ethnicity and DHB, New Zealand at the 2006 Census (2 of 2).....	24
Table 9. Proportion of Pacific Young People Aged 15-24 Years Identifying with a Particular Religion by Ethnicity, New Zealand at the 2006 Census.....	36
Table 10. Languages Spoken by New Zealand Young People Aged 15-24 Years at the 2006 Census (n=571,176)	39
Table 11. Proportion of Pacific Young People 15-24 Years Speaking Selected Languages by Ethnic Group, New Zealand at the 2006 Census.....	41
Table 12. Number of Children <18 Years with a Parent Receiving a Main Income Tested Benefit by Benefit Type, New Zealand 2000-2007	60
Table 13. Number of Young People Aged 16-24 Years Reliant on Benefits by Type, New Zealand April 2000-2007	62
Table 14. Young People Aged 16-24 Years Reliant on Benefits by Benefit Type, New Zealand April 2000-2007	63
Table 15. Proportion of Children and Young People 0-24 Years Living in a Crowded Household by Ethnicity and NZ Deprivation Index Decile, New Zealand at the 2006 Census.....	70
Table 16. Enrolments in Early Childhood Education by Service Type, New Zealand 1990-2006.....	77
Table 17. Average Number of Hours of Attendance in Early Childhood Education Services by Service Type, New Zealand 1997-2006.....	78
Table 18. Number of Suspensions in State Schools by Type of Behaviour, New Zealand 2006.....	94
Table 19. Unmet Need for General Practitioner Services in Children and Young People, New Zealand 1996-2004 (Selected Years).....	104
Table 20. New Baby Enrolments with Plunket, New Zealand 2006.....	105
Table 21. Percentage of Plunket Babies Who Were Exclusively or Fully Breastfed at <6 Weeks by Ethnicity and DHB, New Zealand Year Ending June 2006	117

Table 22. Number and Percentage of Babies Breastfed at Two Weeks of Age by Maternal Age Group, New Zealand 2004	118
Table 23. Babies Who Were Breastfed at 2 Weeks of Age by Maternal Ethnic Group (Missing Responses Removed), New Zealand 2004	118
Table 24. Babies Who Were Breastfed at 2 Weeks of Age by Maternal Ethnic Group (Missing Responses Included), New Zealand 2004	119
Table 25. Definitions of Physical Activity used in the New Zealand Sport and Physical Activity Surveys for Children Aged 5-17 Years, 1997-2001	137
Table 26. Proportion of Children 0-14 Years Living in a Household with a Smoker by Ethnicity and NZ Deprivation Index Decile, New Zealand at the 2006 Census	148
Table 27. Proportion of Young People Aged 15-24 Years Who Were Regular Smokers by Ethnicity and NZ Deprivation Index Decile, New Zealand at the 2006 Census	156
Table 28. Alcohol Related Hospital Admissions in Young People Aged 15-24 Years by Primary Diagnosis, New Zealand 2002-2006	161
Table 29. Primary Cause of Alcohol Related Hospital Admissions Resulting in Injury in Young People 15-24 Years by Cause of Injury, New Zealand 2002-2006	162
Table 30. Risk of Alcohol Related Hospital Admission in Young People Aged 15-24 Years by Ethnicity and NZ Deprivation Index Decile, New Zealand 2002-2006	162
Table 31. Distribution of Alcohol Related Hospital Admissions in Pacific Young People Aged 15-24 Years by Pacific Group, New Zealand 2002-2006	163
Table 32. Most Frequent Causes of Mortality Outside the Neonatal Period in (Any) Pacific Children and Young People 0-24 Years, New Zealand 2000-2004	172
Table 33. Most Frequent Causes of Post-Neonatal Hospital Admission for (Any) Pacific Children 0-14 Years, New Zealand 2002-2006	173
Table 34. Most Frequent Causes of Hospital Admission for (Any) Pacific Young People 15-24 Years, New Zealand 2002-2006	174
Table 35. Proportion of Children <15 Years Living in One Parent Households by Ethnicity and NZ Deprivation Index Decile, New Zealand at the 2006 Census	182
Table 36. Risk Factors for Small for Gestational Age, New Zealand Singleton Live Births 2002-2006	189
Table 37. Distribution of Small for Gestational Age in Pacific Singleton Live Births by Pacific Group, New Zealand 2002-2006	190
Table 38. Risk Factors for Preterm Birth, New Zealand Singleton Live Births 2002-2006	191
Table 39. Distribution of Preterm Births in Pacific Singleton Live Births by Pacific Group, New Zealand 2002-2006	192
Table 40. Causes of Neonatal Mortality (0-28 days), New Zealand 2000-2004	197
Table 41. Risk Factors for Infant Mortality due to Congenital Anomalies, New Zealand 2000-2004	198
Table 42. Risk Factors for Infant Mortality due to Extreme Prematurity and Other Perinatal Conditions, New Zealand 2000-2004	198
Table 43. Causes of Post-Neonatal Mortality (29-364 days), New Zealand 2000-2004	199

Table 44. Risk Factors for Infant Mortality due to Sudden Unexpected Death in Infancy, New Zealand 2000-2004	199
Table 45. Immunisation Schedule for Children Aged 0-11 Years, New Zealand 2006	206
Table 46. Proportion of Children Fully Immunised at 2 Years of Age, New Zealand 1991/92, 1996, 2005.....	208
Table 47. Number of Children Fully Immunised at 2 Years of Age by Ethnicity, New Zealand 1996, 2005.....	208
Table 48. Hospital Admissions for Selected Vaccine Preventable Diseases in Children and Young People 0-24 Years, New Zealand 2002-2006	211
Table 49. Notifications of Selected Vaccine Preventable Diseases in Children and Young People 0-19 Years, New Zealand 2002-2006	211
Table 50. Most Frequent Causes of Injury Related Mortality in (Any) Pacific Children and Young People 0-24 Years, New Zealand 2000-2004	222
Table 51. Most Frequent Causes of Injury Related Hospital Admission for (Any) Pacific Children and Young People 0-24 Years, New Zealand 2002-2006.....	223
Table 52. Risk Factors for Hospital Admission due to Unintentional Non-Transport Injury in Children 0-14 Years, New Zealand 2002-2006.....	227
Table 53. Risk Factors for Hospital Admission due to Unintentional Non-Transport Injury in Young People 15-24 Years, New Zealand 2002-2006.....	228
Table 54. Hospital Admissions for Unintentional Non-Transport Injuries in Pacific Children 0-14 Years by Pacific Group, New Zealand 2002-2006	229
Table 55. Hospital Admissions for Unintentional Non-Transport Injuries in Pacific Young People 15-24 Years by Pacific Group, New Zealand 2002-2006.....	230
Table 56. Hospital Admissions for Land Transport Injuries in Children and Young People 0-24 Years by Type, New Zealand 2002-2006.....	231
Table 57. Risk Factors for Hospital Admission for Land Transport Injuries in Children 0-14 Years, New Zealand 2002-2006	233
Table 58. Risk Factors for Hospital Admission for Land Transport Injuries in Young People 15-24 Years, New Zealand 2002-2006.....	234
Table 59. Hospital Admissions for Land Transport Injuries in Pacific Children 0-14 Years by Pacific Group, New Zealand 2002-2006.....	235
Table 60. Hospital Admissions for Land Transport Injuries in Pacific Young People 15-24 Years by Pacific Group, New Zealand 2002-2006.....	236
Table 61. Risk Factors for Hospital Admission due to Injuries Arising from the Assault, Neglect or Maltreatment in Children 0-14 Years, New Zealand 2002-2006	240
Table 62. Nature of Injury Arising from Assault, Neglect and Maltreatment in Hospitalised Children 0-14 Years by Age Group, New Zealand 2001-2005.....	241
Table 63. Hospital Admissions due to Injuries Arising from Assault, Neglect and Maltreatment in Pacific Children 0-14 Years by Pacific Group, New Zealand 2002-2006	242
Table 64. Risk Factors for Hospital Admission due to Injuries Arising from Assault in Young People 15-24 Years, New Zealand 2002-2006	244
Table 65. Distribution of Hospital Admissions due to Assault in Pacific Young People 15-24 Years by Pacific Group, New Zealand 2002-2006.....	245

Table 66. Number of Notifications Recorded by Child Youth and Family, New Zealand 2001-2006	247
Table 67. Outcome of Assessment for Children Notified to Child Youth and Family and Investigated Further, New Zealand 2001-2006	248
Table 68. Hospital Admissions (2002-2006) and Mortality (2000-2004) due to Serious Bacterial Infections in New Zealand Children and Young People 0-24 Years.....	259
Table 69. Risk Factors for Hospital Admissions due to Serious Bacterial Infections in Children and Young People 0-24 Years, New Zealand 2002-2006.....	260
Table 70. Distribution of Hospital Admissions for Serious Bacterial Infections in Pacific Children and Young People 0-24 Yrs by Pacific Group, New Zealand 2002-2006	261
Table 71. Risk Factors for Hospital Admission due to Meningococcal Disease in Children and Young People 0-24 Years, New Zealand 2002-2006.....	265
Table 72. Distribution of Hospital Admissions due to Meningococcal Disease in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 2002-2006	266
Table 73. Risk Factors for Hospital Admission due to Acute Rheumatic Fever in Children and Young People 0-24 Years, New Zealand 2002-2006.....	270
Table 74. Distribution of Hospital Admissions for Acute Rheumatic Fever in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 2002-2006	271
Table 75. Distribution of Hospital Admissions for Rheumatic Heart Disease in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 2002-2006	272
Table 76. Risk Factors for Hospital Admission due to Serious Skin Infections in Children 0-14 Years, New Zealand 2002-2006	275
Table 77. Risk Factors for Hospital Admission due to Serious Skin Infections in Young People 15-24 Years, New Zealand 2002-2006	275
Table 78. Distribution of Hospital Admissions due to Serious Skin Infections in Pacific Children 0-14 Years by Pacific Group, New Zealand 2002-2006.....	277
Table 79. Distribution of Hospital Admissions due to Serious Skin Infections in Pacific Young People 15-24 Years by Pacific Group, New Zealand 2002-2006.....	278
Table 80. Risk Factors for Hospital Admissions due to Tuberculosis in Children and Young People 0-24 Years, New Zealand 2002-2006	282
Table 81. Distribution of Hospital Admissions due to Tuberculosis in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 2002-2006.....	283
Table 82. Risk Factors for Hospital Admissions due to Gastroenteritis in Children 0-14 Years, New Zealand 2002-2006.....	287
Table 83. Distribution of Hospital Admissions due to Gastroenteritis in Pacific Children 0-14 Years by Pacific Group, New Zealand 2002-2006	288
Table 84. Hospital Admissions (2002-2006) and Deaths (2000-2004) due to Lower Respiratory Infections and Asthma in New Zealand Children 0-14 Years by Diagnosis	295
Table 85. Risk Factors for Hospital Admission due to Lower Respiratory Tract Infections (excluding Asthma) in Children 0-14 Years, New Zealand 2002-2006	296
Table 86. Distribution of Hospital Admissions due to Lower Respiratory Tract Infections in Pacific Children 0-14 Years by Pacific Group, New Zealand 2002-2006.....	297
Table 87. Risk Factors for Hospital Admissions due to Bronchiolitis in Infants <1 Year, New Zealand 2002-2006	301

Table 88. Distribution of Hospital Admissions due to Bronchiolitis in Pacific Infants <1 Year by Pacific Group, New Zealand 2002-2006	303
Table 89. Risk Factors for Hospital Admissions due to Pertussis in Infants <1 Year, New Zealand 2002-2006	306
Table 90. Distribution of Hospital Admissions due to Pertussis in Pacific Infants <1 Year by Pacific Group, New Zealand 2002-2006	307
Table 91. Risk Factors for Hospital Admissions due to Pneumonia in Children 0-14 Years, New Zealand 2002-2006	311
Table 92. Distribution of Hospital Admissions for Pneumonia in Pacific Children 0-14 Years by Pacific Group, New Zealand 2002-2006.....	312
Table 93. Risk Factors for Hospital Admission due to Bronchiectasis in Children and Young People 0-24 Years, New Zealand 2002-2006	315
Table 94. Distribution of Hospital Admissions due to Bronchiectasis in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 2002-2006	317
Table 95. Risk Factors for Hospital Admissions due to Asthma in Children 0-14 Years, New Zealand 2002-2006	321
Table 96. Distribution of Hospital Admissions due to Asthma in Pacific Children 0-14 Years by Pacific Group, New Zealand 2002-2006.....	322
Table 97. Hospital Admissions for Diabetes in Children and Young People 0-24 Years by Diagnosis, New Zealand 2002-2006.....	329
Table 98. Risk Factors for Hospital Admission for Insulin Dependant Diabetes in Children and Young People 0-24 Years, New Zealand 2002-2006	329
Table 99. Hospital Admissions for Epilepsy in Children and Young People 0-24 Years by Diagnosis, New Zealand 2002-2006.....	331
Table 100. Risk Factors for Hospital Admission for Epilepsy and Status Epilepticus in Children and Young People 0-24 Years, New Zealand 2002-2006.....	332
Table 101. Cancer Registrations in Children 0-14 Years, New Zealand 2000-2004 ..	335
Table 102. Cancer Registrations in Young People 15-24 Years, New Zealand 2000-2004	336
Table 103. Cancer Deaths in Children 0-14 Years, New Zealand 2000-2004.....	337
Table 104. Cancer Deaths in Young People 15-24 Years, New Zealand 2000-2004.	337
Table 105. Estimated Number of Pacific Children and Young People 0-24 Years with Autism in New Zealand During 2006	345
Table 106. Estimated Number of Pacific Children and Young People 0-24 Years with Cerebral Palsy in New Zealand During 2006.....	347
Table 107. Classification of Intellectual Disability Based on Severity and IQ Score...	348
Table 108. Number of Other Congenital Anomalies Listed at the Time of Birth in Infants with Down Syndrome, New Zealand 2002-2006	352
Table 109. Number of Blind and Low Vision Learners Receiving Education Services by Region, New Zealand June 2006	356
Table 110. Ethnicity of Blind and Low Vision Learners Receiving Education Services and Enrolled on the National Database, New Zealand June 2006	357

Table 111. Communication Modes of Blind and Low Vision Learners Receiving Education Services and Enrolled on the National Database, New Zealand June 2006	358
Table 112. Number of Notifications Meeting the Criteria for Inclusion in Deafness Notification Database by Region of Residence, New Zealand 1998-2004	361
Table 113. Age at Suspicion and Confirmation of Moderate or Greater Hearing Loss, New Zealand 2001-2004	362
Table 114. Degrees of Hearing Loss and Associated Functional Impairment in Children Notified to a New Zealand Database, New Zealand 2004.....	363
Table 115. Degrees of Hearing Loss by Ethnicity in Children Notified to the Deafness Database, New Zealand 2004 (n=155).....	363
Table 116. Number of Admissions for Cochlear Implant Surgery in Children and Young People 0-24 Years, New Zealand 1990-2005	364
Table 117. Number and Percentage of Calls to the 0800WHATSUP Telephone Counselling Service by Category, New Zealand 2006	375
Table 118. The Top 5 Reasons for Calling the 0800WHATSUP Telephone Counselling Service by Gender and Age, New Zealand 2006	376
Table 119. Calls to Youthline's Youth Help Line by Reason, New Zealand Sept. 2005 - 2006.....	377
Table 120. The Most Frequent Reasons for a Hospital Admission with a Mental Health Issue in Young People 15-24 Years, New Zealand 2002-2006.....	379
Table 121. Risk of Hospital Admission for Schizophrenia in Young People 15-24 Years by Ethnicity, Gender and NZ Deprivation Index Decile, New Zealand 2002-2006	380
Table 122. Risk of Hospital Admission for Depression in Young People 15-24 Years by Ethnicity, Gender and NZ Deprivation Index Decile, New Zealand 2002-2006	381
Table 123. Risk of Hospital Admission for Bipolar Affective Disorder in Young People 15-24 Years by Ethnicity, Gender and NZ Deprivation Index Decile, New Zealand 2002-2006	381
Table 124. Risk of Hospital Admission for Eating Disorders in Young People 15-24 Years by Ethnicity, Gender and NZ Deprivation Index Quintile, New Zealand 2002-2006.....	382
Table 125. Risk Factors for Hospital Admission for Self Inflicted Injury in Young People 15-24 Years, New Zealand 2002-2006.....	385
Table 126. Risk Factors for Suicide in Young People 15-24 Years, New Zealand 2000-2004.....	385
Table 127. Distribution of Hospital Admissions for Self Inflicted Injury in Pacific Young People 15-24 Years by Pacific Group, New Zealand 2002-2006	387
Table 128. Distribution of Deaths due to Suicide in Pacific Young People 15-24 Years by Pacific Group, New Zealand 2000-2004	388
Table 129 Teenage Birth Rates by Maternal Ethnicity and NZ Deprivation Index Decile, New Zealand 2002-2006	392
Table 130. Distribution of Teenage Births (Excluding Terminations and Miscarriages) in Pacific Women by Pacific Ethnic Group, New Zealand 2002-2006	394
Table 131. Gender, Ethnicity, NZ Deprivation Index Decile and Risk of Hospital Admission for Bronchiolitis in New Zealand Infants < 1 Year, 2002-2006.....	406

Table 132. Indicator Categories Based on the Type of the Indicator and the Quality of its Data Source 414

Table 133. Variables used in the NZDep2006 Index of Deprivation[331] 423

Table 134. Well Child - Tamariki Ora National Schedule from Birth to 12 Months 429

Table 135. Well Child - Tamariki Ora National Schedule from 15 Months to School Entry 430





Introduction

Introduction

Nothing matters more to Pacific people than the health, well-being and future success of our children. Our community's future is inextricably linked to their health and success (Teuila Percival p 167)

Children share a central and pivotal position in traditional and contemporary Pacific society. It is thus encouraging to note that recently there have been many improvements in their wellbeing. These include large reductions in the number of Pacific young people leaving school without formal qualifications; decreased numbers of Pacific young people reporting that they smoke regularly; and meningococcal disease rates which have declined markedly in recent years [1]. These improvements are significant for developing a healthy and successful future generation.

Of concern however, hospital admissions for many respiratory and infectious diseases (e.g. serious skin infections, bronchiolitis) have either remained static or increased, with rates in many cases remaining 2-5x higher for Pacific and Maori children and young people, and those living in the most deprived areas [1]. While more recently, many of these hospital admissions have come to be perceived as avoidable, on the basis that early access to effective interventions in primary care may have prevented their occurrence, it is increasingly being recognised that such disparities also reflect real differences in health status, as well as access to the underlying cultural and socioeconomic determinants of health¹. Hence much broader and more integrated approaches to the design, delivery, maintenance and future planning of policies and services may be required, if we are to promote and maintain improvements in the health of all Pacific children and young people in future years.

When considering what form such integrated approaches might take however, it is important not only to review the chains of causality which have led to Pacific children and young people experiencing a disproportionate burden of morbidity and mortality, but also to integrate into this analysis the viewpoints of Pacific leaders, community workers and health professionals, as such a synthesis potentially offers some real, utilitarian and effective solutions.

In achieving these aims, this report firstly uses the recently developed Zealand Child and Youth Indicator Framework [1], to review the health of Pacific Children and Young People in New Zealand and the underlying cultural and socioeconomic determinants which contribute to their wellbeing. Secondly, strategically placed throughout the report are a number of Viewpoints, written by key Pacific academics / health professionals, which each provide a different perspective on how the health and other sectors might best respond to the health needs of Pacific children and young people.

The following sections briefly review each of these aspects in turn.

Overall Structure of the Report

This report provides information on a broad set of indicators, which those working in the health sector felt were of importance to child and youth health [1]. Due to its large size it has been presented as a reference manual, which is divided into three main sections as follows:

1. **Demography and the Measurement of Ethnicity:** This section explains the origins of the various ethnicity classification systems used in this report, before considering the distribution (by geographic location and NZ Deprivation Index decile) of Pacific children and young people in New Zealand since 1996.
2. **Pacific Child and Youth Health Statistics:** This section provides information on a range of health issues affecting Pacific children and young people in New Zealand.



Within this section, individual indicators are loosely arranged according to the hierarchical domains of the NZ Child and Youth Health Indicator Framework [1], which considers the underlying socioeconomic and cultural determinants of health, a range of risk and protective factors, and a large number of individual health outcomes of relevance to Pacific children and young people.

While the information accompanying each of these indicators varies depending on the data sources used, in general each indicator follows a standard format:

- a. **Introduction:** The health issue is defined, and a brief summary is provided of its public health significance in the NZ context.
 - b. **Data Sources and Methods:** Brief notes on the data sources and statistical methods used are then presented. These are linked to a series of Appendices at the back of this report, which provide a more detailed discussion on the strengths and limitations of the various datasets.
 - c. **New Zealand Distribution and Trends:** Summary graphs then present an analysis of New Zealand trends over time, as well as the distribution of the indicator by age and (where relevant) gender.
 - d. **Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile:** Where possible, the distribution of the indicator by prioritised ethnicity and NZ Deprivation Index decile is then presented using data from the last 5 years. The aim of the prioritised ethnicity analysis (which allocates children and young people to one of 5 hierarchically arranged groups: Māori > Pacific > Asian / Indian > Other > European) is to allow the reader to compare health outcomes for Pacific children and young people in New Zealand with those of other ethnic groups. When making comparisons (i.e. rate ratios), the European group has been used as the reference group, due to its large numerical size and because the use of a non-Māori non-Pacific reference group in this context would preclude comparisons between Pacific, European and Asian / Indian children.
 - e. **Distribution by Pacific Group Within New Zealand:** Where possible, the distribution of each indicator by Pacific group is then presented using the Sole (i.e. identifying solely with one Pacific group) / Any (i.e. identifying with a Pacific group in any of the first three responses) Classification System. The aim of this analysis is to allow comparisons to be made between different Pacific groups using a common reference category (i.e. the non-Māori non-Pacific group, selected because of its large numerical size and because of the relative absence of health disparity, although the table format also allows for comparisons between Pacific groups as required).
3. **Appendices:** When considering the information contained in the sections above, there are some real data quality issues which must be taken into account, as they influence the way in which the information in this report can be interpreted. While these issues are described in more detail in Appendices 1-10 at the back of this report, the most important of these are described in the text box below:

Interpreting Ethnic Specific Rates and Trends: Data Quality Issues and Limitations

This report brings together routinely collected data on the health of Pacific children and young people in New Zealand. When interpreting this data, a number of the limitations need to be taken into consideration:

1. **The Calculation of Ethnic Specific Rates:** The majority of the rates calculated in this report have relied on the division of numerators (e.g. hospital admissions, mortality data) by Census or Birth Registration denominators. Calculation of accurate ethnic specific rates relies on the assumption that information on ethnicity is collected in a similar manner in both the numerator and denominator and that a single child will be identified similarly in each. In New Zealand this has not always been the case, and even with the improvements in the collection of ethnicity data which have occurred over the past decade, there still remains the possibility the same individual will be identified differently in different data collections.

1. This is of particular concern in the context of reporting multiple ethnicities and has implications for the interpretation of differences between the Sole and (Any) Pacific groups highlighted in this report (e.g. if parents tend to identify children as having only a single Pacific identity in hospital admission data, but report multiple ethnic affiliations in the Census, this may potentially increase hospital admission rates for Sole Pacific children when compared with (Any) Pacific children). While the extent to which this actually occurs is difficult to quantify, the reader must nevertheless include data quality issues in the list of possible factors contributing to the differences between Sole and (Any) Pacific children and young people highlighted in this report.
2. Changes in Uploading Emergency Department Cases to the Hospital Admission Dataset Over Time: Appendix 1 outlines a number of issues associated with the Hospital Admission Dataset, and in particular how changes in the way in which emergency department cases have been uploaded to the national minimum dataset can profoundly affect time series data for a number of conditions commonly dealt with in the emergency department setting (e.g. injuries, asthma, gastroenteritis). This problem is of particular importance for paediatric admissions in the Auckland region, and with nearly 2/3 of Pacific children and young people in New Zealand residing in Auckland, also has implications for the interpretation of Pacific child and youth health statistics. A more detailed overview of this issue is provided in Appendix 1, and the reader is strongly urged to read this Appendix before attempting to interpret any of the time series information on hospital admissions in this report.
3. The Signalling of Statistical Significance: Appendix 10 outlines the rationale for the use of statistical significance testing in this report. In brief, all of the data in this report can be considered as belonging to one of two groups: Population Surveys (which use a sample to make inferences about the population as a whole) and Routine Administrative Datasets (which capture information on all events occurring in a particular category e.g. all deaths from a particular cause). The way in which each is handled for the purposes of statistical significance testing differs (as outlined in Appendix 10). In order to assist the reader to identify whether tests of statistical significance have been applied in a particular section, the *Data Sources and Methods* text box accompanying each indicator contains a small paragraph entitled *Statistical Significance Testing*, which either suggests that: 1) "Tests of statistical significance have not been applied to any of the data in this section, and thus any associations described do not imply statistical significance or non-significance"; OR 2) Tests of statistical significance (in the form of 95% confidence intervals) have been applied to some of the data in this section. Where relevant, the significance of these associations has been signalled in the text (with the words *significant*, or *not significant* in italics being used to denote the statistical significance of the observed association). Where the words *significant* or *non-significant* do not appear in the text, then the associations described do not imply statistical significance or non-significance".

Main Themes Emerging from the Viewpoints of Pacific Authors

In addition, a number of Viewpoints, written by key Pacific academics and clinicians have been scattered throughout this report. These Viewpoints aim to pull together the main themes presented in the report and to provide a personal perspective on how New Zealand might best respond to the health needs of Pacific children and young people. In the first of these Viewpoints (**Page 29**), Pefi Kingi considers the cultural determinants of health and notes that *"...healthy confident children, strong resilient families and engaged communities are the building blocks of a vibrant and hopeful society. In transforming New Zealand's health system into one which assists Pacific communities to fully realise these ideals, some fundamental changes may need to occur. These changes must take into account the significant roles family, ancestral lands, spirituality and religion play in shaping Pacific world views and cultural identity"*.

Two authors then consider the role socioeconomic and family factors play in shaping children and young people's wellbeing, with Seini Taufu (**Page 45**) noting that *"All societies desire their children to grow up to become competent and productive citizens. Yet not all children start off from the same mark. In many societies, a significant minority of children face hazards or disadvantages linked to their socioeconomic circumstances, which they need to overcome if they are to reach their full potential"*. Teuila Percival (**Page 167**) takes this theme further, noting that *"...a sentinel article by Mosley and Chen [2] provides a framework for combining the social science research of socioeconomic and cultural determinants with medical research focusing on specific diseases.....providing us with multiple levels of intervention with which to improve the health of Pacific children, from legislation and government policy influencing proximal*

determinants such as Pacific family's household income, to health service funding focused on improving efficacy of primary care for Pacific children."

The role of health services is also considered by two authors, with Lana Perese (**Page 99**) focusing on *"the important, and often unrecognised role of the support services provided by the non-regulated health workforce (e.g. health promoters, mental and community health workers, caregivers, youth workers), as a broader distal and socio-cultural factor associated with influencing behavioural change and positive health outcomes"*. Similarly, Minnie Strickland (**Page 203**) considers the role of antenatal and Well Child services and notes the need for *"the establishment and implementation of a national register of Well Child contacts", "a focused strategy to inform Pacific mothers, especially Cook Island Māori mothers, about the early and adequate attendance at antenatal visits" and "further research into oral health in Pacific children, due to the paucity of information that is currently available"*.

Finally, Karlo Mila-Schaaf (**Page 367**) reviews health issues for Pacific young people and notes that *"Despite the good news of strong, consistent and positive improvements in outcomes, what is also clear... is that ethnic disparities have not disappeared..."* She goes on to make recommendations in the areas of sexual and reproductive health, mental health and education, noting that *"...any services developed for young people... need to be cognisant of Pacific cultures, as well as of youth culture, recognising young Pacific people straddle (often the contradictions of) both worlds"*.

Note: Accompanying each of these Viewpoints is a painting by one of two Pacific Artists; Michael Lea and Sione Tukuafu, whose artworks each provide a personal perspective on the role culture plays in forming the identities of Pacific young people growing up in New Zealand.

In Conclusion

This report provides a comprehensive overview of the health of Pacific children and young people in New Zealand, and presents the viewpoints of key Pacific authors, who each reflect on the potential responses the health sector might consider in addressing the large health disparities currently experienced by Pacific children and young people. However, it is clear that this task is beyond the capacity of the health sector alone, and it will require the coordinated, integrated and inter-agency efforts of a range of other sectors including Education, Housing and Social Development, if any real and long term changes are to be achieved.

Effective and sustained changes for Pacific children and young people will also only be realised if their families, extended families, caregivers and respective communities are an integral part of the mix. Collective ownership will ensure optimum care and responsibility for the wellbeing of this important group. The ongoing advocacy and support of Pacific leaders, health professionals, and those working with Pacific children and young people at the community, District Health Board and Government Ministry level is also critical, if we are to achieve the shared vision of every Pacific child and young person in New Zealand growing up to reach their full potential.

Teuila Percival and Elizabeth Craig December 2008



Demography and the Measurement of Ethnicity

The Measurement of Ethnicity

Introduction

In New Zealand during 2002-2006, a total of 43,760 babies were born who were identified as belonging to a Pacific Island group. Of these babies, 44.4% were identified as belonging solely to one Pacific group, while a further 8.2% were identified as simultaneously belonging to 2+ Pacific groups. An additional 12.2% were also identified as being Māori, 11.8% as European and 1.8% as Asian / Indian / Other, with the remaining 21.6% belonging to three or more ethnic groups, of which at least one was Pacific (**Figure 1**).

While these figures reflect the ethnic diversity of New Zealand's population today, they also pose a number of challenges for anyone attempting to review the health status of New Zealand's Pacific children and young people. In particular, they highlight the potential for ethnic disparities in health outcome to change depending on the ethnicity definitions used, as well as the need for robust methodologies for the collection and classification of ethnicity information.

This section thus briefly outlines how information on ethnicity has been collected within the New Zealand health sector over the past two decades, before reviewing the systems used to classify ethnicity in the context of this report. A following section then provides a brief overview of the demographic profile of Pacific children and young people in New Zealand, using these definitions and information available from the Birth Registration Dataset and 1996-2006 Censuses.

The Classification of Ethnicity in New Zealand's National Data Collections: A Historical Perspective

The majority of the rates calculated in this report have relied on the division of numerators (e.g. hospital admissions, mortality data) by Statistics New Zealand Census denominators. Calculation of accurate ethnic specific rates relies on the assumption that information on ethnicity is collected in a similar manner in both the numerator and denominator datasets and that a single child will be identified similarly in each. In New Zealand this has not always been the case, and in addition the manner of collecting information on ethnicity has varied significantly over time. Since 1996 however, there has been a move to ensure that ethnicity information is collected in a similar manner across all administrative datasets in New Zealand (Census, Hospital Admission, Mortality, Births) [3]. The following section briefly reviews how information on ethnicity has been collected in national data collections since the early 1980s and the implications of this for the information contained in this report.

1981 Census and Health Sector Definitions

Earlier definitions of ethnicity in official statistics relied on the concept of fractions of descent, with the 1981 census asking people to decide whether they were fully of one ethnic origin (e.g. Full Pacific, Full Māori) or if of more than one origin, what fraction of that ethnic group they identified with (e.g. 7/8 Pacific + 1/8 Māori). When prioritisation was required, those with >50% of Pacific or Māori blood were deemed to meet the ethnic group criteria of the time [4]. A similar approach was used to record ethnicity in health sector statistics, with birth and death registration forms asking the degree of Pacific or Māori blood of the parents of a newborn baby / deceased individual. For hospital admissions, ancestry based definitions were also used during the early 80s, with admission officers often assuming ethnicity, or leaving the question blank [5].

1986 Census and Health Sector Definitions

Following a review expressing concern at the relevance of basing ethnicity on “fractions of descent”, a recommendation was made to move towards self-identified cultural affiliation. Thus the 1986 Census asked the question “What is your ethnic origin?” and people were asked to tick the box(s) that applied to them. Birth and death registration forms however, continued to use the “fractions of blood” question until 1995, making comparable numerator and denominator data difficult to obtain [4]. For hospital admissions, the move from an ancestry based to a self-identified definition of ethnicity began in the mid-80s, although non-standard forms were used and typically allowed a single ethnicity only [5].

1991 Census and Health Sector Definitions

A review suggested that the 1986 ethnicity question was unclear as to whether it was measuring ancestry or cultural affiliation, so the 1991 Census asked two questions:

1. Which ethnic group do you belong to? (tick the box or boxes which apply to you)
2. Have you any NZ Māori ancestry? (if yes, what iwi do you belong to?)

As indicated above however, birth and death registrations continued with ancestry based definitions of ethnicity during this period, while a number of hospitals were beginning to use self-identified definitions in a non standard manner [5].

1996 Census and Health Sector Definitions

While the concepts and definitions remained the same as for the 1991 census, the ethnicity question in the 1996 Census differed in that:

1. The NZ Māori category was moved to the top of the ethnic categories
2. The 1996 question made it more explicit that people could tick more than 1 box.
3. There was a new “Other European” category with 6 sub groups

As a result of these changes, there was a large increase in the number of multiple responses, as well as an increase in the Māori ethnic group in the 1996 Census [4]. Within the health sector however, there were much larger changes in the way in which ethnicity information was collected. From late 1995, birth and death registration forms incorporated a new ethnicity question identical to that in the 1996 Census, allowing for an expansion of the number of ethnic groups counted (previously only Māori and Pacific) and resulting in a large increase in the proportion of Pacific and Māori births and deaths recorded. From July 1996 onwards, all hospitals were also required to inquire about ethnicity in a standardised way, with a question that was compatible with the 1996 Census and that allowed multiple ethnic affiliations [5]. A random audit of hospital admission forms conducted by Statistics NZ in 1999 however, indicated that the standard ethnicity question had not yet been implemented by many hospitals. In addition, an assessment of hospital admissions by ethnicity over time showed no large increases in the proportions of Māori and Pacific admissions after the 1996 “change over”, as had occurred for birth and death statistics, potentially suggesting that the change to a standard form allowing for multiple ethnic affiliations in fact did not occur. Similarities in the number of people reporting a “sole” ethnic group pre and post 1996 also suggest that the way in which information on multiple ethnic affiliations was collected did not change either. Thus while the quality of information available since 1996 has been much greater than that previously, there remains some concern that hospitals continue to undercount multiple ethnic identifications and as a result, may continue to undercount Pacific and Māori peoples [5].

2001 Census and Health Sector Definitions

The 2001 Census reverted back to the wording used in the 1991 Census after a review showed that this question provided a better measure of ethnicity based on the current statistical standard [4]. The health sector also continued to use self-identified definitions of ethnicity during this period, with the *Ethnicity Data Protocols for the Health and Disability Sector* [3] providing guidelines which ensured that the information collected across the sector was consistent with the wording of the 2001 Census (i.e. *Which ethnic groups do you belong to (Mark the space or spaces that apply to you)?*)

2006 Census Questions

The 2006 Census used identical wording to the 2001 Census. Within the “Other” ethnic group however, a new category was created which allowed for the responses of those identifying as a “New Zealander”. In previous years this sub-category had been assigned to the European ethnic group. At the 2006 Census, a total of 429,429 individuals (10.6% of the NZ population) identified themselves as a New Zealander, a large increase from previous years and a trend, which if continued, may seriously impair the health sector’s ability to source consistent ethnic specific denominators for use with its administrative datasets. As yet the consequences of this change have not been fully addressed by the health sector and in this report, where prioritised ethnicity has been used, 2006 Census data has combined the New Zealander category with the European category, as per the protocol in previous censuses.

The Current Recording of Ethnicity in New Zealand’s National Datasets

In New Zealand at present, only 3 ethnic groups are stored electronically in the National Minimum (Hospital Admission) Dataset and Mortality Collection (although evidence suggests that <0.5% of National Health Index Database entries have 3 ethnicities recorded [3]). Within these datasets, each ethnic group is coded using Statistics New Zealand’s 4 Level Hierarchical Classification System as follows:

1. Level 1 (least detailed level) e.g. code 3 is Pacific
2. Level 2 e.g. code 37 is Other Pacific Peoples
3. Level 3 e.g. code 371 is Other Pacific Peoples
4. Level 4 (most detailed level) e.g. code 37124 is Kiribati

For those reporting multiple ethnic affiliations, a single “Level 1 Prioritised” Ethnic Group can be assigned using Statistics New Zealand’s prioritisation algorithms, which assign Māori ethnicity precedence over Pacific > Asian > Other > European ethnic groups [3]. This ensures that each individual is counted only once and that the sum of the ethnic groups equals the total NZ population [5]. The implication of prioritisation for Pacific groups however, is that outcomes for those identifying as both Māori and Pacific are only recorded under the Māori ethnic group.

The Ethnicity Classifications Used in this Report

Because of the inconsistencies in the way in which ethnicity information was collected prior to 1996, all of the ethnic specific analyses in this report are based on data collected since this period. While all of the classification systems used are based on self-identified concepts of ethnicity and are derived from information stored in New Zealand’s national data collections, each differs in the way in which it deals with children and young people with multiple ethnic affiliations:

1. Prioritised Level 1 Ethnicity: Where comparisons with other ethnic groups are required, this report utilises Statistics NZ’s Level 1 Prioritised Ethnicity, which recognises 5 ethnic groups: European, Māori, Pacific Island, Asian (including Indian) and Other. For those reporting multiple ethnic affiliations, ethnicity is prioritised in the following order: Māori > Pacific > Asian > Other > European, so that each child or young person is only assigned to a single ethnic group [3]. While convenient for the purposes of analysis, this process results in the loss of a small but significant proportion of Pacific children and young people to the Māori ethnic group (in both the numerator and the denominator).
2. Any Pacific: Where a Pacific focused analysis is required which seeks to incorporate the ethnic heterogeneity of New Zealand’s Pacific population, this report utilises the Any Pacific classification, which includes all children and young people identifying as Pacific in ANY of their first three ethnic groups. This classification system has the advantage of including anyone identifying as Pacific in the broader sense and in addition, provides a larger and more stable numerator and denominator for statistical analysis. Because the Any Pacific group includes a

large number with multiple ethnic affiliations however, health disparities for those in the Any Pacific Group tend to be less than for those in the Sole Pacific Category. In addition, due to the possibility that a single individual may appear in more than one Any Pacific category when a Level 2 (e.g. Samoan, Tongan) analysis is undertaken, outcomes for Level 2 Any Pacific groups cannot be directly added to produce an overall Any Pacific total. (Note: This classification system is often referred to as *Total Response* in other Ministry of Health Publications).

3. Sole Pacific: Where a Pacific focused analysis is required which seeks to discount the ethnic heterogeneity of New Zealand's Pacific population, this report utilises a Sole Pacific classification, which includes only those identifying solely with one Pacific Island group. This system results in greater homogeneity, as there is no admixture with other ethnic groups, and health disparities tend to be greater than if the Any classification system is used. The Sole Pacific classification results in a much smaller and statistically less stable numerator and denominator however and in addition, potentially fails to take into account the ethnic diversity of New Zealand's Pacific child and youth population.

One or all of above classification systems have been utilised in this report wherever the analysis of primary data was undertaken by the authors. In addition, a number of ethnic specific analyses have also been provided by a range of agencies outside of the health sector (e.g. Education, MSD, the NZ Police), each of which has its own methodology for collecting and analysing ethnicity information. Care must be taken when interpreting this information, as the classification systems outlined above may not apply to information derived from these Agencies.

Pacific Children & Young People in New Zealand: Demographic Profile

Having considered the ways in which ethnicity has been classified in this report, this section provides a brief overview of the demographic profile of Pacific children and young people in New Zealand using information available from the Birth Registration Dataset and the 1996-2006 Censuses. The information serves to highlight both the significant heterogeneity and relative youth of the Pacific population in New Zealand, as well as the disproportionate overrepresentation of Pacific children and young people in New Zealand's most deprived (NZ Deprivation Index decile 10) areas.

Data Sources and Methods

Data Sources

Birth Registration Dataset and 1996, 2001 and 2006 Censuses

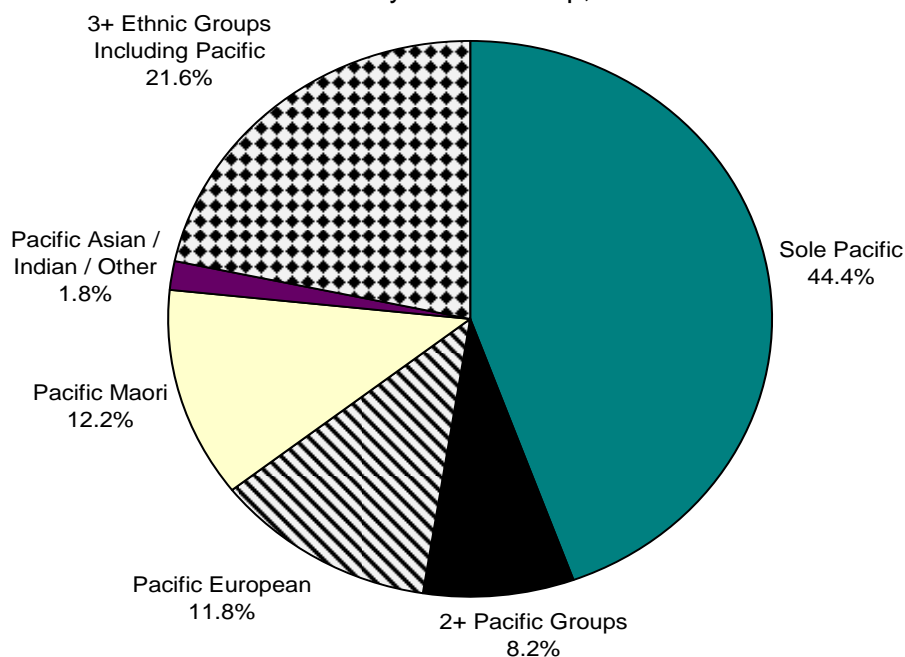
Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

Birth Registrations

As highlighted previously, in New Zealand during 2002-2006 a total of 43,760 babies were born who were identified as belonging to a Pacific Island group. Of these babies, 44.4% identified solely with one Pacific group, while a further 8.2% identified simultaneously with 2+ Pacific groups. In addition, 12.2% also identified as Māori, 11.8% as European and 1.8% as Asian / Indian / Other, with the remaining 21.6% identifying with ≥ 3 ethnic groups, of which at least one was Pacific (**Figure 1**).

Figure 1. Breakdown of Pacific Births by Ethnic Group, New Zealand 2002-2006



Source: Birth Registration Dataset; Includes all births where a Pacific ethnicity was recorded in the first three ethnic groups

When attempting to quantify the proportion of babies born in New Zealand each year who are of Pacific Island origin, the final estimate is very much dependant on the ethnicity classification used. While an analysis using prioritised ethnicity would suggest that during 1996-2006 Pacific babies accounted for just under 11% of births each year, the same analysis using the Sole Pacific classification yields a figure of 6.5-7%. In addition, while an analysis using either of these classifications suggests that the overall proportion of Pacific births in New Zealand each year has not changed appreciably, an analysis using the Any Pacific classification suggests that the proportion may be increasing, with the widening disparity in numbers between the Any and Sole categories potentially suggesting either that the ethnic heterogeneity of the Pacific population is increasing, or that Pacific Island parents are increasingly more likely to identify multiple ethnic groups on their baby's birth registration forms (**Table 1**).

Table 1. Proportion of Pacific Births Using Three Different Ethnicity Classifications, New Zealand 1996-2006

Year	Prioritised Pacific		Any Pacific		Sole Pacific		NZ Total
	Number	% of Births	Number	% of Births	Number	% of Births	Number
1996	5,760	10.0	7,670	13.3	3,896	6.7	57,817
1997	5,740	9.9	7,695	13.2	3,795	6.5	58,100
1998	5,251	9.4	7,068	12.7	3,410	6.1	55,849
1999	6,284	10.9	8,363	14.5	4,162	7.2	57,807
2000	6,190	10.8	8,369	14.6	4,046	7.1	57,345
2001	6,164	10.9	8,393	14.8	3,924	6.9	56,552
2002	6,031	11.0	8,231	15.0	3,845	7.0	54,870
2003	6,187	10.9	8,470	14.9	3,844	6.8	56,925
2004	6,421	10.8	8,925	15.1	3,966	6.7	59,214
2005	6,278	10.6	8,884	15.0	3,837	6.5	59,091
2006	6,461	10.7	9,250	15.2	3,936	6.5	60,666

Source: Birth Registration Dataset; See Page 11 for Details of Ethnicity Classifications Used

Distribution of Births by Pacific Ethnic Group

In addition, when the above figures were broken down by Pacific Ethnic Group a number of additional themes emerged (**Table 2**). These included:

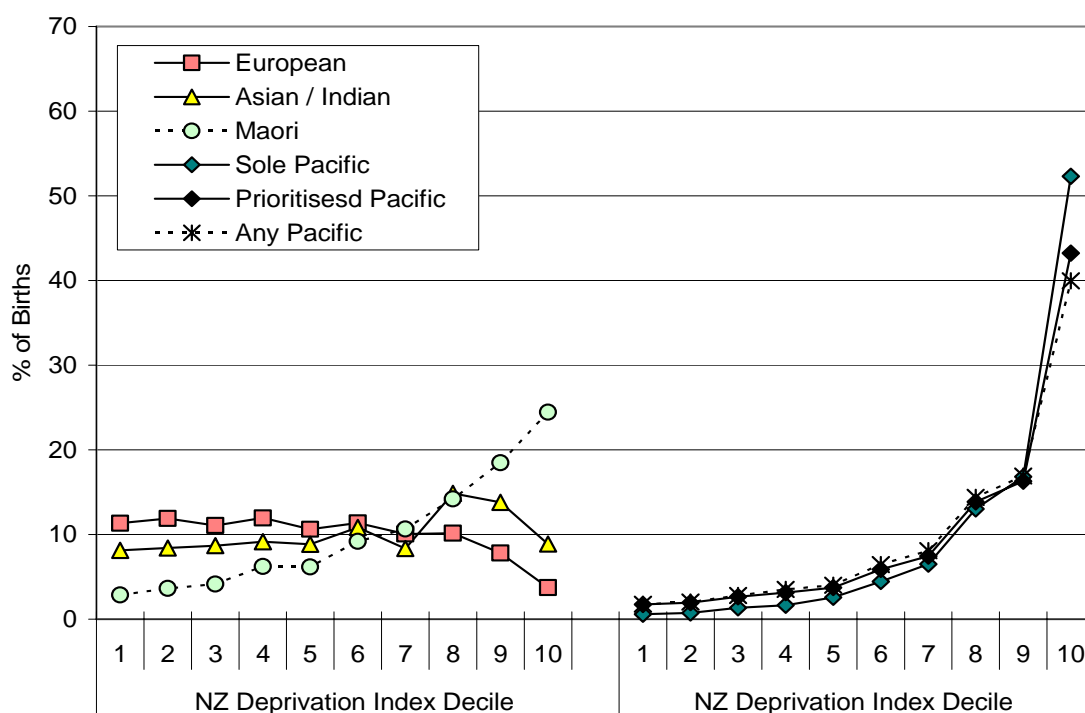
1. Samoan babies comprised the largest Pacific group, followed by those identifying as Tongan and Cook Island Māori. Smaller numbers identified as being Niue, Fijian, Tokelauan, or as belonging to Other Pacific groups.
2. The largest Pacific groups also had the highest proportion of babies identifying solely with that Pacific group, although even amongst Samoan and Tongan babies approximately half also identified with other ethnic groups.
3. For the majority of ethnic groups, the proportion identified solely as belonging to one ethnic group declined as the period progressed, either suggesting increasing ethnic heterogeneity, or an increased tendency for parents to report multiple ethnic affiliations on their baby's birth registration forms.

Table 2. Number of Pacific Births by Ethnic Group, New Zealand 1996-2006

Year	Samoan			Tongan			Cook Island Māori		
	Any	Sole	% Sole	Any	Sole	% Sole	Any	Sole	% Sole
1996	3,905	2,075	53.1	1,548	935	60.4	1,826	583	31.9
1997	3,905	1,992	51.0	1,568	957	61.0	1,869	547	29.3
1998	3,573	1,726	48.3	1,555	923	59.4	1,659	484	29.2
1999	4,303	2,101	48.8	1,830	1,093	59.7	1,873	619	33.0
2000	4,215	2,034	48.3	1,878	1,123	59.8	1,914	554	28.9
2001	4,255	1,978	46.5	1,923	1,065	55.4	1,896	550	29.0
2002	4,175	1,919	46.0	1,834	1,035	56.4	1,875	546	29.1
2003	4,218	1,885	44.7	1,877	1,022	54.4	2,008	573	28.5
2004	4,547	2,038	44.8	1,991	1,011	50.8	2,116	552	26.1
2005	4,463	1,926	43.2	2,024	975	48.2	2,105	564	26.8
2006	4,683	2,019	43.1	2,020	998	49.4	2,185	575	26.3
Year	Niue			Fijian			Tokelauan		
	Any	Sole	% Sole	Any	Sole	% Sole	Any	Sole	% Sole
1996	673	147	21.8	234	39	16.7	211	56	26.5
1997	585	133	22.7	224	32	14.3	229	53	23.1
1998	562	114	20.3	199	38	19.1	194	57	29.4
1999	682	131	19.2	206	47	22.8	236	61	25.8
2000	670	133	19.9	220	50	22.7	217	68	31.3
2001	679	107	15.8	226	46	20.4	222	54	24.3
2002	673	104	15.5	263	38	14.4	181	52	28.7
2003	754	105	13.9	283	43	15.2	206	45	21.8
2004	763	108	14.2	281	45	16.0	207	57	27.5
2005	807	128	15.9	272	57	21.0	251	71	28.3
2006	798	125	15.7	294	52	17.7	239	42	17.6
Year	Other Pacific						Total Pacific		
	Any	Sole	% Sole				Any	Sole	% Sole
1996	212	60	28.3				7,670	3,896	50.8
1997	211	78	37.0				7,695	3,795	49.3
1998	183	66	36.1				7,068	3,410	48.2
1999	224	109	48.7				8,363	4,162	49.8
2000	217	82	37.8				8,369	4,046	48.3
2001	272	123	45.2				8,393	3,924	46.8
2002	287	148	51.6				8,231	3,845	46.7
2003	291	169	58.1				8,470	3,844	45.4
2004	286	151	52.8				8,925	3,966	44.4
2005	269	114	42.4				8,884	3,837	43.2
2006	296	122	41.2				9,250	3,936	42.6

Source: Birth Registration Dataset; Ethnicity is the ethnicity of the baby as recorded on their birth registration form. Due to a large number of babies who identify with more than one ethnic group, a single baby may be counted more than once across the "Any" categories (see page 11 for details). The % Sole category refers to the proportion of babies in a particular group who identify solely with that ethnic group

Figure 2. Distribution of Births by Ethnicity and NZ Deprivation Index Decile, New Zealand 2002-2006



Source: Birth Registration Dataset; Ethnicity for Non-Pacific Groups is Level 1 Prioritised; Ethnicity for Pacific Groups also assigned using Any / Sole Classification (see page 11 for details)

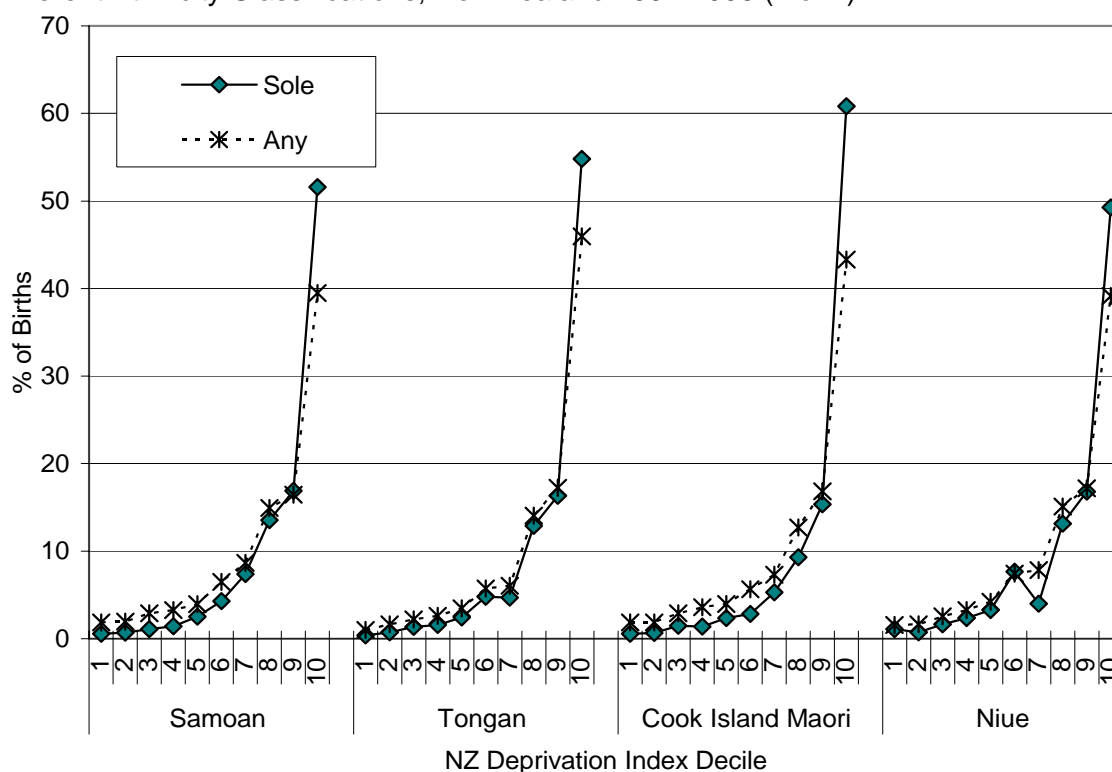
Distribution of Pacific Births by NZ Deprivation Index Decile

Birth registration data for this period also suggested that the distribution of Pacific births by NZ Deprivation Index decile also varied depending on the ethnicity classification used, with 52.3% of Sole Pacific babies being born into the most deprived (NZDep Decile 10) areas, as compared to 40.0% if the Any Pacific classification was used. Irrespective of the classification system however, Pacific babies as a group were much more likely to be born into the most deprived NZDep areas than any other ethnic group (**Figure 2**), with a similar profile being exhibited by all Pacific groups, with the exception of Fijian's and those in the "Other" Pacific group (**Figure 3, Figure 4**).

Distribution of Births by Region

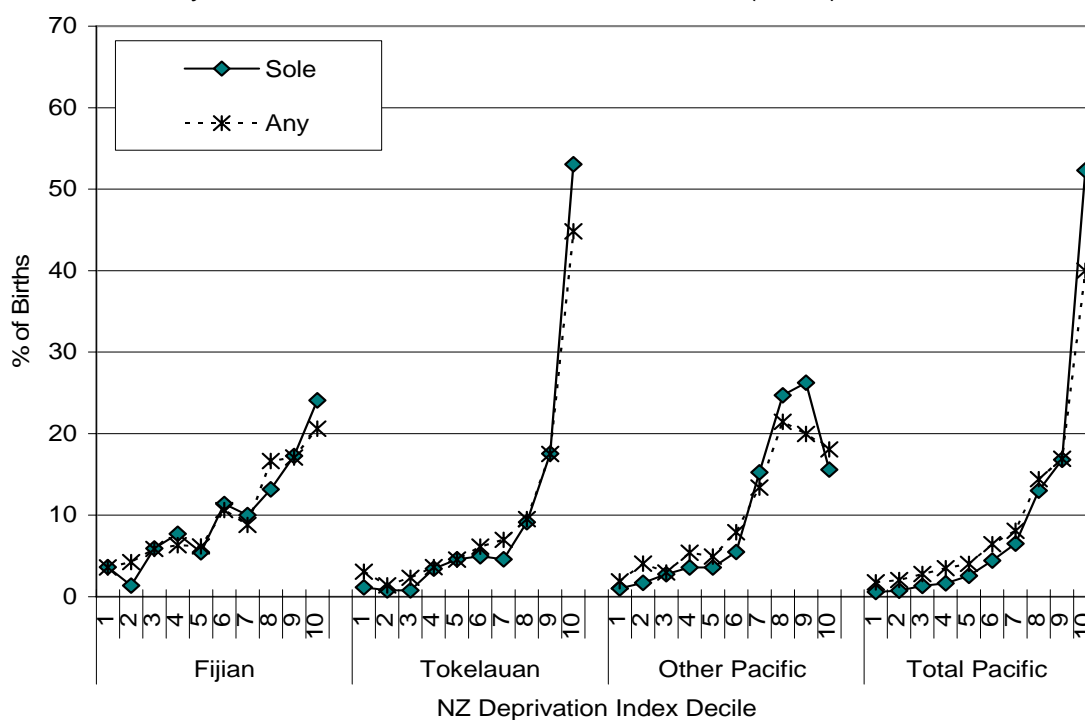
During 2002-2006, 67.5% of New Zealand's (Any) Pacific births occurred within the three DHBs in the Wider Auckland region. While the pattern was similar for all of New Zealand's larger Pacific Island Groups (67.5% of (Any) Samoan and 80.2% of (Any) Tongan births occurred in the Wider Auckland Region), 50% of (Any) Tokelauan births occurred in the two DHBs in the Wellington region. Yet, despite the over representation of Pacific births in the Wider Auckland region, only 27.7% of all births in the Auckland Region during this period were identified as being (Any) Pacific (**Table 3, Table 4**).

Figure 3. Proportion of Pacific Births by NZ Deprivation Index Decile Using Two Different Ethnicity Classifications, New Zealand 2002-2006 (1 of 2)



Source: Birth Registration Dataset; Ethnicity assigned using Any / Sole Classification (see page 11 for details)

Figure 4. Proportion of Pacific Births by NZ Deprivation Index Decile Using Two Different Ethnicity Classifications, New Zealand 2002-2006 (2 of 2)



Source: Birth Registration Dataset; Ethnicity assigned using Any / Sole Classification (see page 11 for details)

Table 3. Distribution of Pacific Births by (Any) Ethnic Group and District Health Board, New Zealand 2002-2006 (1 of 2)

DHB	Any Samoan			Any Tongan			Any Cook Island Māori			Any Niue		
	Number in 5 year period	% DHB Births	% Ethnic Group Births	Number in 5 year period	% DHB Births	% Ethnic Group Births	Number in 5 year period	% DHB Births.	% Ethnic Group Births	Number in 5 year period	% DHB Births	% Ethnic Group Births
Northland	185	1.8	0.8	148	1.4	1.5	223	2.1	2.2	85	0.8	2.3
Waitemata	3,228	9.2	14.8	1,125	3.2	11.7	981	2.8	9.6	619	1.8	16.5
Auckland	3,559	11.5	16.3	2,745	8.9	28.7	1,384	4.5	13.6	889	2.9	23.7
Counties Manukau	8,070	20.5	36.9	3,810	9.7	39.8	3,954	10.1	38.8	1,544	3.9	41.1
Waikato	571	2.3	2.6	289	1.2	3.0	740	3.0	7.3	135	0.5	3.6
Lakes	161	2.0	0.7	85	1.1	0.9	254	3.2	2.5	28	0.4	0.7
Bay of Plenty	238	1.7	1.1	154	1.1	1.6	220	1.6	2.2	47	0.3	1.3
Tairāwhiti	69	1.8	0.3	123	3.2	1.3	61	1.6	0.6	8	0.2	0.2
Taranaki	109	1.6	0.5	18	0.3	0.2	71	1.0	0.7	17	0.2	0.5
Hawke's Bay	559	5.2	2.6	79	0.7	0.8	384	3.6	3.8	20	0.2	0.5
Whanganui	84	2.0	0.4	15	0.4	0.2	70	1.6	0.7	8	0.2	0.2
MidCentral	318	3.0	1.5	191	1.8	2.0	185	1.7	1.8	32	0.3	0.9
Hutt	1,077	10.7	4.9	168	1.7	1.8	321	3.2	3.1	78	0.8	2.1
Capital & Coast	2,034	10.8	9.3	188	1.0	2.0	761	4.0	7.5	123	0.7	3.3
Wairarapa	78	3.2	0.4	11	0.5	0.1	36	1.5	0.4	9	0.4	0.2
Nelson Marlborough	125	1.6	0.6	80	1.0	0.8	52	0.7	0.5	8	0.1	0.2
West Coast	12	0.7	0.1	5	0.3	0.1	5	0.3	0.0	<5	0.1	0.0
Canterbury	1,023	3.5	4.7	215	0.7	2.2	275	0.9	2.7	70	0.2	1.9
South Canterbury	26	0.9	0.1	17	0.6	0.2	11	0.4	0.1	<5	0.1	0.1
Otago	192	1.9	0.9	100	1.0	1.0	128	1.3	1.3	13	0.1	0.3
Southland	137	1.9	0.6	15	0.2	0.2	87	1.2	0.9	15	0.2	0.4
NZ Total	21,855	7.6	100.0	9,581	3.3	100.0	10,203	3.5	100.0	3,753	1.3	100.0

Source: Birth Registration Dataset; Ethnicity is that of the baby as recorded on their birth registration form. (Any) category includes births where the specified Pacific group was recorded in Any of the first three ethnic groups. Due to a large number of babies who identify with more than one ethnic group, a single baby may be counted more than once across these ethnic groups.

Table 4. Distribution of Pacific Births by (Any) Ethnic Group and District Health Board, New Zealand 2002-2006 (2 of 2)

DHB	Any Fijian			Any Tokelauan			Any Other Pacific			Any Total Pacific		
	Number in 5 year period	% DHB Births	% Ethnic Group Births	Number in 5 year period	% DHB Births	% Ethnic Group Births	Number in 5 year period	% DHB Births.	% Ethnic Group Births	Number in 5 year period	% DHB Births	% Ethnic Group Births
Northland	37	0.4	2.7	13	0.1	1.2	24	0.2	1.9	674	6.4	1.6
Waitemata	241	0.7	17.7	108	0.3	10.1	470	1.3	36.7	5881	16.8	13.6
Auckland	270	0.9	19.8	45	0.1	4.2	157	0.5	12.3	7725	25.0	17.9
Counties Manukau	327	0.8	24.0	143	0.4	13.3	175	0.4	13.7	15500	39.5	36.0
Waikato	94	0.4	6.9	10	0.0	0.9	88	0.4	6.9	1794	7.3	4.2
Lakes	23	0.3	1.7	106	1.3	9.9	26	0.3	2.0	632	7.9	1.5
Bay of Plenty	37	0.3	2.7	13	0.1	1.2	35	0.3	2.7	703	5.2	1.6
Tairāwhiti	5	0.1	0.4	<5	0.1	0.3	8	0.2	0.6	266	7.0	0.6
Taranaki	5	0.1	0.4	5	0.1	0.5	23	0.3	1.8	236	3.4	0.5
Hawke's Bay	27	0.3	2.0	17	0.2	1.6	21	0.2	1.6	1049	9.7	2.4
Whanganui	17	0.4	1.2	5	0.1	0.5	5	0.1	0.4	197	4.6	0.5
MidCentral	26	0.2	1.9	28	0.3	2.6	33	0.3	2.6	755	7.1	1.8
Hutt	46	0.5	3.4	164	1.6	15.3	18	0.2	1.4	1683	16.7	3.9
Capital & Coast	79	0.4	5.8	372	2.0	34.7	96	0.5	7.5	3160	16.8	7.3
Wairarapa	8	0.3	0.6	<5	0.2	0.4	<5	0.1	0.2	139	5.7	0.3
Nelson Marlborough	20	0.3	1.5	<5	0.0	0.2	17	0.2	1.3	288	3.7	0.7
West Coast	<5	0.1	0.1	0	0.0	0.0	5	0.3	0.4	30	1.7	0.1
Canterbury	66	0.2	4.8	17	0.1	1.6	49	0.2	3.8	1618	5.5	3.8
South Canterbury	0	0.0	0.0	0	0.0	0.0	7	0.2	0.5	62	2.1	0.1
Otago	25	0.3	1.8	17	0.2	1.6	11	0.1	0.9	439	4.4	1.0
Southland	8	0.1	0.6	<5	0.0	0.1	8	0.1	0.6	261	3.7	0.6
NZ Total	1363	0.5	100.0	1073	0.4	100.0	1279	0.4	100.0	43092	14.9	100.0

Source: Birth Registration Dataset; Ethnicity is that of the baby as recorded on their birth registration form. (Any) category includes births where the specified Pacific group was recorded in Any of the first three ethnic groups. Due to a large number of babies who identify with more than one ethnic group, a single baby may be counted more than once across these ethnic groups.

Census Data

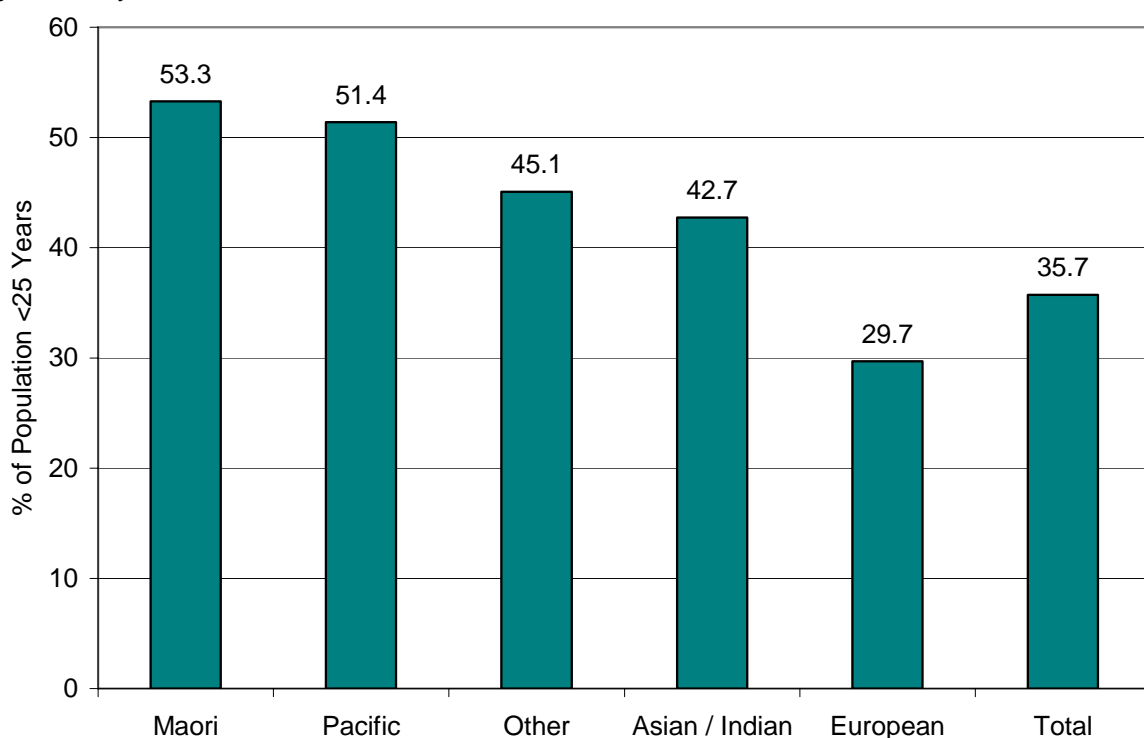
Census data also provides some useful insights into the demographic profile of New Zealand's Pacific children and young people. During 2006 (using prioritised ethnicity), 8.7% of children (0-14 years) and 7.1% of young people (15-24 years) were identified as belonging to a Pacific ethnic group (**Table 5**).

Table 5. Distribution of Children and Young People 0-24 Years by Ethnicity, New Zealand at the 2006 Census

Ethnic Group	Number	%
Children 0-14 Years		
European	479,418	55.3
Māori	199,914	23.0
Pacific	75,528	8.7
Asian / Indian	70,479	8.1
Other	8,652	1.0
Not Stated	33,555	3.9
Total	867,573	100.0
Young People 15-24 Years		
European	320,736	56.2
Māori	101,298	17.7
Pacific	40,707	7.1
Asian / Indian	75,180	13.2
Other	6,630	1.2
Not Stated	26,619	4.7
Total	571,182	100.0

Source: Statistics New Zealand; Ethnicity is Level 1 Prioritised

Figure 5. Proportion of the New Zealand Population Who Were Under 25 Years of Age by Ethnicity at the 2006 Census



Source: Statistics New Zealand; Ethnicity is Level 1 Prioritised.

In 2006, 51.4% of the Pacific population (Level 1 Prioritised) were under the age of 25 years, as compared to 29.7% of the European population and 35.7% for the population as a whole (**Figure 5**). Only the Māori population (53.3%) had a higher proportion of children and young people than the Pacific population at the 2006 Census.

Distribution of Children and Young People by Pacific Ethnic Group

In comparing the results of the 1996, 2001 and 2006 Censuses with birth registration data a number of other themes also emerged including (**Table 1, Table 2, Table 6**):

1. A comparison of 2006 birth registration and Census data potentially suggests that a lower proportion of Pacific parents report multiple ethnic affiliations on their children's Census forms, than do on their baby's birth registration forms.
2. While birth registration data suggest that either the Pacific population in New Zealand is becoming more heterogeneous, (or that more parents are choosing to report multiple ethnic affiliations on their baby's birth registration forms), a comparable analysis of Census data is not possible due to differences in the way in which ethnicity information was collected at each of the last 3 Censuses.
3. Within each of the last three Censuses however, young people have been more likely to report a sole ethnic identity than have the parents of Pacific children. It remains uncertain however whether this reflects the increasing diversity of Pacific children in New Zealand in recent years, a tendency for Parents to fill out their children's Census forms in a different manner to the way in which the child chooses to do so once they reach adolescence, or a tendency for young people as they get older to more closely identify with a single ethnic group.

Distribution of Children and Young People by Region

As with the analysis of births, 66.1% of Pacific children and young people (0-24 years) in New Zealand lived in the Wider Auckland Region, although within this Region only 19.9% of children and young people were of Pacific Island origin (**Table 7, Table 8**).

Summary

The Pacific population in New Zealand is becoming increasingly ethnically diverse, with large numbers of Pacific children and young people simultaneously identifying with other ethnic groups. As a consequence, the way in which ethnicity is coded in New Zealand's national datasets is likely to play an important role in defining how health outcomes for Pacific children and young people are portrayed. Despite these differences, the majority of Pacific children and young people in New Zealand share a very similar demographic profile, with higher proportions living in the Wider Auckland region, and in areas characterised by relative socioeconomic deprivation. The relative youth of the New Zealand Pacific population also suggests that the issues facing Pacific children and young people may potentially have a much greater impact on the Pacific population as a whole, than occurs for other ethnic groups. Each of these factors must to be taken into account when interpreting the information presented in the sections which follow.



Table 6. Number of Pacific Children and Young People 0-24 Years by Ethnic Group at the 1996, 2001 and 2006 Censuses

Ethnic Group	1996			2001			2006		
	Age 0-14 Years								
	Any	Sole	% Sole	Any	Sole	% Sole	Any	Sole	% Sole
Samoan	39,903	20,409	51.1	44,958	24,108	53.6	49,962	25,383	50.8
Cook Island Māori	19,905	7,005	35.2	22,170	8,757	39.5	23,751	8,316	35.0
Tongan	13,356	7,353	55.1	17,379	10,506	60.5	21,315	12,411	58.2
Niue	7,533	2,043	27.1	8,184	2,034	24.9	8,922	1,704	19.1
Tokelauan	2,001	732	36.6	2,637	843	32.0	2,865	711	24.8
Fijian	2,424	468	19.3	2,340	630	26.9	3,168	1,014	32.0
Other Pacific	1,635	363	22.2	2,409	936	38.9	3,105	1,365	44.0
Pacific NOS	90	27	30.0	135	39	28.9	159	81	50.9
Total Pacific	79,248	38,397	48.5	90,147	47,859	53.1	100,344	50,862	50.7
Age 15-24 Years									
Samoan	19,689	11,754	59.7	20,481	13,479	65.8	23,697	14,976	63.2
Cook Island Māori	8,652	4,254	49.2	9,387	5,121	54.6	11,043	5,469	49.5
Tongan	5,262	2,676	50.9	6,942	4,440	64.0	8,616	5,847	67.9
Niue	3,456	1,368	39.6	3,669	1,443	39.3	4,338	1,449	33.4
Tokelauan	1,077	489	45.4	1,137	501	44.1	1,269	534	42.1
Fijian	1,623	435	26.8	1,341	489	36.5	1,890	828	43.8
Other Pacific	1,239	504	40.7	1,386	699	50.4	1,503	747	49.7
Pacific NOS	51	21	41.2	90	39	43.3	114	69	60.5
Total Pacific	38,040	21,498	56.5	41,265	26,214	63.5	48,411	29,844	61.6

Source: Statistics New Zealand; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Slight differences in the way in which information on ethnicity was sought between the 1996, 2001 and 2006 Censuses mean that the percentage of children and young people who identify solely with one ethnic group may not be strictly comparable between Censuses.

Table 7. Distribution of (Any) Pacific Children and Young People 0-24 Years by Ethnicity and DHB, New Zealand at the 2006 Census (1 of 2)

DHB	Any Samoan			Any Cook Island Māori			Any Tongan			Any Niue			DHB Total (All Ethnic Groups)
	Number	% DHB 0-24 Yrs	% Ethnic Group 0-24 Yrs	Number	% DHB 0-24 Yrs	% Ethnic Group 0-24 Yrs	Number	% DHB 0-24 Yrs	% Ethnic Group 0-24 Yrs	Number	% DHB 0-24 Yrs	% Ethnic Group 0-24 Yrs	
Northland	747	1.4	1.0	831	1.6	2.4	453	0.9	1.5	279	0.5	2.1	51,936
Waitemata	10,323	6.0	14.0	3,186	1.8	9.2	3,417	2.0	11.4	1,983	1.2	15.0	172,260
Auckland	11,601	8.1	15.7	4,683	3.3	13.5	8,352	5.8	27.9	3,291	2.3	24.8	143,343
Counties Manukau	27,204	15.3	36.9	12,777	7.2	36.7	11,859	6.7	39.6	5,079	2.9	38.3	177,228
Waikato	2,088	1.7	2.8	2,547	2.0	7.3	1,023	0.8	3.4	534	0.4	4.0	126,285
Lakes	552	1.5	0.7	906	2.5	2.6	273	0.8	0.9	108	0.3	0.8	36,321
Bay of Plenty	762	1.2	1.0	756	1.1	2.2	441	0.7	1.5	180	0.3	1.4	66,222
Tairāwhiti	231	1.3	0.3	231	1.3	0.7	249	1.4	0.8	39	0.2	0.3	17,403
Taranaki	360	1.0	0.5	210	0.6	0.6	96	0.3	0.3	93	0.3	0.7	35,793
Hawke's Bay	1,473	2.8	2.0	1,284	2.5	3.7	282	0.5	0.9	84	0.2	0.6	52,305
Whanganui	312	1.4	0.4	282	1.3	0.8	69	0.3	0.2	39	0.2	0.3	21,645
MidCentral	1,137	2.0	1.5	735	1.3	2.1	612	1.1	2.0	177	0.3	1.3	58,017
Hutt	4,059	8.2	5.5	1,134	2.3	3.3	657	1.3	2.2	270	0.5	2.0	49,326
Capital and Coast	7,263	7.7	9.9	2,778	2.9	8.0	606	0.6	2.0	489	0.5	3.7	94,275
Wairarapa	237	1.9	0.3	135	1.1	0.4	42	0.3	0.1	42	0.3	0.3	12,372
Nelson Marlborough	372	0.9	0.5	249	0.6	0.7	258	0.6	0.9	69	0.2	0.5	40,461
West Coast	60	0.6	0.1	33	0.3	0.1	36	0.4	0.1	6	0.1	0.0	9,789
Canterbury	3,621	2.3	4.9	1,128	0.7	3.2	711	0.4	2.4	336	0.2	2.5	158,202
South Canterbury	114	0.7	0.2	48	0.3	0.1	66	0.4	0.2	12	0.1	0.1	16,308
Otago	735	1.2	1.0	534	0.8	1.5	339	0.5	1.1	90	0.1	0.7	63,642
Southland	411	1.2	0.6	330	0.9	0.9	99	0.3	0.3	63	0.2	0.5	35,553
NZ Total	73,659	5.1	100.0	34,794	2.4	100.0	29,934	2.1	100.0	13,260	0.9	100.0	1,438,749

Source: Statistics New Zealand; Includes children and young people who identify as Pacific in ANY of their three first ethnic groups; Due to the large number who identify with more than one ethnic group, a single individual may be counted more than once across any of these ethnic groups.

Table 8. Distribution of (Any) Pacific Children and Young People 0-24 Years by Ethnicity and DHB, New Zealand at the 2006 Census (2 of 2)

DHB	Any Tokelauan			Any Fijian			Any Other Pacific Peoples			Total Pacific			DHB Total (All Ethnic Groups)
	Number	% DHB 0-24 Yrs	% Ethnic Group 0-24 Yrs	Number	% DHB 0-24 Yrs	% Ethnic Group 0-24 Yrs	Number	% DHB 0-24 Yrs	% Ethnic Group 0-24 Yrs	Number	% DHB 0-24 Yrs	% Ethnic Group 0-24 Yrs	
Northland	30	0.1	0.7	171	0.3	3.4	90	0.2	2.0	2,418	4.7	1.6	51,936
Waitemata	342	0.2	8.3	987	0.6	19.5	1,407	0.8	30.5	19,329	11.2	13.0	172,260
Auckland	219	0.2	5.3	930	0.6	18.4	543	0.4	11.8	26,151	18.2	17.6	143,343
Counties Manukau	561	0.3	13.6	996	0.6	19.7	771	0.4	16.7	52,788	29.8	35.5	177,228
Waikato	72	0.1	1.7	345	0.3	6.8	396	0.3	8.6	6,459	5.1	4.3	126,285
Lakes	408	1.1	9.9	129	0.4	2.6	69	0.2	1.5	2,241	6.2	1.5	36,321
Bay of Plenty	63	0.1	1.5	90	0.1	1.8	129	0.2	2.8	2,286	3.5	1.5	66,222
Tairāwhiti	15	0.1	0.4	30	0.2	0.6	24	0.1	0.5	792	4.6	0.5	17,403
Taranaki	21	0.1	0.5	48	0.1	0.9	60	0.2	1.3	846	2.4	0.6	35,793
Hawke's Bay	60	0.1	1.5	57	0.1	1.1	54	0.1	1.2	3,126	6.0	2.1	52,305
Whanganui	24	0.1	0.6	90	0.4	1.8	21	0.1	0.5	804	3.7	0.5	21,645
MidCentral	96	0.2	2.3	171	0.3	3.4	114	0.2	2.5	2,859	4.9	1.9	58,017
Hutt	627	1.3	15.2	159	0.3	3.1	105	0.2	2.3	6,417	13.0	4.3	49,326
Capital and Coast	1,398	1.5	33.8	315	0.3	6.2	405	0.4	8.8	11,646	12.4	7.8	94,275
Wairarapa	21	0.2	0.5	30	0.2	0.6	27	0.2	0.6	498	4.0	0.3	12,372
Nelson Marlborough	21	0.1	0.5	78	0.2	1.5	54	0.1	1.2	1,008	2.5	0.7	40,461
West Coast	<5			21	0.2	0.4	9	0.1	0.2	156	1.6	0.1	9,789
Canterbury	66	0.0	1.6	276	0.2	5.5	192	0.1	4.2	5,973	3.8	4.0	158,202
South Canterbury	9	0.1	0.2	6	0.0	0.1	15	0.1	0.3	255	1.6	0.2	16,308
Otago	57	0.1	1.4	90	0.1	1.8	87	0.1	1.9	1,806	2.8	1.2	63,642
Southland	18	0.1	0.4	33	0.1	0.7	27	0.1	0.6	897	2.5	0.6	35,553
NZ Total	4,134	0.3	100.0	5,058	0.4	100.0	4,608	0.3	100.0	148,755	10.3	100.0	1,438,749

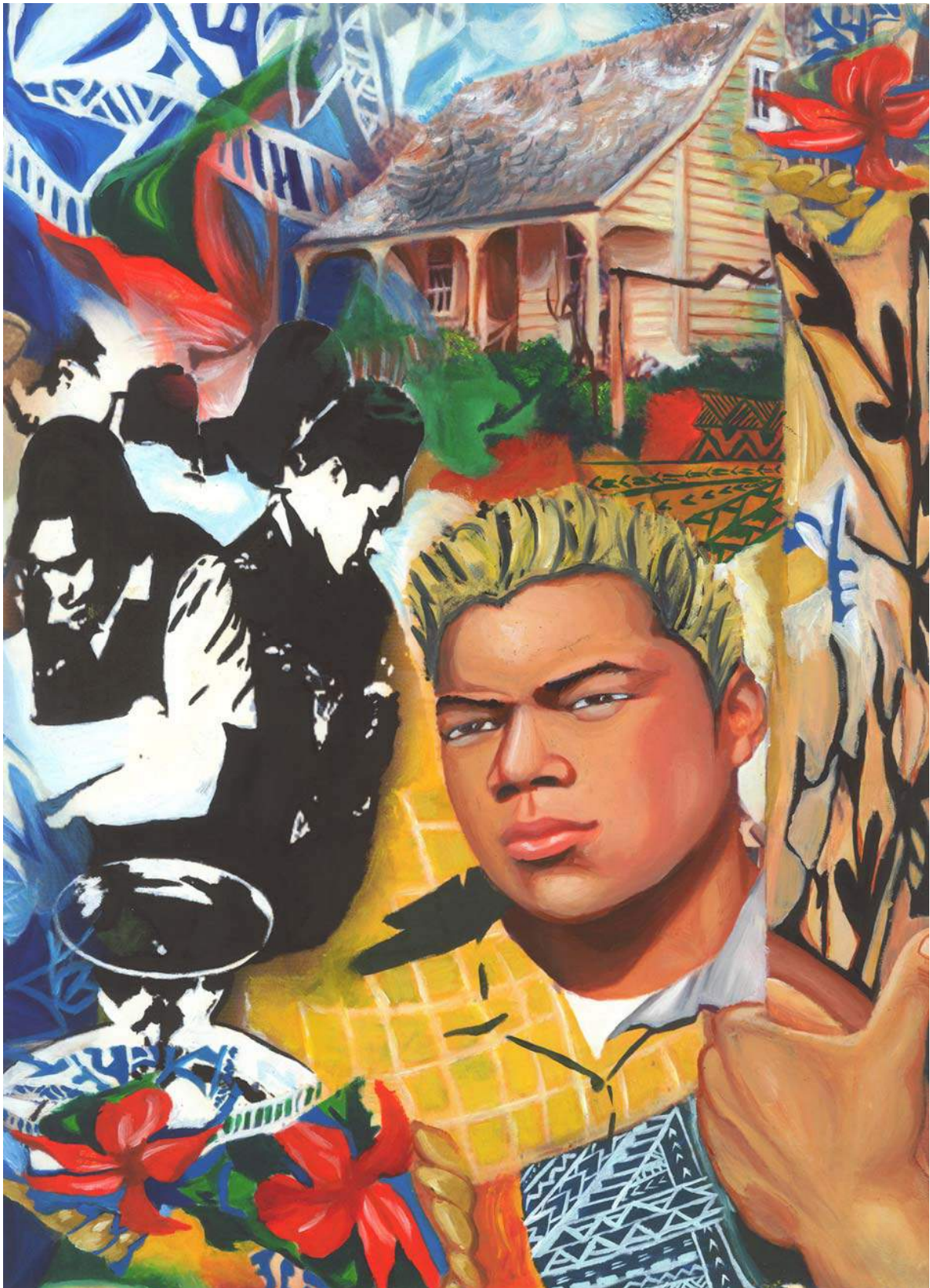
Source: Statistics New Zealand; Includes children and young people who identify as Pacific in ANY of their three first ethnic groups; Due to the large number who identify with more than one ethnic group, a single individual may be counted more than once across any of these ethnic groups.



Socioeconomic and Cultural Determinants



Socioeconomic
and Cultural
Determinants
Cultural Identity



Self Portrait by Michael Lea
"Creating a Spiritual and Cultural Identity in a Colonial Background"

Viewpoint: Cultural Determinants of Health

by Pefi Kingi

"Ko te tama te tumu o te akara'anga" (Cook Islands Māori)

"Sa idivi ni loma ni mata na gone" (Fijian)

"Ko e tama ko e alito he mata" (Niue)

"O le mea uliuli o mata o matua o fanau" (Samoan)

"Ko e fanau ko e pele tu'u kanoimata" (Tongan)

The child is the centre of one's eye (Papa'alagi)

Introduction

Pacific peoples collectively maintain a core set of cultural values which have sustained, nurtured and developed them through the centuries. These values include family, community, spirituality, and a holistic worldview of life and health. A number of Pacific cultures have also retained proverbs which describe the centrality of children in contemporary society, including the one above, which sees children as being the "centre of one's eye". This analogy is appropriate, as without the eye there can be no light.

This opinion piece perceives healthy confident children, strong resilient families and engaged communities as the building blocks of a vibrant and hopeful society. In transforming New Zealand's health system into one which assists Pacific communities to fully realise these ideals however, some fundamental changes and paradigm shifts may need to occur. Such changes must take into account the significant roles family, ancestral lands, spirituality and religion play in shaping Pacific world views and cultural identity. The following opinion piece reviews some of these key determinants of cultural identity for Pacific children and young people in New Zealand, before considering how the health sector might respond to their needs in an effective and culturally competent manner.

Understanding the Cultural Determinants of Health for Pacific Children and Young People

Pacific Worldviews: Historically, analyses of Pacific health have often had inherent problems with how health differences are conceptualised and constructed. These narratives have often been instituted within Papa'alagi health systems and institutions and contested through constructs such as race, power and hegemony. Pacific history is replete with cases, patients and services managed by those with deep-seated beliefs drawn from dominant frameworks, and this persists today. However, through the ongoing efforts of Pacific health leaders, community workers and professionals, this debate has expanded and now gives credence to Pacific worldviews. As a result, Pacific paradigms and frameworks can be utilised for the maximum development of Pacific communities. For example, effective strategies can be designed, and targeted resources invested in a way which allows Pacific communities to participate in an inclusive, collaborative and empowering manner.

Pacific Cultural Democracy: The Pacific is multicultural, multiethnic and comprises a multitude of small populations in ecological microcosms [6]. In this context, health may be viewed "... not merely as a state of individual well-being; it is also constructed as an equilibrium in relationships between the individual, ancestral spirits, other people and the environment" [7]. Such a definition implies that the freedom to practice one's culture without fear, coined by Finau as "cultural democracy" [8] should be central to health and health service provision, particularly in a diverse society such as Aotearoa New Zealand, where children and young people, as our future leaders, all hail from population groups that are unique in culture, language, physique and lifestyle. It is also vital that Pacific Peoples themselves, fully acknowledge culture and its tenets, and



know their individual and collective place and power in the equation. As Kavaliku points out, “*We must always remember that not only do we live in a culture but we are the culture, nor do we live in a vacuum*” [9]. Finally, it has been posed that Pacific peoples have moved past the imbalances of health wrought by globalization, imperialism and colonialism. While debatable, such an analysis does offer a much more optimistic outlook for the health of the next generation.

Pacific Values: Pacific peoples maintain core cultural values that have sustained nurtured and developed them through the centuries. These values have gained increased visibility, vitality and validity in contemporary society. They include family, community, spirituality and a holistic worldview of life and health. These intertwining components of Pacific life are extremely dynamic and constantly changing. Some Pacific Peoples believe that illness and other health misfortunes can be attributed to the loss of, or damage to, mana (special power or life force), fonua (land) or fakafetuiaiga (Vagahau Niue for human relationships, although other vernaculars have equivalents) [5]. Restoring health may thus include an analysis of the cause of the problem, a family fono [6], a meeting or gathering, the expression of an abject apology (ole fakamolemole), or a ceremony of forgiveness (ifoga). In addition, some values are of greater significance, or have greater currency amongst Pacific Peoples. For example: interdependence is a treasured principle; it is the practice of reciprocity and the notion of equal and equitable giving, taking and receiving. Group harmony is achieved when all members of the family work and live cooperatively and reciprocally. Respect is also highly valued and manifests itself via a range of verbal and non-verbal cues and behaviours i.e. *doing the right things and doing things right*. Thus, recognising and understanding the significance of these core cultural values is an effective and profitable investment for those working to enhance Pacific Peoples’ health.

Pacific Families: Pacific cultures place great value on the family. In this context, “family” may include family members related through blood, adoption (legal or customary), and marriage. In addition, some Pacific families recognize a deceased relative’s spirit as an active family member. This may be relevant when treating mental health issues; it may pose a risk that requires sensitive management, but it may also provide spiritual strength.

For many Pacific groups, the family is the cornerstone of personal life from birth to death [10], and identity can centre on one’s roles, duties and responsibilities within the family. At times however, it may seem that collective well-being is awarded a higher priority than that of the individual, which may be problematic if group decisions minimise the importance of the sick individual, particularly if that individual is a child. It is positive however, when family supports are working at an optimum level. Further, at times the sheer volume of family members may appear problematic, especially if discussions favour a complex consensus model of decision-making. At other times however, the volume of family members may be favourable for family strength and consolidation. Religious ethics add to a problematic situation, and it is fair to state that at times, religious dogma does not always dwell well with cultural dynamics. This is an anticipated constant that Pacific communities deal with; it may seem confusing to external forces, but to Pacific peoples it is normal and resolvable.

In contemporary contexts, Pacific families are redefining themselves, although these changes may not always be accepted, or be seen as appropriate. While families are usually stratified by generation, and relationships are often determined by genealogical seniority, the current contextual changes and adaptations of today may be eroding some of these structures. For example, family structures may be challenged when power roles are switched for utilitarian purposes. However, this can be managed well so that the family “tivaevae” becomes a firm coping mechanism. Pacific families can also be strengthened, so that they are well-equipped to withstand all the challenges of

a modern environment. Thus for the Pacific child, any constructs of health and well-being must focus on family and familial values, even though their duality as both risk and protective factors may at times seem complicated.

Pacific Spirituality and Religion: Spirituality is also an intrinsic part of many Pacific cultures, with many Pacific worldviews being holistic and therefore, spiritual. Spiritual health in turn contributes to physical and psychological wellness, with spiritual well-being being seen as *“the affirmation of life in a relationship with a god, self, community, and environment that nurtures and celebrates wholeness”* [11]. This underscores the inter-relationships and inter-connectedness between all elements in life, with a number of great leaders noting that one of the foundations of spiritual wellbeing is self-determined wisdom; another is the ability to balance all aspects of life.

Pacific Peoples have embraced different forms of religious belief and faith with fervour; and these have served as a guide and safeguard for many. For Pacific Peoples, religion includes a range of new and adopted forms of worship, characterised by diverse dogmas, infrastructures, churches and church buildings. However, as with all other influences, religious belief has the potential to be both a protective and a risk factor for Pacific children and young people.


Belonging in the Pacific: In addition, lands exert a centripetal force for many Pacific Peoples, be they clan, tribe or family. Ancestral lands provide a sense of belonging, a place of connectedness and a basis for strength, with many Pacific Peoples having close and sacred ties to their homelands. *“You know who you are when you know where you are...being without a place means being severed “from the most vital physical, psychological, social, and spiritual values of one’s existence”* [12]. However, clashes over land titles have led to disconnectedness among some Pacific families and extended families.

Other challenges associated with belonging have meant that some Pacific Peoples experience complex problems associated with oppression or racism, alienation from the mainstream culture, identity conflict, generational conflicts, and a sense of powerlessness. These in turn may result in continued negative behaviours or consequences, including illegal or criminal behaviours. In contrast, knowledge of Pacific cultures can be instructive in understanding Pacific concepts of health, which in turn is useful for developing healthcare solutions. With healthcare systems being in a state of ongoing change, developing a culturally competent system should be a priority in modern western health services, so that they are best able to ensure the future for Pacific peoples.

A Health Sector Which Better Meets the Needs of Pacific Children and Young People

Prioritising Pacific Children and Young People in Health Policy: This report identifies Pacific children and young people as belonging to a diverse and cohesive society. However, it is necessary to ensure that this vulnerable cultural group is awarded a high priority in New Zealand health policy, given that the majority are / will be born in Aotearoa, and that they will comprise an increasing proportion of the New Zealand population in future years. Current health strategies are increasing public confidence amongst Pacific communities and there is a perception that New Zealand is becoming a more diverse, tolerant, creative and supportive place, where Pacific children and young people can receive the best healthcare. However, if health policies and strategies are to result in positive impacts for Pacific children and young people, they must include concepts of *“belonging, participation, inclusion, recognition and legitimacy”* [13]. It is also critical that Pacific cultural identities and worldviews are fully incorporated into policy development and that the political agenda of the day does not interfere with the long-term political commitment to resourcing and operationalising clear strategic priorities for Pacific children and young people.





Services Which Acknowledge Pacific Cultural Identity: Health services must also foster cultural identity as the basis for the values, beliefs, attitudes, motivation, knowledge, and skills needed to bring about change and improved health outcomes for Pacific children. Providers should view cultural identity and cultural pride as positive factors in the provision of health care and the prevention of illness. Pacific languages are critical as part of the foundation of a strong identity and can be a potentially strong protective factor. Services should promote and preserve cultural identity, values, and traditions in order to enhance the resiliency of Pacific Peoples who experience multiple health ailments. Other challenges relate to the demise of identifying with being *Island-Born* or *Island-Raised*, as opposed to *New Zealand-Born* or *New Zealand-Raised*. It is also pertinent that nowhere else in the world do young people identify as being “*Pacific*” except in Aotearoa New Zealand. Strong protective factors can be generated through positive cultural affiliations, resulting in positive self-identity and enhanced self-esteem. Recognising, acknowledging and supporting cultural values and norms are inherent cultural strengths that should contribute to Pacific Peoples’ participation in, and ownership of, their own wellness.

Access and Utilisation of Primary Health Care: Access and utilisation of primary health care services is one of the most common denominators reflecting health disparities in New Zealand [14]. The basis for these disparities may be ethnicity, socio-economic status, social class and/or geographical distribution [15]. Pacific Peoples are noted as “hard to reach New Zealanders”, so there is a need to further improve their access and rates of utilisation. Those who need care the most, often have the least access to the healthcare services they need, want or demand. Barriers to access for Pacific Peoples cannot just be explained by a lack of available facilities, appropriate personnel, or socioeconomic factors. Barriers may exist for a range of other valid reasons including acceptability, and affordability [16]. For example, Pacific Peoples who have access to services may still under-utilise these services if the system is not responsive to their cultural norms. Often, healthcare systems have neglected to incorporate cultural worldviews and values into service delivery and this discourages use by Pacific groups who subscribe to particular values. A healthcare system that does not include the client, their families and communities at large may exacerbate distress during a period of poor health [17]. In this context, negative outcomes are costly, expensive, ineffective, inefficient, and reflect poorly on New Zealand as a developed nation.

Cultural Competence of Health Care Providers: Health providers can benefit from strategies which increase their understanding of the health beliefs held, and treatments utilised, by Pacific clients. It is important to ask Pacific caregivers and parents what they think may have caused their child’s illness, and what they are already doing to treat their child. It is equally important to ask whether prescribed medical interventions conflict with their beliefs and traditional practices, especially if these beliefs and practices apply to children of a particular age group. Cultural competence thus requires not only a knowledge of a child’s family’s worldview, but also a sensitivity to cultural boundaries and norms, and an appreciation of the role these cultural differences play in the Pacific child’s wellbeing and illness. Health care providers who are medically competent but not culturally competent are at risk of treating a Pacific child inappropriately. In contrast, health services that emphasize the importance of holism, a family’s scope for access, and who can accommodate Pacific cultural perspectives, increase opportunities for acceptability. Cultural competence can be the best risk management plan conceived and it is advantageous and effective, if implemented constantly and consistently.

In Conclusion

Pacific peoples maintain a set of core cultural values including family, community, spirituality and a holistic world view, which have sustained nurtured and developed

them through the centuries. While service providers can have a powerful influence on the wellbeing of Pacific children, to do so they require a knowledge of Pacific worldviews, a sensitivity to cultural boundaries and norms, and an appreciation of the role these cultural differences play in the Pacific child's wellbeing and illness.

Culturally competent health services do have the potential to be acceptable to Pacific groups; and Pacific communities do have the potential and capacity to meet the challenges faced by their children and young people. By utilising the values and principles which characterize Pacific peoples as a firm basis for transformation, community-based participation to enhance the accessibility and acceptability of services, and a commitment by Government departments to a health system that is progressively financed, inclusive and equitable [18], the wellbeing of Pacific children and young people can be transformed. Pacific communities thus anticipate and look forward to a future that is uncompromisingly responsive to the health needs, wants and demands of their children and young people.



Religious Affiliation

Religion plays an important role in Pacific societies, and is incorporated in the national mottos of several Pacific nations e.g. the Samoan motto reads: "*Samoa is founded on God*" while the Tongan motto translates "*The Lord and Tonga are my heritage*."

The arrival of missionaries in the Pacific had a profound influence on many Pacific nations (e.g. in the Cook Islands, missionaries were responsible not only for religious affairs, but were also instrumental in formal education and civil law; the introduction of Christianity to Tokelau was conducted in the Samoan language and today, many important Tokelau cultural functions are still conducted in Samoan [19]). Such examples highlight the profound influence religion has on cultural and social norms.

With migration to New Zealand, the Church has taken on a special place in the Pacific community. Hendrikse [20] notes that religious affiliations within neighbourhoods of ethnic migrant groups (e.g. Otara, Porirua) remain a universal phenomenon in providing a social institution for ethnic groups to maintain and retain their cultural language, beliefs and practices. It is also a reason why many Pacific people choose to dwell in Auckland, to be closer to these.

In answering the question "*Why does religion matter in the Pacific region?*", Douglas [21] responds – "*It matters because Christianity is neither foreign nor imposed, but an indigenised daily spiritual experience and a powerful ritual practice. Religion is engraved into many Pacific cultures, thus it has a role in identity and connectedness.*" In addition, for issues such as youth suicide, spirituality and religious beliefs are seen as being protective [22], with Tiatia [23] in her study on Samoan youth suicide identifying family, social support, friends and being connected as "reasons for living", with churches being a site to learn about cultural protocols and to interact with others.

In this context, the following section explores the religious affiliations of Pacific young people (15-24 years) in New Zealand using data from the 2006 Census.

Data Source and Methods

Definition

Proportion of Young People 15-24 Yrs Identifying with a Particular Religion at the 2006 Census
Proportion of Young People 15-24 Yrs Not Identifying with Any Religion at the 2006 Census

Data Source and Interpretation

Numerator: Number of Young People 15-24 Yrs Identifying with a Particular Religion at the 2006 Census

Numerator: Number of Young People 15-24 Yrs Not Identifying with Any Religion at the 2006 Census

Denominator: Number of Young People 15-24 Years at the 2006 Census

Indicator Category: Ideal B

Interpretation: At the 2006 Census, respondents were asked "What is your religion?" Tick box options included no religion, Christian, Buddhist, Hindu, Muslim, and Jewish, with those identifying as Christian also being asked to specify whether they were Anglican, Catholic, Presbyterian, Methodist, Ratana or Ringatu. Additional space was also provided for those wishing to nominate other religions. As multiple responses were allowable, the percentages in each category do not sum to 100%, making it difficult to estimate the overall proportion of Pacific young people identifying with religion as a whole. It was possible however, to quantify the proportion of young people who had no religion, and it is this category which has been used for comparative purposes in the figures which follow.

Note: This data in this section relates to religious identification only and is unable to provide any insights into the extent to which young people actually engaged in religious activities (e.g. attended church, participated in church activities, or observed religious practices)

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

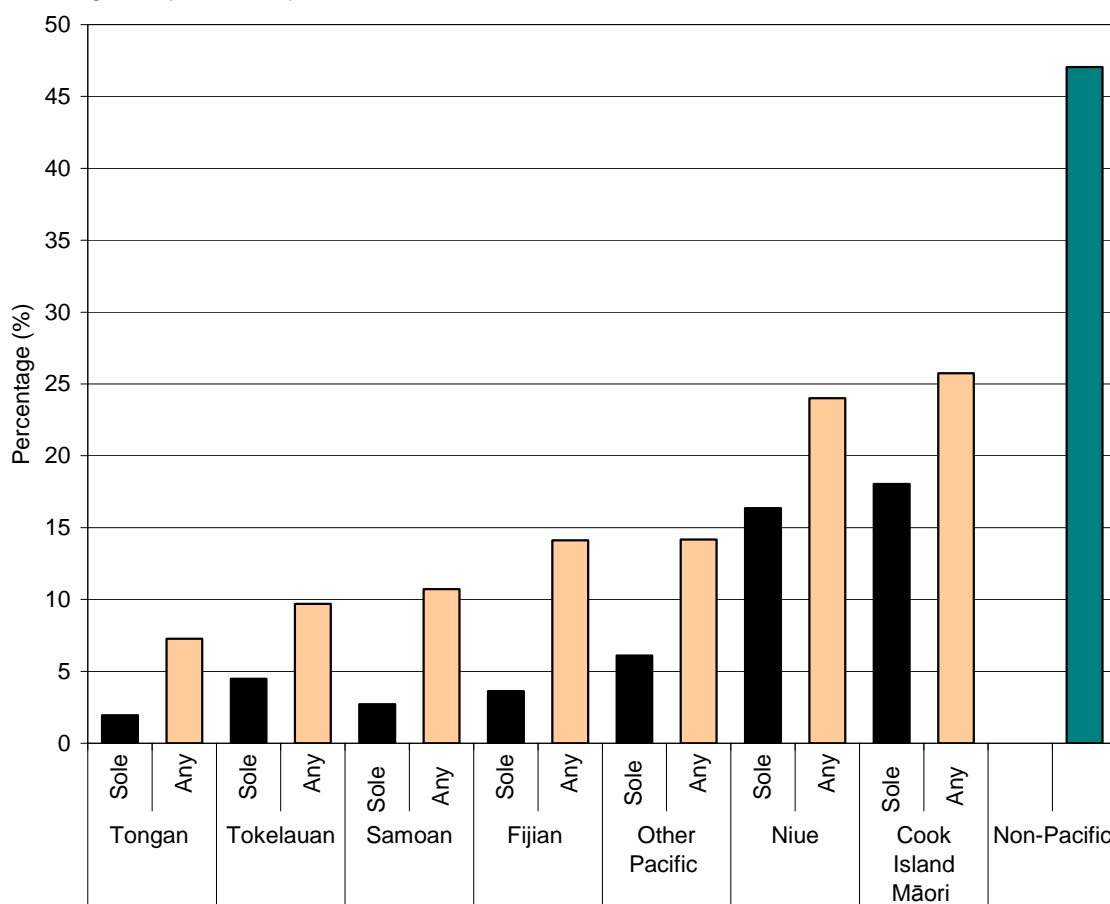
New Zealand Distribution

Religious Affiliations of Pacific Young People at the 2006 Census

At the 2006 Census, respondents were asked “*What is your religion?*” While a review of the responses of Pacific young people suggests considerable diversity, a number of common themes emerged (**Figure 6, Table 9**):

1. The vast majority of Pacific young people identified with a Christian religion, although the denomination varied from Pacific group to Pacific group. In addition, a significant minority identified with the Church of Jesus Christ of Latter Day Saints.
2. There was considerable variation between Pacific groups in terms of the number of young people identifying with no religion, with the proportion being lowest for Tongan young people (Sole 1.9%; Any 7.3%) and highest for Cook Island Māori (Sole 18.0%; Any 25.7%) young people.
3. Within Pacific groups, the proportion of young people stating that they had no religion was higher for those in the (Any) category.
4. Even for (Any) Cook Island young people, who had the highest proportion not identifying with a religion (25.7%), rates were lower than for non-Pacific groups (where 47.1% stated they had no religion).

Figure 6. Proportion of Pacific Young People Aged 15-24 Years Stating That They Had No Religion by Ethnicity, New Zealand at the 2006 Census



Source: Statistics New Zealand; Ethnicity assigned using Any / Sole Classification (see page 11 for details)

Table 9. Proportion of Pacific Young People Aged 15-24 Years Identifying with a Particular Religion by Ethnicity, New Zealand at the 2006 Census

Religious Affiliation	Samoan (%)		Cook Island Māori (%)		Tongan (%)	
	Any	Sole	Any	Sole	Any	Sole
Anglican	1.9	0.9	3.5	2.2	2.8	1.7
Baptist	1.0	1.0	0.5	0.4	0.3	0.3
Catholic	23.0	22.9	13.3	12.8	17.9	17.5
Christian NFD	8.2	8.6	7.4	8.6	5.7	5.1
Latter-Day Saints	7.5	7.6	4.8	4.4	10.0	10.1
Methodist	8.1	10.6	1.6	0.9	38.0	48.5
Pentecostal	8.3	10.9	2.8	2.9	4.0	4.2
Presbyterian	18.0	22.1	21.4	29.8	3.0	1.6
Other Christian Religions	5.6	6.3	5.7	7.0	4.1	3.9
All Other Religions	2.4	0.9	4.7	3.0	2.4	1.2
Object to Answering	3.6	2.6	6.9	3.0	3.1	1.8
No Religion	10.7	2.7	25.7	18.0	7.3	1.9
Religious Affiliation	Niue (%)		Tokelauan (%)		Fijian (%)	
	Any	Sole	Any	Sole	Any	Sole
Anglican	3.5	1.2	1.7	1.1	3.7	1.8
Baptist	0.8	1.0	1.4	1.1	0.8	1.1
Catholic	9.4	3.1	34.8	41.0	20.3	18.8
Christian NFD	6.8	6.6	5.2	5.1	5.2	4.7
Latter-Day Saints	8.5	11.2	1.9	s	2.5	2.9
Methodist	2.5	1.0	2.4	s	16.2	27.5
Pentecostal	2.3	1.7	3.5	2.8	10.8	16.3
Presbyterian	25.9	43.9	31.0	38.2	2.7	2.2
Other Christian Religions	4.5	3.5	2.1	1.7	6.8	8.7
All Other Religions	4.8	0.6	0.9	0.0	12.9	10.1
Object to Answering	6.8	6.8	4.0	2.2	4.8	1.8
No Religion	24.0	16.4	9.7	4.5	14.1	3.6
Religious Affiliation	Other Pacific (%)		Pacific (%)		Non Pacific	New Zealand
	Any	Sole	Any	Sole		
Anglican	4.8	3.7	2.7	1.4	8.1	7.3
Baptist	0.6	s	0.8	0.7	1.5	1.4
Catholic	16.4	14.2	18.9	19.0	11.6	11.8
Christian NFD	6.2	5.3	7.2	7.6	4.4	4.4
Latter-Day Saints	6.0	5.3	7.0	7.4	0.8	1.3
Methodist	8.0	10.2	11.7	16.0	1.2	2.1
Pentecostal	3.8	4.1	5.9	7.5	2.0	2.2
Presbyterian	22.8	30.9	16.7	20.5	4.9	5.7
Other Christian Religions	7.6	10.2	5.2	5.9	2.3	2.4
All Other Religions	2.8	1.6	3.5	1.6	9.2	8.4
Object to Answering	4.2	1.6	4.5	3.2	5.4	5.1
No Religion	14.2	6.1	14.5	6.2	47.1	42.3

Source: Statistics New Zealand; Ethnicity assigned using Any / Sole Classification (see page 11 for details); As young people may identify with more than one religious group, columns do not add to 100%

Summary

Religion plays an important role in Pacific societies, and is incorporated into the mottos of a number of Pacific nations. In New Zealand during 2006, the vast majority of Pacific young people identified with a Christian religion, although the denomination varied from Pacific group to Pacific group. In addition, there was considerable variation between Pacific groups in terms of the number of young people who identified with no religion, with the proportion being lowest for Tongan young people (Sole 1.9%; Any 7.3%) and highest for Cook Island Māori young people (Sole 18.0%; Any 25.7%). Even for (Any) Cook Island young people however, rates were lower than for non-Pacific groups, where 47.1% stated they had no religion.



Pacific Language Retention

Throughout history, writers have reflected on the importance of language and its role in shaping communities. Chaika [24] in a publication entitled *Language the Social Mirror*, noted that “*Language and society are so intertwined that it is impossible to understand one without the other. There is no human society that does not depend on, is not shaped by, and does not itself shape language.*”

Language is thus an important part of an ethnic group’s cultural identity. It is embedded within the values, beliefs and norms of the groups who use it. For many migrants, maintaining one’s first language and passing it on to the next generation is perceived as important to both cultural and personal well-being, in that it ensures that traditions, customs and protocols are preserved [25].

In New Zealand, the 2001 Census suggested that birthplace was the most significant adult characteristic influencing the probability of children speaking their group’s first language, with New Zealand born children living with an overseas born mother being more likely to speak their group’s first language than children living with a New Zealand born mother. Such findings suggest that the intergenerational transfer of first languages between parents and children is more likely to occur in households containing overseas-born parents. Similarly, for New Zealand born children, multiple ethnicities were identified as the most significant characteristic influencing the probability of speaking their group’s first language, with the probability decreasing as the number of ethnic affiliations increased [26].

These findings are of particular relevance for Pacific children and young people in New Zealand, with the 2006 Census suggesting that approximately 3/4 of the current Cook Island Māori, Niue and Tokelauan populations were New Zealand born, as compared to 60% of the Samoan and 56% of the Tongan populations. During the same period, language retention was higher for Samoans, Tongans and Tuvaluans, with Cook Island Māori, Niueans, Fijians and Tokelauans having significantly lower retention rates (only 16% of Cook Island Māori and a quarter of Niueans and Fijians reported being able to speak their own languages during 2006) [27].

For New Zealand, preserving linguistic diversity through the maintenance of languages such as Tokelauan and Niuean is increasingly being considered an issue of social responsibility. A range of initiatives such as Pacific language nests and subsidized community broadcasting (e.g. Access Radio) have been put in place to increase Pacific language retention. Newer government initiatives include supporting second-language learning in schools. These strategies reflect New Zealand’s growing language diversity and will enable further development of Pacific and global trade and security interests, as well as strengthening the cultural identity of Pacific children and young people in New Zealand. In this context, the following section explores the languages spoken by Pacific young people (15-24 years) in New Zealand at the time of the 2006 Census.

Data Source and Methods

Definition

Number of Young People 15-24 Yrs Who Spoke a Pacific Language at the 2006 Census

Proportion of Pacific Young People 15-24 Yrs who Spoke Their Own Pacific Language at the 2006 Census

Data Source and Interpretation

Numerator: Number of Young People 15-24 Years Speaking a Pacific Language at the 2006 Census

Denominator: Number of Young People 15-24 Years at the 2006 Census

Indicator Category: Ideal B

Interpretation: At the 2006 Census, respondents were asked “In which language(s) could you have a conversation about a lot of everyday things?” Respondents were also reminded to tick the “English” box if they could have a conversation in English. Tick box options included English, Māori, Samoan and NZ Sign Language, and additional space was provided for nominating other languages. As multiple responses were allowable, the percentages in the tables and figures which follow do not sum to 100%.

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

New Zealand Distribution

Number of New Zealand Young People Speaking Pacific Languages

At the 2006 Census respondents were asked “*In which language(s) could you have a conversation about a lot of everyday things?*” The responses of New Zealand young people (15-24 years) suggested that English had the largest number of speakers (n=530,856). Of Pacific languages during this period, Samoan had the largest number of speakers (n=15,000), followed by Tongan (n=5,070) and Cook Island Māori (n=1,011) (**Table 10**).

Table 10. Languages Spoken by New Zealand Young People Aged 15-24 Years at the 2006 Census (n=571,176)

Language	Number of Speakers Aged 15-24 Years	Percent of 15-24 Year Olds
English	530,856	92.9
Māori	27,675	4.8
Samoan	15,000	2.6
Tongan	5,070	0.9
Cook Islands Māori	1,011	0.2
Niue	681	0.1
Tokelauan	468	0.1
Tuvaluan	327	0.1
Tahitian	27	0.0
Pukapukan	21	0.0
Fijian	657	0.1
Rotuman	30	0.0
Solomon Islands Languages	18	0.0
Kiribati	183	0.0
Nauruan	21	0.0
Vanuatu Languages	15	0.0
Other Languages	92,031	16.1
None, Not Stated or NOS	33,075	5.8

Source: Statistics New Zealand; Note: As many young people speak more than one language, percentages do not add to 100%

Proportion of Pacific Language Speakers by Pacific Ethnic Group

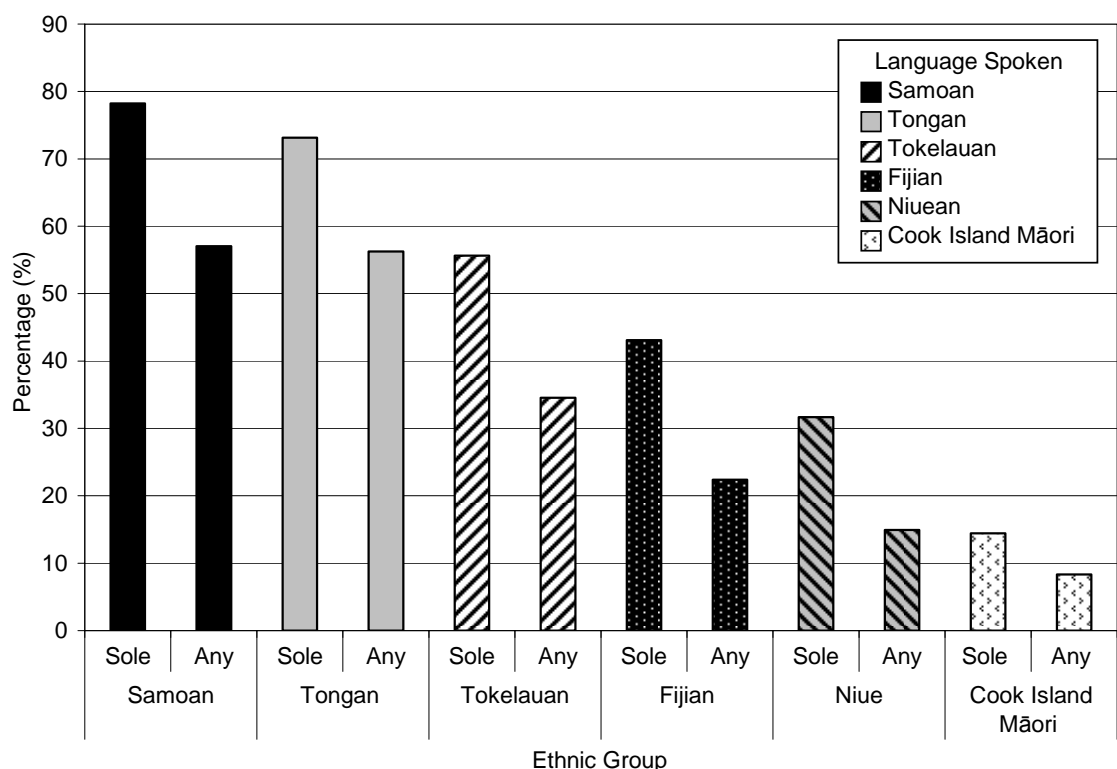
During 2006 a review of the number of Pacific young people (15-24 years) who spoke a Pacific language suggested that (**Table 11, Figure 7**):

1. The vast majority (>90%) of Pacific young people in New Zealand could hold an everyday conversation in English, and while differences were small, within each Pacific group, the proportion who could do so was higher for those in the (Any) category. Given that a significant minority of young people did not provide an interpretable response (range 1.1-5.7%), it is possible that the proportion able to hold an everyday conversation in English is higher than these figures suggest.
2. The proportion of young people able to hold an everyday conversation in their own Pacific language varied markedly from ethnic group to ethnic group, with the highest

proportions being seen amongst Samoan (Sole 78.2%; Any 57.0%) and Tongan (Sole 73.2%; Any 56.2%) young people, and the lowest proportions being seen amongst Niue (Sole 31.7%; Any 14.9%) and Cook Island Māori (Sole 14.4%; Any 8.3%) young people.

3. Within each Pacific group, a higher proportion of Sole than (Any) young people could hold an everyday conversation in their own Pacific language.
4. Particularly amongst the (Any) Pacific groups, a significant minority were also able to hold an everyday conversation in Māori.

Figure 7. Proportion of Pacific Young People Aged 15-24 Years Speaking Pacific Languages by Ethnic Group, New Zealand at the 2006 Census



Source: Statistics New Zealand; Ethnicity assigned using Any / Sole Classification (see page 11 for details)

Summary

Language is an important part of an ethnic group's cultural identity. It is embedded within the values, beliefs and norms of the groups who use it. For many migrants, maintaining one's first language and passing it on to the next generation is perceived as important to both cultural and personal well-being, in that it ensures that traditions, customs and protocols are preserved. In New Zealand during 2006, the proportion of Pacific young people able to hold an everyday conversation in their own Pacific language varied, with the highest rates being seen in Samoan and Tongan young people, and lower rates being seen in Niue and Cook Island Māori young people. For New Zealand, preserving linguistic diversity is increasingly being considered an issue of social responsibility, with a range of initiatives such as Pacific language nests and subsidized community broadcasting being put in place to increase Pacific language retention.

Table 11. Proportion of Pacific Young People 15-24 Years Speaking Selected Languages by Ethnic Group, New Zealand at the 2006 Census

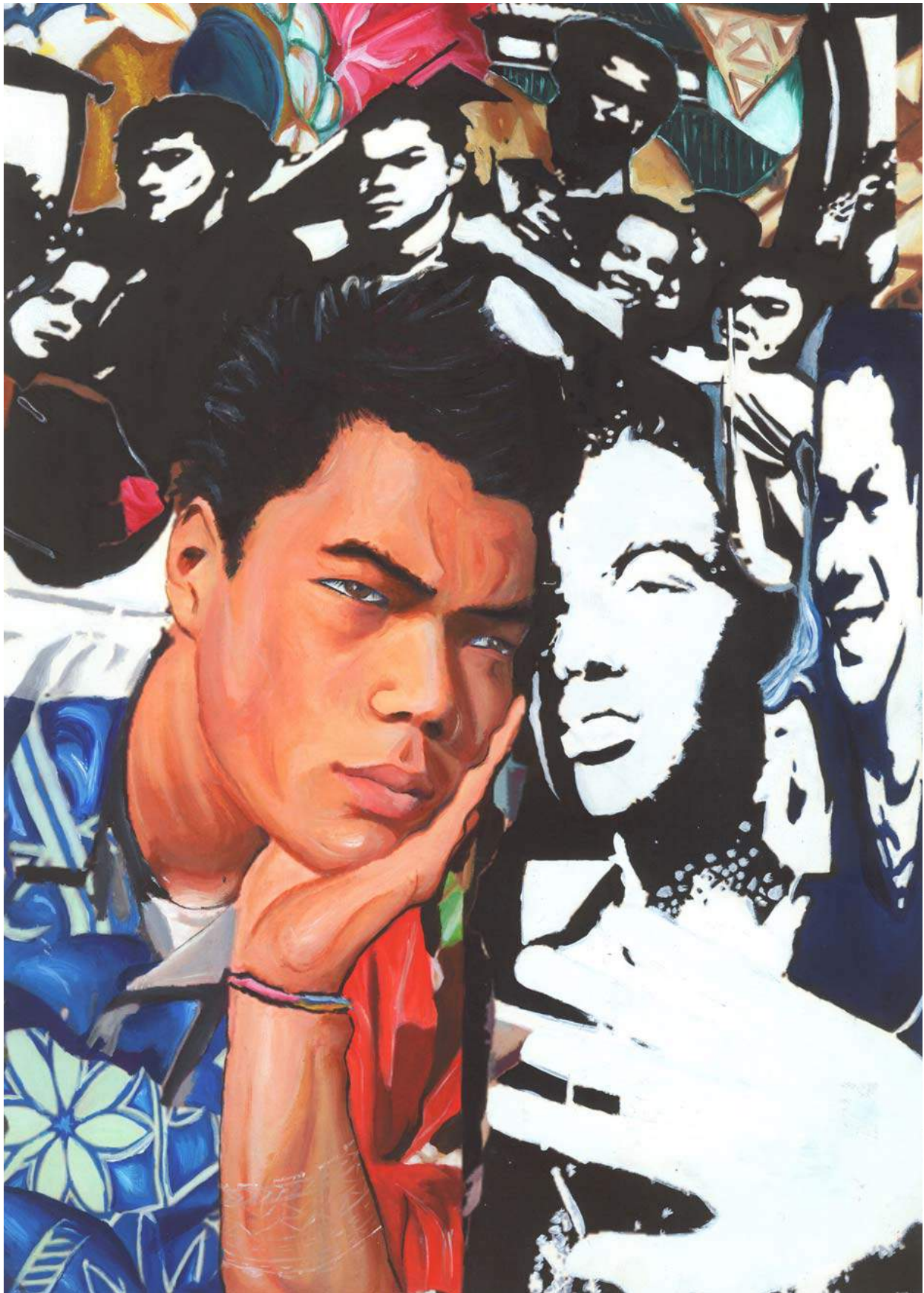
Languages Spoken	Samoan (%)		Languages Spoken	Cook Island Māori (%)	
	Sole	Any		Sole	Any
English	91.5	94.0	English	95.6	97.0
Māori	0.9	3.2	Māori	5.6	8.2
Samoan	78.2	57.0	Cook Island Māori	14.4	8.3
Not Stated	2.7	2.1	Not Stated	3.2	2.1
Languages Spoken	Tongan (%)		Languages Spoken	Niue (%)	
	Sole	Any		Sole	Any
English	92.8	94.4	English	95.7	97.1
Māori	0.8	3.1	Māori	0.4	4.9
Tongan	73.2	56.2	Niue	31.7	14.9
Not Stated	3.2	2.7	Not Stated	2.3	1.8
Languages Spoken	Tokelauan (%)		Languages Spoken	Fijian (%)	
	Sole	Any		Sole	Any
English	96.6	97.2	English	94.9	97.0
Māori	3.4	4.0	Māori	-	2.5
Tokelauan	55.6	34.5	Fijian	43.1	22.4
Not Stated	1.1	1.4	Not Stated	2.5	1.4
Other Pacific Peoples (%)					
Languages Spoken	Sole	Any	Languages Spoken	Sole	Any
English	91.1	95.0	Kiribati	17.1	9.6
Māori	0.8	4.6	Nauruan	1.6	1.4
Tuvaluan	35.4	20.2	Not Stated	5.7	3.2
Tahitian	1.2	1.0			
Rotuman	1.2	1.8			

Source: Statistics New Zealand; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Numbers do not total to 100% as many young people speak more than one language



Socioeconomic
and Cultural
Determinants

Economic
Standard
Of Living



Self Portrait and Friends by Michael Lea
"The patterns and colour symbolise my cultural identity"

Viewpoint: Socioeconomic and Family Factors

by Seini Taufa

Introduction

All societies desire their children to grow up to become competent and productive citizens. Yet not all children start off from the same mark. In many societies, a significant minority of children face hazards or disadvantages linked to their socioeconomic circumstances, which they need to overcome if they are to reach their full potential [28]. Socioeconomic status thus remains a topic of great interest for those who study child and youth health, with the literature suggesting that high socioeconomic status families have opportunities to afford their children an array of services, goods, parental actions, and social connections which contribute to their development. In contrast, children from less affluent families may lack access to these same resources, putting them at risk of poorer health [29] [28].

As the following sections of this report will suggest, these issues are particularly important for Pacific families in New Zealand, with Pacific babies being much more likely to be born into socioeconomically deprived (NZDep Decile 8-10) areas, or to be brought up in families whose living standards result in severe hardship (**Page 48**). Given the crucial links between family socioeconomic circumstances and child and youth health, this viewpoint considers three key elements of socio-economic status (income, employment and education) and how these might be improved, in order to achieve better outcomes for Pacific families and children.

Income

Income is one of the single most important determinants of health [30]. While the 2006 Census noted that Pacific people in New Zealand had lower incomes than non-Pacific people (median annual income Pacific People \$20,500 vs. New Zealand \$24,400 [31]), the potentially greater financial commitments many Pacific families experience must also be taken into account. While the 2006 Census found that Niueans and Samoans had the highest median incomes [32], a recent study exploring health related socioeconomic characteristics amongst Pacific populations in Auckland found that Samoans experienced greater financial pressures. These pressures were in part as a result of remittances to family in Samoa, donations of money to the Church, and an adherence to the cultural concept of Fa'a Samoa (in response to requests from family elders, leaders, or Matai (village chief) for financial contributions to be used to finance projects, functions, or for gifting to prominent people, guests, and visitors [33]).

Similarly, the high priority Pacific families place on being connected or geographically close to kin means that many Pacific families choose to locate themselves in major urban centres (e.g. Auckland and Wellington), even though the cost of living these centres is much higher than in regional or rural areas (e.g. in 2006, 67% of Samoan, 60% of Cook Island Māori, 80% of Tongan and 79% of Niue people in New Zealand were based in Auckland [32] even though median weekly rentals in Auckland (\$275) were much higher than the New Zealand average (\$201) [34]. During 2006 a much higher proportion of Pacific people (34%) were also living in an extended family situation than the total New Zealand population (10%) [32]. Thus even for a given level of income, it is likely that Pacific families have greater financial commitments as a result of the high priority they place on being connected to kin and other community obligations, and these factors need to be taken into account when considering the role income plays in ensuring wellbeing for Pacific families and children.

Employment

One of the main factors determining income is employment. Employment has been shown to increase general health and wellbeing as it provides opportunities for social interaction, community participation, the development of social status, and can



increase levels of physical activity [35]. In New Zealand a higher proportion of Pacific men (71%) are employed than Pacific women (59%), with the most common occupations for Pacific men being labourers (23%), machinery operators / drivers (21%) and technicians / trades workers (20%). Pacific women are more likely to be clerical / administrative workers (19%), labourers (19%), professionals (15%) or community / personal service workers (15%) [31]). With many Pacific people working in low-skilled jobs paying the minimum wage, it is likely that the high cost of living in urban areas will impact on the number of hours they have to work, as well as the priority they award to health issues (e.g. for those working long hours or doing shift work, finding adequate child care may be an issue, and personal health may not be taken seriously, as time taken off work means less income).

Conversely, unemployment has been found to be detrimental to both physical and mental health [36]. In New Zealand during 2006, 10.7% of the adult Pacific population was unemployed, as compared to 5.0% for New Zealand as a whole [32]. In contrast, 28% of Pacific adults received income support (e.g. Government benefits or other payments) as compared to 17% of the total New Zealand population [32]. When interpreting these figures however, the larger size of Pacific families and the impact this may have on care giving duties, as well as different levels of awareness for welfare entitlements, and how to access them must be taken into account [30]. In addition, the 2006 Census suggest that workforce statistics may underestimate the amount of time put into the traditional labour market (e.g. volunteer work within Pacific communities).

Education

Another key determinant of socio-economic status is education, which effects health indirectly via its impact on occupation and income [37]. Education also impacts on health directly by improving an individual's knowledge about health related topics and giving people confidence to seek the aid of professionals. In a recent study entitled "*Who Doesn't Get Into Preschool*" Fergusson et al [38] found that mothers who were better educated were more likely to receive health services for their children (e.g. postnatal care, immunisation, community nurses, early dental care, early childhood education) than those that were not. These findings highlight the importance of ensuring that Pacific people are aware of the health issues prevalent within the community and the services available to address them.

Secondary school education is also critical for developing potential employment opportunities for students. It paves the way for further tertiary education, or moving into a trade or apprenticeship. While retention rates for Pacific students in senior secondary school remain higher than for most other ethnic groups (**Page 86**), the proportion of Pacific students leaving school with a University Entrance Standard remains much lower than for Asian or European students. Thus in 2006 only 16.8% of Pacific students left school with a University Entrance Standard, as compared to 41.3% of European and 63.0% of Asian young people. While all ethnic groups saw increases in the proportion of students gaining a University Entrance Standard since 2002, the differences between ethnic groups have remained (**Page 81**).

Considering these figures in the context of the earlier figures on employment, it is likely that many Pacific students go straight from high school into a low-paid job. This editorial recognizes the importance of maximizing education by encouraging further tertiary education and/or youth learning a trade or apprenticeship. This will better the chances of gaining employment and increasing income.

Conclusions and Recommendations

This editorial has considered three components of socioeconomic status which impact on the wellbeing of Pacific families and their children. It has also highlighted a number of areas where it may be possible to break down the barriers Pacific children experience as a result of their socio-economic position.

Firstly, secondary school education is critical for enhancing potential employment opportunities for Pacific young people. It paves the way for further tertiary education, a trade or an apprenticeship. Given that at present, many Pacific students are likely to go straight from high school into a low-paid job, maximizing education by encouraging further tertiary education and / or the learning of a trade / an apprenticeship is vitally important for future employment and income earning potential. This can be achieved by working with Pacific communities, so that both Pacific youth and Pacific families are aware of the options available for further study.

Secondly, a significant proportion of the Pacific population are involved in unskilled occupations, which at times require either long hours or shift work. In such cases it is likely that traditional child care facilities will be unable to meet the needs of working families. It is thus recommended that culturally appropriate childcare facilities which can cater to the needs of shift workers be explored, so that parents can ensure that their children are adequately cared for while earning income for their families.

Finally, it is recommended that greater emphasis be placed on ensuring that Pacific families are aware of the resources available to them in the community. This can be done by being mobile, working with cultural centres, community groups or local churches to spread key health messages. By interacting with the local community, health professionals can thus ensure that Pacific families will be more confident to use services and ask questions.



Children in Families with Restricted Socioeconomic Resources

Introduction

High rates of child poverty are a cause for concern, as low family income has been associated with a range of negative outcomes including low birth weight, infant mortality, poorer mental health and cognitive development, and hospital admissions from a variety of causes [39]. While there is much debate about the precise pathways via which lower family income leads to adverse outcomes, the relationship appears to be non-linear, with the effects increasing most rapidly across the range from partial to severe deprivation [40].

Family income, however, is only one facet of the complex construct called socioeconomic status, which also encompasses such dimensions as economic ownership, community prestige and access to resources via family background, lifestyle and social networks [41]. This complexity often means that conceptually coherent measures of socioeconomic status are difficult to derive from routine data sources [42] and instead researchers have tended to use a number of crude proxy measures (e.g. family income, parental education and occupation, and area of residence), each of which assesses a slightly different aspect of socioeconomic wellbeing. Despite this, each of these measures has been associated with adverse child health outcomes in a variety of different settings.

In New Zealand, a range of agencies collect information on the socioeconomic resources available to families with children, which collectively can be used to create a picture of the overall economic wellbeing of Pacific families living in New Zealand. The following section thus brings together information from three different data sources:

1. The distribution of Pacific births by NZ Deprivation Index decile, which reflects the degrees of relative deprivation into which Pacific babies are born each year.
2. The Proportion of Dependant Children / Families with Dependant Children / Total Families who live below the Poverty Line (Net-of-Housing-Cost-Incomes < the 60 % Line) [43].
3. The Distribution of Pacific Families with Dependent Children by the New Zealand Economic Living Standards Index, which serves to identify groups of families who are living in severe or significant hardship [44].

Data Source and Methods

Definition

1. Distribution of Births by NZ Deprivation Index Decile
2. Proportion of Dependant Children / Families with Dependent Children / Total Families with Net-of-Housing-Cost-Incomes < the 60 % Line
3. Distribution of Families with Dependent Children by the NZ Economic Living Standards Index

Indicator Category

Bookmark B

Data Source and Interpretation

1. *Distribution of Births by NZ Deprivation Index Decile*

Numerator: Birth Registration Dataset (Appendix 2): Number of births registered in New Zealand (by ethnicity and NZ Deprivation Index Decile).

Denominator: Birth Registration Dataset: Total number of births registered in New Zealand

Interpretation: Births are presented by birth registration year rather than year of birth. Ethnicity (of the baby) is that supplied by parents on their child's birth registration form and NZ Deprivation Index decile is based on the domicile code representing the usual residential address of the mother at the time of birth registration (which in this analysis has been mapped to NZDep2001).

2. *Proportion of Dependant Children / Families with Dependent Children / Total Families with Net-of-Housing-Cost-Incomes < the 60 % Line*

Numerator: The Ministry of Social Development's Social Report: Derived from Statistics New Zealand's Household Economic Survey (1988-2004)

Interpretation: The New Zealand Household Economic Survey is a 3-yearly survey managed by Statistics New Zealand. In 2004 the survey comprised the responses of 2,854 households sampled in a statistically representative fashion. Economic Family Units were constructed by the Ministry of Social Development as follows: all young adults are considered financially independent at 18 years of age, or at 16-17 years if they are receiving a benefit, or are employed for >30 hours per week. Housing costs were apportioned to economic family units and adjustments for family size by means of a per capita equivalisation based on the 1988 Revised Jensen Equivalence Scale. The resulting amount – the Housing-Adjusted Equivalised Disposable Income (HEDY) can be regarded as an income based proxy measure of standard of living. An income of < 60% of the median HEDY was chosen as the low income threshold in this analysis. A more detailed discussion of the methodology used and limitations of this analysis can be found in the 2006 Social Report [43].

3. *Distribution of Families with Dependent Children by the NZ Economic Living Standards Index*

Numerator: The Distribution of Living Standards for Families with Dependent Children as Reported by the Ministry of Social Development in its 2004 Living Standards Report [44]

Interpretation: The Economic Living Standard Index (ELSI) uses information on 40 items, which individually have a strong relationship with living standards (e.g. household amenities, personal possessions, access to services, and adequacy of income to meet everyday needs). The 2004 Living Standards Survey used the ELSI to survey a probabilistic sample of New Zealand residents aged 18+ years in March and June 2004. A total of 4,989 respondents answered on behalf of their family units, giving a response rate of 62.2%. The results in this section relate to the living standards of families with dependent children, with the level of analysis being the economic family unit, rather than the individual child. A more detailed discussion of the methodology used and the limitations of this survey can be found in the New Zealand Living Standards 2004 Report [44].

Statistical Significance Testing

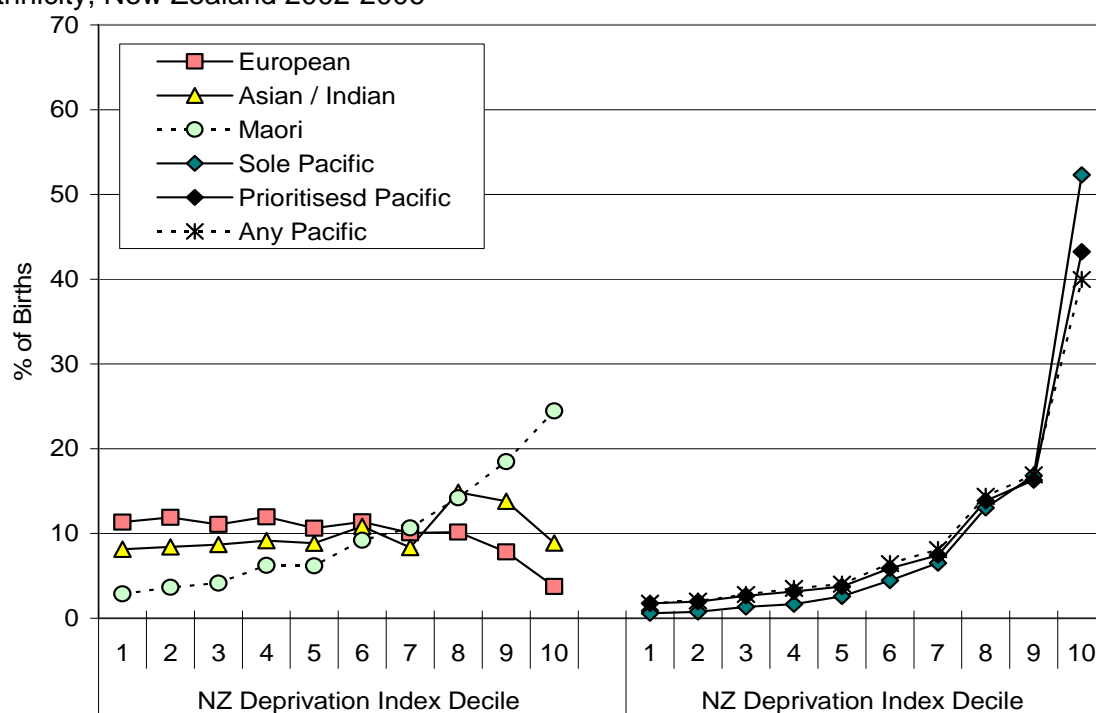
Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance.

Distribution of Births by NZ Deprivation Index Decile

Distribution During Past 5 Years: In New Zealand during 2002-2006, 52.3% of Sole Pacific, 43.2% of Prioritised Pacific and 40.0% of Any Pacific babies were born into the most deprived (NZDep Decile 10) areas, while only 0.6% of Sole Pacific, 1.7% of Prioritised Pacific and 1.8% of Any Pacific babies were born into the most affluent (NZDep Decile 1) areas. In contrast, European and Asian / Indian births were much more evenly spread across the NZDep distribution (**Figure 8**). (For a more detailed analysis of births by Pacific ethnic group see **Figure 3** and **Figure 4** in the earlier Demography and the Measurement of Ethnicity section).

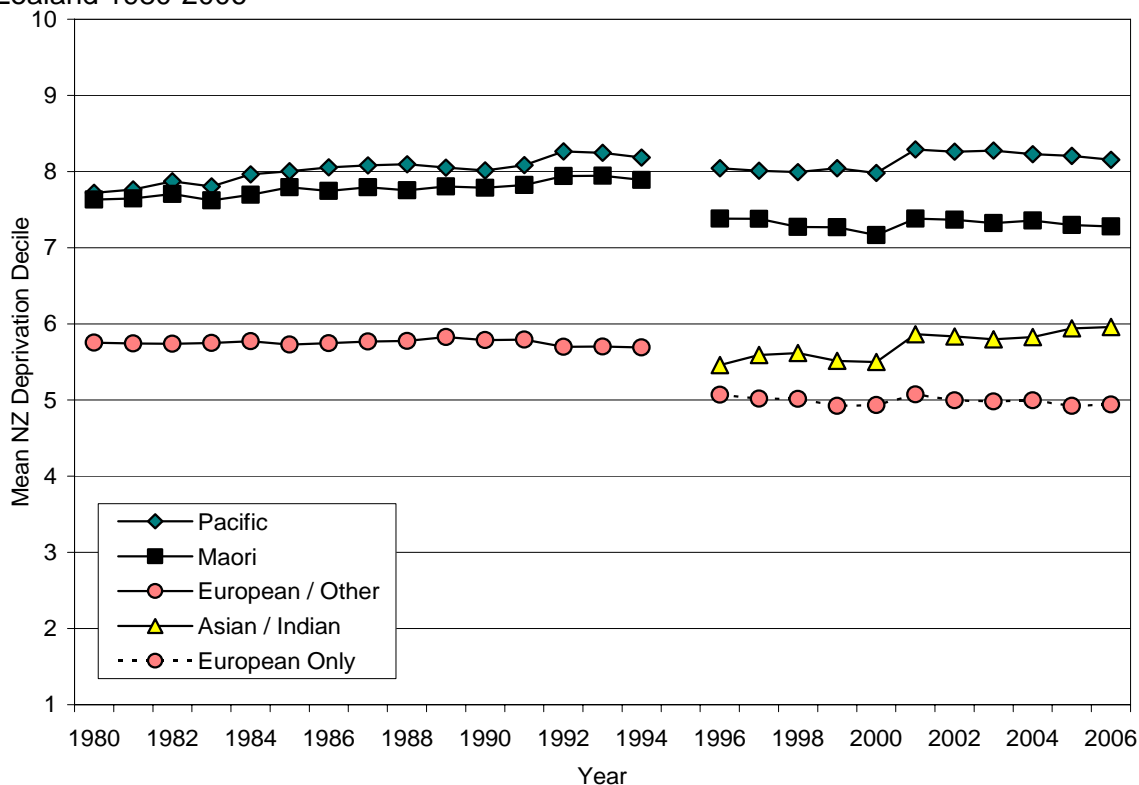
Trends Over Time: During 1996-2006, the mean NZDep Index Decile into which Pacific babies were born remained consistently higher than for Māori > Asian / Indian > European babies. While the NZDep Index is a relative scale and thus absolute changes in socioeconomic wellbeing (e.g. parental income, education) may have occurred, in relative terms the average socioeconomic position into which Pacific babies were born changed little during this period (**Figure 9**).

Figure 8. Distribution of Births by NZ Deprivation Index Decile (NZDep2001) and Ethnicity, New Zealand 2002-2006



Source: Birth Registration Dataset; Ethnicity for Non-Pacific Groups is Level 1 Prioritised; Ethnicity for Pacific Groups also assigned using Any / Sole Classification (see page 11 for details)

Figure 9. Distribution of Births by Ethnicity and NZ Deprivation Index Decile, New Zealand 1980-2006



Source: Birth Registration Dataset; Note: Ethnicity prior to 1995 is ancestry based, but after 1995 is Level 1 Prioritised. NZ Deprivation Index Decile is mapped to NZDep1996 and then NZDep 2001

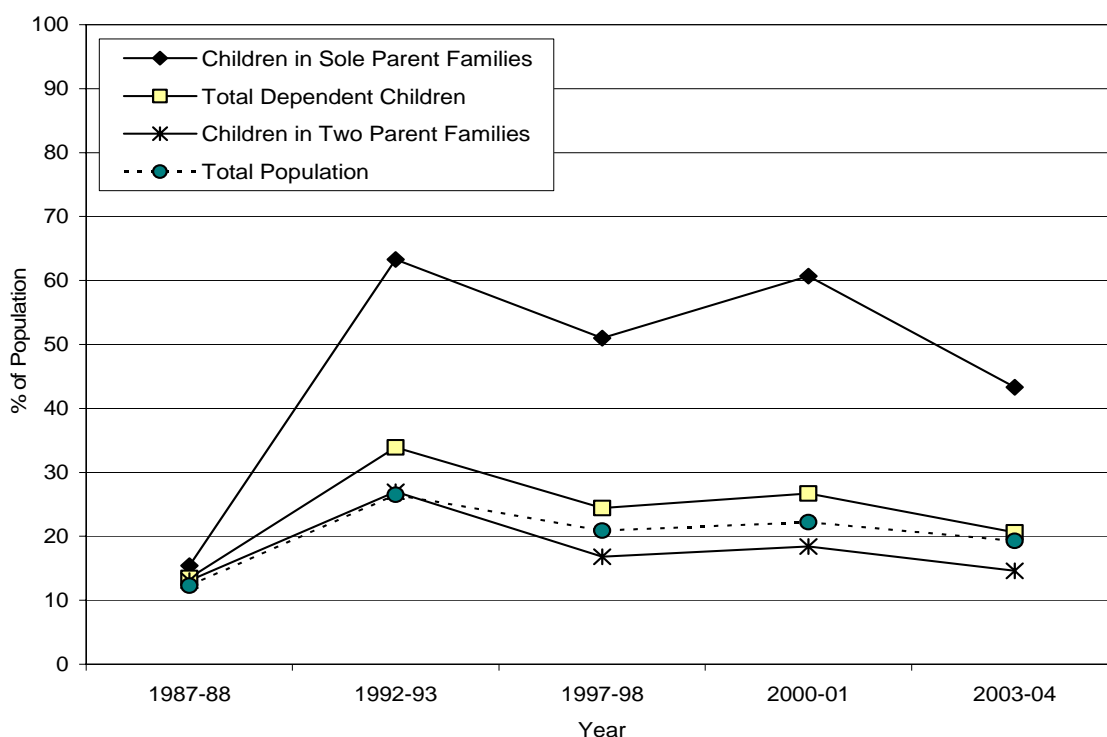
Children in Families with Low Incomes

Family Type: During 1987-88, data from the New Zealand Household Economic Survey (NZHES) suggested that 13.5% of dependent children in New Zealand lived below the poverty line (net-of-housing-cost income <60% of the median). During this period, there was little variation by family type, with 15.4% of children in sole-parent families living below the poverty line, as compared to 13.1% of children in two-parent families. By 1992-1993 however this proportion had increased markedly, with 63.3% of children in sole-parent families living below the poverty line, as compared to 27.0% of children in two-parent families. Since then, the proportion living below the poverty line has gradually declined for all family types, with 43.3% of children in sole parent families and 14.6% of children in two parent families living below the poverty line in 2003-2004 (Figure 10).

Income Source: During 1987-88, 12.3% of families with dependent children lived below the poverty line, as compared to 25.1% of (all) families who were reliant on income tested benefits. By 1992-1993, these proportions had increased, with 32.7% of families with dependent children living below the poverty line, as compared to 75.1% of (all) families relying on income tested benefits. While rates gradually declined again during the late 1990s / early 2000s, they never reached their late 1980's levels, so that by 2003-2004 51.2% of (all) families on income tested benefits and 20.1% of families with dependent children still lived below the poverty line (Figure 11).

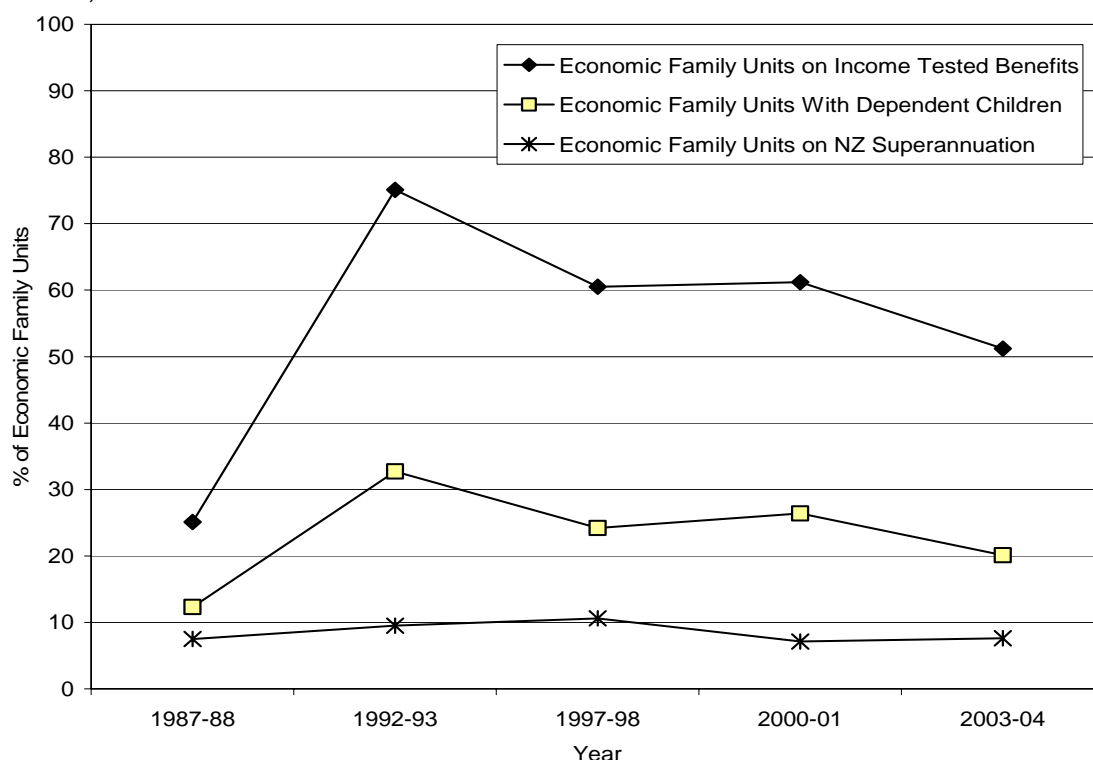
Ethnicity: During 1987-88, 23.4% of Pacific families lived below the poverty line, as compared to 12.5% of European families. By 1992-93 however, the proportion of Pacific families living below the poverty line had increased to 50.0%, with gradual declines during the ensuing decade never returning Pacific families to their late 1980s income poverty levels (40.2% of Pacific family units lived below the poverty line in 2003-04 (Figure 12)).

Figure 10. Proportion of Population with Incomes Below the Poverty Line (Net-of-Housing-Cost Income <60% Line Benchmarked to 1998 Median) by Family Type, Selected Years 1987-2004



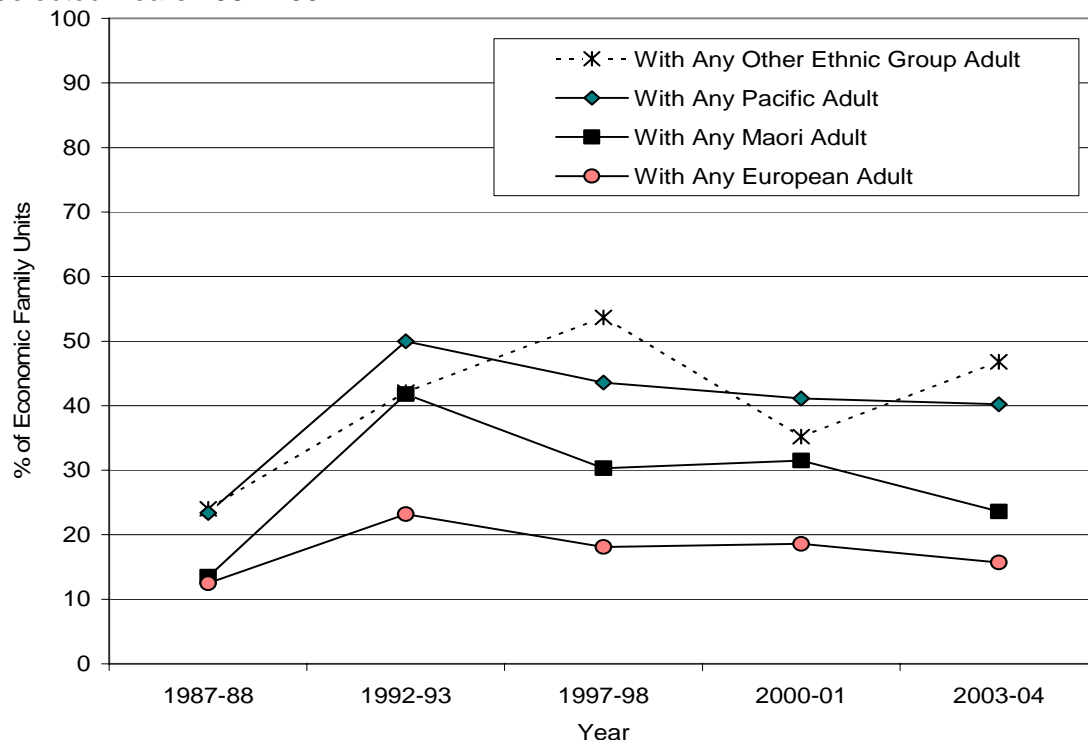
Source: The Social Report 2006 [43], derived from Statistics NZ's Household Economic Survey (1988-04)

Figure 11. Proportion of Economic Family Units with Incomes Below Poverty Line (Net of Housing Cost Incomes <60% Line Benchmarked to 1998 median) by Income Source, Selected Years 1987-2004



Source: The Social Report 2006 [43], derived from Statistics NZ's Household Economic Survey (1988-2004)

Figure 12. Proportion of Economic Family Units with Incomes Below Poverty Line (Net of Housing Cost Incomes <60% Line Benchmarked to 1998 median) by Ethnicity, Selected Years 1987-2004

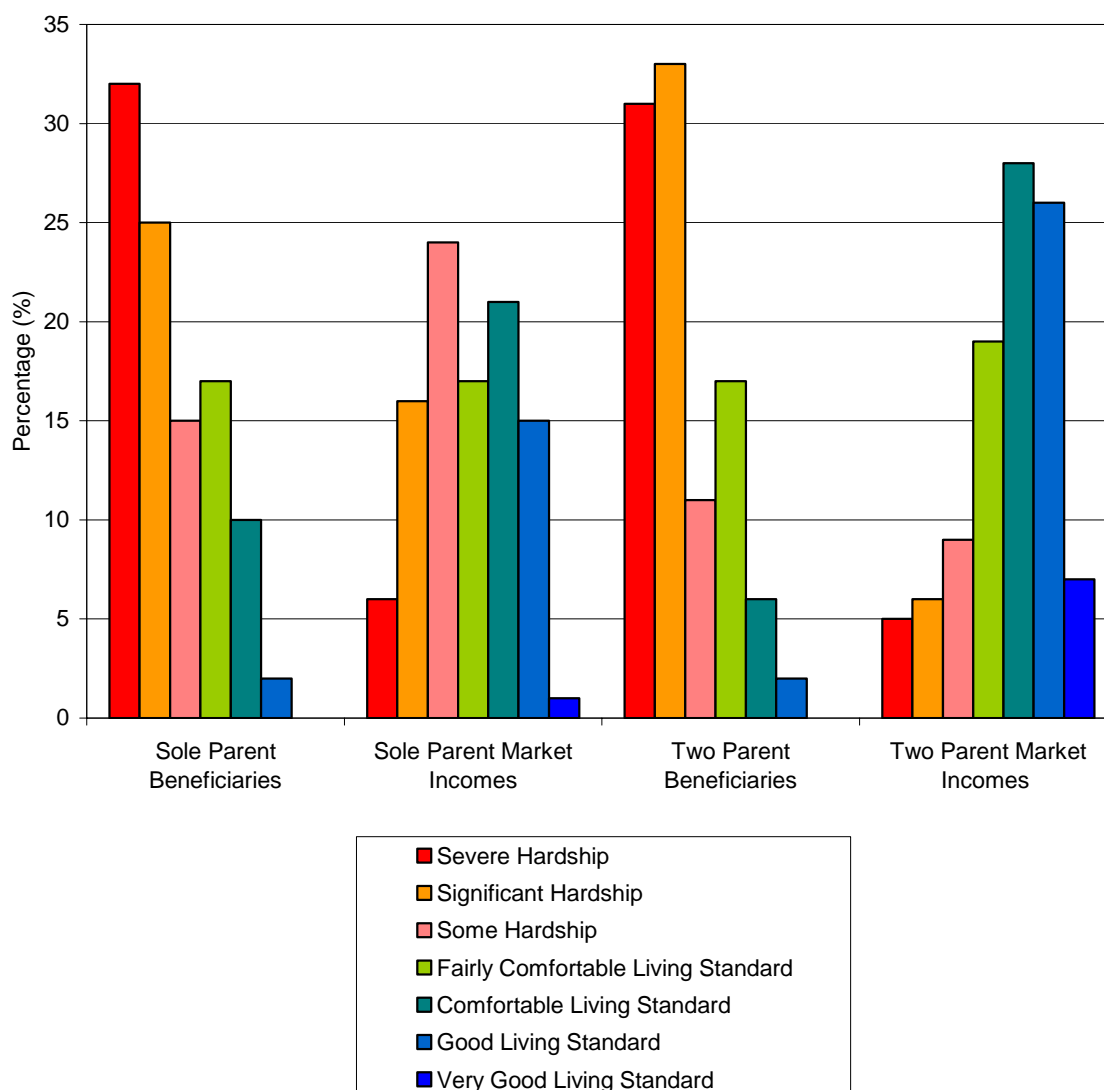


Source: The Social Report 2006 [43], derived from Statistics NZ's Household Economic Survey (1988-2004); Family ethnicity is defined by the presence of an adult of a particular ethnic group. The figures in each category are thus not mutually exclusive.

Families with Reduced Living Standards

Family Type and Income Source: In the 2004 Living Standards Survey, 30% of all Economic Family Units contained dependent children. While only 10% of family units without children were classified as living in severe or significant hardship, this figure rose to 22% for families with dependent children. The proportion living in severe or significant hardship also varied with family type and income source, with 42% of sole-parent families being classified as living in severe or significant hardship as compared to only 14% of two-parent families. Similarly, 58% of families who relied on income tested benefits were classified as living in severe or significant hardship, as compared to 12% of families receiving their income from market sources. Further analysis however, suggested that the difference in living standards between sole and two-parent families was largely due to the former's greater reliance on benefits as their main source of family income [44] (**Figure 13**).

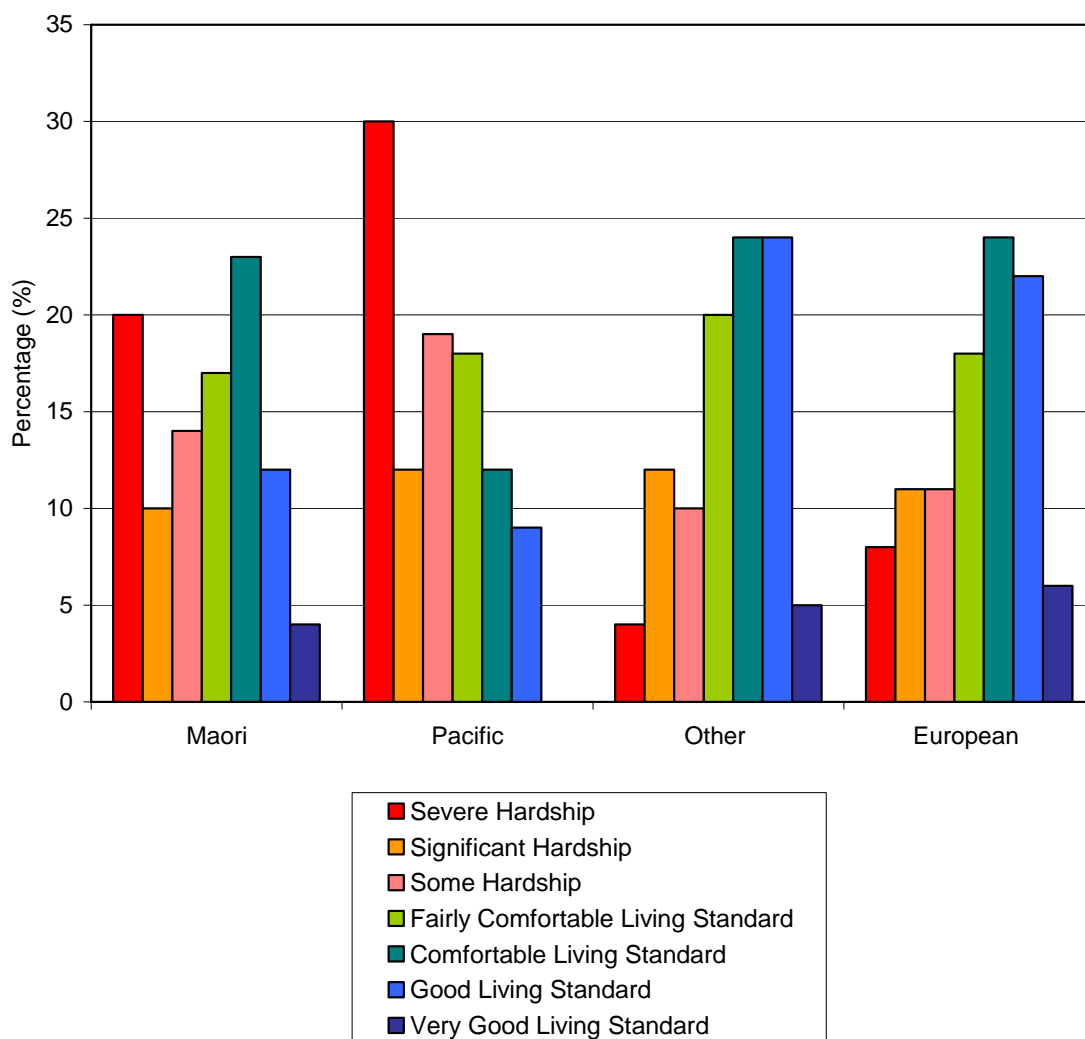
Figure 13. Distribution of Living Standards for Families with Dependent Children by Family Type and Income Source, NZ Living Standards Survey 2004



Source: NZ Living Standards Survey [44]

Ethnicity: The 2004 Living Standards Survey also noted that European and Other families with dependant children had higher average living standards (37.6 and 38.4 respectively) than Pacific and Māori families with dependant children (25.3 and 31.6 respectively). Of note, 30% of all Pacific families with dependant children in the 2004 survey reported living in severe hardship, as compared to 8% of European families. Overall, 61% of all Pacific families with dependant children lived in severe, significant or some hardship during this period (**Figure 14**).

Figure 14. Distribution of Living Standards for Families with Dependent Children by Family Ethnicity, NZ Living Standards Survey 2004



Source: NZ Living Standards Survey [44]; Family Ethnicity is based on total responses to the ethnicity question e.g. if any adult or child specified Pacific as one of their ethnicities, the family is counted as Pacific – thus these ethnic groupings are not mutually exclusive.

The Living Standards Survey also explored the constraints placed on children's consumption arising from their family's living standards and noted that of children living in severe hardship, 51% had to go without suitable wet weather gear, 38% were unable to have a friend over for a meal and 34% were unable to have friends over for a birthday party because of the cost. In addition, 46% of parents had postponed a child's doctor's visit and 36% had postponed a child's dentist's visit because of cost, and in 40% of cases children had to share a bed [44].

Summary

The above analysis suggests that a significant proportion of Pacific children and young people in New Zealand are placed at a disadvantage as a result of their family's limited socioeconomic resources. During 1988-2004, New Zealand saw large increases in the number of Pacific families living below the poverty line, and while improvements have occurred during the past decade, the proportions of Pacific families living below the poverty line have not yet recovered to their 1987-1988 levels. In addition, the relative socioeconomic position into which Pacific babies are born (as measured by the NZ Deprivation Index) has not changed appreciably during the past decade (although no conclusions can be drawn as to the absolute socioeconomic position of Pacific babies from these figures). Finally, the NZ Living Standards survey suggested that 30% of Pacific families with dependant children in 2004 lived in severe hardship, with many families having to postpone doctors and dentists visits due to cost and a number being unable to afford wet weather gear, or a separate bed for their children. Such figures are of concern and potentially suggest that restricted family resources make a significant contribution to the currently large health disparities experienced by Pacific children and young people in New Zealand.



Children Reliant on Benefit Recipients

Introduction

In New Zealand, children who are reliant on beneficiaries are a particularly vulnerable group. During 2003-04, 51% of all families (including both those with and without children) relying on benefits as their main source of income were living below the poverty line (housing adjusted equivalent disposable income <60% median) [45]. This proportion has fluctuated markedly over the past two decades, rising from 25% of benefit dependent families in 1987-88, to a peak of 75% in 1992-93 and then gradually falling back again to 61% in 2000-01, with the fluctuations being attributed to 3 main factors: cuts in the level in income support during 1991, growth in unemployment (which peaked at 11% in 1991) and escalating housing costs, particularly for those in rental accommodation [46]. Furthermore, benefit dependent children account for the majority of those living in poverty, with approximately 60% of children living below the poverty line in 2004 relying on Government benefits as their main source of family income [47].

The vulnerability of benefit dependent children was further highlighted by the 2000 Living Standards Survey, which noted that even once the level of family income was taken into account, families whose main source of income was Government benefits were more likely to be living in severe or significant hardship and as a consequence, more likely to buy cheaper cuts of meat, go without fruit and vegetables, put up with feeling cold to save on heating costs, make do without enough bedrooms, have children share a bed, postpone a child's visit to the doctor or dentist, go without a computer or internet access and limit their child's involvement in school trips, sports and extracurricular activities [46]. The recently released 2004 Living Standards Survey suggests that this picture did not improve between 2000-2004, with the proportion of benefit dependent families living in severe or significant hardship increasing from 39% in 2000 to 58% in 2004 [44] (Fig 4.2 p102).

While the number of children reliant on beneficiaries does not precisely correlate with the number living below the poverty line (in 2004 they comprised 60% of those in poverty [47]), and the relationship between benefit dependence and child poverty is sensitive to changes in Government social policy and market forces (e.g. changes in levels of income support vs. housing and other costs), an awareness of large shifts in the numbers of benefit dependent children (e.g. due to increased unemployment rates) is of value in tracking changes in the size of a particularly vulnerable group with higher health needs, and as a consequence for planning for future health service demand.

The following section thus reviews the number of New Zealand children (<18 years) dependent on core benefit recipients using information available from the Ministry of Social Development. As the MSD's SWIFFT database does not record the ethnicity of children reliant on benefit recipients (it only records the ethnicity of the benefit recipient themselves), it is difficult to accurately estimate the proportion of Pacific children in New Zealand who were reliant on benefit recipients during the last 7 years. It is likely however, that many of the trends highlighted in this section are of as much relevance to Pacific children living in New Zealand as they are to other ethnic groups.

Data Source and Methods

Definition

Children Under 18 Years of Age Reliant on Core Benefit Recipients by Benefit Type

Data Source

Numerator: Ministry of Social Development's SWIFTT database

Denominator: Census (with population estimates between census years)

Indicator Category Ideal B-C

Notes on Interpretation

Data was provided by the MSD from their SWIFTT database which records information on recipients of financial assistance through Work and Income for 2000-2007. All figures unless stated otherwise, refer to the number of children who were dependent on benefit recipients as at the end of April and provide no information on those receiving assistance at other times of the year.

To be eligible for a benefit, clients must have insufficient income from all sources to support themselves and any dependents and meet the eligibility criteria for benefits [48]. These are:

Domestic Purposes Benefit – Sole Parent (DPB-SP): This benefit provides income support for sole parents living with their dependent children under 18 years, who meet an income test and are New Zealand citizens or permanent residents. To be eligible, a parent must be 18 years or older OR have been legally married or in a civil union. A 16 or 17 year old sole parent who has never been married may be eligible to receive an Emergency Maintenance Allowance. This emergency benefit can also be paid to sole parents aged 18 and over who do not meet specific criteria for DPB-SP or other benefits.

Unemployment Benefits: Unemployment benefits are available to people who are available for and actively seeking full time work. Clients must be aged 18+ years or 16-17 years and living with a spouse or partner and dependent children. Those receiving unemployment benefits are subject to a full time work test, as are their spouses or partners if they have no dependent children, or if their youngest dependent child is aged 14+ years. Applicants must have continuously lived in New Zealand for 2 years or more. An Unemployment Benefit-Hardship is available to those who do not meet these criteria but who are not successfully able to support themselves through paid employment or by other means.

Sickness Benefit: To be eligible for a Sickness Benefit people need to be 18 years of age, or 16-17 years of age and either 27+ weeks pregnant or living with a partner and children they support. They must have had to stop working or reduce their hours because of sickness, injury, pregnancy or disability OR, if unemployed or working part time, find it hard to look for or do full time work for the same reasons. To qualify, a person's (and their partner's) income must be below a certain level and they must have a medical certificate, the first of which can last for only up to 4 weeks. For pregnant women, payments may continue for up to 13 weeks after the birth of their child. At least 2 years' residence is also required, though a benefit may be granted in cases of hardship.

Invalid's Benefit: To be eligible for an Invalid's Benefit, people need to be 16+ years of age and unable to work 15+ hours a week because of a sickness, injury or disability which is expected to last at least 2 years OR their life expectancy is <2 years and they are unable to regularly work 15+ hours a week OR they are blind with a specified level of visual impairment. A doctor's certificate is required and an applicant must be a New Zealand citizen or permanent resident and have lived in New Zealand for 10 years or more.

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

New Zealand Distribution and Trends

Total Number of Children Reliant on a Benefit Recipient

In New Zealand during 2000-2007, the number of children who were reliant on a beneficiary fell from 271,446 in 2000 to 205,256 in 2007. A large proportion of this fall resulted from declines in the number of children relying on unemployment benefit recipients, with numbers in this category falling from 49,214 in 2000 to 7,757 in 2007. These declines were only partially offset by increases in the number of children reliant on sickness and illness beneficiaries (**Table 12**).

Proportion of All New Zealand Children Reliant on a Benefit Recipient

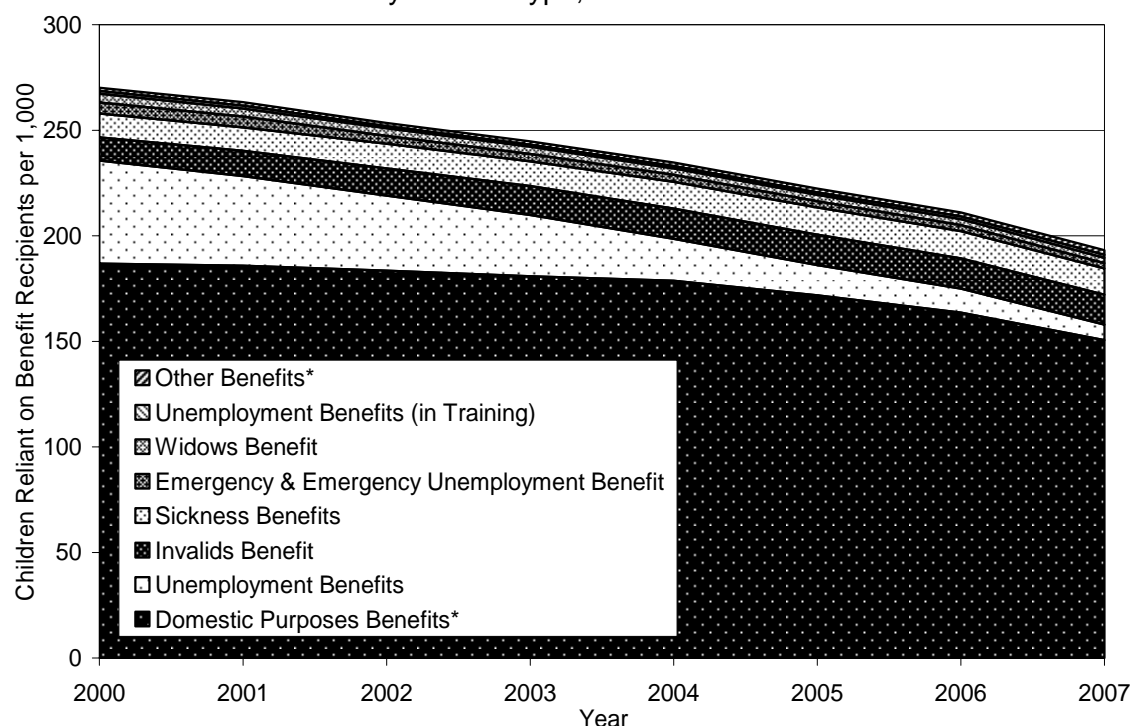
During 2000-2007, the proportion of all New Zealand children <18 years who were dependent on a benefit recipient fell from 27.0% in 2000 to 19.3% in 2007. A large proportion of this decrease was due to a fall in the number of children relying on unemployment benefit recipients (4.9% of all children in 2000 to 0.7% in 2007). While

the proportion of children reliant on domestic purposes benefit (DPB) recipients also fell (18.7% of all children in 2000 to 15.1% in 2007), more rapid declines in those reliant on unemployment benefits meant that in relative terms, the proportion of benefit dependent children reliant on DPB recipients actually increased, from 69.1% of benefit dependent children in 2000 to 78.0% in 2007 (**Figure 15**).

Age Distribution

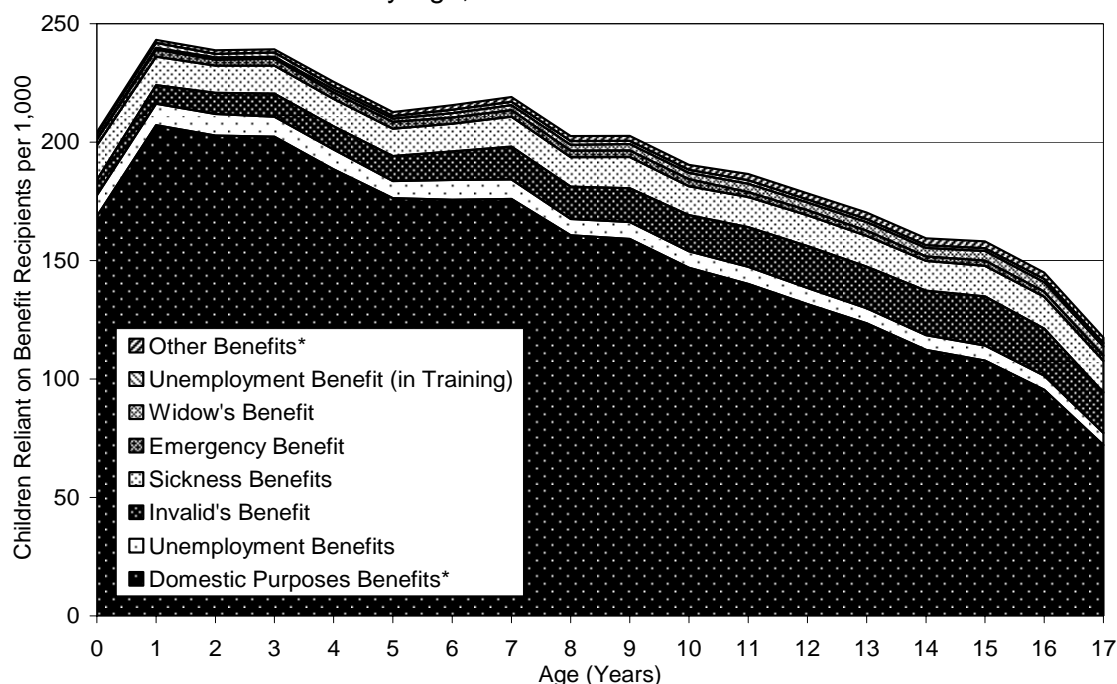
During 2007, the proportion of children reliant on a beneficiary was highest amongst those <6 years of age, with numbers tapering off gradually throughout childhood and then more rapidly after 11 years of age (**Figure 16**). While the proportion of children reliant on benefit recipients declined for all age groups during 2000-2007, these age differences persisted throughout this period.

Figure 15. Proportion of Children Under 18 Years of Age With a Parent Receiving a Main Income-Tested Benefit by Benefit Type, New Zealand 2000-2007



Source: Ministry of Social Development; Domestic Purposes Benefits includes DPB Sole Parent and Emergency Maintenance Allowance. Other Benefits includes DPB Women Alone and DPB Caring for Sick or Infirm, NZ Superannuation, Veterans and Transitional Retirement Benefit, and Unemployment Benefit Student Hardship

Figure 16. Proportion of Children Under 18 Years of Age with a Parent Receiving a Main Income-Tested Benefit by Age, New Zealand 2007



Source: Ministry of Social Development; Domestic Purposes Benefits includes DPB Sole Parent and Emergency Maintenance Allowance. Other Benefits includes DPB Women Alone and DPB Caring for Sick or Infirm, NZ Superannuation, Veterans and Transitional Retirement Benefit, and Unemployment Benefit Student Hardship

Summary

During 2000-2007, the proportion of all New Zealand children <18 years who were dependent on a benefit recipient fell from 27.0% in 2000 to 19.3% in 2007. A large proportion of this decrease was due to a fall in the number relying on unemployment benefit recipients. While the proportion of children reliant on DPB recipients also fell, more rapid declines in those reliant on unemployment benefits meant that in relative terms, the proportion of benefit dependent children relying on DPB recipients actually increased during this period. In addition, during 2007 it was younger children who were disproportionately reliant on benefit recipients, with rates being highest for those <6 years of age and then tapering off gradually through childhood and more rapidly after 11 years of age. While the number of children reliant on benefit recipients may not correlate precisely with the number living below the poverty line, they do reflect a particularly vulnerable group with higher health and support needs and tracking changes in their distribution over time (e.g. as a result of changes in labour market forces) may be of value in predicting future health service demand.

Table 12. Number of Children <18 Years with a Parent Receiving a Main Income Tested Benefit by Benefit Type, New Zealand 2000-2007

Benefit Type		2000	2001	2002	2003	2004	2005	2006	2007
Domestic Purposes* Benefit	No.	187,685	187,334	186,712	185,649	185,087	179,443	172,349	160,010
	%	69.1	70.6	72.4	73.9	76.2	77.3	77.5	78.0
Unemployment	No.	49,214	42,965	36,111	29,825	20,517	15,028	11,977	7,757
	%	18.1	16.2	14.0	11.9	8.4	6.5	5.4	3.8
Invalids	No.	11,028	12,029	13,110	14,089	14,931	15,083	15,172	15,081
	%	4.1	4.5	5.1	5.6	6.1	6.5	6.8	7.3
Sickness	No.	11,191	11,160	11,896	12,009	13,040	13,503	13,625	13,368
	%	4.1	4.2	4.6	4.8	5.4	5.8	6.1	6.5
Emergency Benefits	No.	5,413	5,171	3,874	3,526	3,392	2,968	3,040	2,659
	%	2.0	1.9	1.5	1.4	1.4	1.3	1.4	1.3
Widows Benefit	No.	4,064	3,806	3,655	3,530	3,272	3,145	2,924	2,585
	%	1.5	1.4	1.4	1.4	1.3	1.4	1.3	1.3
Unemployment (in Training)	No.	1,317	1,353	1,029	979	1,118	1,163	1,265	1,526
	%	0.5	0.5	0.4	0.4	0.5	0.5	0.6	0.7
Other Benefits*	No.	1,534	1,668	1,556	1,655	1,691	1,900	2,057	2,270
	%	0.6	0.6	0.6	0.7	0.7	0.8	0.9	1.1
Total		No.	271,446	265,486	257,943	251,262	243,048	232,233	222,409
									205,256

Source: Ministry of Social Development; % refers to the percentage of children relying on benefit recipients rather than the percentage of all children. Domestic Purposes includes DPB Sole Parent and Emergency Maintenance Allowance. Other Benefits includes DPB Women Alone and Caring for Sick or Infirm, NZ Superannuation, Veterans and Transitional Retirement Benefit, and Unemployment Benefit Student Hardship

Young People Reliant on Benefits

Introduction

While adolescence is for many young people a time for investing in learning and acquiring new skills, it is also a time of vulnerability. While the majority of young people successfully complete their years of secondary education and continue on to further training and employment, a significant minority are unable to support themselves financially for a variety of reasons. For those who meet certain eligibility criteria (see *Children Reliant on Benefit Recipients* for more detail), the NZ Government offers a range of benefits. Those most commonly used by people 16-24 years are listed below:

- **Domestic Purposes Benefit – Sole Parent (DPB-SP):** This benefit provides income support for sole parents living with their dependent children under 18 years. To be eligible, a parent must be 18 years or older OR have been legally married, or in a civil union. A 16 or 17 year old sole parent who has never been married may be eligible to receive an Emergency Maintenance Allowance.
- **Unemployment Benefits:** Unemployment benefits are available to people who are available for and actively seeking full time work. Clients must be aged 18+ years or 16-17 years and living with a spouse or partner and dependent children. Those receiving unemployment benefits are subject to a full time work test.
- **Sickness Benefit:** Sickness Benefit recipients must have had to stop working or reduce their hours because of sickness, injury, pregnancy or disability OR, if unemployed or working part time, find it hard to look for, or do full time work for the same reasons. Recipients need to be 18 years of age, or 16-17 years of age and either 27+ weeks pregnant, or living with a partner and children they support.
- **Invalid's Benefit:** To be eligible for an Invalid's Benefit, recipients need to be 16+ years and unable to work 15+ hours a week because of a sickness, injury or disability which is expected to last at least 2 years OR their life expectancy is <2 years and they are unable to regularly work 15+ hours a week OR they are blind with a specified level of visual impairment.

While the diversity of the above criteria suggest that young people require income support for a variety of reasons (e.g. being temporarily out of work, caring for children, being unable to participate in the workforce for medical or other reasons), as a group they may nevertheless share experiences in common with groups highlighted in other sections of this report (e.g. children reliant on beneficiaries, those leaving school without qualifications) and as a consequence, may warrant further consideration in future planning and strategy development.

The following section uses data from the MSD's SWIFTT database to explore the number of Pacific young people (16-24 years) in New Zealand who were reliant on benefits during 2000-2007.

Data Source and Methods

Definition

Young People Aged 16-24 Years Reliant on a Core Benefit by Benefit Type.

Data Source

Numerator: Ministry of Social Development's SWIFTT database [49]

Denominator: Census

Indicator Category Ideal B-C

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

Notes on Interpretation

Data was provided by the Ministry of Social Development from their SWIFTT database, which records information on the recipients of financial assistance through Work and Income for the period April 2000 – April 2007. All figures, unless stated otherwise, refer to the number of young people aged 16-24 years in receipt of a core benefit at the end of April and thus provide no information on those receiving assistance from Work and Income at other times of the year.

New Zealand Distribution and Trends

Number of New Zealand Young People on Benefits

In New Zealand during 2000-2007 there was a large decline in the number of young people relying on benefits, with overall numbers decreasing from 76,392 in 2000 to 41,064 in 2007. While there were large declines in the number receiving unemployment benefits during this period, the numbers receiving domestic purposes benefits decreased less rapidly and the numbers receiving sickness and invalid's benefits increased. Thus while in 2000, unemployment benefits were the most frequent form of income support received by New Zealand young people, by 2007 domestic purposes benefits were the predominant benefit type received (**Table 13**).

Table 13. Number of Young People Aged 16-24 Years Reliant on Benefits by Type, New Zealand April 2000-2007

Benefit Type		2000	2001	2002	2003	2004	2005	2006	2007
Unemployment Benefits	No.	40,732	35,808	31,310	27,071	18,135	13,257	10,650	5,257
	%	53.3	49.9	47.0	43.2	33.8	27.5	23.0	12.8
Domestic Purposes	No.	19,812	19,645	19,459	19,053	18,830	18,245	18,013	17,647
	%	25.9	27.4	29.2	30.4	35.1	37.8	38.9	43.0
Invalid's	No.	4,866	5,185	5,511	5,755	6,035	6,288	6,424	6,580
	%	6.4	7.2	8.3	9.2	11.2	13.0	13.9	16.0
Sickness	No.	3,892	4,066	4,406	4,940	5,369	5,566	6,234	6,669
	%	5.1	5.7	6.6	7.9	10.0	11.5	13.5	16.2
Independent Youth	No.	3,479	3,680	2,935	2,560	2,190	1,936	1,617	1,179
	%	4.6	5.1	4.4	4.1	4.1	4.0	3.5	2.9
Unemployment Training Related	No.	2,773	2,508	2,227	2,465	2,363	2,219	2,542	2,889
	%	3.6	3.5	3.3	3.9	4.4	4.6	5.5	7.0
Emergency	No.	632	658	503	588	479	429	454	424
	%	0.8	0.9	0.8	0.9	0.9	0.9	1.0	1.0
All Other Benefits	No.	206	239	253	288	304	306	364	419
	%	0.3	0.3	0.4	0.5	0.6	0.6	0.8	1.0
Total	No.	76,392	71,789	66,604	62,720	53,705	48,246	46,298	41,064
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Ministry of Social Development; % refers to % of beneficiaries. Unemployment includes Unemployment Benefit and Unemployment Benefit-Hardship; Domestic Purposes includes DPB Sole Parent and Emergency Maintenance Allowance.

Proportion of New Zealand Young People on Benefits

These changes resulted in a large decline in the proportion of young people reliant on unemployment benefits during this period, with rates falling from 89.1 per 1,000 in 2000 to 10.1 per 1,000 in 2007. In contrast, the proportion of young people reliant on domestic purposes benefits declined more slowly (43.4 per 1,000 in 2000 to 34.0 per 1,000 in 2007), while the proportion on invalids and sickness benefits increased. Overall however, the total proportion of young people relying on core benefits fell during this period, from 167.2 per 1000 in 2000 to 79.2 per 1,000 in 2007 (**Table 14**).

Table 14. Young People Aged 16-24 Years Reliant on Benefits by Benefit Type, New Zealand April 2000-2007

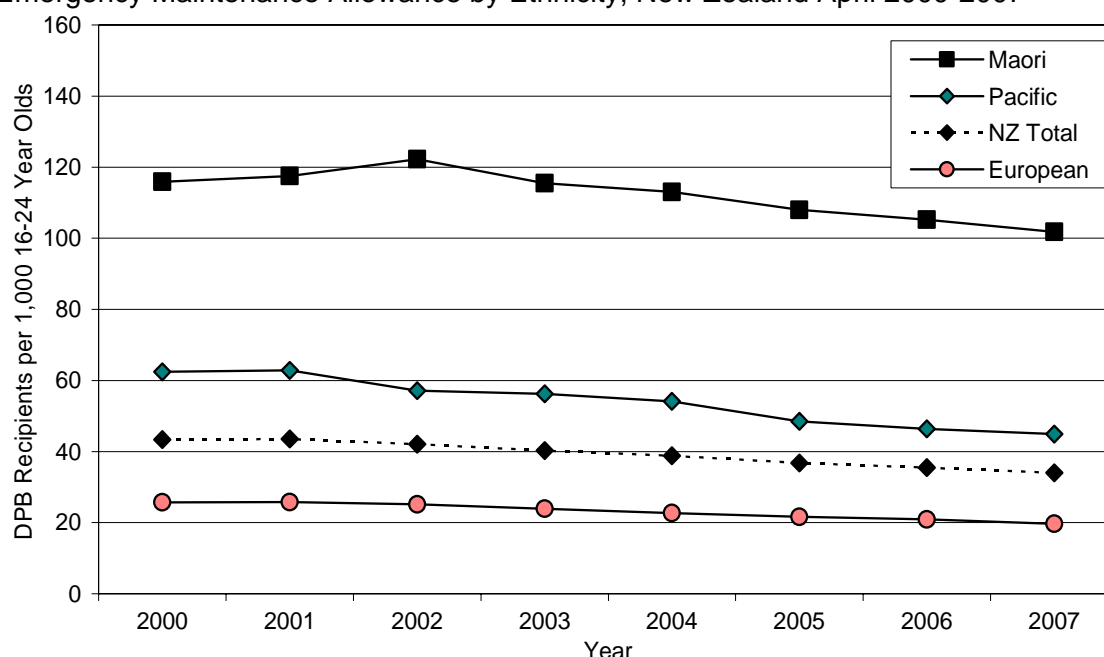
Benefit Type	Rate per 1,000							
	2000	2001	2002	2003	2004	2005	2006	2007
Unemployment	89.1	79.4	67.8	57.2	37.4	26.7	21.0	10.1
Domestic Purposes	43.4	43.6	42.1	40.3	38.9	36.8	35.5	34.0
Invalid's	10.6	11.5	11.9	12.2	12.5	12.7	12.7	12.7
Sickness	8.5	9.0	9.5	10.4	11.1	11.2	12.3	12.9
Independent Youth	7.6	8.2	6.4	5.4	4.5	3.9	3.2	2.3
Unemployment Training Related	6.1	5.6	4.8	5.2	4.9	4.5	5.0	5.6
Emergency	1.4	1.5	1.1	1.2	1.0	0.9	0.9	0.8
All Other Benefits	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.8
Total	167.2	159.2	144.1	132.5	110.8	97.3	91.3	79.2

Source: Ministry of Social Development; Unemployment includes Unemployment Benefit & Unemployment Benefit-Hardship; Domestic Purposes includes DPB Sole Parent and Emergency Maintenance Allowance

Domestic Purposes Benefit

During 2000-2007, the number of Pacific young people on a Domestic Purposes Benefit (sole parent) or Emergency Maintenance Allowance fell, from 1,947 in 2000 to 1,636 in 2007, with rates declining from 62.4 per 1,000 in 2000, to 44.9 per 1,000 in 2007. During this time, DPB uptake for Pacific young people was intermediate between that of Māori and European young people (**Figure 17**).

Figure 17. Young People Aged 16-24 Years Receiving a Domestic Purposes Benefit or Emergency Maintenance Allowance by Ethnicity, New Zealand April 2000-2007



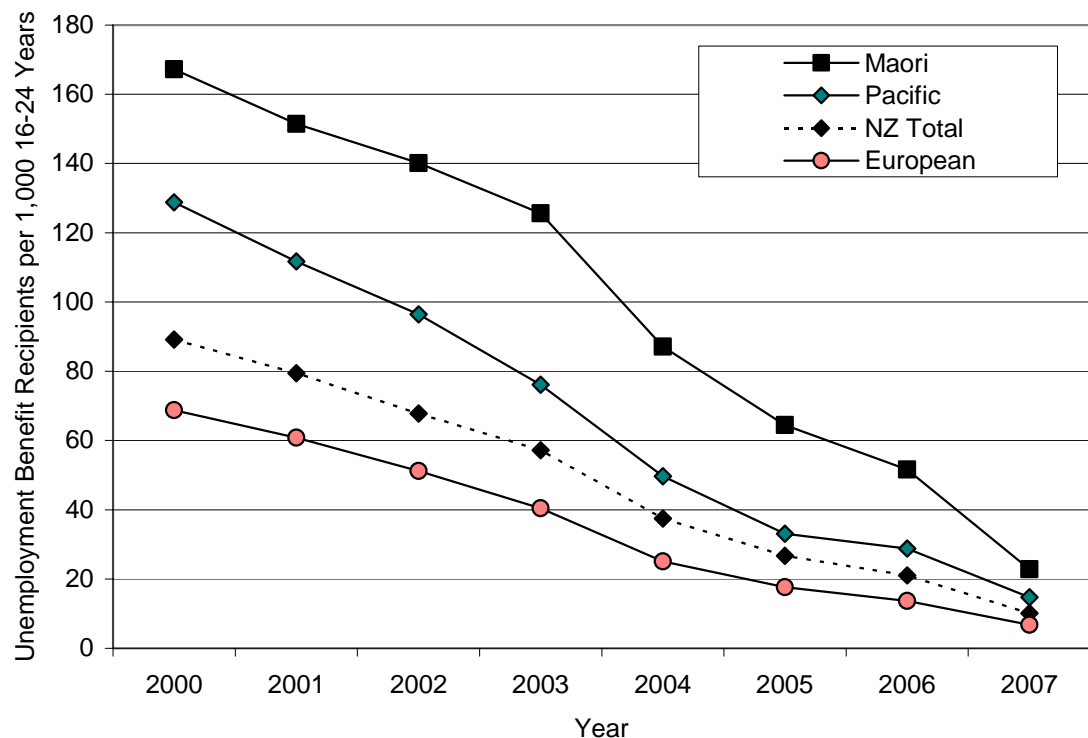
Source: Ministry of Social Development; DPB includes DPB Sole Parent and Emergency Maintenance Allowance

Unemployment Benefits

In New Zealand during 2000-2007, the number of Pacific young people reliant on unemployment benefits fell, from 4,019 in 2000 to 536 in 2007, with rates declining from 128.8 per 1,000 in 2000 to 14.7 per 1,000 in 2007. While unemployment benefit uptake declined for all ethnic groups, uptake rates for Pacific young people remained

intermediate between those of Māori and European young people (**Figure 18**). While the number of Pacific young people on training related unemployment benefits actually increased during this period (272 in April 2000 to 317 in April 2007), comparisons between these two benefit categories are problematic, as while training related benefits are aimed at assisting young people with training that will aid their transition into the workforce, unemployment benefits are more responsive to labour market changes (e.g. market led job growth). Again uptake rates for training related unemployment benefits for Pacific young people were intermediate between those of Māori and European young people.

Figure 18. Young People Aged 16-24 Years Receiving Unemployment Benefits by Ethnicity, New Zealand April 2000-2007



Source: Ministry of Social Development; Note: Training Related Unemployment Benefits Excluded

Sickness and Invalid Benefits

In New Zealand during 2000-2007, there was a gradual increase in the number of Pacific young people reliant on sickness and invalid's benefits, with the number of Pacific sickness beneficiaries increasing from 257 in 2000 to 302 in 2007 and the number of Pacific invalid's benefit recipients increasing from 231 to 344 during the same period. When increases in population growth were taken into account however, rates of sickness benefit uptake for Pacific young people changed little (8.2 per 1,000 in 2000 vs. 8.3 per 1,000 in 2007), while rates of invalid's benefit uptake increased (7.4 per 1,000 in 2000 to 9.4 per 1,000 in 2007).

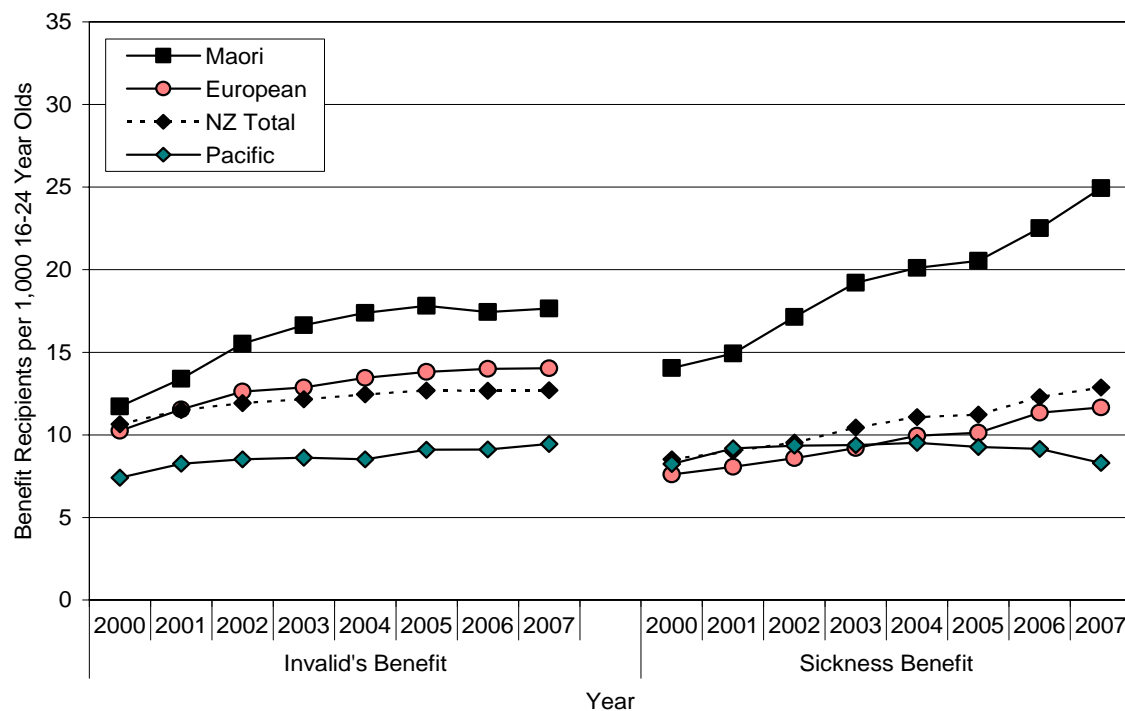
During the same period, invalid's benefit uptake for Pacific young people was consistently lower than the New Zealand average, while ethnic differences in sickness benefit uptake were more variable (**Figure 19**).

Reasons for Accessing Sickness and Invalid's Benefits

During April 2007, 46% of New Zealand young people receiving a sickness benefit required financial support for psychological / psychiatric reasons and 17% required support as the result of a pregnancy. Accidents (7%), substance use (7%) and musculoskeletal problems (6%) also made a significant contribution (**Figure 20**). In

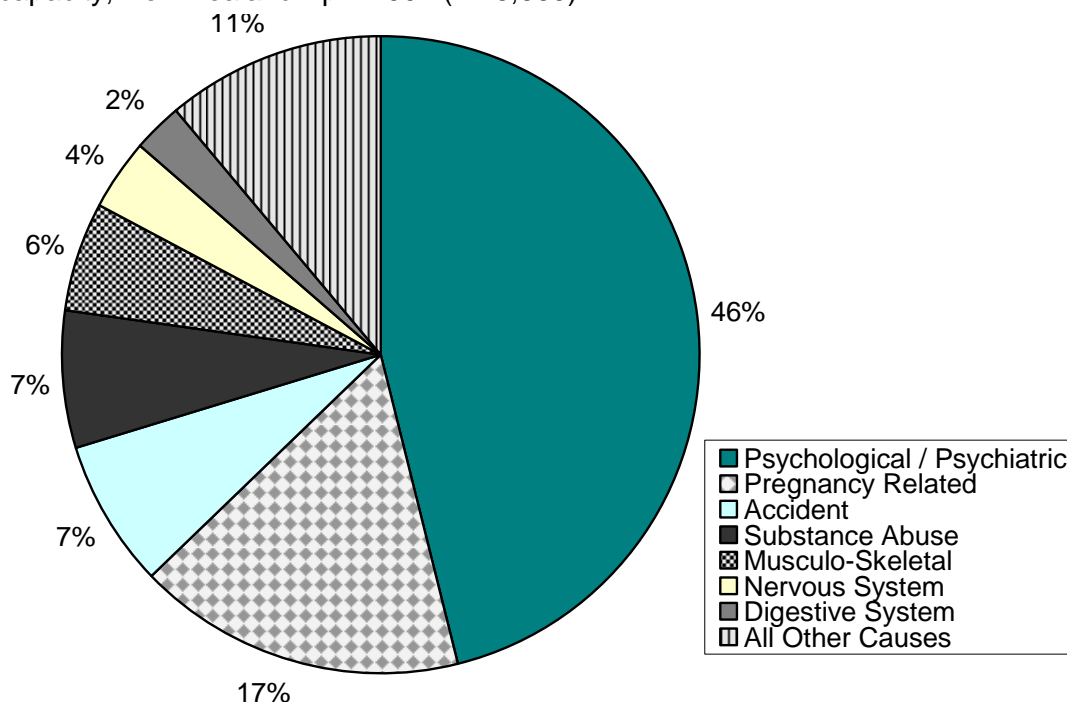
contrast, 26% of invalid's benefit recipients required financial support for intellectual disabilities, while 24% required support for psychological / psychiatric reasons. An additional 21% required support as the result of congenital anomalies and 10% as the result of nervous system problems (**Figure 21**).

Figure 19. Young People Aged 16-24 Years Receiving an Invalids or Sickness Benefit by Ethnicity, New Zealand April 2000-2007



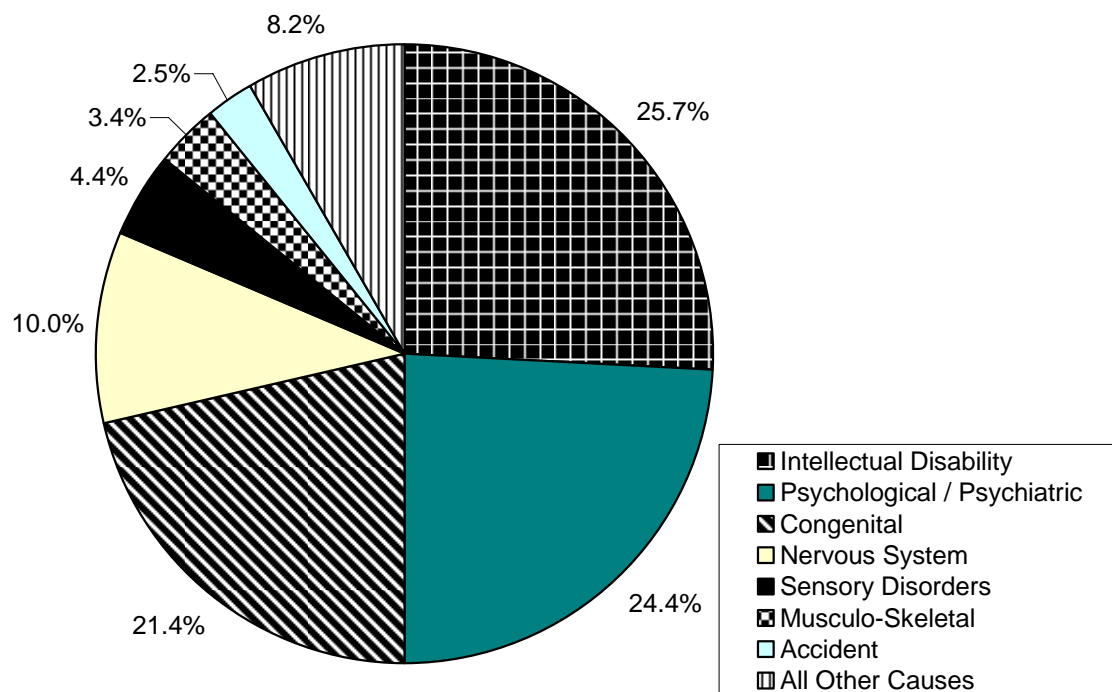
Source: Ministry of Social Development

Figure 20. Young People Aged 16-24 Years Receiving a Sickness Benefit by Cause of Incapacity, New Zealand April 2007 (n= 6,669)



Source: Ministry of Social Development

Figure 21. Young People Aged 16-24 Years Receiving an Invalid's Benefit by Cause of Incapacity, New Zealand April 2007 (n= 6,580)



Source: Ministry of Social Development

Summary

In New Zealand during 2000-2007, there was a steep decline in the proportion of Pacific young people receiving unemployment benefits, while the proportion receiving domestic purposes benefits declined more slowly and the proportions receiving invalid's benefits increased. While reductions in the number of Pacific young people reliant on unemployment benefits are encouraging and potentially reflect greater employment and training opportunities, those remaining on income tested benefits nevertheless represent a high needs group, who may warrant further consideration in future planning and strategy development.

Household Crowding

Introduction

In New Zealand, household crowding is of particular concern for Pacific families, although the proportion of Pacific families living in crowded households declined progressively between the 1986 and 2001 Censuses [50]. Despite this, it is likely that household crowding has had a significant impact on the health of Pacific children and young people, with recent research suggesting that in New Zealand household crowding is strongly correlated with childhood meningococcal disease, with the risk increasing progressively with the addition of each additional adult into a household [36]. While there is less local information for other infectious diseases, overseas research has also demonstrated correlations between crowding and rheumatic fever, TB, bronchiolitis, croup, childhood pneumonia, hepatitis B, head lice and conjunctivitis [51]. In addition, it has been suggested that crowding impacts negatively on mental health, leading to interpersonal aggression, withdrawal, socially deviant behaviour and psychological distress [52].

While the relationship between crowding and poorer health outcomes has been known for some time, uncertainty still remains about how much of the association is due to crowding itself and how much is due to other factors which often accompany crowding, such as poor quality housing (e.g. damp, mould, temperature extremes), low income, unemployment, fewer material resources, living in run-down neighbourhoods and lack of control over stress [51]. Supporters for a direct role for crowding have proposed a number of pathways including:

For Infectious Diseases [51, 52]:

- Increased frequency of contact between children and infectious disease carriers.
- Closer and more prolonged physical contact between children and carriers.
- Increased exposure to second hand tobacco smoke.
- Children sharing a bed or bedroom.
- Lack of ability to adequately care for sick household members.
- Difficulties in maintaining good hygiene practices.

For Poorer Mental Wellbeing [52]:

- An increased number of social contacts and unwanted interactions.
- Decreases in privacy and the ability to achieve simple goals (e.g. eating, watching TV).
- Reduced ability of parents to monitor children's behaviour.
- The need to co-ordinate activities such as using the bathroom with others.

In order to assess the extent to which household crowding remains an issue for Pacific families in New Zealand, the following section explores the proportion of Pacific children and young people who were living in crowded households at the 2001 and 2006 Censuses.

Data Source and Methods

Definition

The proportion of children and young people 0-24 years living in crowded households, as defined by the Canadian Household Occupancy Index

Data Source

Numerator: Census: The number of children and young people 0-24 years living in households which require one or more additional bedrooms.

Denominator: Census: The total number of children and young people 0-24 years at the Census for whom crowding status was known.

Indicator Category Ideal B

Notes on Interpretation

Information is for the usual resident population and relates to the household crowding status of individual children. Thus the number of children reported on will be greater than the number of households on Census night (i.e. with the exception of Figure 22, the unit of reference is the child and thus 2 children from the same household will be counted twice in these statistics).

Canadian Crowding Index

The Canadian National Occupancy Standard (CNOS), developed in Canada in the 1980s, calculates appropriate person-bedroom ratios for households of differing sizes and compositions. It makes judgements on appropriate age limits for bedroom sharing e.g. using the CNOS, children <5 years of different sexes may share a room, while those aged 5-17 years may only share a room if they are of the same sex. The CNOS compares the number of bedrooms in a household with its bedroom requirements based on the age, sex, marital status and relationship of household members to one another. Households are reported as having 2+, 1 or 0 bedrooms spare or as requiring an additional 1 or 2+ bedrooms; those needing 1 or 2+ additional bedrooms are deemed crowded [50].

Statistical Significance Testing

95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

New Zealand Distribution and Trends

New Zealand Trends

In New Zealand between 1986 and 2001, the proportion of Pacific households (including those without children) who required additional bedroom(s) declined, from 33.4% to 25.8%. In contrast, for the population as a whole rates declined from 6.9% to 4.8% [50]. While household crowding declined for all ethnic groups (with the exception of the "Other" category), in absolute terms declines were greatest for Māori and Pacific households. Despite these declines, household crowding remained higher for Pacific > Māori & Asian / Indian > European households during this period (Note: Changes in the way in which ethnicity information was collected between Censuses may influence the interpretability of such time series data) (**Figure 22**).

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

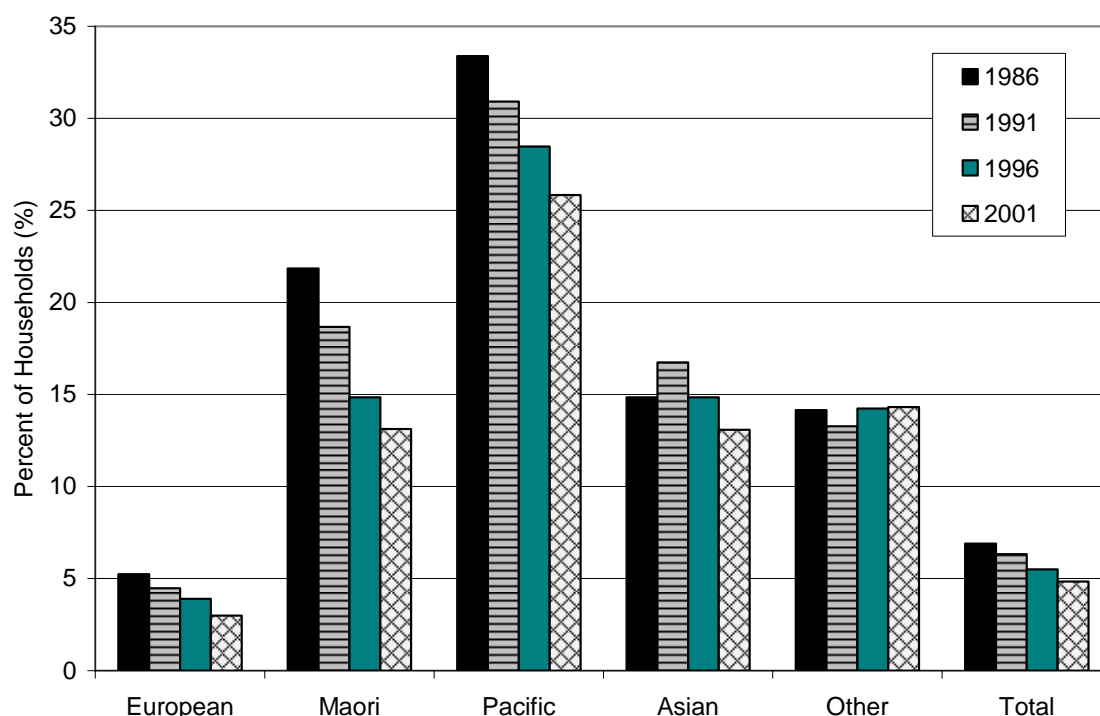
During 2001, 49.9% of Pacific children (0-14 years) lived in crowded households, as compared to 16.2% of children nationally. Household crowding was higher for Pacific > Māori > Asian / Indian > European children during this period. Similarly in 2006, 49.9% of Pacific children lived in crowded households compared to 16.4% of children nationally, with ethnic differences being very similar to those in 2001. A similar pattern was seen for young people aged 15-24 years (**Figure 23**). When both age groups were combined, household crowding rates during 2006 were *significantly higher* for Pacific > Māori > Asian / Indian > European children and young people (**Table 15**).

During 2001, there were also marked socioeconomic differences in the proportion of children living in crowded households, with rates rising from 2.7% amongst those living in the most affluent (NZDep Decile 1) areas to 42.5% amongst those living in the most deprived (NZDep Decile 10). By 2006, 2.3% of children in the most affluent areas lived in crowded households, as compared to 43.9% of children in the most deprived areas. Similar disparities were seen for young people 15-24 years (**Figure 24, Table 15**).

Relationship between Socioeconomic Status and Ethnicity

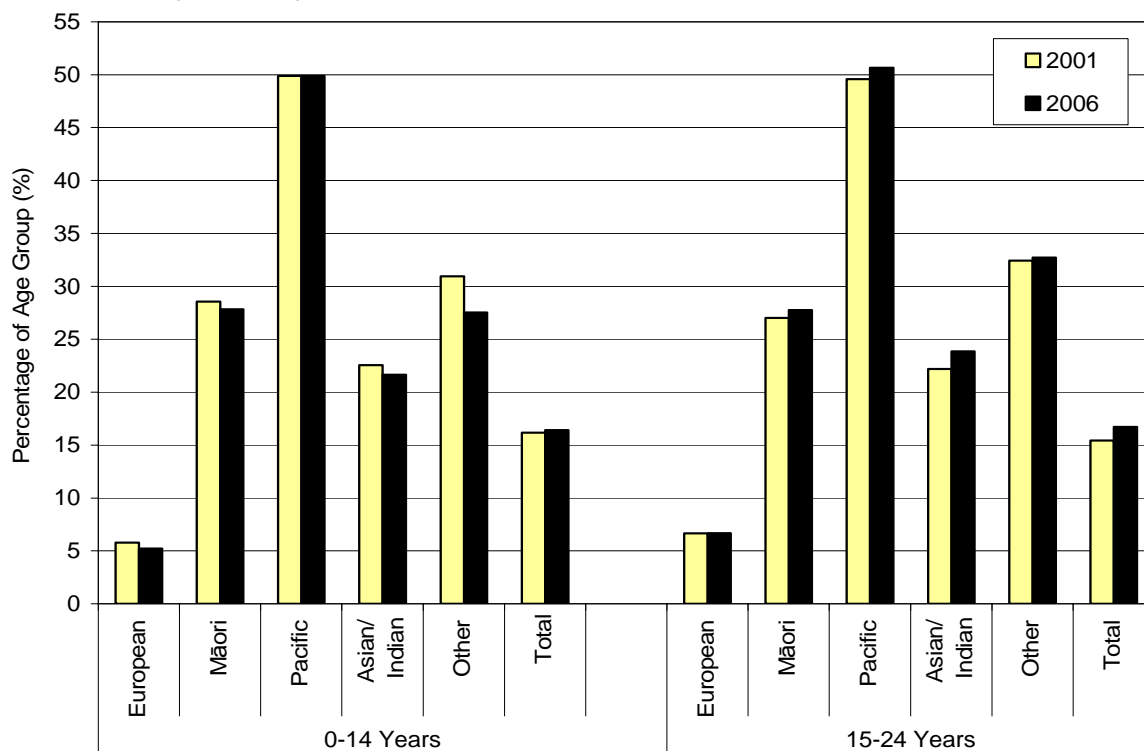
Even once household crowding rates were broken down by Deprivation Index decile, higher proportions of Pacific children and young people lived in crowded households than did Māori and Asian / Indian > European children and young people, with 61.8% of Pacific children in the most deprived (NZDep Decile 10) areas living in households who required one or more additional bedrooms to meet their family's needs during 2006 (**Figure 25**).

Figure 22. Proportion of Crowded Households (including those without children) by Ethnicity, New Zealand at the 1986, 1991, 1996 and 2001 Censuses



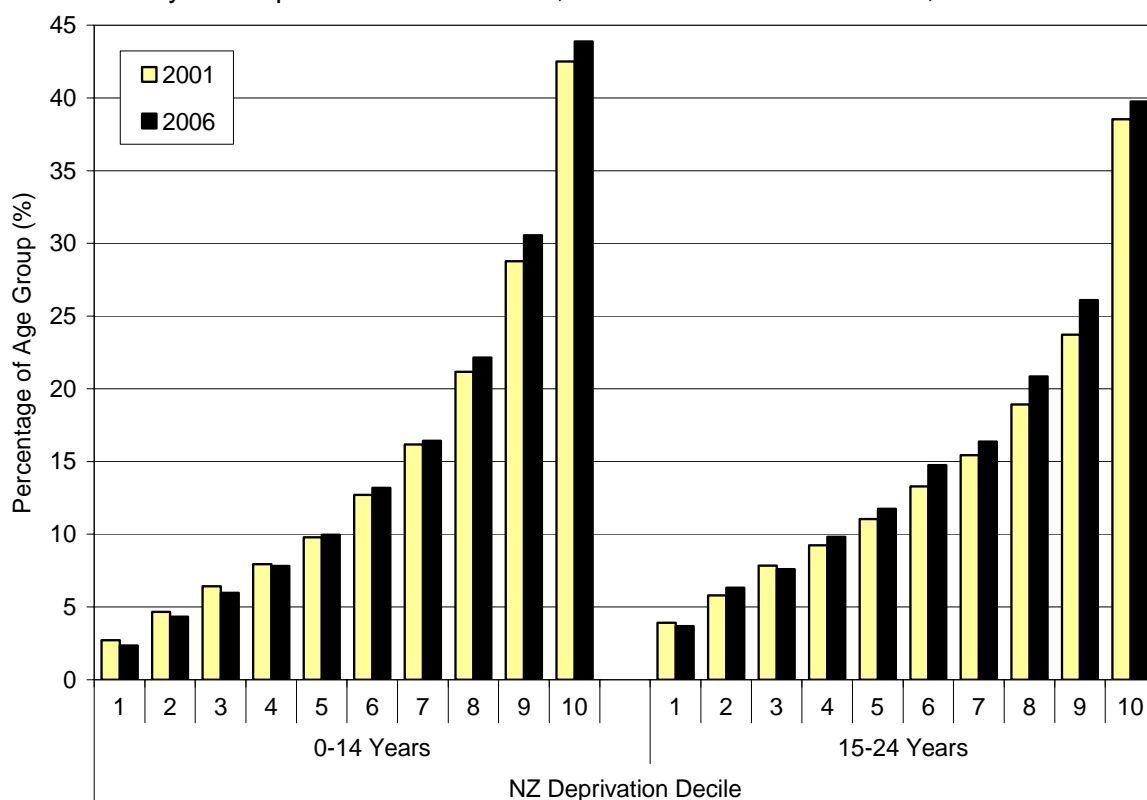
Source: Statistics New Zealand [50]: Caution: Changes in the way in which ethnicity information was collected between Censuses may influence the interpretability of time series data

Figure 23. Proportion of Children and Young People 0-24 Years Living in a Crowded Household by Ethnicity, New Zealand Census 2001, 2006



Source: Statistics New Zealand; Ethnicity is Level 1 Prioritised; Figure only includes children and young people where crowding status was known

Figure 24. Proportion of Children and Young People 0-24 Years Living in a Crowded Household by NZ Deprivation Index Decile, New Zealand Census 2001, 2006



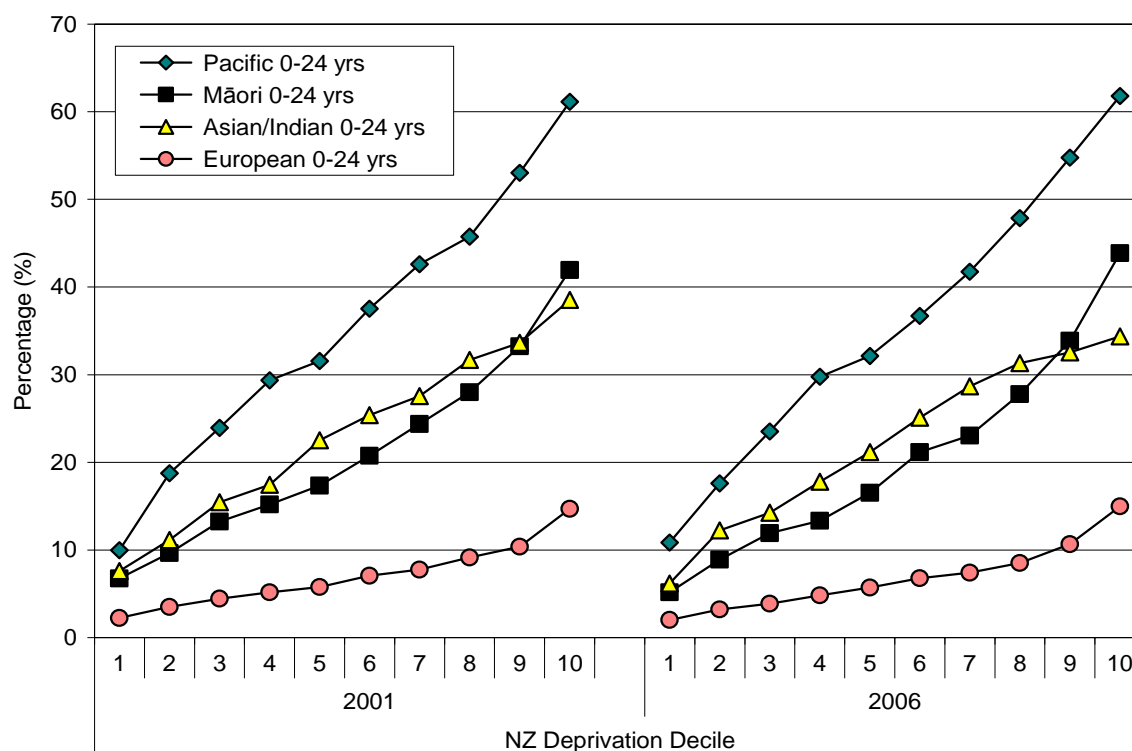
Source: Statistics New Zealand; Note: Only includes those where crowding status is known

Table 15. Proportion of Children and Young People 0-24 Years Living in a Crowded Household by Ethnicity and NZ Deprivation Index Decile, New Zealand at the 2006 Census

Variable	Percent	RR	95% CI	Variable	Percent	RR	95% CI
NZDep Index Decile				Prioritised Ethnicity			
1	2.80	1.00		Māori	27.81	4.81	4.76-4.86
2	5.03	1.80	1.73-1.87	Pacific	50.15	8.67	8.58-8.77
3	6.59	2.35	2.26-2.44	European	5.78	1.00	
4	8.56	3.06	2.95-3.18	Asian/Indian	22.76	3.93	3.88-3.98
5	10.66	3.81	3.67-3.95				
6	13.81	4.93	4.76-5.11				
7	16.41	5.86	5.66-6.07				
8	21.61	7.71	7.45-7.98				
9	28.72	10.25	9.92-10.6				
10	42.36	15.12	14.6-15.6				

Source: Statistics New Zealand; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted; Figure only includes those where crowding status is known

Figure 25. Proportion of Children and Young People 0-24 Years Living in a Crowded Household by Ethnicity and NZ Deprivation Index Decile, New Zealand Census 2001, 2006



Source: Statistics New Zealand; Ethnicity is Level 1 Prioritised; Figure only includes those where crowding status is known

Summary

In New Zealand during 2006, 49.9% of Pacific children lived in crowded households, as compared to 16.4% of children nationally. Household crowding rates were higher for Pacific > Māori > Asian / Indian > European children during this period. There were also marked socioeconomic differences in the proportion of children and young people living in crowded households during 2006, with rates rising progressively as the degree of NZDep deprivation increased. Even once household crowding was broken down by NZDep deprivation however, higher proportions of Pacific children and young people lived in crowded households than did Māori and Asian / Indian > European children and young people, with 61.8% of Pacific children in the most deprived areas living in households requiring one or more additional bedrooms during 2006.



Socioeconomic
and Cultural
Determinants

Education:
Knowledge
and Skills

Participation in Early Childhood Education

Introduction

Research would suggest that participation in high quality early childhood education (ECE) has significant long term benefits for children's academic performance [53]. While the benefits appear greatest for children from low income families, those who attend ECE regularly and those who have started ECE at a younger age (e.g. 2-3 years), a number of longitudinal studies have suggested that the relationship between ECE and subsequent outcomes may be quite complex and related to the age at which the child starts ECE, the number of hours in ECE each week, the quality of the ECE service and the socioeconomic background from which the child comes [53].

In one US study, children who started ECE between 2-3 years had higher pre-reading and mathematics scores at school entry than those who started earlier or later, but starting ECE at <2 years was associated with lower social development scores (e.g. motivation, social engagement, self-control). In addition, children experienced greater academic gains if they attended ECE for >15 hours per week, but this was offset by lower social scores, particularly for those who attended for >30 hours per week. Outcomes also varied by socioeconomic status, with children from low income families only experiencing significant academic gains if they attended ECE for >30 hours per week (for this group attending >30 hours per week had no negative behavioural consequences). In contrast, children from affluent homes experienced no additional academic gains from attending >30 hours per week, but displayed increasingly negative behaviour the longer they attended ECE [54].

In New Zealand the Competent Children, Competent Learners Study, which followed a cohort of children from preschool to age 14, suggested that differences in the ECE environment continued to influence performance (e.g. mathematics, writing, communication) at age 14, with differences between those with the highest or most of a particular aspect of ECE and others being on average 9%. Family factors (income and maternal qualifications) made more of a difference than a child's ECE experience however, although ECE experience continued to make a contribution once these factors had been taken into account. In general, ECE experience made the greatest impact at the time a child started school, but the contribution was still evident at 14 years, even after taking age-5-performance, family income and maternal qualifications into account [53].

In New Zealand, ECE is provided by a variety of different services and in a variety of different settings ranging from the more traditional Kindergartens and Te Kohanga Reo, to services that cater for the needs of working parents (e.g. Education and Care Services, Home Based Services). During 1990-2005, New Zealand's enrolments in ECE increased for all age groups, with the largest increases occurring amongst those <3 years, for whom enrolments doubled. This increase in enrolments was absorbed almost entirely by the Education and Care Services, who offer flexible hours and require little parental involvement and thus are attractive to working parents. While there was also a 6-fold increase in Home Based Services during this period, in absolute terms the numbers of children receiving this type of care were less [55].

The following section reviews Ministry of Education data on the participation of New Zealand children in Early Childhood Education during the past 16 years, as well as the prior participation of Pacific new entrants in ECE during 2000-2006.



Data Source and Methods

Definition

1. Total enrolments in Early Childhood Education (ECE)
2. Proportion of school new entrants (Year 1) reporting regular participation in ECE immediately prior to attending school

Data Source and Interpretation

1. Total enrolments in Early Childhood Education

Numerator: Ministry of Education: Total enrolments in early childhood education

Denominator: Not applicable (see notes below)

Interpretation: Total enrolments tend to overestimate ECE participation as they may double or triple count those children who attend more than one ECE service. The measure however is a useful indicator of patterns of enrolment across different types of ECE.

2. Prior Participation in Early Childhood Education

Numerator: The number of new entrants reporting regular participation in early childhood education immediately prior to attending school

Denominator: The number of new entrants enrolled (at primary school entry)

Interpretation: The number of new school entrants (Year 1) reporting regular participation in ECE immediately prior to attending school is a useful measure of ECE participation as it overcomes some of the over counting problems associated with other ECE enrolment measures. However no information is provided on the duration of, number of hours in, or the type of ECE attended prior to attending school.

Indicator Category Proxy C

School Socioeconomic Decile: All schools are assigned a decile ranking based on the socioeconomic status of the areas they serve. These rankings are based on Census data from families with school age children in the areas from which the school draws its students, along with school ethnicity data. Census variables used in the ranking procedure include equivalent household income, parent's occupation and educational qualifications, household crowding and income support payments. Using these variables, schools are assigned a decile (10%) ranking, with Decile 1 schools being the 10% of schools with the highest proportion of students from low socioeconomic communities and Decile 10 schools being the 10% of schools with the lowest proportion of these students. Decile ratings are used by the Ministry of Education to allocate targeted funding, as well as for analytical purposes.

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

Ethnicity Classification

For those reporting multiple ethnic affiliations, ethnicity has been prioritised as follows: Māori > Pasifika > Asian > Other Groups Except European/Pākehā > European/Pākehā.

New Zealand Distribution and Trends

Total Enrolments in Early Childhood Education

In New Zealand during 1990-2006, while the number of enrolments in Early Childhood Education (ECE) increased by 55.8%, the number of enrolments in Pacific Island Early Childhood Groups declined by 56.8%. Overall, changes in ECE enrolment varied markedly by service type, with enrolments in Education and Care Centres increasing by 177.3%, enrolments in Home Based Networks increasing by 508.4% and enrolments in License Exempt Playgroups increasing by 214.0%. In contrast, enrolments in Kindergartens only increased by 1.5%, while enrolments in Te Kohanga Reo declined by 6.1% and enrolments in Playcentre declined by 34.3%. Thus while in 1990, Kindergarten was the most common source of ECE, by 2006 Education and Care Centres were the most common, with 46.7% of ECE enrolments during 2006 being for this type of Service (**Table 16**).

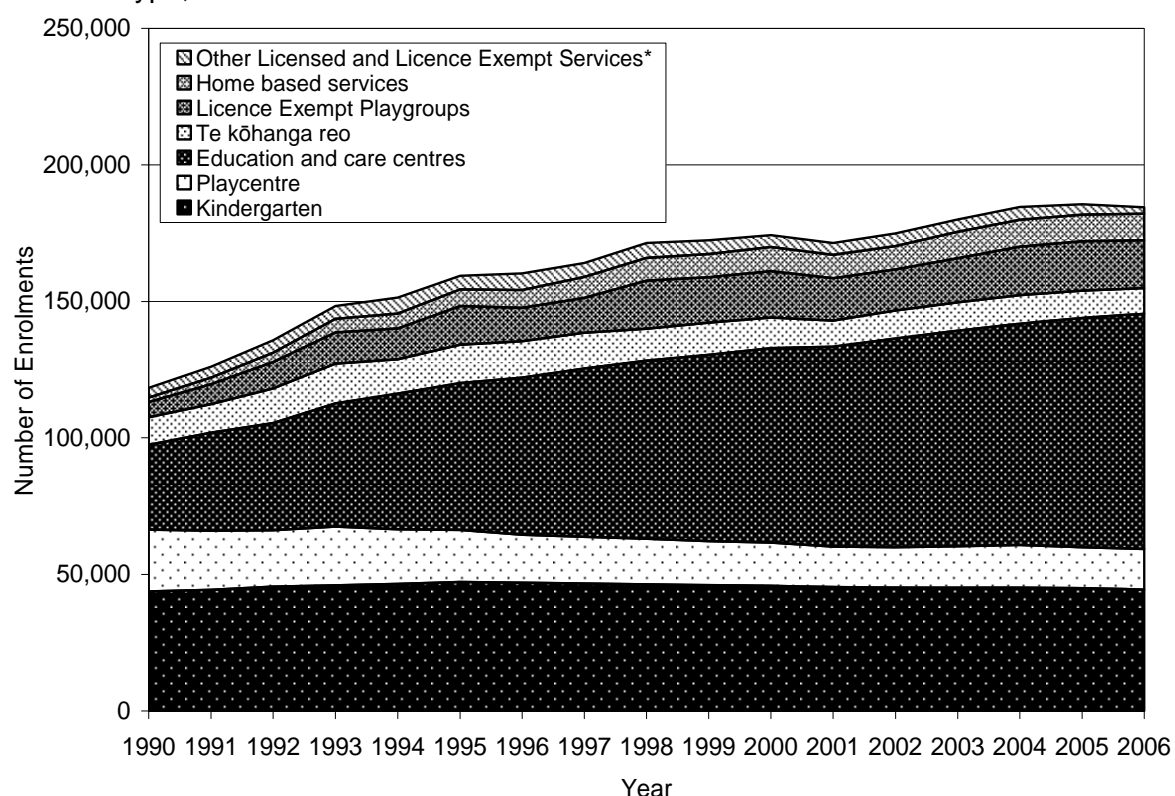
In addition to an increase in ECE enrolments, the number of hours spent in ECE increased progressively during 1996-2006 for all Service types, with the exception of Playcentres and Te Kohanga Reo (**Table 17**). Children enrolled in Te Kohanga Reo, at 27-30 hours per week, spent the longest amount of time in ECE, followed by those enrolled in Home Based Networks who had the second longest average hours, as well as the largest increases in average hours in ECE during this period [56].

Table 16. Enrolments in Early Childhood Education by Service Type, New Zealand 1990-2006

Service Type	Year																	% Change 1990-06
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	
Licensed Services																		
Kindergarten	43,792	44,363	45,603	46,030	46,604	47,208	46,960	46,756	46,307	45,993	45,869	45,439	45,169	45,109	45,287	44,920	44,435	1.5%
Playcentre	22,668	21,578	20,601	21,540	19,979	19,108	17,596	17,058	16,787	16,261	15,808	14,786	14,879	15,200	15,440	15,059	14,888	-34.3%
Education and Care Centres	31,033	35,980	39,300	45,158	49,687	53,769	57,582	61,597	65,205	68,132	71,231	73,192	76,246	78,967	81,096	83,889	86,059	177.3%
Te Kōhanga Reo	10,108	10,451	12,617	14,514	12,508	14,015	13,279	13,104	11,689	11,859	11,138	9,594	10,389	10,319	10,418	10,070	9,493	-6.1%
Home Based Networks	1,611	2,364	3,470	4,907	5,414	6,114	6,558	7,615	8,300	8,498	8,937	8,546	8,591	9,587	9,922	9,770	9,802	508.4%
Correspondence School	861	793	812	783	802	901	993	1,024	1,044	1,097	984	947	913	991	922	813	577	-33.0%
Sub-Total	110,073	115,529	122,403	132,932	134,994	141,115	142,968	147,154	149,332	151,840	153,967	152,504	156,187	160,173	163,085	164,521	165,254	50.1%
Licence-Exempt Services																		
Playgroups	5,565	7,331	9,647	11,430	11,353	14,155	12,195	12,770	17,630	16,629	16,949	15,457	15,002	16,250	17,744	18,042	17,476	214.0%
Ngā Puna Kōhungahunga	...	...	...	...	...	...	...	..	..	..	..	209	351	408	571	519	289	...
Pacific EC Groups	2,729	3,274	3,682	3,877	3,982	3,709	3,736	3,365	3,599	2,948	2,576	2,545	2,914	2,573	2,392	1,864	1,179	-56.8%
Playcentres	..	..	..	..	..	175	369	345	433	388	372	404	371	466	530	436	167	...
Te Kōhanga Reo	..	..	..	..	1,035	248	1,023	401	361	524	381	214	138	130	191	146	89	...
Sub-Total	8,294	10,605	13,329	15,307	16,370	18,287	17,323	16,881	22,023	20,489	20,278	18,829	18,776	19,827	21,428	21,007	19,200	131.5%
Total	118,367	126,134	135,732	148,239	151,364	159,402	160,291	164,035	171,355	172,329	174,245	171,333	174,963	180,000	184,513	185,528	184,454	55.8%

Source: Ministry of Education

Figure 26. Licensed and License Exempt Early Childhood Education Enrolments by Service Type, New Zealand 1990-2006



Source: Ministry of Education; Other License and License Exempt Services include Correspondence School, Nga Puna Kohungahunga, License Exempt Playcentres and Kohanga Reo, and Pacific Islands EC Groups

Table 17. Average Number of Hours of Attendance in Early Childhood Education Services by Service Type, New Zealand 1997-2006

Type of Service	Year									
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Kindergarten	10.4	10.7	10.8	11.2	11.5	11.8	12.0	12.5	12.6	12.6
Playcentre	4.4	4.4	4.3	4.4	4.2	4.3	4.3	4.4	4.3	4.4
Education and Care	15.8	15.9	16.4	16.6	17.7	18.3	18.6	19.5	20.3	20.8
Home Based Networks	15.2	15.7	16.1	16.9	18.6	18.1	19.7	21.3	22.4	22.0
Licensed Kohanga Reo*	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5

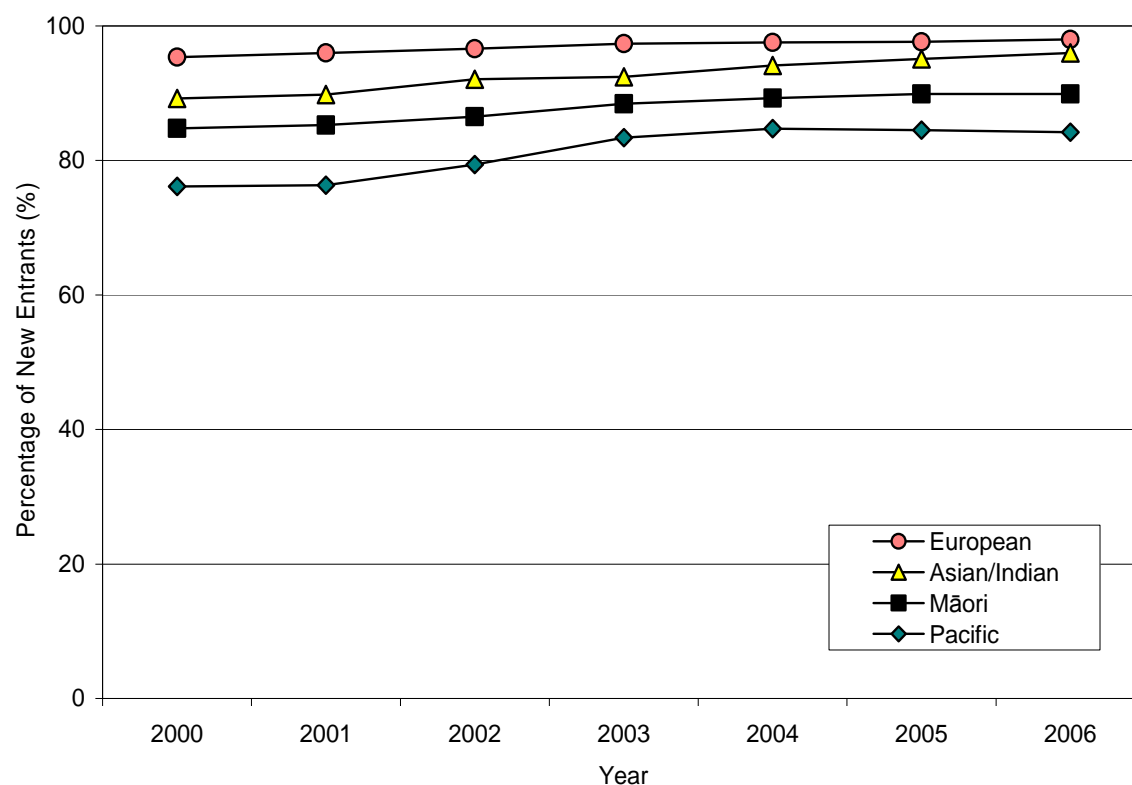
Source: Ministry of Education. *Estimated - most children are enrolled for 27-30 hours per week.

Prior Participation in Early Childhood Education

Trends and Ethnic Differences

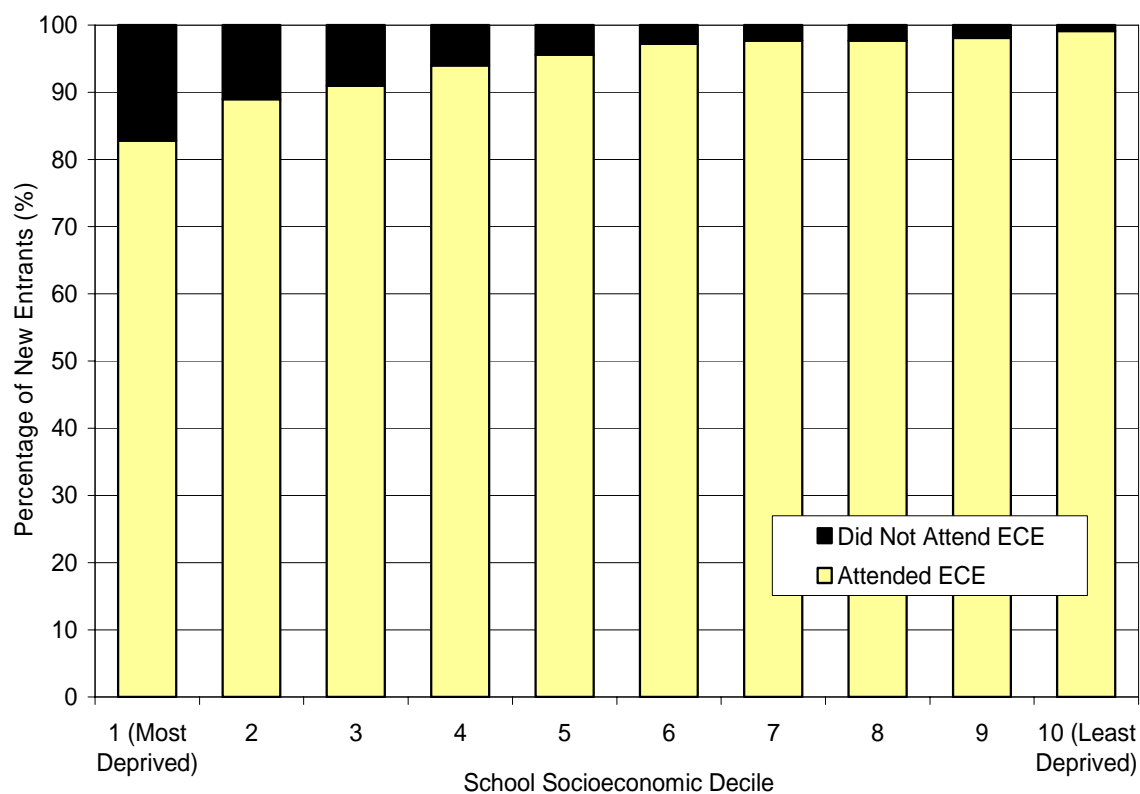
In New Zealand during the past 7 years, the percentage of Pacific new entrants (Year 1) reporting regular participation in ECE prior to attending school increased, from 76.1% in 2000 to 84.2% in 2006. While prior participation in ECE remained highest amongst European > Asian / Indian > Māori > Pacific children during this period, in absolute terms, participation rates for Pacific children increased more rapidly than for European (95.4% in 2000 to 98.0% in 2006) children during this period (**Figure 27**).

Figure 27. Proportion of Primary School New Entrants Who Had Previously Attended Early Childhood Education by Ethnicity, New Zealand 2000-2006



Source: Ministry of Education; Ethnicity is Prioritised (See Methods for Details)

Figure 28. Proportion of Primary School New Entrants Who Had Previously Attended Early Childhood Education by School Socioeconomic Decile, New Zealand 2006



Source: Ministry of Education

Socioeconomic Differences

In New Zealand during 2006, the percentage of new entrants (Year 1) reporting regular participation in ECE also exhibited a modest socioeconomic gradient, with those attending the least affluent schools being less likely to report prior attendance at ECE. Thus during 2006, 17.2% of children attending the least affluent (Decile 1) schools had not attended ECE immediately prior to school entry, as compared to only 0.9% of children attending the most affluent (Decile 10) schools (**Figure 28**). Nevertheless these figures suggest that on average, 82.8% of children in the least affluent schools had attended some form of ECE immediately prior to school entry.

Summary

In New Zealand, Early Childhood Education is provided in a variety of contexts ranging from the more traditional Kindergartens and Te Kohanga Reo, to services that cater for the needs of working parents. In New Zealand during 1990-2006, the number of children enrolled in ECE increased by 55.8%, with the largest increases being in Education and Care Services, Home Based Services and License Exempt Playgroups. In contrast, enrolments in Pacific Island Early Childhood Groups declined by 56.8%. Despite this, during 2000-2006, the percentage of Pacific new entrants (Year 1) reporting prior participation in ECE increased from 76.1% to 84.2% and while rates remained higher amongst European > Asian / Indian > Māori > Pacific children and those attending the most affluent schools, in absolute terms rates increased most rapidly for Pacific children.

Educational Attainment at School Leaving

Introduction

In an increasingly knowledge based society, formal school qualifications are crucial in ensuring that young people gain access to tertiary education and entry level jobs [57]. Yet despite this, during 2006 12.2% of Pacific school leavers left school with little or no formal attainment. While some of these students may have continued their education through other tertiary providers, it is likely that a significant number would have also attempted to join the workforce, a process made more difficult by their lack of formal qualifications [58].

In attempting to understand why some students leave school with little or no formal attainment, the Ministry of Education (MOE) recently commissioned a literature review on the determinants of children's educational attainment [59]. This review found:

1. There were marked ethnic differences in children's educational achievement, with European and Asian children consistently achieving at higher levels than Māori and Pacific children (although some of these differences may be due to socioeconomic factors).
2. There were marked socioeconomic differences in childhood educational achievement, with performance across a variety of subjects (e.g. reading, maths, science) increasing with increasing parental occupational class and school socioeconomic decile. Family income during early childhood (0-5 yrs) also affected educational achievement during primary school, even if income subsequently improved during this time.
3. Children living in families with higher levels of parental (especially maternal) education and which provided study facilities, computers and other resources, had higher achievement levels than those without such resources.
4. Frequent mobility adversely impacted on educational attainment, with those attending 4+ schools by the age of 10 yrs achieving less well on some social and academic measures.
5. Factors positively impacting on educational attainment included parental expectations, social networks (e.g. Pacific church and cultural connections), peer influences (which exert positive and negative effects), access to community institutions (e.g. libraries, medical services), social agencies (e.g. to receive income entitlements) and integrated programmes which enhance the involvement of families in children's education.

While the relationships between these factors were seen as being complex, the review highlighted the significant role family socioeconomic position and access to educational resources played in the academic achievements of children and young people. Such achievements in turn, are likely to significantly impact on the socioeconomic position in which these children and young people bring up their own families in future years.

The following section, using information available from the Ministry of Education, reviews two key indicators of educational performance for Pacific students:

1. The proportion of school leavers with little or no formal attainment
2. The proportion of school leavers with a University Entrance Standard



Data Source and Methods

Definition

1. *School Leavers with a University Entrance Standard*

Relevant qualifications include 42-59 credits at Level 3 or above for NCEA or other National Certificates at Level 3 with University Entrance requirements, Accelerated Christian Education or overseas award at Year 13, University Entrance, National Certificate Level 3, University Bursary (A or B), New Zealand Scholarship or National Certificate Level 4

2. *School leavers with Little or no Formal Attainment*

Before 2001: Leaving school without any credits towards a qualification in the National Qualifications Framework (NQF) or leaving school with 1-11 credits in a National Certificate;

2002-2004: Leaving school without any credits towards a qualification in the NQF or leaving school with 1-13 credits at NCEA Level 1 and other NQF qualifications;

From 2005: Leaving school without any credits towards a qualification in the NQF or leaving school with 1-13 credits at any NCEA Level and other NQF qualifications.

Data Source

Ministry of Education

Numerator: Students leaving with / without the qualifications outlined above.

Denominator: Number of school leavers in a given year

Indicator Category Ideal B

Notes on Interpretation

NCEA is part of the National Qualifications Framework and has replaced School Certificate, 6th Form Certificate and University Entrance / Bursaries. In 2002 all schools implemented NCEA Level 1, replacing School Certificate. In 2003, NCEA Level 2 was rolled out, although schools were still able to offer a transitional 6th Form Certificate Programme. From 2004, NCEA Level 3 replaced Higher School Certificate, University Entrance / Bursaries and a new Level 4 qualification, the New Zealand Scholarship was offered. The changes in qualification structure mean that time series information prior to and after 2002 may not be strictly comparable and in addition, the staggered roll out of the new qualification structure may mean that changes over 2002-05 merely reflect this transition.

School Socioeconomic Decile: See page 76

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

Ethnicity Classification

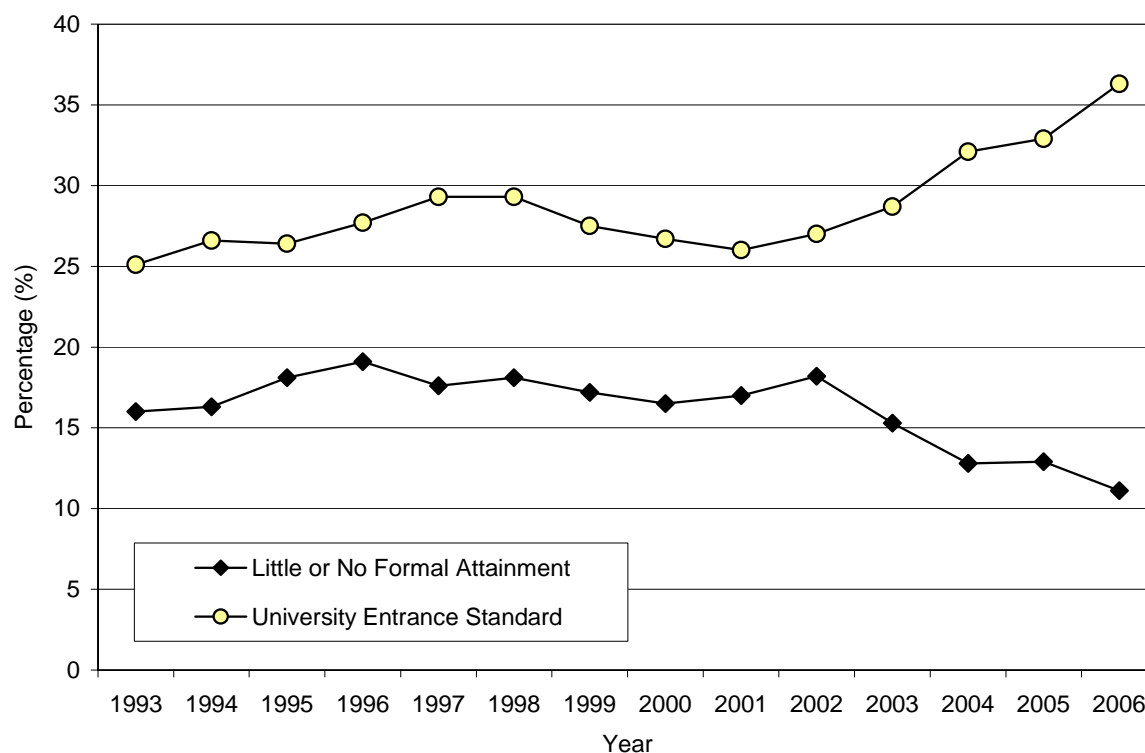
For those reporting multiple ethnic affiliations, ethnicity has been prioritised as follows: Māori > Pasifika > Asian > Other Groups Except European/Pākehā > European/Pākehā.

New Zealand Trends and Distribution

New Zealand Trends

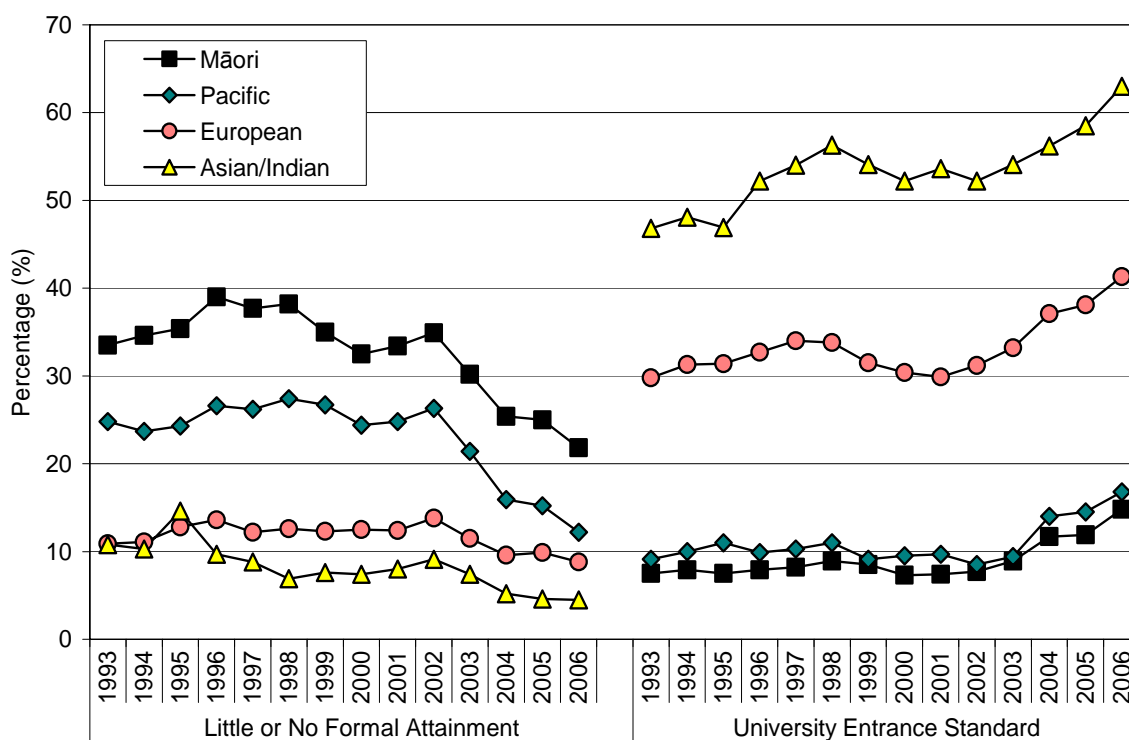
UE Standard: In New Zealand, the proportion of secondary students who left school with a University Entrance Qualification rose during the mid-late 1990s, reached a peak of 29.3% in 1997-1998 and then declined. Following the introduction of the NCEA in 2002, the proportion acquiring a University Entrance Qualification rose again, reaching a peak of 36.3% in 2006. **Little or No Formal Attainment:** Similarly, the proportion of secondary students with little or no formal educational attainment rose during the early 1990s, reached a peak of 19.1% in 1996 and then declined slightly. Declines however became more rapid after the introduction of the NCEA in 2002 (**Figure 29**). Care must be taken when interpreting educational attainment data before and after the introduction of the NCEA in 2002 however, as the qualification structure may not be strictly comparable. In addition the roll out of NCEA occurred over a 3-year period, possibly masking any abrupt transitions within the data.

Figure 29. Highest Educational Attainment of Secondary School Leavers, New Zealand 1993-2006



Source: Ministry of Education

Figure 30. Highest Educational Attainment of Secondary School Leavers by Ethnicity, New Zealand 1993-2006



Source: Ministry of Education; Ethnicity is Prioritised (See Methods for Details)

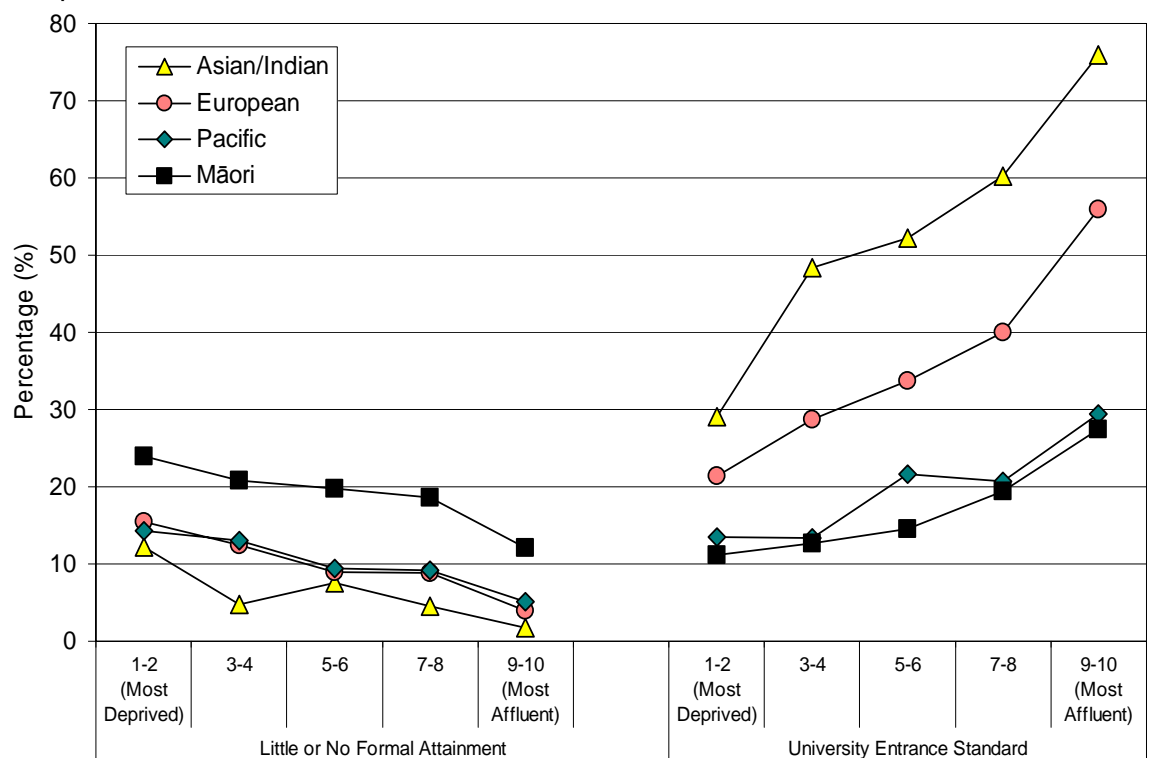
Ethnic Specific Trends

UE Standard: In New Zealand during 1993-2006, the proportion of Pacific and Māori students leaving school with a UE standard was lower than for European or Asian / Indian students. While there were some increases in attainment rates for Asian / Indian students during the early-mid 1990s, rates for Pacific and Māori students remained relatively static until the introduction of the NCEA in 2002. Despite these increases, by 2006 still only 16.8% of Pacific students left school with a UE standard. **Little or No Formal Attainment:** During the same period, the proportion of Pacific students who left school with little or no formal attainment was intermediate between that of Māori and European students. For Pacific students, rates reached a peak of 27.4% in 1998 and thereafter declined only marginally, until the introduction of the NCEA in 2002. By 2006, only 12.2% of Pacific students left school with little or no attainment (**Figure 30**).

School Socioeconomic Decile

During 2006, there were marked socioeconomic differences in educational attainment within New Zealand's largest ethnic groups, with the proportion of Pacific students leaving with little or no formal attainment rising from 5.1% for those attending the most affluent (Decile 9-10) schools, to 14.3% for those attending the most deprived (Decile 1-2) schools. Similarly, the proportion of Pacific students leaving with a University Entrance Qualification fell from 29.4% for those attending the most affluent (decile 9-10) schools, to 13.5% for those attending the most deprived (Decile 1-2) schools (**Figure 31**).

Figure 31. Highest Educational Attainment of Secondary School Leavers by Ethnic Group and School Socioeconomic Decile, New Zealand 2006



Source: Ministry of Education; Ethnicity is Prioritised (See Methods for Details)

Summary

In New Zealand since the introduction of the NCEA in 2002, the proportion of Pacific students leaving school with a UE standard has increased, while the proportion leaving with little or no formal attainment has declined. Care must be taken when interpreting these trends however, as the old and new qualification structures may not be strictly comparable. In addition, despite these improvements, the proportion of Pacific young people leaving school with little or no formal attainment has remained intermediate between that of Māori and European students, while the proportion attaining a UE standard has remained lower than for Asian / Indian and European students. Such differences are of concern, as they are likely to significantly influence the socioeconomic environments in which the current generation of Pacific young people bring up their own families in future years.



Secondary School Retention Rates

Introduction

A key factor in ensuring academic achievement at secondary school level is participation. In order to achieve, students must stay at school, experience a sense of belonging and stay interested and engaged in learning. Research suggests that there are strong correlations between early school leaving, unemployment and lower incomes and that these in turn influence later socioeconomic position [60]. One indicator of continuing participation is school retention i.e. the % of students who attend school beyond the age they are legally required to do so [60]. In New Zealand, the minimum school leaving age rose from 15 to 16 years in early 1993 [61], although parents of students aged 15 years are able to apply to the Ministry of Education for an exemption on the basis of educational problems, conduct or the unlikelihood that a student will obtain benefit from attending school. In such cases, parents are required to give details about training programmes or employment that the student will move on to, if the exemption is granted [60].

In understanding trends and disparities in New Zealand's school retention rates over the past two decades, a number of factors must be taken into account:

1. During the past two decades school retention rates have fluctuated, partly in response to prevailing labour market conditions, with the rising retention rates observed during the late 1990s coinciding with increases in unemployment [62].
2. Not all students who leave school <18 years, or without formal qualifications transition directly into the workforce, with many taking part in other forms of tertiary education (e.g. in 2004 of those <18 yrs, 8% of Pacific, 14% of Māori, 10% of European and 4% of Asian / Indian young people were involved in tertiary education, with >80% studying at Certificate 1-3 Level) [63].
3. During 1998-04, there were large increases in the number of students attending tertiary education, and while the largest gains were for Māori students in Level 1-3 Certificate courses, participation rates for Pacific students in these courses also increased, from 47.0 per 1,000 in 2001 to 70.3 per 1,000 in 2005. During 2001-2005 there were also steady increases in the number of Pacific students undertaking bachelor's degrees, with rates increasing from 25.3 per 1,000 in 2001, to 30.6 per 1,000 in 2005. While those <18 yrs made up only a small proportion of these increases (the largest gains nationally were in those 25+ yrs), these figures suggest that for many students, participation in education does not end at school leaving and that this must be taken into account when assessing the impact early school leaving has on long term employment and earning potential [64].
4. Not all forms of tertiary education have the same impact on future earning potential however, with an analysis of graduate incomes during 2002 suggesting that those completing a Level 1-3 Certificate had a median income of only \$25,920, as compared to \$40,000 for those completing a bachelors degree [65]. Thus, while a number of school leavers may actively participate in Certificate Level Courses, further training may be required if they are to achieve the same income premiums as those completing a degree.

The following section explores secondary school retention rates for Pacific young people using information available from the Ministry of Education. In addition, information on tertiary participation rates is reviewed, in order to provide some context for interpreting ethnic differences in secondary school participation during this period.

Data Source and Methods

Definition

Retention of 16 and 17 year old students in secondary school education

Data Source

Ministry of Education

Numerator: The number of 16 (and 17) year olds on the school roll as at July 1 each year

Denominator: The number of 14 year old students on the roll as at 1 July, 2 (and 3) years previously

Indicator Category Ideal C

Notes on Interpretation

Because the retention of individual students cannot be tracked over time, these figures are estimates derived from comparing enrolments by ethnic group in each year, with the numbers in each ethnic group enrolled 2 and 3 years previously. As a result of high migratory inflows, enrolments for some ethnic groups may increase, inflating the observed retention rates and in the case of Asian students, resulting in apparent retention rates of >100%. These issues need to be taken into account when interpreting school retention data, particularly for Asian and Pacific students. School retention rates exclude foreign NZAID and foreign fee paying students.

School Socioeconomic Decile: See page 76

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

Ethnicity Classification

For those reporting multiple ethnic affiliations, ethnicity has been prioritised as follows: Māori > Pasifika > Asian > Other Groups Except European/Pākehā > European/Pākehā.

New Zealand Distribution and Trends

Retention Rates by Gender and Age

In New Zealand school retention rates increased markedly during the late 1980s, with fluctuations during the 1990s and early 2000s never taking rates back to their pre 1990 levels. While retention rates declined with age for both genders, gender differences in retention at 16 & 17 years widened during the late 1990s and early 2000s (**Figure 32**).

Retention Rates by Ethnicity

Limited time series information on school retention rates was available by ethnicity for 1995-2006 (**Figure 33**). During this period school retention rates at 16, 17 and 18 years were consistently higher for Pacific students than for Māori students. In addition, for the majority of this period retention rates for Pacific students were also higher than for New Zealand as a whole. Care must be taken when interpreting these figures however, as while it is likely that they reflect real ethnic differences, these figures also must also be interpreted in the light of Pacific migration and the potential effect this may have on inflating retention rates, as discussed in the methods section above.

During 2002-2006 when more detailed information was available, school retention rates at 16 and 17 years were higher for Asian / Indian > Pacific and European > Māori students. Retention rates in excess of 100% for Asian/Indian students are potentially the result of immigration, as discussed in the methods section above (**Figure 34**).

Retention Rates by School Socioeconomic Decile

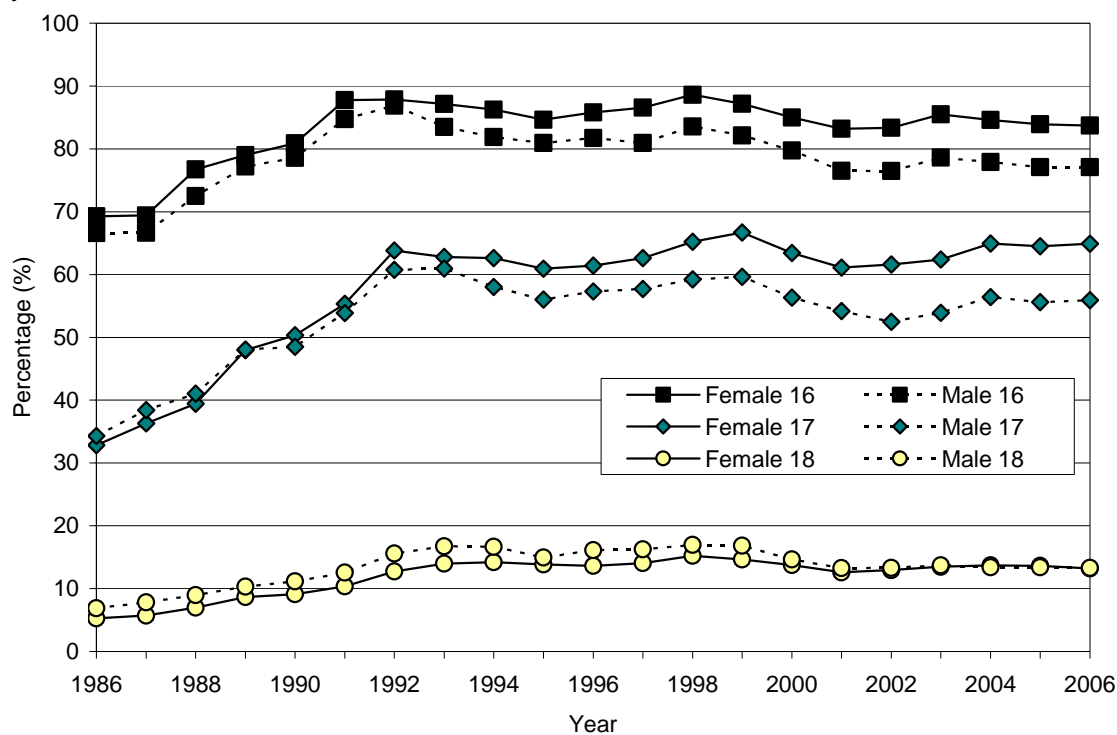
During 2006, modest socioeconomic gradients in school retention rates were apparent at both 16 and 17 years, with the proportion of students remaining at school increasing progressively as the affluence of the school catchment area increased (**Figure 35**).

Comparison with Tertiary Participation Rates

Ethnic differences in school retention rates <18 years of age need to be viewed within the context of the alternative educational opportunities available to students. As discussed previously, during 1998-04, there were large increases in the number of students attending tertiary education, and while the largest gains were for Māori students in Level 1-3 Certificate courses, participation rates for Pacific students also increased, from 47.0 per 1,000 in 2001 to 70.3 per 1,000 in 2005. During 2001-2005,

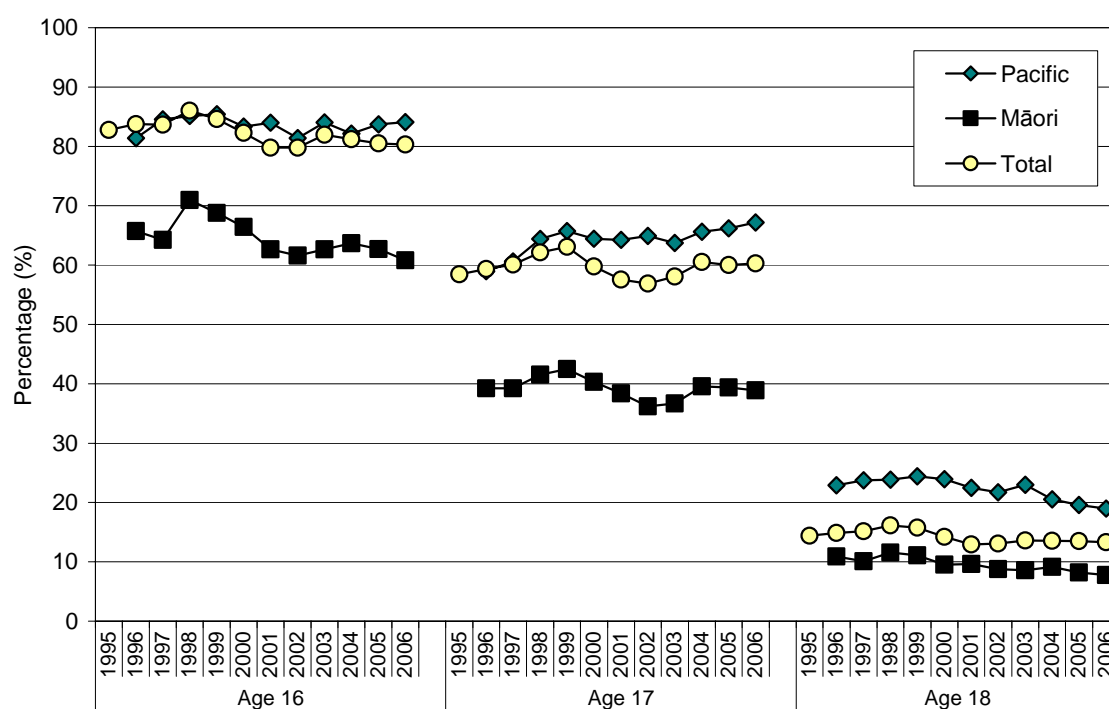
there were also steady increases in the number of Pacific students undertaking bachelor's degrees, with rates increasing from 25.3 per 1,000 in 2001, to 30.6 per 1,000 in 2005.

Figure 32. Apparent Senior Secondary School Retention Rates at 16, 17 and 18 Years by Gender, New Zealand 1986-2006



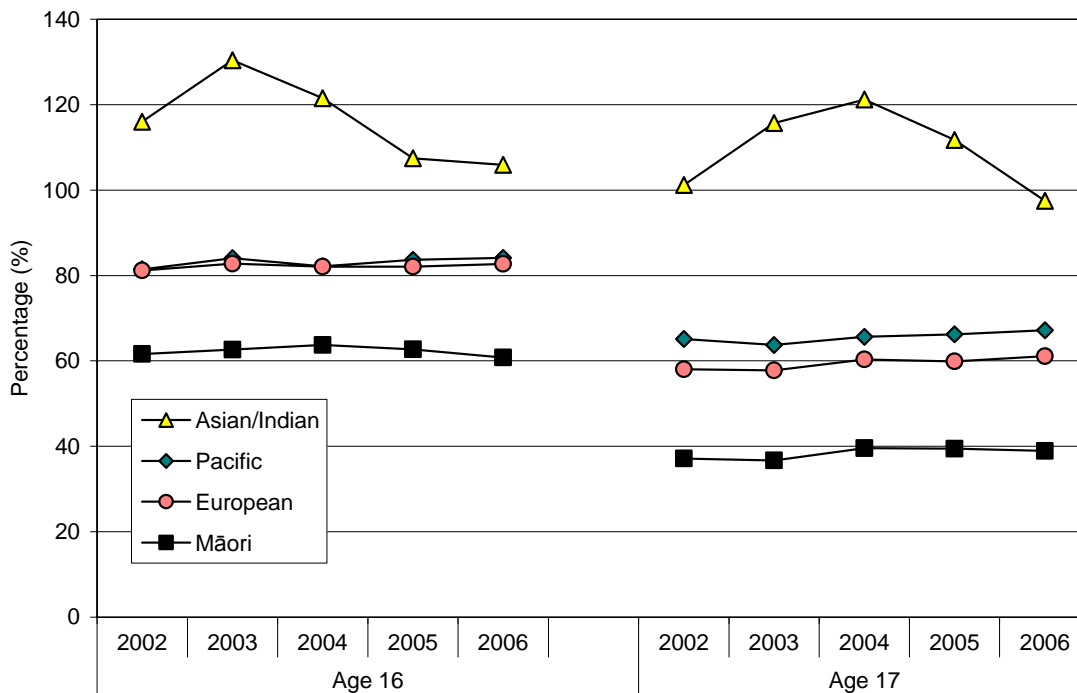
Source: Ministry of Education.

Figure 33. Apparent Senior Secondary School Retention Rates at 16, 17 and 18 Years by Ethnic Group, New Zealand 1995-2006



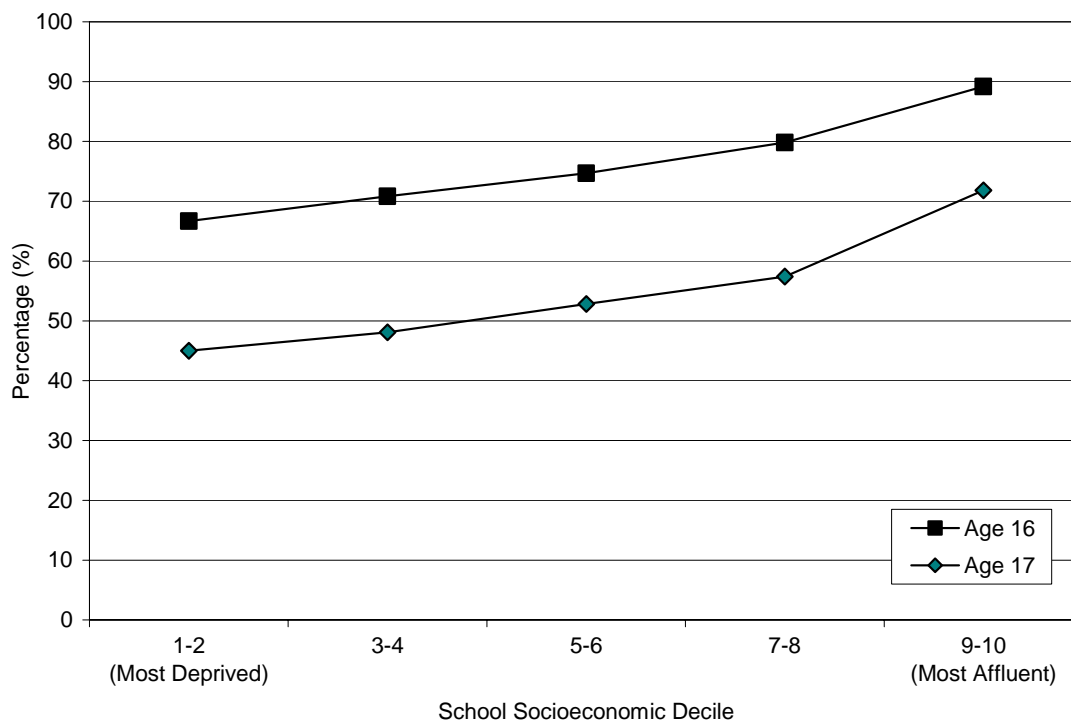
Source: Ministry of Education; Ethnicity is Prioritised (See Methods for Details)

Figure 34. Apparent Senior Secondary School Retention Rates at 16 and 17 Years by Ethnic Group, New Zealand 2002-2006



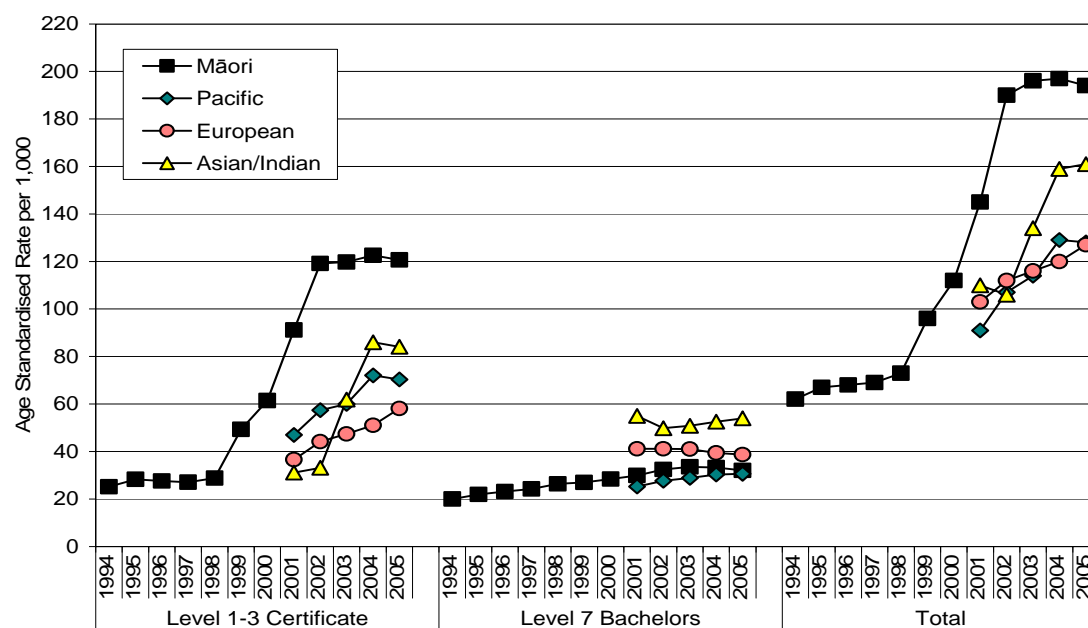
Source: Ministry of Education; Ethnicity is Prioritised (See Methods for Details); Note: Due to the high positive net migration, retention rates for Asian students may be over inflated

Figure 35. Apparent Senior Secondary School Retention Rates at 16 and 17 Years by School Socioeconomic Decile, New Zealand 2006



Source: Ministry of Education; Due to the high positive net migration of Asian students, retention rates in schools with high Asian student populations are erroneously inflated. Given the disproportionately large concentration of Asian students in higher decile schools, the graph above excludes Asian students.

Figure 36. Age Standardised Tertiary Education Participation Rates by Ethnicity and Type of Qualification, New Zealand 1994-2005 (all age groups)



Source: Ministry of Education; Ethnicity is Prioritised (See Methods for Details)

Summary

During the past decade, senior secondary retention rates for Pacific students have remained higher than for Māori students and in addition, for the majority of this period have also been higher than for New Zealand as a whole. Care must be taken when interpreting these differences however, as rates are very sensitive to migratory inflows. In addition, trends in retention rates need also to be viewed in the context of the alternative educational opportunities available to students, with participation rates for Pacific students taking Certificate Level 1-3 courses, increasing from 47.0 per 1,000 in 2001 to 70.3 per 1,000 in 2005. There were also steady longer term increases in the proportion of Pacific students participating in bachelor level study during 2001-2005. While the majority of these increases were in the 25+ age group, such figures suggest that for many, participation in formal education does not cease at school leaving, although the income premiums achieved for completing various types of study need to be taken into consideration when assessing the longer term impacts educational participation has on future socioeconomic security.

School Stand-Downs, Suspensions, Exclusions and Expulsions

Introduction

Participation in secondary school is vital for academic achievement and factors which cut short or interrupt participation potentially impact on educational outcomes. In New Zealand schools, stand-downs, suspensions, exclusions and expulsions are ways in which the educational system deals with student behaviour that disrupts the learning and wellbeing of other students or staff. These approaches are not used lightly by schools, but are seen as a way of helping students return to productive learning and relationships within the school community [66].

In recent years, the most common reasons for suspensions and exclusions were for issues related to student conduct, including continual disobedience, physical or verbal assaults on staff or other students and for other harmful or dangerous behaviours. In addition, a significant number were suspended or excluded as a result of alcohol, drug use, or cigarette smoking [67]. While for the majority of students a stand-down or suspension was a one off event, with the time spent away from school being fairly limited (e.g. a few days–weeks), both New Zealand and overseas research suggests that adolescent conduct problems are associated with poorer long term outcomes including educational underachievement (e.g. leaving school early and without qualifications), unemployment and occupational instability during adulthood [68].

In exploring the determinants of childhood / adolescent conduct problems and how they impact on educational achievement, the Christchurch Longitudinal study noted [68]:

1. Conduct problems in middle childhood were associated with a range of socioeconomic, family and individual factors including young maternal age, lack of maternal qualifications, low parental occupational status, below average living standards, living in a sole parent household or a household with significant conflict, lower IQ and attention problems.
2. In turn, conduct problems during childhood were associated with poorer school achievement in the teenage years. Some, but not all of this association could be explained by the fact that children with conduct problems came from more disadvantaged backgrounds, which in turn was associated with poorer educational performance. Adjusting for these factors reduced the associations between conduct problems on poorer achievement from a 4.8x excess risk to a 1.8x excess risk (i.e. a significant, albeit reduced risk remained which could not be attributed to these factors).
3. Those with conduct problems in childhood tended to also develop patterns of behaviour during adolescence (e.g. cannabis use, suspension from school and affiliation with peers who tranted or broke the law) which predisposed them to poorer educational outcomes, and once these behavioural patterns were also taken into account, any residual associations between conduct problems and educational achievement disappeared.

The authors concluded that while socioeconomic, family and individual factors contributed to the onset of conduct problems during childhood and as a consequence, accounted for a large part of the association between conduct problems and poorer educational achievement in adolescence, a significant part of this association was also due to the tendency for children with conduct disorders to develop affiliations with delinquent peers and patterns of substance use during adolescence, which reduced

their commitment to continuing with their education [68]. The following section, using data from the Ministry of Education, reviews the proportion of Pacific students who were stood-down, suspended, excluded or expelled from school during 2000-2006.

Data Source and Methods

Definition

Information in this section is based on two Ministry of Education Student Participation Indicators: Stand-Downs and Suspensions and Exclusions and Expulsions, which are defined as follows:

1. **Stand-Down:** The formal removal of a student from school for a specified period. Stand-downs may not exceed 5 school days in any term or 10 days in any year. Following stand-downs students automatically return to school.
2. **Suspension:** The formal removal of a student from school by the principal until the Board of Trustees decides the outcome at a suspension meeting. Following a suspension, the Board may decide to lift the suspension, with or without conditions, extend the suspension or, in the most serious cases exclude or expel the student.
3. **Exclusion:** The formal removal of a student <16 yrs from school with the requirement that they enrol elsewhere.
4. **Expulsion:** The formal removal of a student 16+ yrs from school. They may enrol at another school.

Data Source

Ministry of Education

Numerator: Stand-Downs, Suspensions, Exclusions and Expulsions, per year of age

Denominator: Number of students on the school roll as at July 1st, per year of age

Indicator Category Proxy B

Notes on Interpretation

Data was obtained from the Ministry of Education's Stand-Down and Suspension database, which was developed in July 1999, after the introduction of the Education (Suspension) Rules 1999. Since these regulations introduced stand-downs for the first time, statistics prior to mid-1999 are not comparable. Rates were calculated by dividing the number of stand-downs, suspensions, exclusions or expulsions per individual year of age during the school year / the number of students on the school roll at July 1st, per individual year of age. All figures were then age standardised (by the MOE), so that all subgroups in all years had the same age structure (this was necessary as stand-downs and suspensions are highest amongst those 13-15 years and thus differences in age structure by ethnic group, or over time (e.g. due to differing school retention rates) may have led to artificial differences in rates. As such the standardised rate is an artificial measure, but does provide an estimate of how groups over time might compare if they had the same age distribution [69]. As a number of students were suspended on >1 occasion, the number of individual students suspended may well be less than the number of cases reported in these figures.

School Socioeconomic Decile: See page 76

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

Ethnicity Classification

For those reporting multiple ethnic affiliations, ethnicity has been prioritised as follows: Māori > Pasifika > Asian > Other Groups Except European/Pākehā > European/Pākehā.

New Zealand Distribution and Trends

Reasons for Suspension

In New Zealand during 2006, there were 5,013 suspensions in State Schools, with 681 occurring amongst Pacific students. For Pacific students, the most common reasons for suspension were the physical assault of other students (28.4%), continual disobedience (27.5%) and the misuse of drugs (8.6%), which together accounted for 64.5% of all suspensions in this group (**Table 18**). For most students, suspension was a once only event, with only 30% of suspensions since 2000 resulting in an exclusion and <3% in an expulsion [70].

Ethnic Trends

In New Zealand, stand-down rates for Pacific students increased from 32.2 per 1,000 in 2000, to 45.0 per 1,000 in 2006. Similarly, suspension rates increased from 8.7 per 1,000 in 2000, to 10.6 per 1,000 in 2006, while exclusion rates increased from 3.5 per 1,000 in 2000, to 4.2 per 1,000 in 2006. Throughout this period stand-downs, suspensions and exclusions in Pacific students were intermediate between those of

Māori and European students. While expulsion rates for Pacific students also increased (4.7 per 1,000 in 2000 to 7.0 per 1,000 in 2006), expulsion rates were generally higher than for other ethnic groups during this period (**Figure 37**).

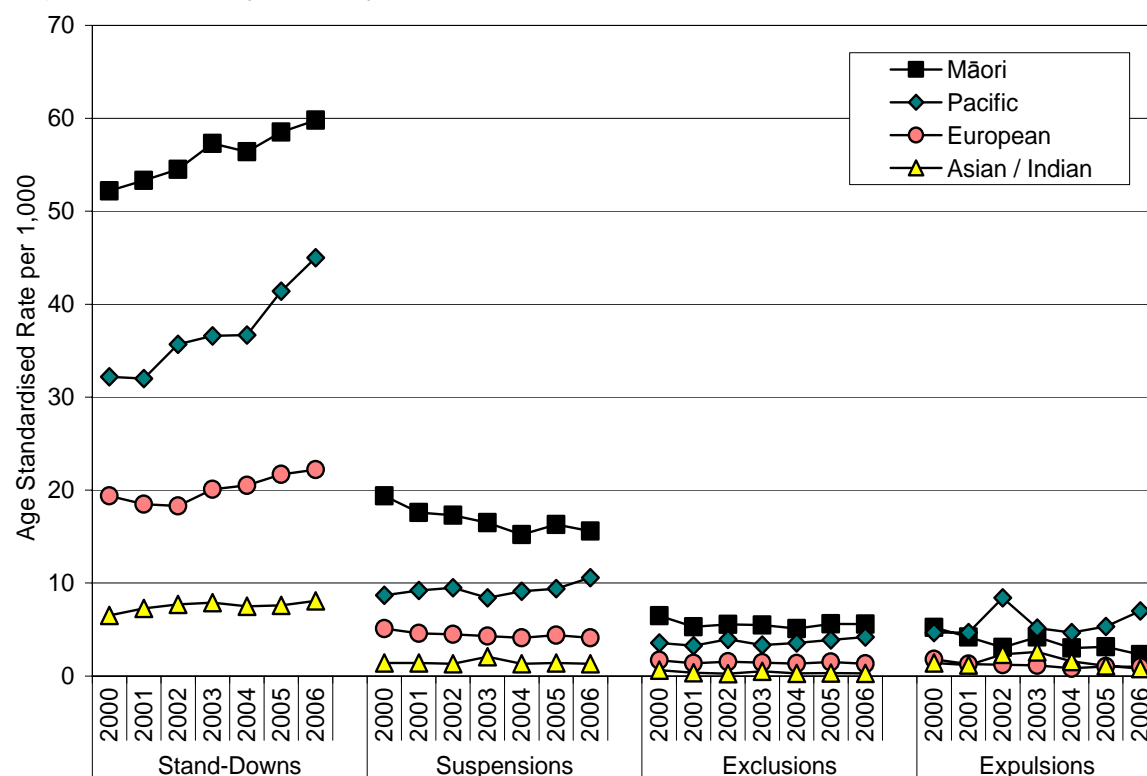
Gender Differences

During 2006, both stand down and suspension rates in Pacific students were higher for males (stand-downs 61.3 per 1,000; suspensions 15.4 per 1,000) than for females (stand-downs 28.2 per 1,000; suspensions 5.6 per 1,000). Similar gender differences were seen for Māori, European and Asian / Indian students (**Figure 38**).

Socioeconomic Differences

During 2006, while suspension rates exhibited a modest socioeconomic gradient for Māori and European students, similar gradients were not evident for Pacific students (where suspension rates were higher for those attending schools in average areas). Once broken down by school socioeconomic quintile, rates for Pacific students were intermediate between those of Māori and European students (**Figure 39**).

Figure 37. Age Standardised School Stand-Down, Suspension, Exclusion and Expulsion Rates by Ethnicity, New Zealand 2000-2006



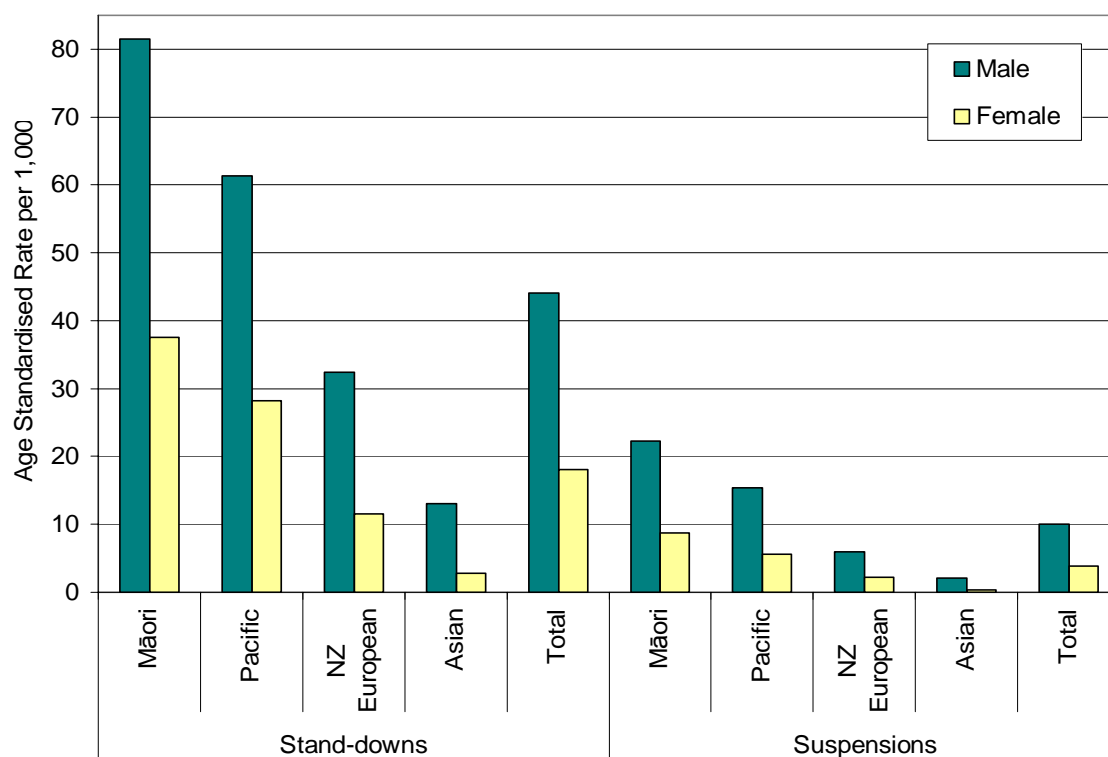
Source: Ministry of Education; Ethnicity is Prioritised (See Methods for Details)

Table 18. Number of Suspensions in State Schools by Type of Behaviour, New Zealand 2006

	Type of Behaviour												Total	Rate Per 1,000 Students
	Alcohol	Arson	Continual Disobedience	Drugs (Including Substance Abuse)	Physical Assault on Other Students or Staff	Sexual Harassment or Misconduct	Smoking	Theft	Vandalism	Verbal Assault on Other Students or Staff	Weapons	Other Harmful or Dangerous Behaviour		
School Type														
Primary / Special	8	10	249	125	332	28	16	21	24	83	38	63	998	2.3
Secondary/Composite	193	39	1,122	886	807	43	29	204	135	234	69	254	4,015	14.4
Total	200	49	1,371	1,011	1,139	71	46	225	158	317	107	318	5,013	7.0
Gender														
Male	93	37	996	707	869	62	31	179	134	234	98	236	3,675	10.1
Female	107	12	375	304	270	9	15	46	24	83	9	82	1,338	3.8
Total	200	49	1,371	1,011	1,139	71	46	225	158	317	107	318	5,013	7.0
Ethnicity														
European	76	24	549	378	330	28	20	71	36	102	38	109	1,762	4.2
Māori	77	16	594	552	586	35	25	99	80	173	49	121	2,407	15.1
Pacific	36	6	187	59	193	7	-	42	34	31	16	69	681	10.1
Asian	5	2	21	7	11	1	-	7	4	3	3	9	73	1.3
Other	6	0	19	15	19	0	1	5	5	8	1	10	90	6.4
Total	200	49	1,371	1,011	1,139	71	46	225	158	317	107	318	5,013	7.0
School Socioeconomic Decile														
1-3	53	8	421	298	462	27	11	66	62	130	31	108	1,675	9.5
4-7	124	28	752	521	515	38	34	114	87	150	67	149	2,578	8.7
8-10	24	13	198	193	162	7	1	45	10	37	9	61	760	3.2
Total	200	49	1,371	1,011	1,139	71	46	225	158	317	107	318	5,013	7.0

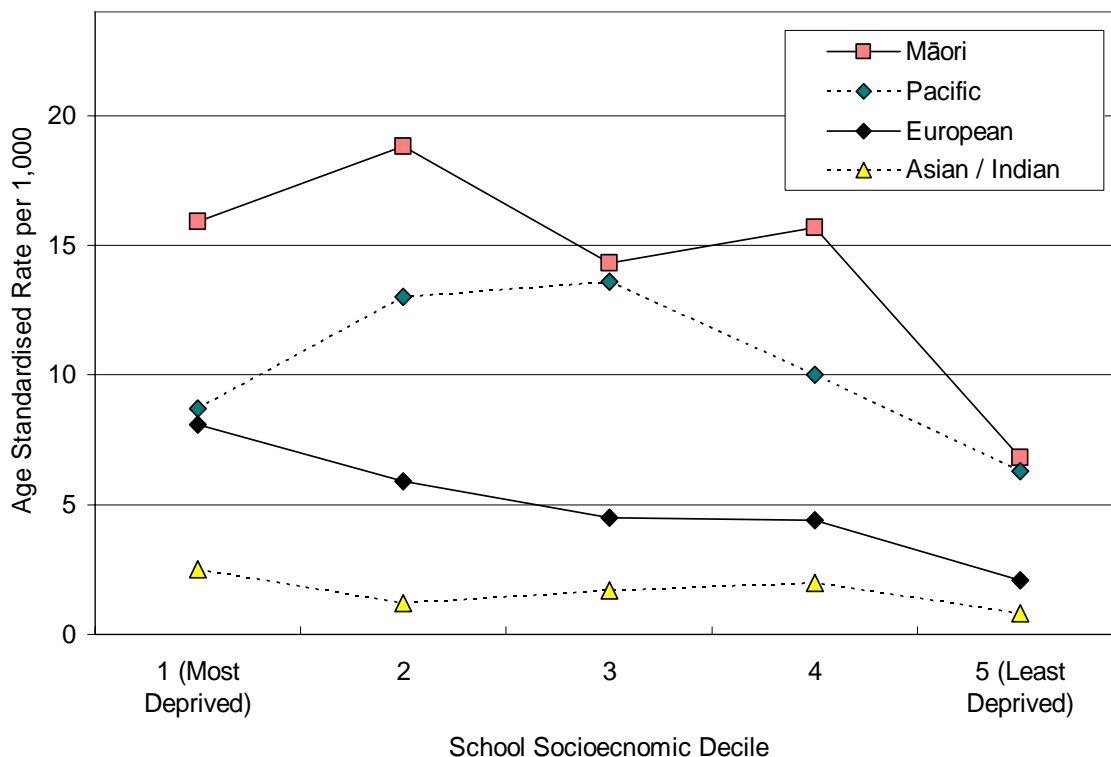
Source: Ministry of Education; Ethnicity is Prioritised (See Methods for Details)

Figure 38. Age Standardised Stand-Down and Suspension Rates per 1,000 Students, by Gender and Ethnic Group, New Zealand 2006



Source: Ministry of Education; Ethnicity is Prioritised (See Methods for Details)

Figure 39. Age Standardised Suspension Rates per 1,000 by Ethnicity and School Socioeconomic Quintile, New Zealand 2006



Source: Ministry of Education; Ethnicity is Prioritised (See Methods for Details)

Summary

Participation in secondary school is vital for academic achievement and factors which cut short or interrupt participation potentially impact on educational outcomes. In New Zealand schools, stand-downs, suspensions, exclusions and expulsions are ways in which the system deals with student behaviour that disrupts the learning and wellbeing of other students or staff. During 2006, the main reasons for suspensions amongst Pacific students were for physical assaults on other students or staff, continual disobedience and drug use. During 2000-2006, stand-downs, suspensions, exclusions and expulsions amongst Pacific students all increased, and while stand-down, suspension and exclusion rates remained intermediate between those of Māori and European students, expulsion rates for Pacific students were higher than for other ethnic groups for the majority of this period. Such figures potentially suggest that for a small minority of Pacific young people, conduct issues significantly impact on their participation in education during their secondary school years.



Socioeconomic
and Cultural
Determinants

Service Provision
and Utilisation



Elements from a Self Portrait by Sione Tukuafu
"Celebrating myself and my culture... with some natural elements ... the birds and the fish"

Viewpoint: Support Services Provided by the Non-Regulated Health Workforce by Lana Perese

This report explores the health status of Pacific children and young people in New Zealand over time and provides some insights into the underlying determinants (proximal factors) and the pathways (distal factors) which lead to particular health prospects (See Part 2 - *Socioeconomic and Cultural Determinants*). This opinion piece focuses on the important, and often unrecognised role of the support services provided by the non-regulated health workforce¹ (e.g. health promoters, mental and community health workers, caregivers, youth workers), as a broader distal and socio-cultural factor associated with influencing behavioural change and positive health outcomes [71, 72]. This piece is premised on the notion that effective policy initiatives and interventions must give due consideration to the underlying and often complex and multi-dimensional factors (e.g. support services, the non-regulated health workforce) that play a role in influencing attitudes toward, and the utilisation of, Primary and Mental Health Care Services for Pacific peoples.

Primary Health Care in New Zealand consists of a broad range of services that cover: community development and empowerment to improve the health of people within communities; preventative services such as health education and counselling, disease prevention and screening; general practice, mobile nursing, community health and pharmacy services; and first-level services for conditions such as maternity, family planning and sexual health, dentistry, physiotherapy, chiropractics and osteopathy, traditional healers and alternative healers. Primary Care also includes Primary Health Organisations (PHOs), which place an emphasis on population health within communities. PHOs consist of general practitioners, primary care nurses, and other health professionals, such as Māori and Pacific health providers and health promotion workers [73]. Research indicates the 96% of the Pacific population are enrolled in PHOs [74].

Despite this finding, the health disparities identified in this report, in conjunction with contextual evidence which suggests that Primary and Mental Health Services remain underutilised by Pacific peoples, young and old [74-81], identify a need to address barriers to help seeking, and provide evidence that Support Services have an increasingly important role to play in improving the health status of Pacific people in New Zealand.

Pacific adult populations have identified a plethora of barriers to Primary and Mental Health Care which include financial hardship, cost and transport, lack of culturally appropriate service, lack of local services, difficulties accessing services, stigma associated with mental illness, lack of childcare and family support, gender insensitivity and a lack of information [76, 77, 82, 83]. Barriers to health care specific to young people include cost (visits / prescriptions), concerns of confidentiality, embarrassment

¹ The non-regulated Pacific health workforce can be defined as:

- Those who are not subjected to regulatory requirements under health legislation (Health Practitioners Competence Assurance Act, 2003))
- Those who have direct personal care interaction with clients, patients or consumers within the health and disability sector and/or who spend at least some of their visiting people in the community or following up on released and discharged patients
- Those who are employed in funded services, and for whom the chief original source of their remuneration is public money
- People who identify as Pacific, and who are of a Pacific culture that is represented in New Zealand
- People employed by a health care provider or an organisation that works with a health care provider, and caters to the needs of the Pacific community.

and not wanting to make a fuss, travel, lack of cultural appropriateness, lack of appropriate and accessible services and information, lack of knowledge about services, and perceptions that communication between adults and young people is sometimes authoritarian, judgemental and patronising [78, 84, 85]. Understanding these barriers to service utilisation is important, if policy initiatives and interventions are to reach and to be effective for their target audience.

In regard to young people in New Zealand, over the last 10-15 years youth-targeted clinical on-site care (e.g. school-based health care) has gradually developed and been proven effective in terms of increasing the utilisation of Primary and Mental Health Services, substance abuse care, health promotion, education and counselling services for this target group [78, 86, 87]. However, despite commendable advancements, it is important to note that there is insufficient evidence to demonstrate changes in physical or mental health status [87]. Also, the most high risk students, who often have the biggest health needs, either leave school early or are in alternative education [84, 87]. This finding, in conjunction with the significant rates of school stand-downs, suspensions, and expulsions for Pacific young people identified in this report, implies that this group remains ill-exposed to targeted health care interventions and that alternative approaches and policy initiatives are required.

The role of Support Services and the non-regulated health workforce as an alternative, effective intervention to complement clinical practice has been contended within Pacific adult population health service utilisation research [83] and exemplified within the mental health sector by significant increases in the use of services delivered by community mental health teams [77]. This seems unsurprising given that the roles undertaken by non-regulated health workers are extensive and encompass cultural mediation, culturally appropriate health education, advocacy for community and individual needs, empowering communities, clients and their families, increasing access to health care and reducing health care costs [71, 88, 89].

In addition, this workforce is identified as being more cost effective and mobile, thus in a position to access 'hard-to-reach' communities and groups, such as Pacific young people who are no longer within the school system. In view of the barriers to service utilisation for young people that are identified within this piece, the non-regulated health workforce is apt to address each of these and to provide the cultural connectedness and appropriateness that Pacific young people consider a necessary enabler to health service utilisation and provision [78, 86]. As well as influencing behavioural change, positive health outcomes, and access to health services, the non-regulated health workforce also plays an effective role in the dissemination of information and increasing client knowledge on health maintenance and disease prevention [89]. Youth workers in the non-regulated health sector are also in a position to provide referral Support Services to non-health organisations such as the Department of Child Youth and Family (CYF), Work and Income New Zealand (WINZ) and the New Zealand Police.

Despite the important role that Support Services can and do play in improving health outcomes for Pacific young people, this workforce remains characterised by lowly paid, casual and voluntary workers with high turnover rates. Also, with the exception of Mental Health Services, there lacks an overarching strategy within the health and disability sector. On the premise that the non-regulated workforce is a key workforce for the future of New Zealand's health and disability services, this opinion piece contends the need to recognise and acknowledge the values that Support Services add to health service provision for Pacific young people in New Zealand. Additionally, this piece provides an insight into and information on a relatively unknown workforce and contends that this will enable better targeting of interventions, policy and services aimed at improving outcomes at the broader distal level for Pacific young people in New Zealand.

Primary Health Care Provision and Utilisation

Introduction

The Ministry of Health defines primary health care as essential healthcare based on practical, scientifically sound, culturally appropriate and socially acceptable methods that is universally acceptable to people in their communities, involves community participation, is integral to, and a central function of, New Zealand's health system, and is the first level of contact within our health system [73]. Primary health care covers a broad range of services, not all of which are Government funded, and includes: working with community groups to improve the health of the people within communities; health improvement and preventive services such as health education and counselling, disease prevention and screening; generalist first-level services such as general practice, mobile nursing, community health and pharmacy services; and first-level services for conditions such as maternity, family planning and sexual health services, dentistry, physiotherapy, chiropractic and osteopathy services, traditional healers and alternative healers. Access to high quality primary health care is associated with better health outcomes, improved preventive care, and reduction in hospitalisations [90]. In addition to these benefits, continuity of care has been associated with patients who feel more able to take care of themselves in the future, better recognition of problems, less recourse to medication as a first line treatment, and improved compliance with prescribed medication [73]. Provision of primary care has also been associated with lower total health service costs [73, 90].

New Zealand's Primary Health Care Strategy identifies a strong primary health care system as being central to improving the health of New Zealanders and tackling inequalities in health [73]. Its vision is for people to become a part of local primary health care services that improve their health, are easy to get to, and that co-ordinate their ongoing care. This vision involves a new direction for primary health care with a greater emphasis on population health strategies and the role of the community, including a shift from a fee-for-service funding structure, to population based funding informed by population needs. Primary Health Organisations (PHOs) form the local structure to achieve this vision and comprise general practitioners, primary care nurses, and other health professionals such as Māori health providers and health promotion workers, working together in groups.

The following section explores three aspects of primary health care provision and utilisation: Enrolment with a PHO, General Practitioner (GP) Visits Foregone, and Well Child Tamariki Ora services.

Data Source and Methods

Definition

1. Primary Health Organisation Enrolment: Children and young people enrolled with a PHO by ethnicity, NZDep, and DHB
2. General Practice Visits Foregone: Children and young people who have foregone a visit with a GP by age group and reason.
3. Well Child Tamariki Ora Scheduled Visits in Children enrolled with Plunket

Data Source

1. *Primary Health Organisation Enrolment*

Numerator: NZHIS PHO Enrolment Collection: Number of children and young people enrolled with a PHO

Denominator: NZ Census 2006: Number of children and young people in New Zealand

2. General Practice Visits Foregone

Numerator: New Zealand Health Survey: Children and young people for whom the answer was “Yes” to the following question: “In the last 12 months, has there been any time you need to see a general practitioner but weren’t able to”.

New Zealand Living Standards Survey: Children for whom the answer was “Yes” to the following question: “In the last 12 months have you postponed or put off visits to the doctor to help keep down costs?”

Interpretation: Note that the questions regarding GP visits foregone differs between the two survey measures, therefore rates will not be directly comparable.

3. Well Child Tamariki Ora Scheduled Visits in Children enrolled with Plunket

Numerator: 2006 New Baby Enrolments (Plunket Client Information System) and; Children enrolled with Plunket who attended Well Child Tamariki Ora Core Visits in 2006

Denominator: Live Births in 2006 (Birth Registration Dataset) and; Children enrolled with Plunket in 2006 (Plunket Client Information System)

Interpretation: In the absence of a national register of Tamariki Ora Well Child contacts, available data for children enrolled with Plunket is reported in this section. Proportion attending visits is the proportion of those enrolled with Plunket and who were old enough to receive a core visit at that age. If children are older than the age specified for a core contact when they attend that visit, then they are not recorded as having had that core visit on the PCIS.

Statistical Significance Testing

Tests of statistical significance have not been applied to PHO and Plunket data in this section, and thus any associations described do not imply statistical significance or non-significance. 95% confidence intervals however, have been provided for NZ Health Survey data and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations.

Primary Health Organisation Enrolment

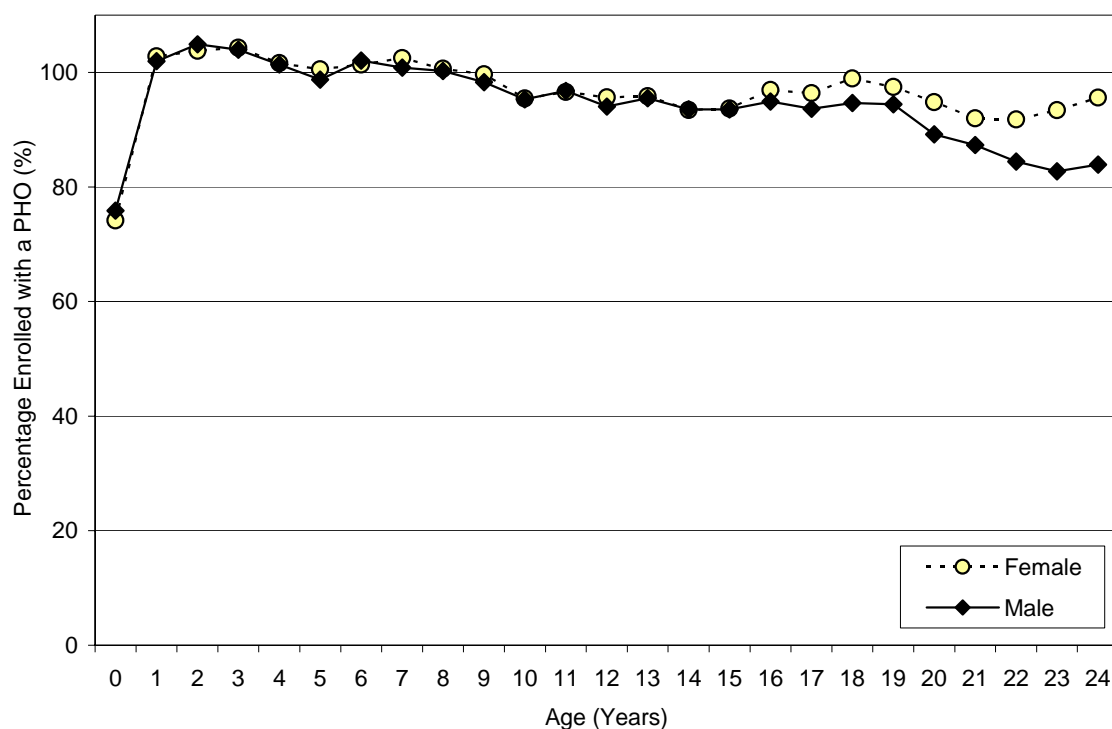
Primary Health Organisations (PHOs) form the local structure to achieve the vision of the New Zealand Primary Health Care Strategy. They comprise general practitioners, primary care nurses, and other health professionals such as Māori health providers and health promotion workers, working together in groups. Following the establishment of the first PHOs in 2003, general practitioners enrolled their current patients into their own PHOs, resulting in an estimated 95% of New Zealanders being enrolled with a PHO by late 2004 [91]. Enrolment with a PHO is voluntary; however people are encouraged to enrol in order to gain the benefits of a population approach to primary care and to improve the continuity and co-ordination of the care they receive (e.g. patients can consult with a general practitioner without enrolling a PHO, but are likely to pay a higher consultation fee).

In terms of their funding structure, PHOs are considered “not for profit” organisations which are funded by District Health Boards for the provision of services to enrolled patients. They receive a monthly amount per capita, based on three funding formulae (regardless of whether the person is seen or not). These formulae are: 1) First Contact, which contributes the most to the funding a PHO receives. It is paid for first contact services such as general practitioner or practice nurse consultations; 2) Services to Improve Access (SIA), which provides funding for initiatives to improve access to the PHO’s services; and 3) Health Promotion (HP) funding, which is used to pay for health promotion activities [92]. Both SIA and HP funding are provided to PHO’s once they have demonstrated how this money will be spent. Additional funding is also available through the Care Plus Programme, which in addition to providing for acute medical and mental health needs, chronic conditions and terminal illness, also aims to improve access, support health promotion and reduce inequalities [91, 93].

Initially providers with more than 50% of those enrolled considered high need (defined as Māori and Pacific peoples, or people resident in areas with a NZDep decile of 9 or 10) received funding under the ‘Access’ capitation formula and offered reduced consultation fees [91, 94]. Providers serving less needy populations received funding according to an ‘Interim’ formula which included subsidies which were increased incrementally by age group to match ‘access’ funding. By mid-2007 however, all enrolled patients were funded at the ‘Access’ rate [92].

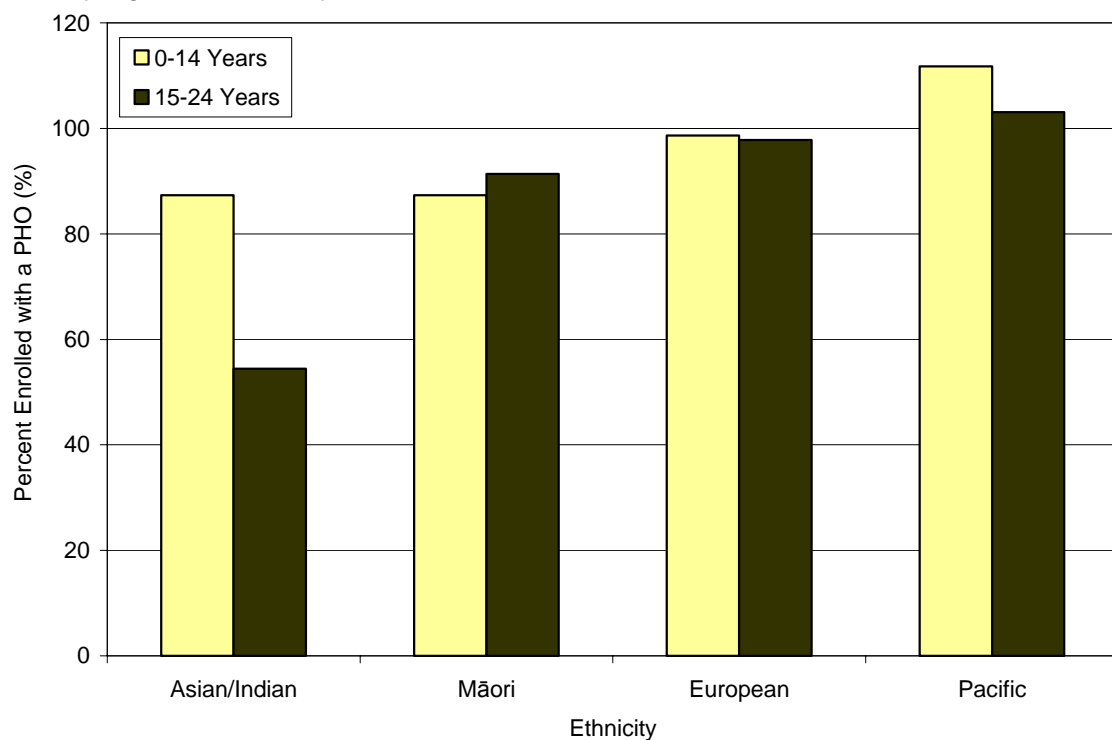
New Zealand Distribution

Figure 40. Proportion of Children and Young People Aged 0-24 Years Enrolled with a PHO by Age and Gender, New Zealand October-December 2006



Source: Numerator: NZHIS PHO Enrolment Collection; Denominator: 2006 Census

Figure 41. Proportion of Children and Young People Aged 0-24 Years Enrolled with a PHO by Age and Ethnicity, New Zealand 2006



Source: Numerator: NZHIS PHO Enrolment Collection; Denominator: 2006 Census; Ethnicity is Level 1 Prioritised.

In New Zealand during 2006 there were 81 PHOs [91]. During October-December of this year, 98.2 % of children 0-14 years and 92.9% of young people aged 15-24 years were enrolled with a PHO. When broken down by single year of age, children <1 year had the lowest PHO enrolment rate (75.0%). Excluding this age group, enrolments were lower in young people than in children, dropping from around 100% in those aged 1-9 years, to 91.8-94.8% in 20-24 year old women, and 83.9-89.1% in 20-24 year old men. Prior to age 16 years however, PHO enrolments in males and females were similar (**Figure 40**). During the same period, PHO enrolments were higher for Pacific > European > Māori and Asian/Indian children and young people, with the lowest rates being seen in Asian/Indian young people aged 15-24 years (**Figure 41**).

Unmet Need for General Practitioner Services

Published data on general practice utilisation suggest that people with low incomes, or living in deprived areas are more likely to be frequent users of general practitioner services [95, 96]. In addition, survey data suggests there are barriers to accessing general practitioner care, with a higher proportion of Māori and Pacific people, young people, and people residing in deprived areas reporting a time in the last 12 months when they needed to see a GP but did not [95, 97]. When broken down by age, the proportion reporting an unmet need for GP services was lowest for those <15 years and highest for those 15-24 years of age [95, 97] (**Table 19**).

The most common single reason caregivers gave for their child not seeing a GP was cost, although a range of other reasons were also important such as lack of transport or inability to get an appointment soon enough or at a suitable time [95]. The most frequently reported reasons for not seeing a GP when needed in young people were cost (53%; 95% CI 43%-63%), could not be bothered (27%; 95% CI 19%-36%) and unable to get an appointment at a suitable time (20%; 95% CI 11%-28%) [97].

Table 19. Unmet Need for General Practitioner Services in Children and Young People, New Zealand 1996-2004 (Selected Years)

	New Zealand Health Survey					
	1996/97 [95]			2002/03 [97]		
Age Group	*Number	%	95% CI	*Number	%	95% CI
Children 0-14 yrs	1,019	6.4	4.2-8.6			
Males 15-24 yrs	NR	16.9	12.2-21.6	NR	13.1	9.0-17.2
Females 15-24 yrs	NR	20.8	15.9-25.7	NR	18.0	13.7-22.3
Total 15-24 yrs	1,050	18.8	15.5-22.1			
	New Zealand Living Standards Survey [98]					
	2000			2004		
Age Group	*Number	%	95% CI	*Number	%	95% CI
Children 0-17 yrs	NR	10	NR	NR	13	NR

Note: Number indicates number surveyed. NR: Not Reported. Questions asked by each Survey varied, see methodology section for details.

Well Child Tamariki Ora Services

Well Child care is a term used to describe a screening, surveillance, education and support service offered to all New Zealand children from birth to five years and their family or whanau [99]. *Ensuring access to appropriate child health care services including Well Child and family health care and immunisation* is listed as one of the 13 priority population health objectives in the New Zealand Health Strategy [100]. In 2002,

in order to achieve this goal, the Ministry of Health developed a Well Child Framework within which Well Child services are provided by general practitioners, registered nurses and community health workers (kaiawhina) with training in child health [101].

The current Tamariki Ora Well Child Framework includes 12 health checks, with 8 of these offered to children aged from 4 weeks to 5 years, with the capacity to offer first time parents and families requiring extra support additional contacts (Appendix 9). To date there is no national register of Well Child contacts; therefore the proportion of children who receive each scheduled contact is unknown. From birth to 4-6 weeks Well Child services are provided by Lead Maternity Carers (obstetricians, general practitioners, midwives), and then by a Well Child Provider from 4-6 weeks to 4½ years of age [102]. This section summarises data on Well Child Tamariki Ora services offered by Plunket.

Well Child Scheduled Visits in Children enrolled with Plunket

Plunket is contracted by the Ministry of Health to provide Well Child Services as specified in the Well Child Framework and provides two types of contacts: core and additional contacts. Plunket offer eight core contacts which include clinical assessment, health promotion and parent education and in 2006 were funded to provide an average of 6.5 core visits per child. Additional contacts are also available from Plunket as part of the Well Child Framework for families who live in areas of greater socio-economic deprivation and to all first time parents.

In 2006, 90.3% of infants born in New Zealand were enrolled with Plunket. Enrolment with Plunket occurred more frequently in infants living in more affluent areas (NZ Deprivation index Decile 1-4), and in European > Pacific > Māori Infants (**Table 20**).

The proportion of children enrolled with Plunket who attend each Core visit increases from 65% for Core 1, scheduled at <6 weeks, to 90% for Core 4, scheduled at 5 months. However, many infants receive their first Well Child check from their Lead Maternity Carer, at <6 weeks of age, and are not enrolled with Plunket until after this is completed. The proportion of children who attend each Core visit then declines with age to 60% at Core 8 (3 years) (**Figure 42**).

The proportion of Plunket enrolled children who attend the Core visits offered in the first year of life (Core 1-5) is higher in European/Other > Pacific > Māori. A modest social gradient is evident with those living in more deprived areas less frequently attending each visit (**Figure 43**). Despite these trends, over 75% of Māori and Pacific infants enrolled with Plunket attend Core 2 – Core 5 in their first year of life.

Table 20. New Baby Enrolments with Plunket, New Zealand 2006

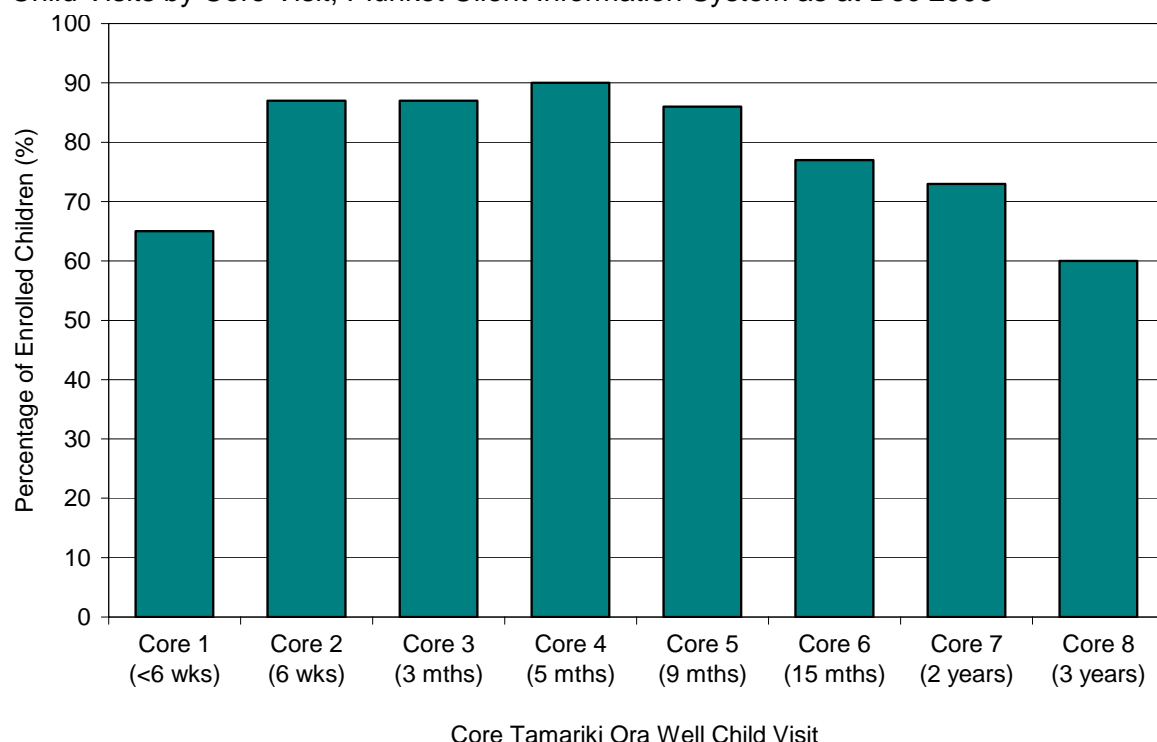
NZ Deprivation Index			Ethnicity		
Decile	Number	% NZ Births		Number	% NZ Births
1-4	19,913	102.4	Māori	11,832	66.0
5-7	15,439	90.5	Pacific	5,589	87.2
8-9	11,498	77.5	European/Other	34,078	94.8
10	6,714	78.5	Total	54,410	90.3

Source: Plunket; Ethnicity is prioritised

Of those children enrolled with Plunket who had their first birthday in 2006, 77% had attended 4 or 5 of their scheduled 5 Well Child Core visits, and 98% had attended 2 or more Core visits. A modest social gradient was evident in these children with 94% of those living in the most affluent areas (NZ Deprivation decile 1) attending 3 or more visits compared with 85% of those living in the most deprived areas (NZ Deprivation decile 10) (**Figure 44**). However, those living in the more deprived areas are eligible to

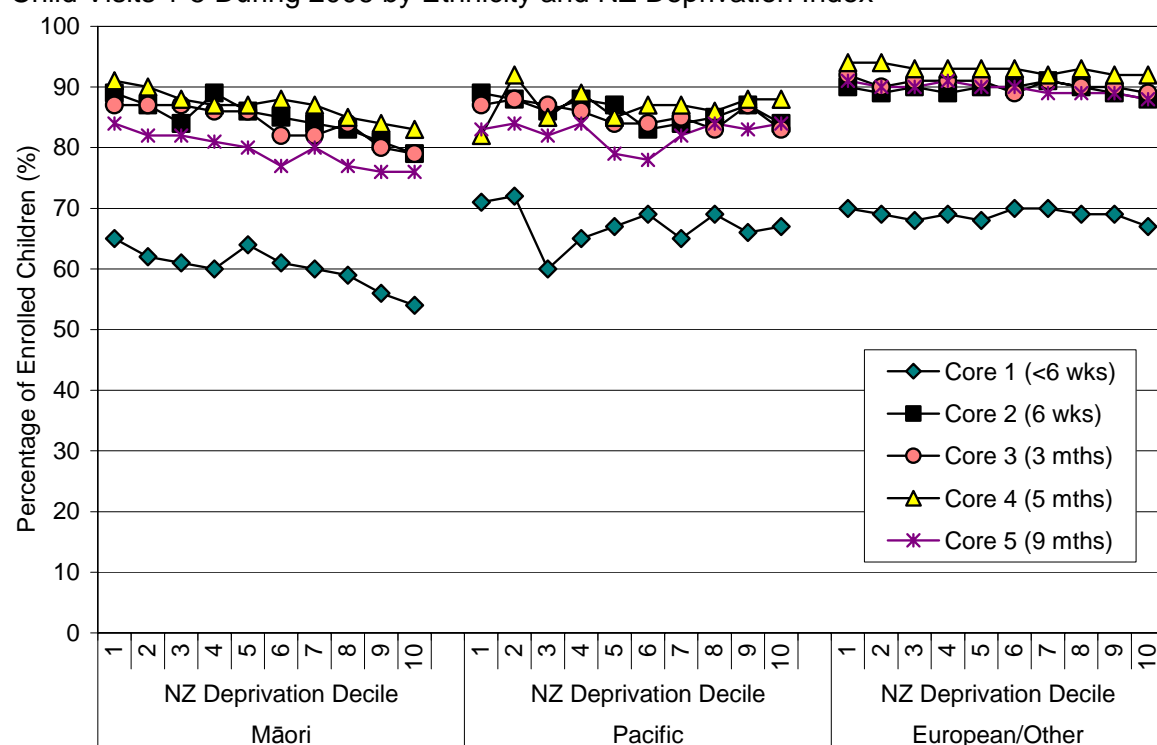
receive additional visits and, on average, received a greater total number of Well Child visits (Core and Addition) than those living in the most affluent areas (**Figure 45**).

Figure 42. Proportion of Children Enrolled with Plunket Attending Tamariki Ora Well Child Visits by Core Visit, Plunket Client Information System as at Dec 2006



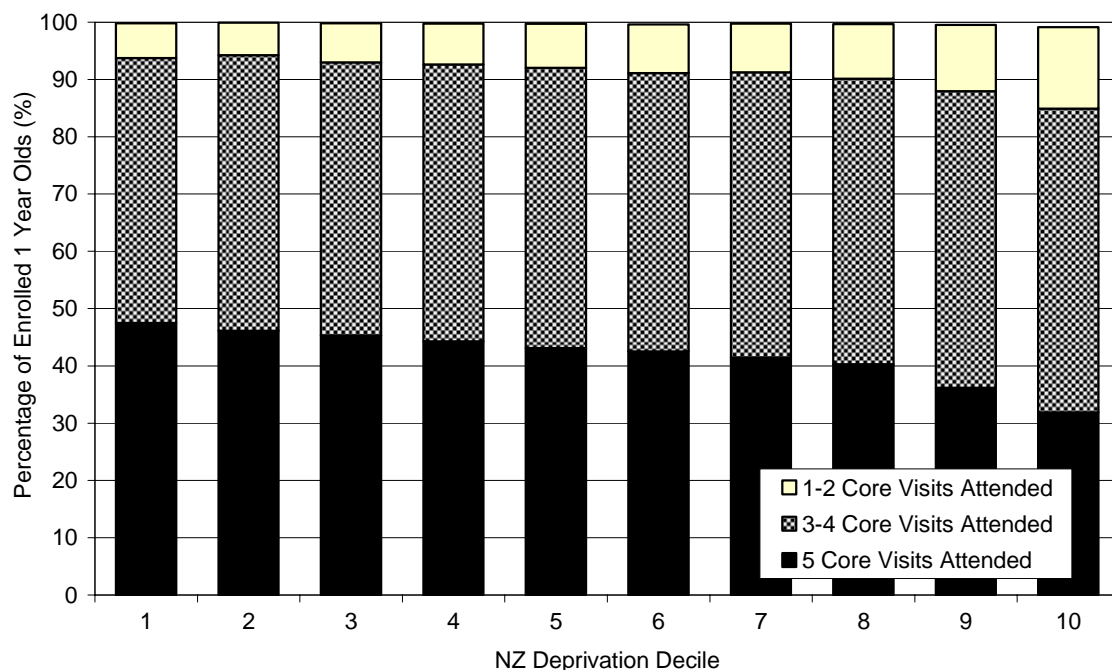
Source: Plunket Client Information System

Figure 43. Proportion of Children Enrolled with Plunket Attending Tamariki Ora Well Child Visits 1-5 During 2006 by Ethnicity and NZ Deprivation Index



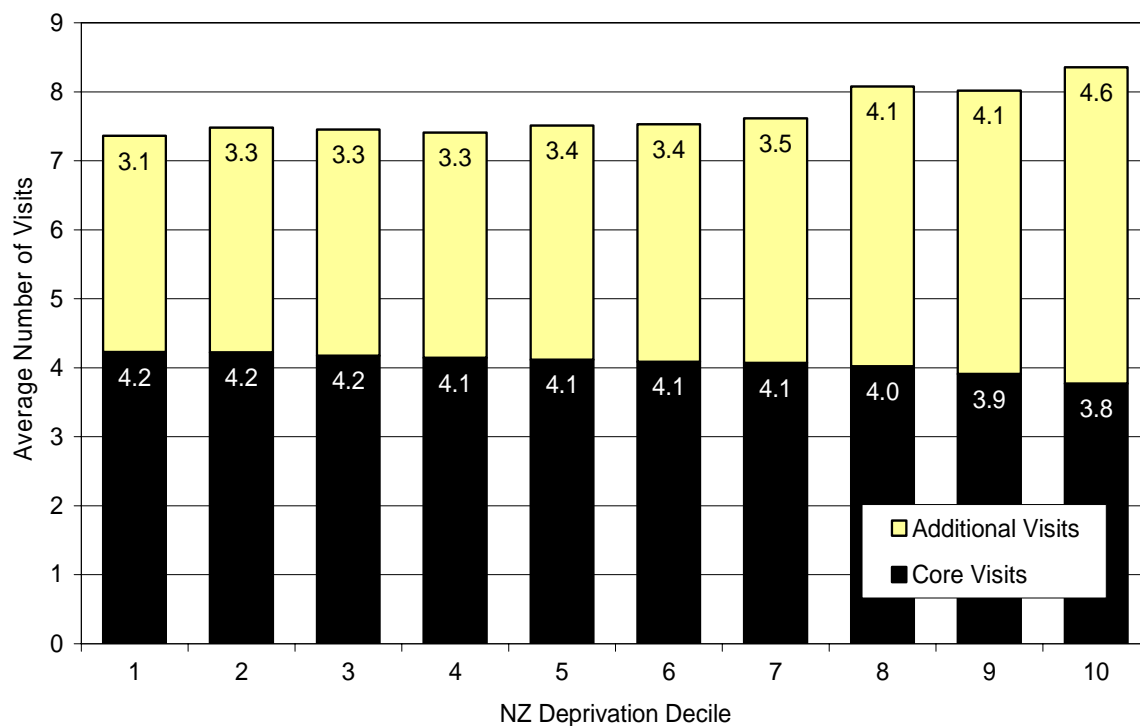
Source: Plunket Client Information System

Figure 44. Number of Core Tamariki Ora Well Child Visits Undertaken by 1 Year Old Children Enrolled with Plunket During 2006 by NZ Deprivation Index Decile



Source: Plunket Client Information System; Note: In their first year children are offered 5 Core visits

Figure 45. Average Number of Tamariki Ora Well Child Core and Additional Visits Undertaken by 1 Year Old Children Enrolled with Plunket During 2006 by NZ Deprivation Index Decile



Source: Plunket Client Information System; Note: In the first year of life children are offered 5 Core visits. Additional visits are available for families who live in areas of greater socio-economic deprivation and to all first time parents

Summary

A strong primary health care system is central to improving the health of New Zealanders and tackling inequalities in health. In New Zealand Primary Health Organisations (PHOs) have become the primary vehicle through which first-level health services are accessed. In the last quarter of 2006, 98% of children and 93% of young people were enrolled with a PHO. The lowest enrolment rates were seen in children aged <1 year (75%), and in Asian/Indian young people 15-24 years (54%).

In addition, the Ministry of Health recommends participation in Tamariki Ora Well Child Visits. Plunket is the leading Well Child Provider in New Zealand and enrolls over 90% of infants born in New Zealand [103]. Of those children enrolled with Plunket, and who turned 1 year in 2006, 98% had attended at least 2 Core Visits, and 77% had attended 4 or 5 of the 5 Core visits scheduled for their first year of life. Of those children enrolled with Plunket, Māori and Pacific children and those living in the more deprived areas are less likely to attend core Well Child visits, with participation also decreasing with increasing age. Those living in the most deprived areas, however, attend more additional visits, and on average receive a greater total number of Well Child visits than those living in more affluent areas.



Risk and Protective Factors



Risk and Protective Factors

Nutrition, Growth and Physical Activity

Breastfeeding

Introduction

Breastfeeding meets a term infant's nutritional needs for the first 4-6 months of life, as well as providing protection against conditions such as diarrhoea, respiratory infections, SIDS, diabetes, asthma and atopy [104]. The World Health Organisation (WHO) recommends "*exclusive breastfeeding for 6 months, with the introduction of complementary food and continued breastfeeding thereafter*" (WHO 2001).

In 1999 the Ministry of Health adopted the following breastfeeding definitions [105]:

Exclusive	The infant has never had, to the mother's knowledge, any water, formula or other liquid or solid food. Only breast milk, from the breast or expressed, and prescribed medicines have been given from birth.
Fully	The infant has taken breast milk only and no other liquids or solids except a minimal amount of water or prescribed medicines, in the past 48 hours (matches WHO exclusive rate indicator)
Partial	The infant has taken some breast milk and some infant formula or other solid food in the past 48 hours.
Artificial	The infant has had no breast milk but has had alternative liquid such as infant formula, with or without solid food in the past 48 hours.

Using these definitions and in line with WHO recommendations, in 2002 the Ministry of Health set the following breastfeeding targets for New Zealand [105]:

1. Increase exclusive/full breastfeeding rates at 6 weeks to 74% by 2005 and 90% by 2010
2. Increase exclusive/full breastfeeding rates at 3 months to 57% by 2005 and 70% by 2010
3. Increase exclusive/full breastfeeding rates at 6 months to 21% by 2005 and 27% by 2010

While to date New Zealand's breastfeeding rates have compared favourably with other OECD countries, they remain below the MOH's 2002 targets and in addition, are consistently lower for Pacific and Māori women [105, 106]. While breastfeeding rates are high at birth they often decline significantly thereafter, with barriers to breastfeeding including paternal attitudes, socioeconomic factors, returning to work, lack of workplace support, poor initiation of breastfeeding, and perceived inadequate milk supply [105]. At a DHB level, one of the key initiatives to promote breastfeeding is the "Baby Friendly Hospital Initiative" which aims to encourage hospitals and health care facilities to adopt practices that fully protect, promote and support exclusive breastfeeding from birth.

The following section explores breastfeeding rates for Pacific women using two data sources: Breastfeeding rates at <6 weeks, 3 months and 6 months from Plunket and breastfeeding rates at 2 weeks from Lead Maternity Carer (LMC) claims data (via the Report on Maternity).



Data Source and Methods

Definition

1. Exclusive / Full Breastfeeding Rates at <6 weeks, 3 months and 5 months
2. Breastfeeding Rates at 2 weeks of age

Indicator Category Proxy C

Data Source and Interpretation

1. *Exclusive / Full Breastfeeding Rates at <6 weeks, 3 months and 5 months*

Plunket Client Information System

Numerator: The proportion of babies who were exclusively / fully breastfed at <6 wks (2 wks - 5 wks, 6 days), 3 months (10 wks - 15 wks, 6 days) and at 6 months (16 wks - 7 months, 4 wks).

Denominator: The number of babies in contact with Plunket at these ages

Interpretation: Plunket currently enrol more than 88% of the new baby population, although Māori and Pacific mothers may be under-reported in these samples (**Table 20**). Plunket have breastfeeding data dating back to 1922, with more detailed information being available in recent years.

2. *Breastfeeding Rates at 2 weeks of age*

Lead Maternity Carer (LMC) claims data, Maternal and Newborn Information System (MNIS)

Numerator: The number of babies who were breastfed at 2 weeks of age by type of feeding

Denominator: The total number of babies recorded using LMC claims data

Interpretation: The information on breastfeeding at two weeks of age was obtained from the Report on Maternity 2003, which derives its data from the MNIS (via claims submitted to HealthPAC by LMCs). This data should be interpreted with caution due to variations in the total number of babies counted (e.g. due to duplicate records and baby numbers). In addition, during 2003 the breastfeeding status of 15% of babies was unknown) [107].

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance.

Plunket Data

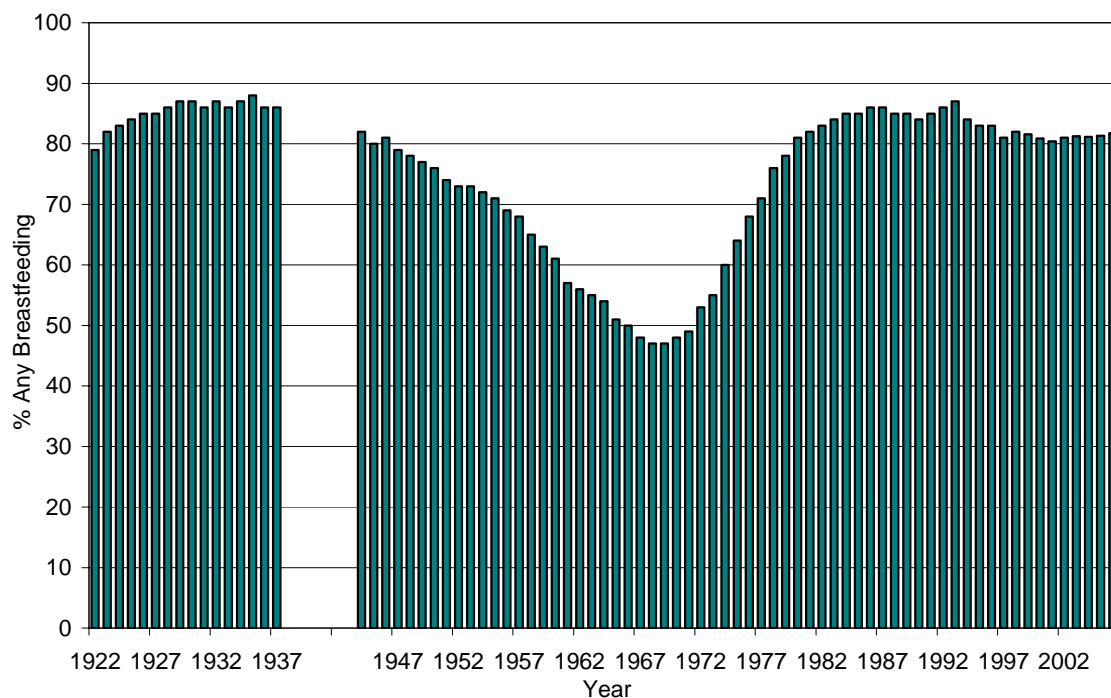
New Zealand Trends

Breastfeeding rates in New Zealand were high during the 1920s and 1930s. Progressive declines during the 1940s, 1950s and 1960's however, saw rates reach a nadir in the late 1960s. Following a rapid recovery during the 1970s and early 1980s, rates reached a plateau in the late 1990s and thereafter have remained relatively static (**Figure 46**). During 1999-2006, while the proportion of babies who were exclusively / fully breastfed at < 6 weeks remained relatively static, there were small increases in the proportion of babies still breastfed at 3 and 6 months (**Figure 47**).

Ethnic Differences

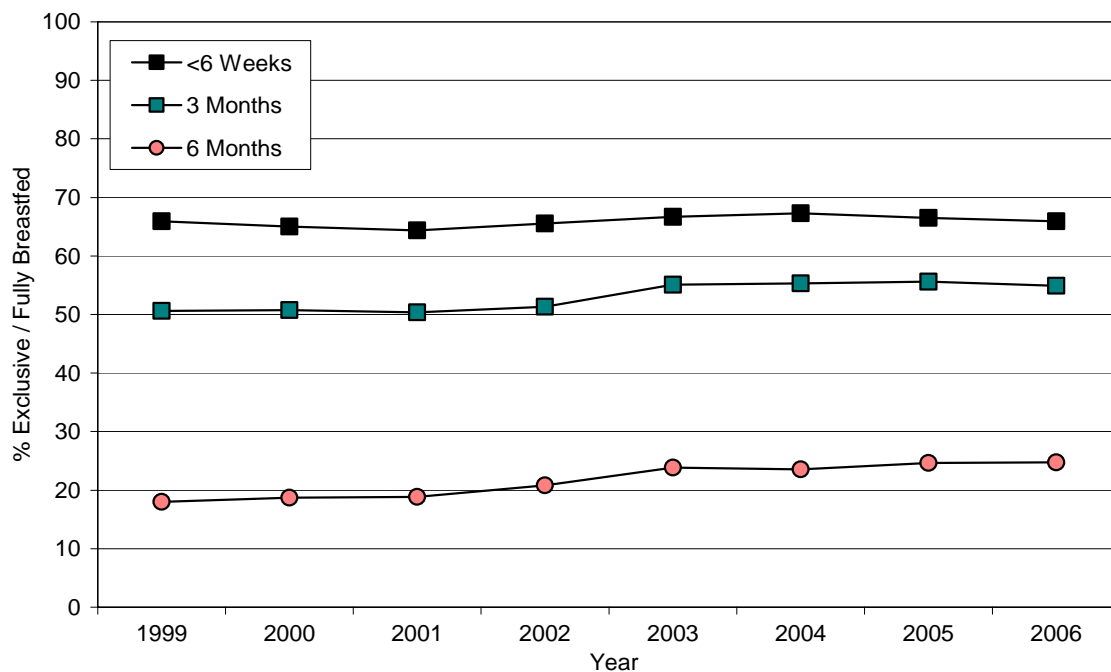
During June 2005-2006, breastfeeding rates for Pacific babies at <6 week (57.6%), 3 months (47.5%) and 6 months (18.5%) were lower than for European / Other babies, but were similar to those for Māori babies. Despite these differences, there was a marked tapering off in exclusive / full breastfeeding rates for all ethnic groups as infants age increased. Thus during June 2005-2006, none of New Zealand's largest ethnic groups achieved the MOH's 2005 breastfeeding targets of 74% at 6 weeks, although European / Other women achieved the MOH's target of 57% at 3 months and Asian and European / Other women achieved the target of 21% at 6 months of age (**Figure 48**).

Figure 46. Percentage of Babies Who Were Breastfed (Any Breastfeeding) at the Time of First Contact with Plunket, New Zealand 1922-2006



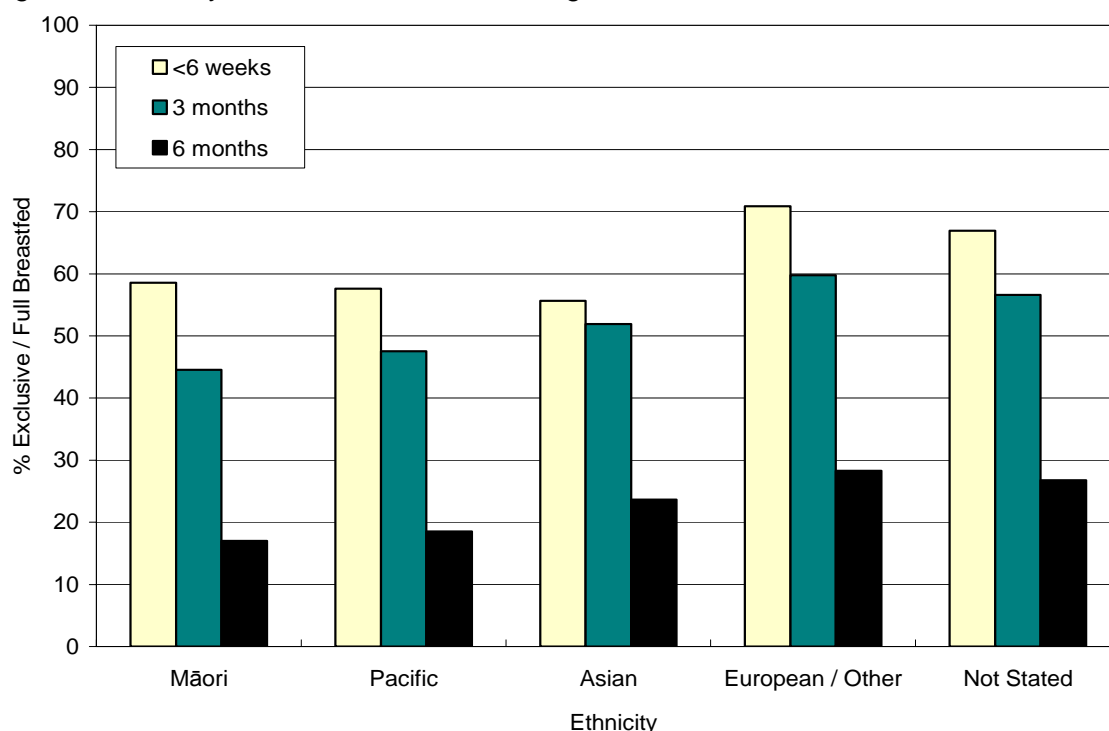
Source: Plunket

Figure 47. Percentage of Plunket Babies who were Exclusively or Fully Breastfed at <6 Weeks, 3 Months and 6 Months, New Zealand 1999-2006



Source: Plunket

Figure 48. Percentage of Plunket Babies Who Were Exclusively or Fully Breastfed by Age and Ethnicity, New Zealand Year Ending June 2006

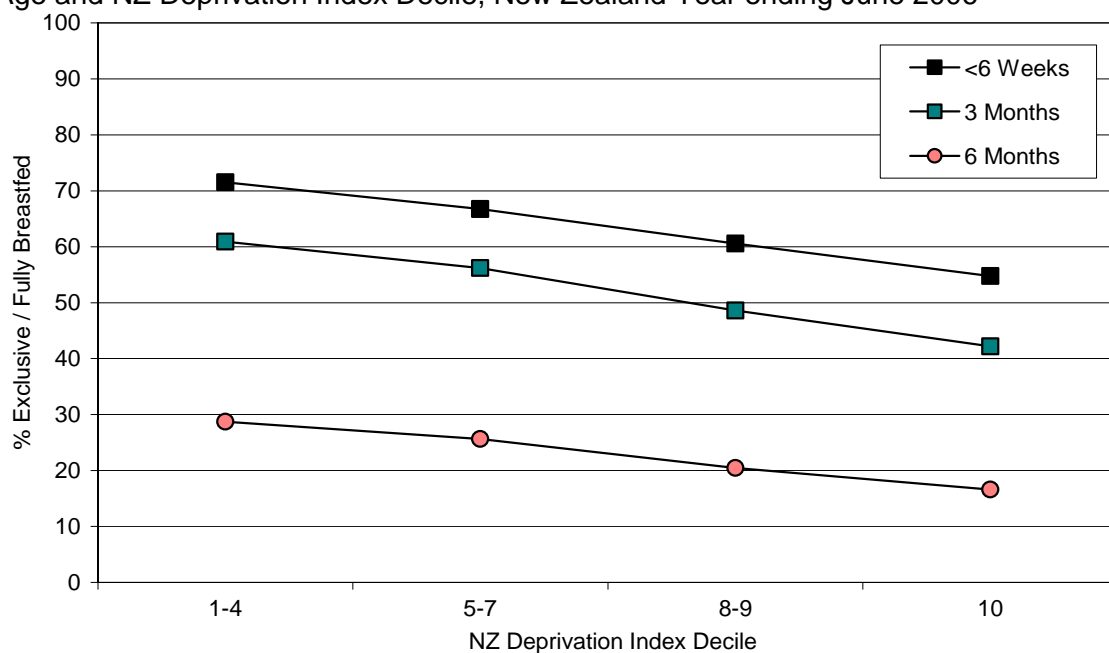


Source: Plunket; Ethnicity is Level 1 Prioritised

Socioeconomic and Regional Differences

In the year ending June 2006, there were also socioeconomic differences in the proportion of babies exclusively or fully breastfed, with rates at all three ages being higher for babies living in Decile 1-4 (the most affluent) > Decile 5-7 > Decile 8-9 > Decile 10 (the most deprived) areas (**Figure 49**). In addition, there was considerable regional variation in breastfeeding rates during this period (**Table 21**).

Figure 49. Percentage of Plunket Babies who were Exclusively or Fully Breastfed by Age and NZ Deprivation Index Decile, New Zealand Year ending June 2006



Source: Plunket

Table 21. Percentage of Plunket Babies Who Were Exclusively or Fully Breastfed at <6 Weeks by Ethnicity and DHB, New Zealand Year Ending June 2006

DHB	Māori	Pacific	European/Other	Asian
Northland	63.2	s	78.0	s
Waitemata	66.3	66.1	71.8	57.4
Auckland	61.6	58.2	76.5	54.9
Counties Manukau	48.5	52.3	65.3	47.5
Waikato	57.4	63.0	75.8	51.7
Lakes	67.6	s	75.9	s
Bay of Plenty	63.7	s	73.2	s
Tairāwhiti	61.9	s	78.4	s
Taranaki	59.9	s	67.3	s
Hawke's Bay	60.0	s	75.4	s
Whanganui	52.5	s	62.7	s
MidCentral	62.6	s	63.4	s
Hutt	51.4	52.5	64.0	65.3
Capital and Coast	58.7	59.5	73.7	59.7
Wairarapa	60.7	s	66.8	s
Nelson Marlborough	62.6	s	72.4	s
West Coast	76.3	s	62.9	s
Canterbury	60.0	59.1	69.5	60.4
South Canterbury	58.7	s	67.0	s
Otago	56.1	s	72.4	s
Southland	60.8	s	68.8	s
New Zealand	58.6	57.6	70.9	55.7

Source: Plunket; Note: s: Small numbers preclude rate calculation; Ethnicity is Level 1 Prioritised

Breastfeeding at Two Weeks: LMC Claims Data

Breastfeeding status at two weeks of age has been a mandatory reporting field in Lead Maternity Carer's (LMC's) claim forms since 2002. During 2004, over 2/3's of babies for whom data was collected were either exclusively or fully breastfed at two weeks of age. Exclusive / Full breastfeeding rates varied with maternal age, with lower rates being seen for younger mothers during this period (**Table 22**).

During 2003 there were also differences in breastfeeding rates by maternal ethnic group, with 72.0% of all Pacific mothers for whom this information was available either exclusively or fully breastfeeding at 2 weeks of age as, compared to 82.4% of European women (**Table 23, Table 24**).

Table 22. Number and Percentage of Babies Breastfed at Two Weeks of Age by Maternal Age Group, New Zealand 2004

Maternal Age (Yrs)		Exclusive	Full	Partial	Artificial	Not Stated	Total
<16	No.	24	<5	8	15	13	63
	%	38.1	s	12.7	23.8	20.6	100.0
16-19	No.	1,022	209	229	398	386	2,244
	%	45.5	9.3	10.2	17.7	17.2	100.0
20-24	No.	3,464	655	581	750	1,186	6,636
	%	52.2	9.9	8.8	11.3	17.9	100.0
25-29	No.	5,326	881	791	783	1,540	9,321
	%	57.1	9.5	8.5	8.4	16.5	100.0
30-34	No.	7,329	1,138	1,077	829	1,897	12,270
	%	59.7	9.3	8.8	6.8	15.5	100.0
35-39	No.	3,993	627	690	437	1,121	6,868
	%	58.1	9.1	10.0	6.4	16.3	100.0
40+	No.	879	175	207	117	300	1,678
	%	52.4	10.4	12.3	7.0	17.9	100.0
Not Stated	No.	3,901	637	583	603	405	6,129
	%	63.6	10.4	9.5	9.8	6.6	100.0
Total	No.	25,938	4,325	4,166	3,932	6,848	45,209
	%	57.4	9.6	9.2	8.7	15.1	100.0

Source: Report on Maternity 2004 [107]; s: small numbers preclude rate calculation

Table 23. Babies Who Were Breastfed at 2 Weeks of Age by Maternal Ethnic Group (Missing Responses Removed), New Zealand 2004

Maternal Ethnicity	Exclusive / Full		Partial		Artificial		Total Stated
	No.	%	No.	%	No.	%	No.
Māori	5,253	74.2	732	10.3	1,098	15.5	7,083
Pacific	2,273	72.0	520	16.5	362	11.5	3,155
Asian	2,105	70.0	682	22.7	222	7.4	3,009
European	18,705	82.4	1,944	8.6	2,039	9.0	22,688
Other	1,360	80.0	208	12.2	133	7.8	1,701
Not Stated	567	78.2	80	11.0	78	10.8	725
Total	30,263	78.9	4,166	10.9	3,932	10.2	38,361

Source: Report on Maternity 2004 [107]; Ethnicity is Level 1 Prioritised; % refers to percentage of mothers for whom breastfeeding information was available (i.e. missing responses have not been included in the denominator).

Table 24. Babies Who Were Breastfed at 2 Weeks of Age by Maternal Ethnic Group (Missing Responses Included), New Zealand 2004

Maternal Ethnicity		Exclusive	Full	Partial	Artificial	Not Stated	Total
Māori	No.	4,417	836	732	1,098	1,320	8,403
	%	52.6	9.9	8.7	13.1	15.7	100.0
Pacific	No.	1,789	484	520	362	1,042	4,197
	%	42.6	11.5	12.4	8.6	24.8	100.0
Asian	No.	1,580	525	682	222	745	3,754
	%	42.1	14.0	18.2	5.9	19.8	100.0
European	No.	16,494	2,211	1,944	2,039	3,407	26,095
	%	63.2	8.5	7.4	7.8	13.1	100.0
Other	No.	1,173	187	208	133	251	1,952
	%	60.1	9.6	10.7	6.8	12.9	100.0
Not Stated	No.	485	82	80	78	83	808
	%	60.0	10.1	9.9	9.7	10.3	100.0
Total	No.	25,938	4,325	4,166	3,932	6,848	45,209
	%	57.4	9.6	9.2	8.7	15.1	100.0

Source: Report on Maternity 2004 [107]; Ethnicity is Level 1 Prioritised

Summary

Breastfeeding meets a term infant's nutritional needs for the first 4-6 months of life, as well as providing protection against a wide range of infections and non-infectious diseases [104]. In New Zealand breastfeeding rates were high during the 1920s and 1930s, but progressive declines during the 1940s, 1950s and 1960's, saw rates reach a nadir in the late 1960s. Following a rapid recovery during the 1970s and early 1980s, rates reached a plateau in the late 1990s and thereafter have remained relatively static. During June 2005-2006, breastfeeding rates for Pacific babies at <6 weeks, 3 months and 6 months were lower than for European / Other babies, but were similar to those for Māori babies. Despite these differences, there was a marked tapering off in exclusive / full breastfeeding rates for all ethnic groups as infants age increased. There were also socioeconomic differences in the proportion of babies exclusively or fully breastfed during this period, with rates at all three ages being higher for babies in the most affluent areas.

Overweight and Obesity

Introduction

While issues of overweight and obesity are of particular concern for Pacific children and young people, there is a paucity of detailed time series data with which to track the course of the “obesity epidemic” in this age group. Surveys of the adult population however, suggest that the proportion of New Zealanders who are obese doubled between 1977 and 2003 (from 9% to 20% for males and from 11% to 22% for females). While modest increases in average body mass index (BMI) occurred during this period, the greatest increases were at the upper ends of the distribution i.e. those who were overweight became even more overweight [108]. While no comparable time series data exists for children, during 1989-2000 the risk of being overweight for Hawke’s Bay 11-12 year olds increased 2.2 fold, while the risk of being obese increased 3.8 fold [109].

Such increases are of concern, as obesity has been associated with a variety of adverse health outcomes including ischemic heart disease, stroke, diabetes and cancer [110]. Ischemic heart disease and diabetes are often preceded by a cluster of cardiovascular risk factors known as the “Metabolic Syndrome”, characterised by abdominal adiposity, glucose intolerance, insulin resistance, hypertension and dyslipidaemia [111]. While these adverse risk factor profiles have traditionally been viewed as the domain of adults, recent evidence would suggest that the Metabolic Syndrome and Type II diabetes are increasing amongst adolescents. In Auckland, a recent audit of Adolescent Diabetes Clinic attendees indicated that the proportion of clients with Type II diabetes had risen from 1.8% in 1996, to 11% in 2002, with Type II diabetes accounting for 35.7% of new cases during 2000-01. Amongst those with Type II diabetes, risk factors for cardiovascular disease were common, with the average BMI being 34.6 kg/m², 85% having dyslipidaemia and 28% having hypertension [112].

When considering the pathways linking childhood obesity to adverse health outcomes, it remains difficult to determine conclusively whether being obese as a child independently increases the risk of later adverse outcomes, once the effects of adult obesity are taken into account [113]. Despite this uncertainty, there remains strong evidence to suggest that being obese as a child increases the risk of adult obesity, and that adult obesity in turn is linked to the adverse outcomes discussed above. While not all obese children become obese adults, the risk increases with increasing age, severity of obesity and whether the child’s parents are also obese. In one recent study, 19% of obese 1-2 year olds were obese as young adults, as compared to 55% of obese 6-9 year olds and 75% of obese 10-14 year olds, with the risk of remaining obese being elevated nearly 3 fold if either parent was obese [114].

Factors predisposing children to obesity tend to be those which result in a positive energy balance over a relatively long period of time (e.g. a high fat diet, a low level of habitual physical activity and variations in body metabolism and insulin resistance). In addition, obesity has been shown to run in families, with genetic predisposition being seen as accounting for a significant proportion familial clustering, once the effects of shared environmental conditions are taken into account [115]. In population health terms, while it remains unclear which of these risk factors has made the greatest contribution to the current obesity epidemic, it is likely that interventions which address both sides of the energy equation (e.g. high fat diets, increased portion sizes vs. reductions in the amount of energy expended on transport, housework and leisure time activities) will be necessary, if the current obesity epidemic is to be addressed.

The following section reviews some of the issues associated with the measurement of overweight and obesity in children and young people, before considering the extent to which they are of concern for Pacific children and young people in New Zealand.

Data Sources and Methods

Definition

Proportion of New Zealand Children and Young People who are Overweight or Obese

Note: While the methodology used by different studies to measure overweight and obesity varies, a number of measurement issues are common to each. This section highlights some of the issues associated with the measurement of obesity in children at different developmental stages and from different ethnic groups.

Indicator Category Bookmark B

Obesity

Obesity is defined as an excess in adiposity or body fat mass. Measures of adiposity in current use include weight, weight for height (e.g. BMI), skin fold thickness (e.g. triceps / sub-scapular) and circumferences / diameters (e.g. waist-hip / waist-thigh ratios, mid-upper arm circumferences), each of which has its own reference standards and cut-points [113]. Of these, perhaps the most popular is the Body Mass Index (BMI), as defined below.

BMI

Obesity is often assessed using the Body Mass Index (BMI), calculated using the formula

$$\text{BMI} = \text{weight (kg)} / \text{height (m)}^2$$

Using height and weight to assess adiposity is generally viewed as being reliable, reproducible, non-intrusive and cheap, making BMI one of the most popular measures for obesity, both in New Zealand and overseas. In adults, cut-offs are based on mortality risk or other criteria, with those having a BMI of 25-30 kg/m² being traditionally classified as overweight and those with a BMI of 30 kg/m² or over being seen as obese. Using BMI to assess obesity in children however has a number of drawbacks, including the changes in body composition that occur as part of normal growth and with the onset of puberty and ethnic differences in body composition for a given BMI [111]. These issues are discussed in more detail below.

Changes in Body Composition with Age: The Need for BMI Percentile Charts

Assessing obesity during childhood and adolescence is more complex than in adults, as both height and body composition change progressively with development. In particular, the proportion of fat mass / total body weight changes significantly during childhood, beginning at around 13-15% in term newborn infants and increasing progressively during the first year of life, to a maximum of 25-26% at 12 months of age. From 12 months to 4-6 years, the proportion of body fat then declines, to a nadir of around 12-16%, before increasing again between the ages of 6-10 years. By early adulthood, the proportion of fat mass is 20-25% for women and 15-20% for men [111]. As a result of these changes, when assessing the level of obesity in an individual child, BMI for age percentile charts are usually used, which extrapolate back the traditional adult cut points of 25-30 kg/m² and >30 kg/m², to the same points on the BMI distribution during the childhood years e.g. a male child with a BMI > 19.3 at the age of 5 years, is on the same point in the percentile charts as an 18 year old with a BMI of >30, and thus will be classified as obese [116]. As NZ to date has not developed its own BMI percentile charts for children, overseas standards must be used. Of these, the most popular was developed by Cole [116] using pooled survey data from 6 different countries.

Ethnic Differences in BMI

With no BMI for age percentile charts specifically designed for New Zealand use, there remains a significant amount of debate about the appropriateness of the traditional BMI-for-age cut offs for New Zealand children of different ethnic groups. While a number of studies have suggested that, for a given BMI, Māori and Pacific children have a lower percentage of body fat [117] [118] [119], others have argued that while statistical differences may exist, there are no clinically significant ethnic differences in the relationship between BMI and body composition and that a common standard should be used for children of all ethnic groups [119]. Overseas research also suggests that ethnic differences in body composition may increase during puberty, with differences being much less marked amongst children <8 years of age [120]. Similarly, ethnic differences in the onset of puberty may also make utilisation of a common BMI cut off difficult, with puberty on average, occurring earlier amongst Māori and Pacific groups [121]. Such differences need to be kept in mind when interpreting ethnic specific obesity rates calculated using overseas percentile charts, as they may tend to overestimate obesity rates amongst Māori and Pacific children slightly.

Data Sources

Because in NZ at present there is no long term, time series information on the height & weight of children and young people, the information in the sections which follow was derived from a variety of surveys and research project reports, the details of which are discussed under each of the relevant sections.

Statistical Significance Testing

The information in this section was obtained from national surveys or research project reports. Where the results of statistical significance testing were available in the published literature, these have been indicated in the text (i.e. the terms *significant* or *not significant* have been used to communicate the significance of the observed associations). Where the terms *significant* or *non-significant* are not specifically used, the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

Time Series Estimates

Hawke's Bay: As part of an asthma prevalence study, data on height, weight and ethnicity were collected from 870 children aged 11-12 years, attending schools in Havelock North or Hastings in 1989 and 2000 [109]. The study found that:

- The % of overweight children increased 2.2 x, from 11.0% in 1989 to 20.9% in 2000
- The % of obese children increased 3.8 x, from 2.4% in 1989 to 9.1% in 2000.
- The greatest proportional increases occurred in European children (overweight 3.0 times higher, obesity 8.3 times higher).

In absolute terms however, the highest obesity rates occurred in Pacific and Māori children, with the authors noting that during 2000:

- 35.0% of Pacific children were overweight, while 15.0% were obese.
- 24.7% of Māori children were overweight, while 15.3% were obese.
- 18.2% of European children were overweight, while 5.7% were obese.

The authors concluded that while higher proportions of Pacific and Māori children were overweight or obese, European children were rapidly catching up. They also noted that the *statistically significant* increases across all ethnic groups were consistent with overseas trends, making childhood obesity a major health problem in New Zealand.

Christchurch: Health and physical activity parameters for 5,579 10-14 year old intermediate children were collected between 1991 and 2001[122]. During this period:

- Boy's weight increased by 2.9 kg and girls weight increased by 2.1 kg.
- The % who were overweight or obese increased from 4.2% in 1991 to 7.8% in 2000 for boys, and from 2.0% in 1991 to 11.3% in 2000 for girls.
- The level of fitness of children also deteriorated, with the time to complete a 550m run increasing by 23.6s for boys and 27.0s for girls.

These two studies provide the only available time series data on changes in childhood BMI in New Zealand during the past two decades. While in absolute terms, the proportions of overweight and obesity are not strictly comparable (the Hawke's Bay study used Coles [116] BMI percentile charts, while the Christchurch study used 25 kg/m² as a cut off for overweight and obesity), what these two studies potentially suggest is that over the past two decades the obesity epidemic has progressed relatively rapidly amongst Intermediate School aged children in New Zealand.

The National Children's Nutrition Survey

Data Sources and Methods

The 2002 National Children's Survey was a cross sectional survey of 3,275 New Zealand children aged 5-14 years. A nationally representative sample was achieved by randomly selecting schools (of 190 schools identified, 172 (90.5%) agreed to participate) and then within these schools, randomly selecting children (of the 4,728 children selected, 3,275 (69.3%) completed an initial 24-hour Diet Recall Questionnaire and 3,151 (66.6%) had their height and weight measured. Over sampling of Māori and Pacific children also occurred, so that ethnic specific analyses could be undertaken (1,160 Māori, 1,035 Pacific and 956 European / Other children had height and weight measurements taken). These measurements were carried out in the school setting, while the main interview was carried out at home in the presence of a parent or caregiver [121]. Cole's [116] BMI for age percentile charts were used to define overweight and obesity cut-points in the survey.

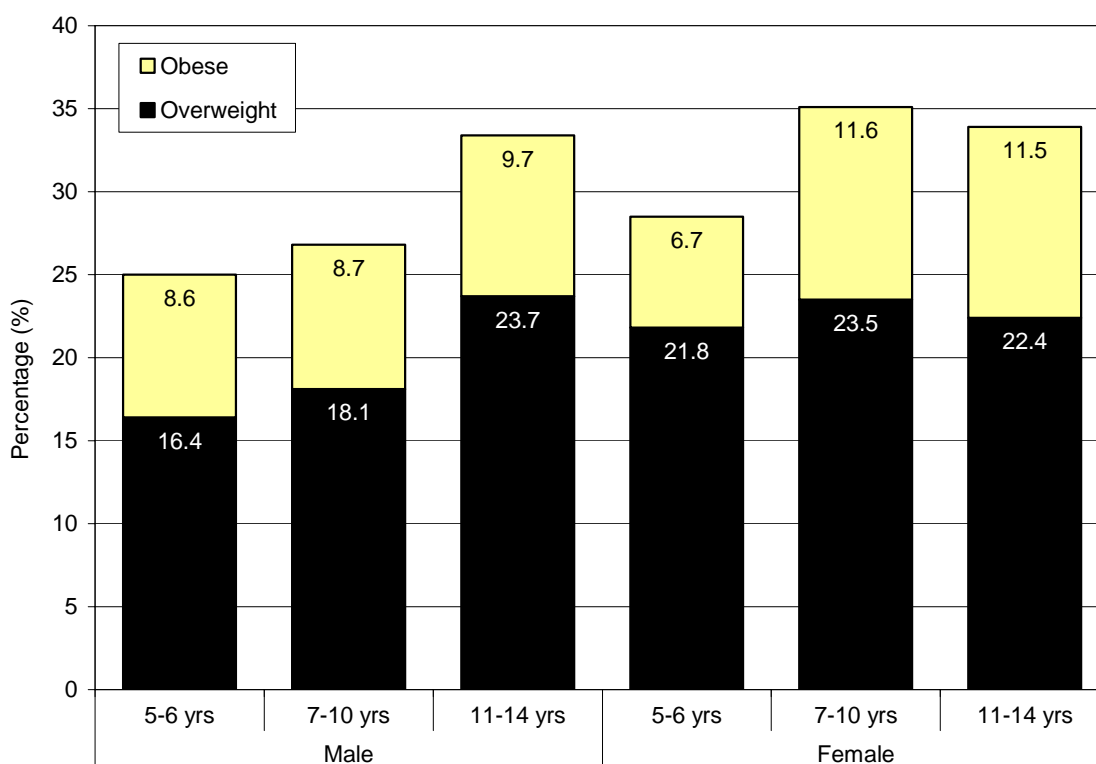
The Assignment of Ethnicity

Participants were asked "Which ethnic groups do you belong to?" A card was then shown with the following options: NZ Māori, Cook Island Māori, Fijian, Niuean, Samoan, Tokelauan, Tongan, Other Pacific Island, NZ European / Pakeha, Other European, Chinese, Other Asian, Indian, South East Asian and Other. This was repeated up to three times, with those reporting multiple affiliations being assigned a single ethnic group using the following hierarchy: Māori > Pacific > European / Other.

The main findings of the 2002 National Children's Nutrition Survey (whose methodology is outlined above) were [121] :

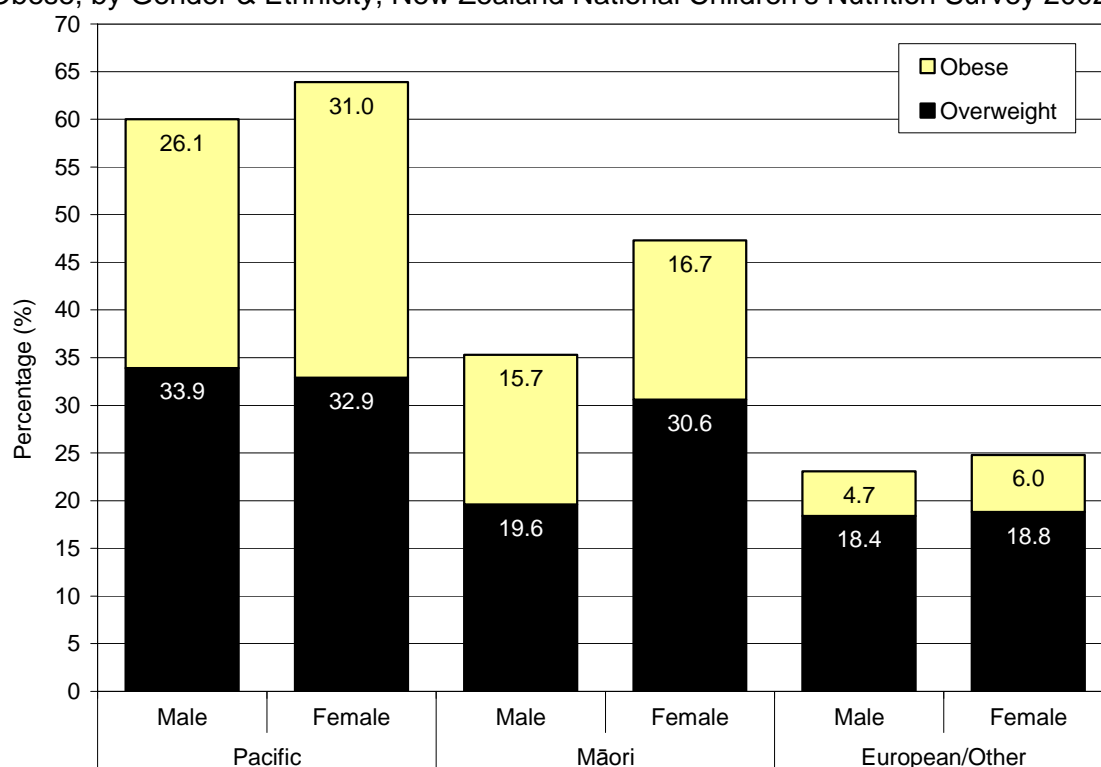
1. 21.3% of New Zealand children were overweight, while 9.8% were obese.
2. 32.9% of Pacific girls and 33.9% of Pacific boys were overweight, while 31.0% of Pacific girls and 26.1% of Pacific boys were obese. In comparative terms, rates of overweight and obesity were *significantly higher* for Pacific > Māori > European / Other children, with the highest rates being amongst Pacific girls (**Figure 51**). However, the earlier onset of puberty in Māori and Pacific girls, as well as the use of internationally derived cut-off values, needs to be taken into consideration when interpreting these results.
3. Overweight and obesity exhibited a modest socioeconomic gradient, with obesity rates for both males and females being higher amongst those living in the most deprived areas (**Figure 52**).
4. With the exception of overweight in females, rural vs. urban differences in overweight and obesity did not reach statistical significance (**Figure 53**).

Figure 50. Proportion of Children Aged 5-14 Years Who Were Either Overweight or Obese by Age and Gender, New Zealand National Children's Nutrition Survey 2002



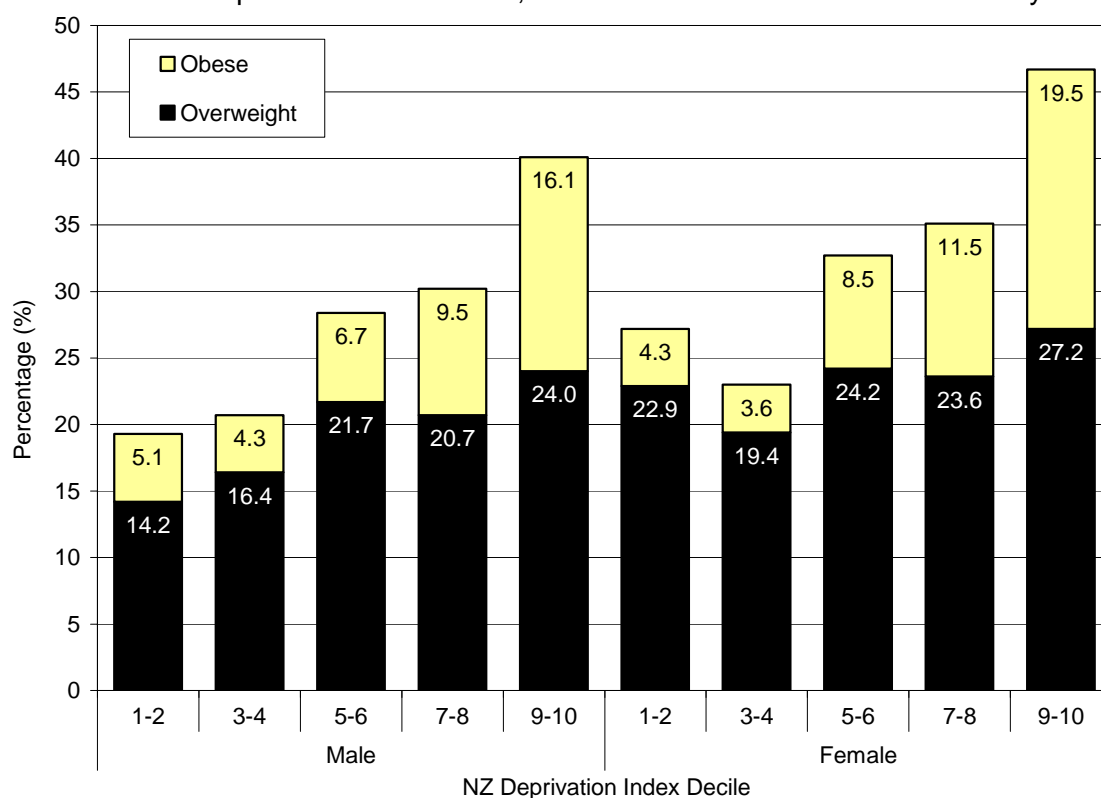
Source: NZ Food, NZ Children: Key Results of the 2002 National Children's Nutrition Survey [121].

Figure 51. Proportion of Children Aged 5-14 Years Who Were Either Overweight or Obese, by Gender & Ethnicity, New Zealand National Children's Nutrition Survey 2002



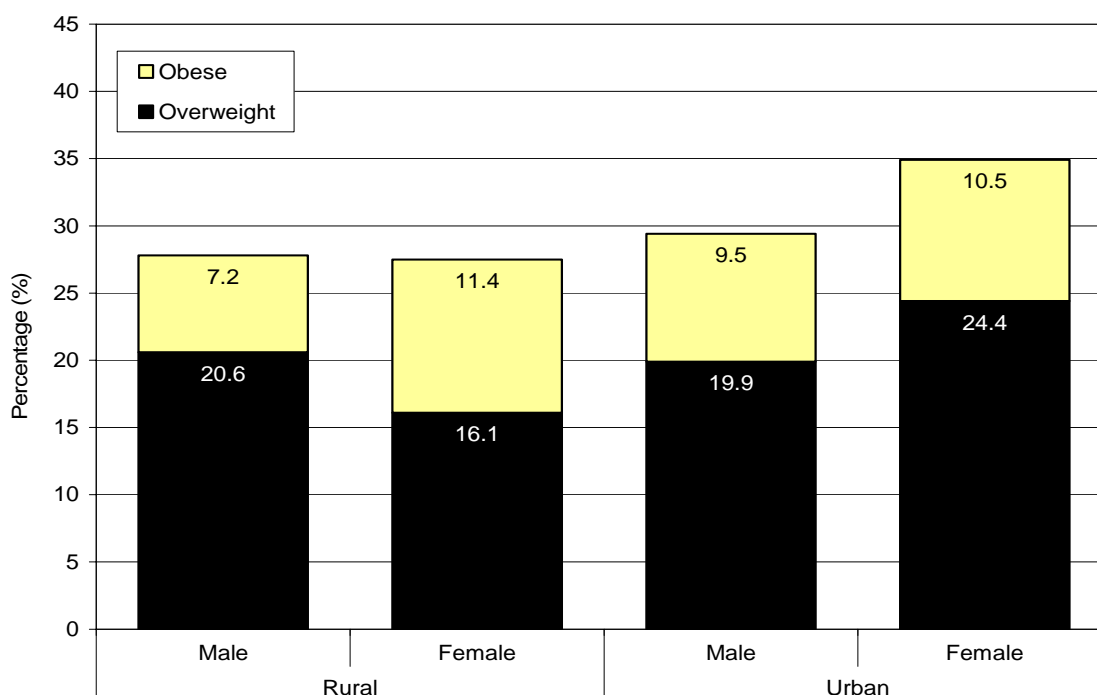
Source: NZ Food, NZ Children: Key Results of the 2002 National Children's Nutrition Survey [121]; Ethnicity is Prioritised (see Methods Section for Details)

Figure 52. Proportion of Children Aged 5-14 Years Who Were Overweight or Obese by Gender and NZ Deprivation Index Decile, NZ National Children's Nutrition Survey 2002



Source: NZ Food, NZ Children: Key Results of the 2002 National Children's Nutrition Survey [121]

Figure 53. Proportion of Children Aged 5-14 Years Who Were Either Overweight or Obese by Gender and School Type (Rural / Urban), New Zealand National Children's Nutrition Survey 2002



Source: NZ Food, NZ Children: Key Results of the 2002 National Children's Nutrition Survey [121]

Summary

The above review of New Zealand data suggests that:

1. **Prevalence:** While estimates vary from study to study, NZ data collected since 2000 suggests that approximately 20% of NZ children are overweight and 10% are obese. In addition, survey data also suggests that approximately 60% of Pacific children aged 5-14 years are either overweight or obese and that in comparative terms rates of overweight and obesity amongst Pacific children are higher than for Māori > European children. These findings however must be viewed within the context of an earlier average age of puberty for Pacific and Māori girls, as well as ethnic differences in the ability of BMI to approximate total body fat composition.
2. **Trends over Time:** Of the 2 studies which have tracked the pace of the obesity epidemic amongst Intermediate School aged children in New Zealand, both suggest that it is progressing relatively rapidly, with the proportion of children who are overweight or obese increasing 2-3 fold over the past decade.
3. **Socioeconomic Disparities:** The New Zealand Children's Nutrition Survey also suggested that overweight and obesity exhibit a modest socioeconomic gradient, with rates being higher amongst those living in the most deprived areas.

These findings are of significant public health concern and potentially suggest that unless New Zealand's current policies and strategies to address overweight and obesity amongst Pacific children and young people continue to be implemented, initiatives aimed at reducing ethnic disparities in cardiovascular disease and Type II diabetes will fail to achieve long term success.

Nutrition

Introduction

As rates of childhood obesity have increased attention has turned towards the environments in which children live and the role dietary and lifestyle changes have played in subtly altering the balance between caloric intake and the amount of energy expended on incidental physical activity. While no time series information is available for New Zealand, serial surveys of nutritional intake in the USA between the mid-70s and 90s have demonstrated a number of strong and consistent trends including a 3-fold increase in the consumption of chips / crackers / pretzels, a 2-fold increase in the consumption of soft drink and a shift towards larger portion sizes. While the proportion of energy derived from fat fell during this period, the proportion derived from carbohydrate increased, with the majority of the increase in per capita calorie intake seen since the mid-80s being derived exclusively from carbohydrate. In addition, the proportion of food dollars Americans spent on eating out increased, from 33% in 1970 to 47% in 2001, with researchers noting that food consumed away from home was more energy dense and contained more fats and sugars than food prepared at home. Relative price changes also saw increases in the price of fruit and vegetables, while prices for sugar, sweets, soft drinks and fats fell in relative terms [123].

While no comparable time series data is available in the New Zealand context, information from a number of cross sectional surveys suggests that aspects of the current nutritional environment are not conducive to healthy food choices for New Zealand children. In one recent survey of 200 primary / intermediate schools, 79% of school canteens offered pies, 57% offered juice and 55% offered sausage rolls. In contrast, filled rolls (the most expensive item) were offered by only 47%, while 30% offered sandwiches and 17% offered fruit [124]. The potential implications this has for disparities in childhood nutritional intake were recently highlighted by the National Children's Nutrition Survey, which suggested that Pacific and Māori children were significantly more likely to buy some or most of the food they consumed at school from the school tuckshop and were also more likely to consume pies, hamburgers, and fizzy drinks than European / Other children [125]. The following section thus reviews the distribution and determinants of nutritional intake amongst Pacific children in New Zealand using information from the 2002 National Children's Nutrition Survey.

Data Source and Methods

Definition

Distribution and Determinants of Nutritional Intake in Children

Data Source

The 2002 National Children's Nutrition Survey [121]

Indicator Category Bookmark B

The Assignment of Ethnicity

Participants were asked "Which ethnic groups do you belong to?" A card was then shown with the following options: NZ Māori, Cook Island Māori, Fijian, Niuean, Samoan, Tokelauan, Tongan, Other Pacific Island, NZ European / Pakeha, Other European, Chinese, Other Asian, Indian, South East Asian and Other. This was repeated up to three times, with those reporting multiple affiliations being assigned a single ethnic group using the following hierarchy: Māori > Pacific > European / Other.

Notes on Interpretation

The 2002 National Children's Survey was a cross sectional survey of 3,275 New Zealand children aged 5-14 years. A nationally representative sample was achieved by randomly selecting schools (of 190 schools identified, 172 (90.5%) participated) and within these schools children were randomly selected. Over sampling of Māori and Pacific children occurred so ethnic specific analyses could be undertaken (1,224 Māori, 1,058 Pacific and 993 European/Other children completed the initial 24-hr Diet Recall Questionnaire). Weight and height measurements were carried at school while the main interview was carried out at home in the presence of a parent or caregiver.

Dietary intake was assessed using a 24-hour diet recall with children asked to report their dietary intakes during the 24-hours immediately prior to data collection. The interview was structured in 3 stages to maximise the child's recall with the child initially being asked to supply a "quick list" of all foods, beverages and dietary supplements eaten during the previous 24-hours. The next stage involved a more detailed description of each food item (time eaten, amount eaten, accompanying foods e.g. bread with butter, cooking method, brand and product names, recipes for home prepared foods). Finally the order and types of foods verified ensuring no omissions. Food and beverages were electronically matched to food composition data to calculate nutrient intake.

Eight questions on food security (developed for 1997 National Nutrition Survey) were asked if adult caregivers were present at the time of interview. Data was not collected from households where the child was interviewed without an adult present. Questions focused on dietary restrictions associated with limited financial resources (e.g. amount, variety, running out of food, reliance on food banks, stress associated with inability to provide food), with respondents being asked to comment on whether the posed situation always, sometimes or never occurred in their household (a fourth category of "don't know" was also available). In addition, a further section on eating patterns asked children about the source of the food they usually ate at school (e.g. whether food was brought from home, a shop / dairy / takeaway outlet or the school canteen or tuckshop), with children being asked whether "most", "some", "none", or "don't know how much" of the food they ate at school was sourced from these particular places.

Limitations of the National Children's Nutrition Survey include its cross-sectional nature, resulting in an inability to track trends over time, its small sample size prohibiting a statistically meaningful regional analysis and the usual issues associated with a 24-hour dietary recall of a limited sample being used to estimate the usual dietary intakes of the total population. Its strengths however are its ethnically based sampling frame, meaning that valid ethnic specific analyses can be undertaken, as well as the fact that the 24-hour recall was repeated on a sub-sample of 505 children, allowing adjustments to be made to better reflect the "usual" intakes of the total sample.

Statistical Significance Testing

The information in this section was obtained from the 2002 National Children's Nutrition Survey. Where the results of statistical significance testing were available in the Survey's published report, these have been indicated in the text (i.e. the terms *significant* or *not significant* have been used to communicate the significance of the observed associations). Where the terms *significant* or *non-significant* are not specifically used, the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

New Zealand Distribution and Trends

Median Energy Intake

The 2002 National Children's Nutrition Survey suggested that at all ages, males had significantly higher energy intakes than females and that energy intake increased *significantly* with increasing age. In addition, Māori children (9609kJ males; 8590kJ females) had *significantly higher* median daily energy intakes than Pacific (8863kJ males, 7871kJ females) or European / Other (8974kJ males; 7518kJ females) children, although socioeconomic gradients in energy intake were not marked (*significant differences* existed only between females in the least and most deprived NZDep quintiles **Figure 54**).

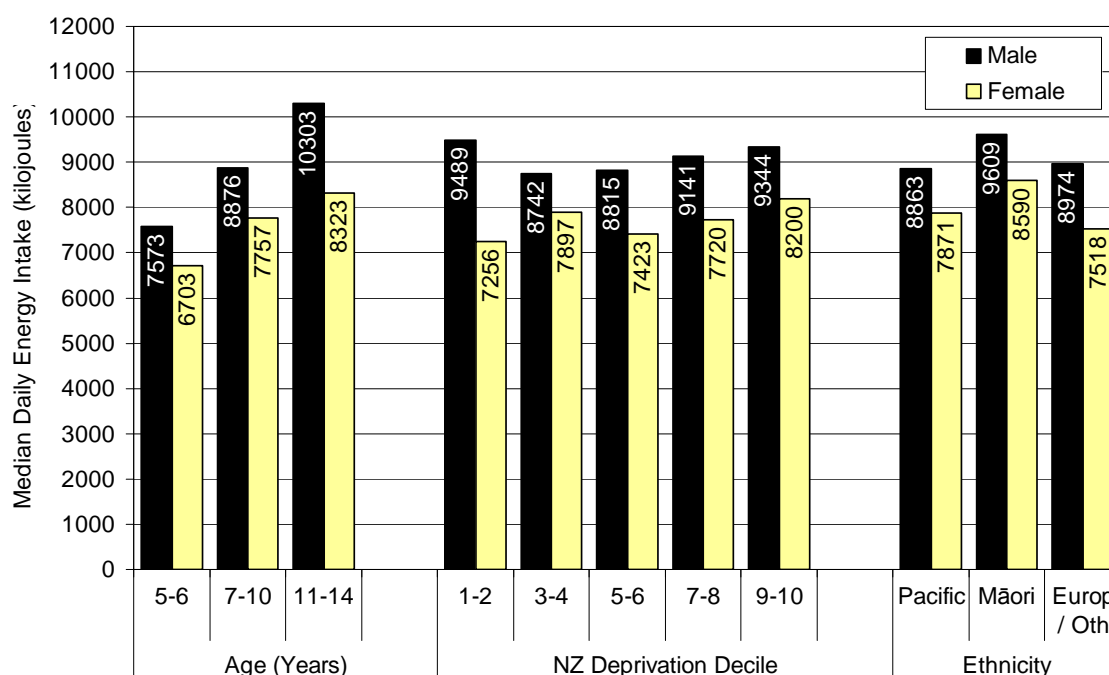
Percentage of Energy Intake from Fat

The New Zealand Nutrition Taskforce (1991) Guideline recommends that fat provides $\leq 33.0\%$ of an adult's total energy intake [126]. The Ministry of Health's subsequent Food and Nutrition Guidelines for Children (2-12 years) noted that while such recommendations should not be applied to children <2 years, from 2 to 5 years a gradual increase in the proportion of energy from carbohydrate, accompanied by a gradual reduction in the proportion of energy from fat was appropriate, ensuring that by 5 years of age, children had the same fat recommendation as adults [127]. The 1998 Food and Nutrition Guidelines for Health Adolescents also consider how this guideline should be applied to those aged 10-24 years [128].

Overall the mean percentage of daily energy intake from fat was higher for Pacific (35.0% males; 34.3% females) and Māori (34.2% males; 34.0% females) children than for European children (32.6% males; 32.3% females). While the mean percentage of daily energy intake from fat was similar for males (33.2%) and females (32.9%), once broken down by NZ Deprivation Index Decile, females in the most affluent (Decile 1-2)

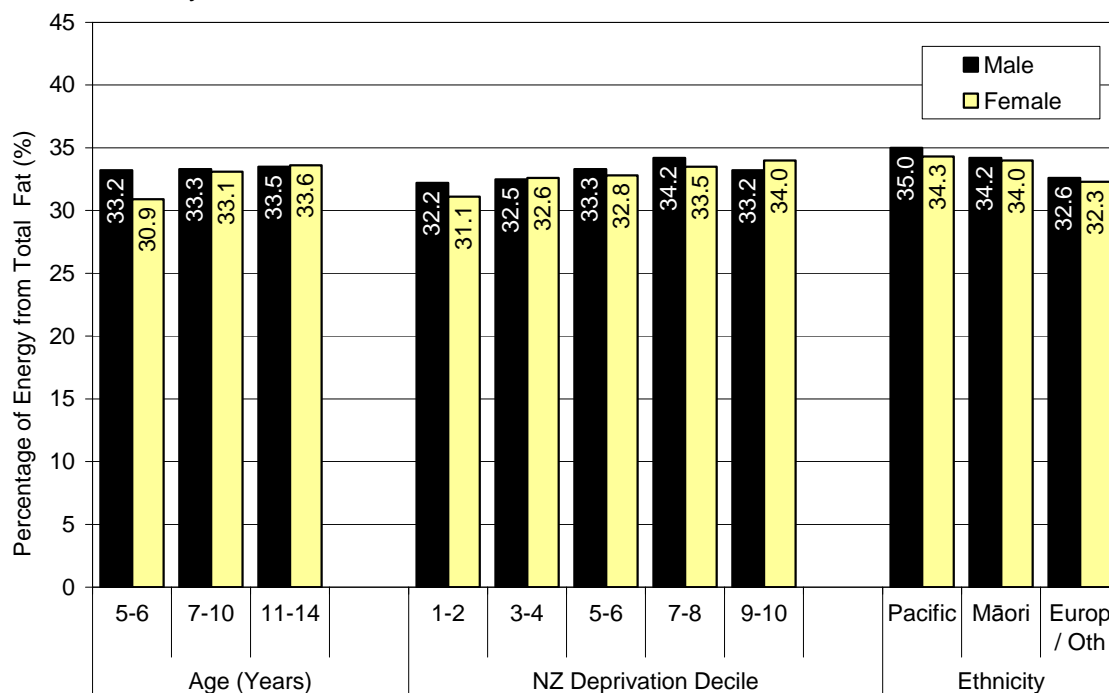
areas had a significantly lower proportion of their total energy intake derived from fat, than females in the most deprived (Decile 9-10) areas (**Figure 55**).

Figure 54. Median Daily Energy Intake (kJ) for Children 5-14 Years by Gender, Age, NZ Deprivation Index and Ethnicity NZ National Children's Nutrition Survey 2002



Source: NZ National Children's Nutrition Survey 2002 [121]; Ethnicity is Prioritised (see Methods Section)

Figure 55. Mean Percentage of Energy Intake from Total Fat in Children 5-14 Years by Gender, Age, NZ Deprivation Index and Ethnicity, New Zealand National Children's Nutrition Survey 2002

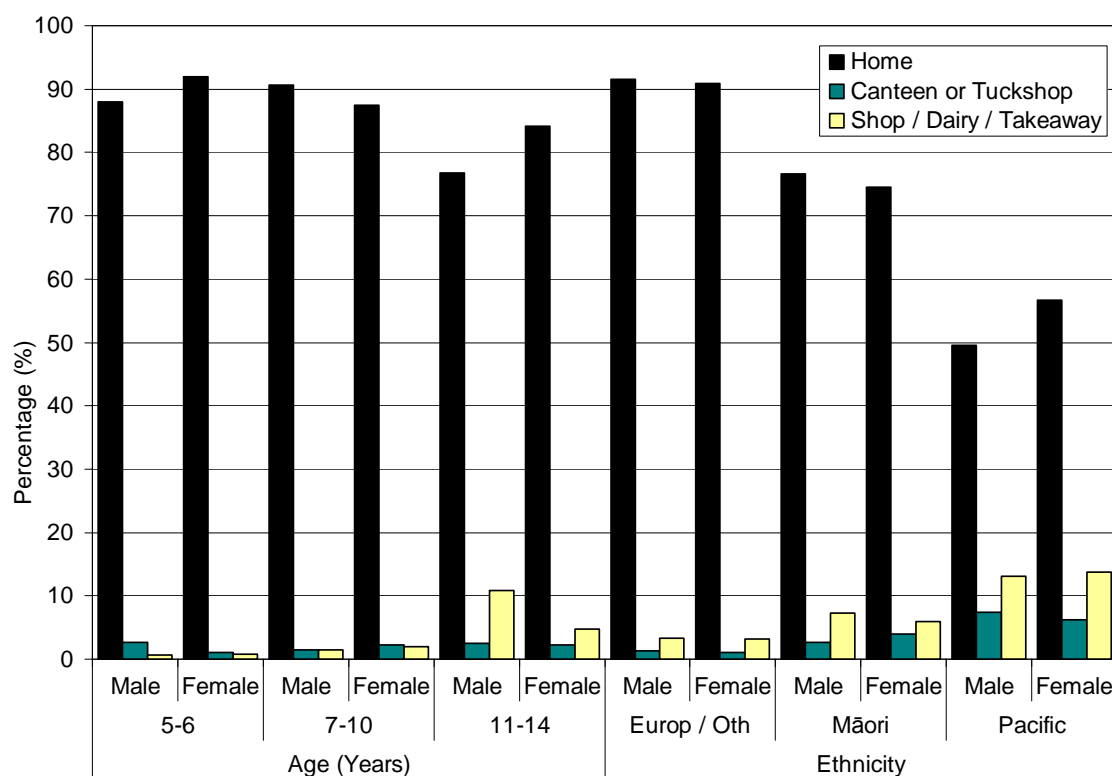


Source: NZ National Children's Nutrition Survey 2002 [121]; Ethnicity is Prioritised (see Methods Section)

Source of Food Consumed at School

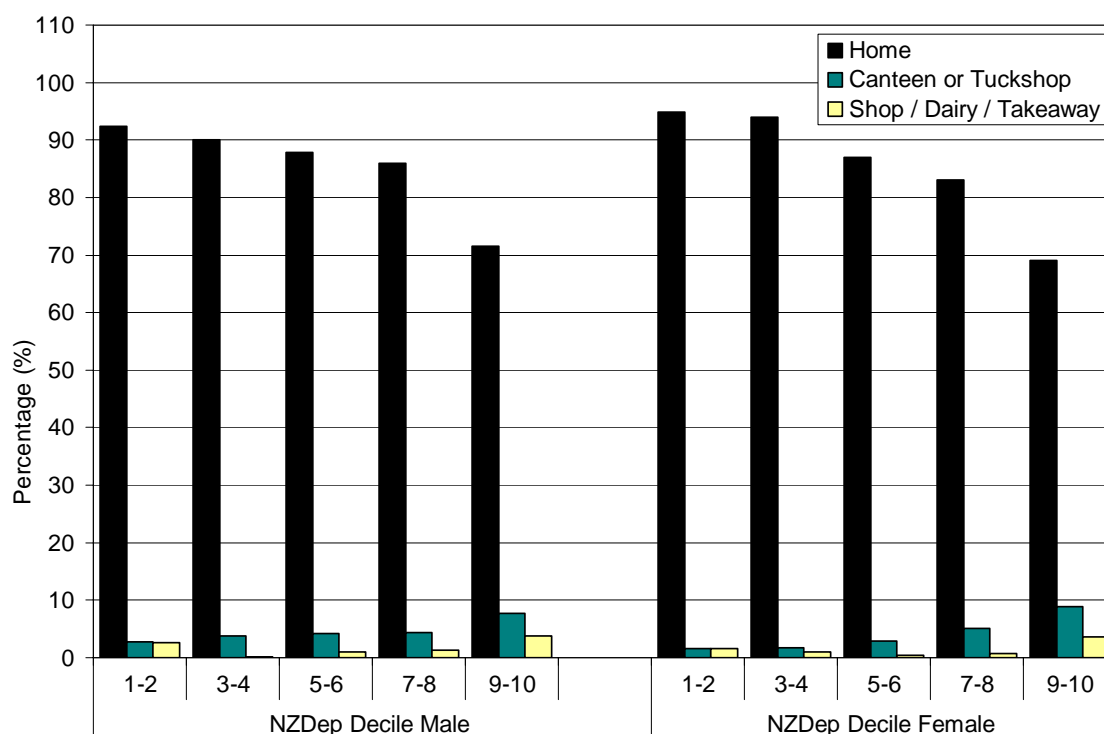
The majority of New Zealand children (84.4%) brought most of the food they consumed at school from home, with approximately $\frac{3}{4}$ not buying any of their food from a shop or takeaway in the past week. While 49.5% of Pacific boys and 56.7% of Pacific girls aged 5-14 years brought most of their food from home, the proportion decreased with age (5-6 yrs boys 60.1%, girls 68.0%; 11-14 yrs boys 37.2%, girls 39.3%). These proportions were significantly lower than for European / Other children, with a higher proportion of Pacific children saying that they brought some of their food from a shop / takeaway or canteen / tuck-shop. In addition, a lower proportion of children in the most deprived NZDep quintiles brought most of their food from home (**Figure 56, Figure 57**).

Figure 56. Source of Most Food Eaten at School for Children 5-14 Years by Gender, Age, and Ethnicity, New Zealand National Children's Nutrition Survey 2002



Source: NZ National Children's Nutrition Survey 2002 [121]; Ethnicity is Prioritised (see Methods Section)

Figure 57. Source of Most Food Eaten at School for Children 5-14 Years by Gender, and NZ Deprivation Index, New Zealand National Children's Nutrition Survey 2002



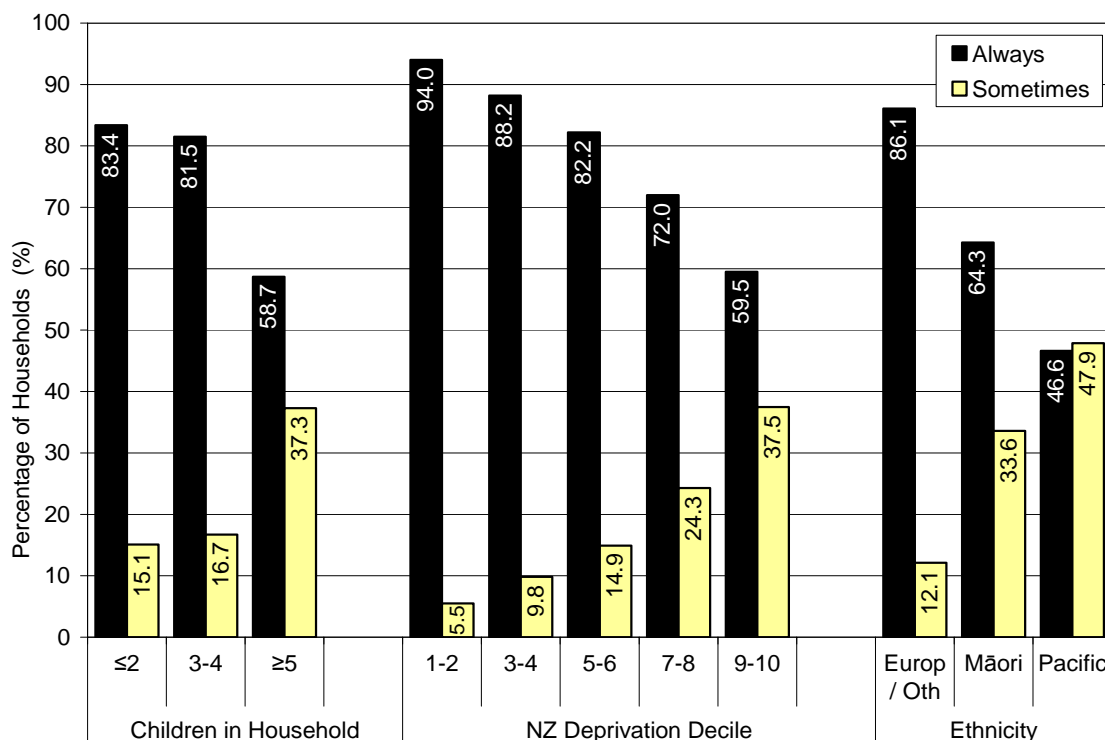
Source: New Zealand National Children's Nutrition Survey 2002 [121]

Food Security

While 46.6% of Pacific households with children 5-14 years reported that they could always afford to eat properly, 47.9% said they could do so only sometimes. Within Pacific households, the proportion who could always afford to eat properly declined from 56.6% for those with ≤ 2 children, to 39.6% for those with ≥ 5 children. The overall proportion was significantly lower than for European / Other families (where 86.1% could always afford to eat properly). In addition, households in the most deprived areas (NZDep Decile 9-10) were also significantly less likely to always eat properly, when compared to those in more affluent areas (NZDep Deciles 1-7) (**Figure 58**).

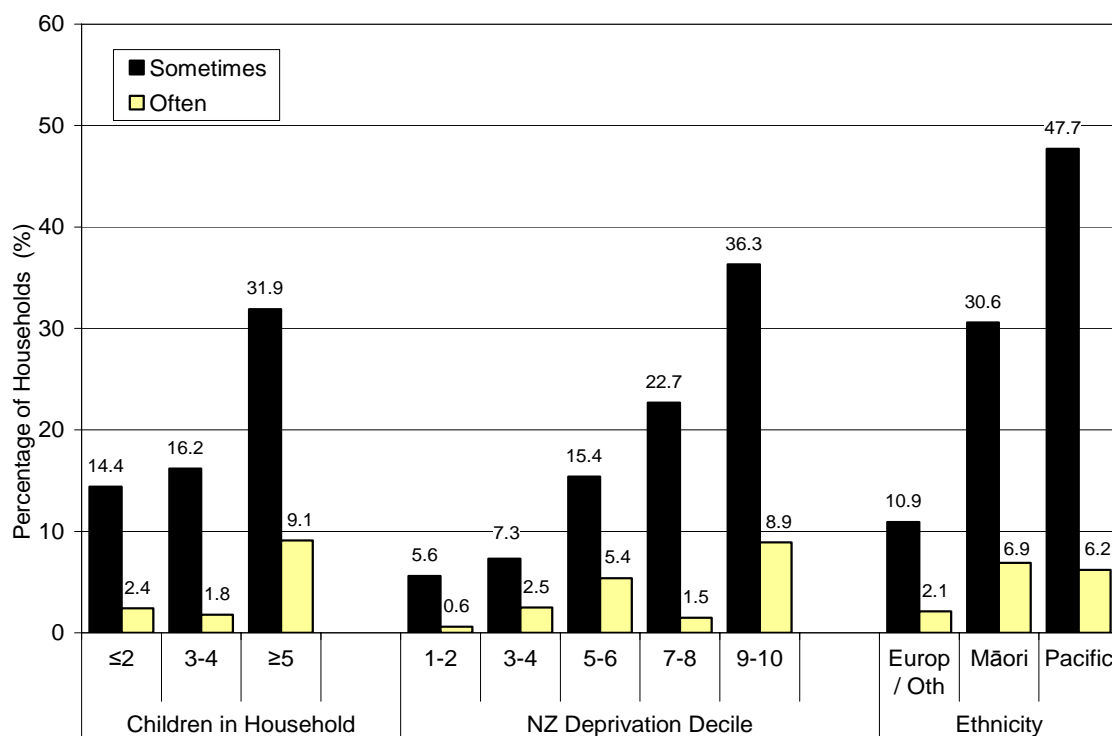
A number of other elements relating to food security were also explored including whether a household ever ran out of food, had to eat less or had to restrict the variety of the food they ate because of a lack of money. Questions were asked about whether the household experienced stress because they had insufficient money for food. While around 47.7% of Pacific households reported that food "sometimes" ran out because of a lack of money, this figure was as high as 55.4% for larger Pacific households (with 5+ children). These proportions were significantly higher than for Māori or European households. In addition, households in the most deprived (NZDep Deciles 9-10) areas were significantly more likely to run out of food than those living in more affluent (NZDep 1-7) areas (**Figure 59**).

Figure 58. Households with Children 5-14 Years that could Afford to Eat Properly (Always vs. Sometimes) by Number of Children in Household, NZ Deprivation Index and Ethnicity, New Zealand National Children's Nutrition Survey 2002



Source: NZ National Children's Nutrition Survey 2002 [121]; Ethnicity is Prioritised (see Methods Section)

Figure 59. Proportion of Households with Children 5-14 Yrs Reporting Food Runs Out Often or Sometimes Due to Lack of Money by Number of Children in Household, NZ Deprivation Index and Ethnicity, NZ National Children's Nutrition Survey 2002



Source: NZ National Children's Nutrition Survey 2002 [121]; Ethnicity is Prioritised (see Methods Section)

Summary

The Children's Nutrition Survey provided a number of insights into the nutritional intake of New Zealand children which may be of value in addressing the obesity epidemic in Pacific children and young people. These include:

1. Ethnic differences in total energy intake did not appear to explain ethnic differences in obesity, with Māori children having higher total energy intakes than European or Pacific children, yet Pacific children having the highest obesity rates. In addition, while socioeconomic gradients in obesity were prominent, socioeconomic gradients in total caloric intake were less marked. In contrast, the % of the daily intake derived from fat did correspond more closely with ethnic differences in obesity, being higher for Pacific and Māori children.
2. While the majority of children brought the food they consumed at school from home this declined as children grew older. In addition, a higher % of Pacific and Māori children and those living in the most deprived areas relied on school canteens or local food outlets. Such differences are concerning in the context of data suggesting that many items currently offered in school canteens and takeaway outlets do not support healthy food choices.
3. Even in the context of the current obesity epidemic, food security remained an issue for Pacific and Māori families, as well as larger families and those living in the most deprived areas, with many saying that they could not always afford to eat properly, and that they often or sometimes ran out of food. That those with the greatest food security issues (Pacific > Māori > European / Other, Least Affluent > Most Affluent) also experienced the highest rates of childhood overweight and obesity, suggests further research is needed to assess the impact that affordability of healthy food has on the current obesity epidemic.

Physical Activity

Introduction

While declines in the amount of time children and young people spend engaged in physical activity are thought to have contributed significantly to the obesity epidemic, the paucity of longitudinal data makes it difficult to quantify the precise role this has played in the New Zealand context. In addition, the lack of standardised physical activity recommendations for children and young people impacts on our ability to define who is inactive and who is active, with different studies focusing on different aspects of physical activity including duration (e.g. 30 minutes per day, 150 minutes per week), intensity (e.g. moderate, vigorous), frequency (e.g. 5 days per week, daily) and type (e.g. incidental, transport or school related, sports) [129]. In addition, each of these aspects can be measured in many different ways, with some relying on subjective measures (e.g. questionnaires, self report, proxy report, interviews) and others using more objective tools [129].

Overseas evidence for declining activity levels comes from a variety of sources including a Swedish study which noted a significant decrease in energy expenditure (particularly occupational and transport) over the 20th century, with a corresponding increase in sedentary leisure activity (e.g. watching TV, reading) [130]. In the UK, USA and New Zealand, declines in the number of children walking or cycling to school since the early 1970s have been attributed to parental perceptions regarding safety and a reluctance to let children cycle on the road [131] [132, 133]. A recent local study also suggested that the fitness levels of New Zealand children may be deteriorating, with the time taken for intermediate school children to run 550 metres increasing by 23.6s for boys and 27.0s for girls between 1991 and 2000 [122]. In addition, participation in organised sport has decreased substantially in a number of countries, while the proportion of leisure time children spend on “electronic entertainment” (e.g. computers, TV) has increased [130]. Not all overseas studies have come to the same conclusion however, with a number of studies exploring leisure time physical activity amongst young people during the 1980s-90s noting either increases in participation in vigorous activity, or no overall change [130]. In understanding the reasons for these differences however, methodological issues need to be taken into consideration, including the emphasis that different studies place on leisure time physical activity (e.g. sport) vs. total energy expenditure (e.g. housework, walking to school), as well as the potential for questions relating to vigorous activities to become less meaningful as the fitness of a population declines (e.g. the frequency of activities which make you “huff and puff”).

In New Zealand, the only trend information on children's physical activity comes from the New Zealand Sport and Physical Activity Surveys (undertaken by the Hilary Commission, reported on by Sports and Recreation New Zealand (SPARC)), which during 1997-01 noted a small decline in the number of children (5-17 yrs) who were active (68.9% in 1997 to 66.5% in 2001) and an increase in the number who were sedentary (no activity in past week 7.9% in 1997 to 12.8% in 2001)[134]. The following section explores the available information on physical activity in New Zealand using information from the 1997-2001 New Zealand Sport and Physical Activity Surveys [134], as well as the limited amount of cross-sectional information provided by the National Child Nutrition Survey [121]. While neither source is able to determine whether increases in total energy intake or decreases in physical activity have played the greatest role in the current obesity epidemic, increasing physical activity remains one of the mainstays of New Zealand's current Healthy Eating, Healthy Action Strategy and an understanding of its determinants is thus of value in identifying potential intervention points for future strategy development.



Data Sources and Methods

Definition

Physical Activity in Children and Young People

Data Sources

The National Children's Nutrition Survey

The New Zealand Sport and Physical Activity Survey

Indicator Category Bookmark C

Notes on Interpretation

National Children's Nutrition Survey (CNS02): The 2002 National Children's Survey was a cross sectional survey of 3,275 New Zealand children aged 5-14 years. A nationally representative sample was achieved by randomly selecting schools (190 schools identified, 172 (90.5%) participated) and within these schools, randomly selecting children. Over sampling of Māori and Pacific children occurred so ethnic specific analyses could be undertaken, with 1,160 Māori, 1,035 Pacific and 956 European/Other children having height and weight measurements taken. Measurements were carried out at school while the main interview was carried out at home in the presence of a parent or caregiver [121]

Physical activity measurements were based on the Physical Activity Questionnaire for Children, developed by Crocker et al [135] and adapted for New Zealand use after piloting in the New Zealand context. The scale has demonstrated acceptable internal consistency and validity in a number of overseas studies and is thought to have moderate external validity [121]. The questionnaire asks about activity patterns during the most recent school week, with mean activity ratings being calculated across a range of questions covering participation in sporting activities, transport to and from school and activities during school lunchtimes and breaks, as well as after school. While the majority of interviews were carried out at the child's home in the presence of a parent / caregiver, some interviews for those aged > 9 years were undertaken at school. Perceived limitations of the questionnaire include its inability to estimate total energy expenditure, or the intensity or duration of the activities children reported taking part in and the combining of European and Asian / Indian children in a single category called European / Other. In addition, the focus of the questionnaire is only on activities taking place during the school year [121].

The Assignment of Ethnicity: Participants were asked "Which ethnic groups do you belong to?" A card was then shown with the following options: NZ Māori, Cook Island Māori, Fijian, Niuean, Samoan, Tokelauan, Tongan, Other Pacific Island, NZ European / Pakeha, Other European, Chinese, Other Asian, Indian, South East Asian and Other. This was repeated up to three times, with those reporting multiple affiliations being assigned a single ethnic group using the following hierarchy: Māori > Pacific > European / Other.

The New Zealand Sport and Physical Activity Surveys: The information in this section comes from the combined results of the Hillary Commission's (now Sport and Recreation NZ (SPARC)) 1997/98, 1998/99 and 2000/01 New Zealand Sport and Physical Activity Surveys (NZSPAS) [136]. Unless otherwise specified, the results quoted are based on the combined results of all 3 surveys and are compiled from publications available on SPARC's website www.sparc.org.nz. In total, these 3 surveys collected information on 4,000 young peoples (age 5-17 years) who were chosen for the survey at random from 12 Regions covered by 17 Regional Sports Trusts. Interviews took place in each region during each month of the survey years to ensure that seasonal variations could be taken into account. Interviews took place in the young person's home, with questions being answered by an adult household member, although the young person could also help answer the questions if they were present during the interview. Information was collected about all of the sport and active leisure that the young person had taken part in during the past 2 weeks. The time the young person spent on their chosen sports and activities was then added to find how active they had been over the past 2 weeks and was categorised as per **Table 25** on page 137.

While the NZSPAS are the only source of longitudinal and regional information on the participation of New Zealand's young people in sport and active leisure, the surveys are seen as having a number of limitations, particularly that for those aged 5-17 years, activity levels are based on parental report (which in a number of studies has been shown to correlate poorly with direct measures of physical activity). In addition, the NZSPAS survey tool has not been validated for the population under study and the focus has tended to be on sport and active leisure rather than physical activity per se. Finally, the levels of activity required to define a youth as physically active are lower than overseas, possibly over inflating New Zealand's levels of physical activity and making overseas comparisons difficult [129]. Nevertheless, these surveys provide a useful tool for assessing young people's participation in sport and exercise over time, as well as at a regional level.

Assignment of Ethnicity: The ethnicity question in NZSPAS was based on self-identification with an ethnic group. The four categories were: a New Zealander of Māori descent or part-Māori, a New Zealander of European descent, a person of Pacific Island descent, and those not identifying with any of these groups (e.g. Asian, African, Middle Eastern or being from other countries).

Statistical Significance Testing

The information in this section was obtained from national survey reports. Where the results of statistical significance testing were available in these reports, these have been indicated in the text (i.e. the terms *significant* or *not significant* have been used to communicate the significance of the observed associations). Where the terms *significant* or *non-significant* are not specifically used, the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

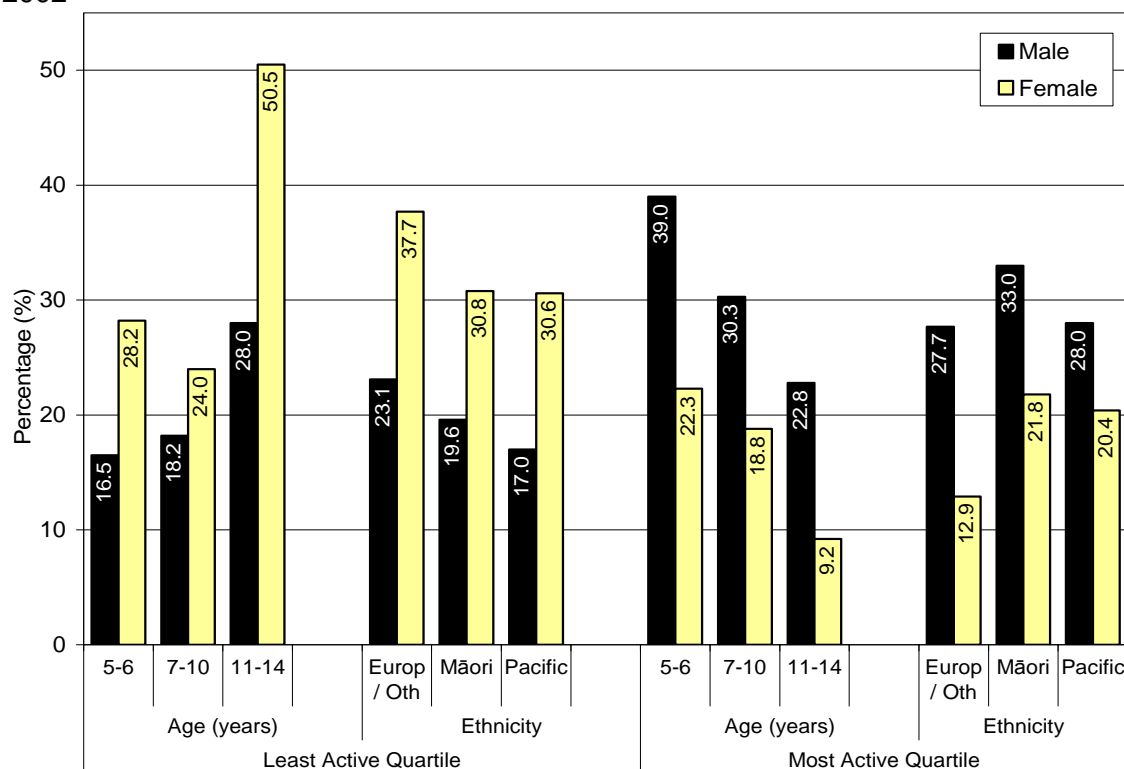
The 2002 National Children's Nutrition Survey

Total Physical Activity Scores

The 2002 National Children's Nutrition Survey (CNS02) measured children's physical activity in a variety of areas (e.g. sporting participation, travel to and from school, amount of time spent in various activities during / after school or at weekends). Each activity was scored on a 5 point scale (1=least active to 5=most active), with the overall activity rating being averaged across all 8 physical activity questions. Overall ratings were then ranked and children were assigned to one of four quartiles, with those in the lowest quartile being the least active and those in the highest quartile being the most active [121]. The main findings of this analysis were (**Figure 60**):

1. At all ages and across all ethnic groups, females were *significantly* more likely to be in the least active quartile, while males were *significantly* more likely to be in the most active quartile.
2. The proportion in the least active quartile increased with age, while the proportion in the most active quartile decreased with age, for both genders.
3. Pacific children had the *lowest proportion* in the least active group, while Māori children had the *highest proportion* in the most active group. European / Other children were *significantly* more likely to be in the least active group and *significantly* less likely to be in the most active group.

Figure 60. Proportion of Children 5-14 Years in the Least and Most Active Physical Activity Quartiles by Gender, Age and Ethnicity, NZ National Children's Nutrition Survey 2002



Source: NZ National Children's Nutrition Survey 2002 [121]; Ethnicity is Prioritised (see Methods Section)

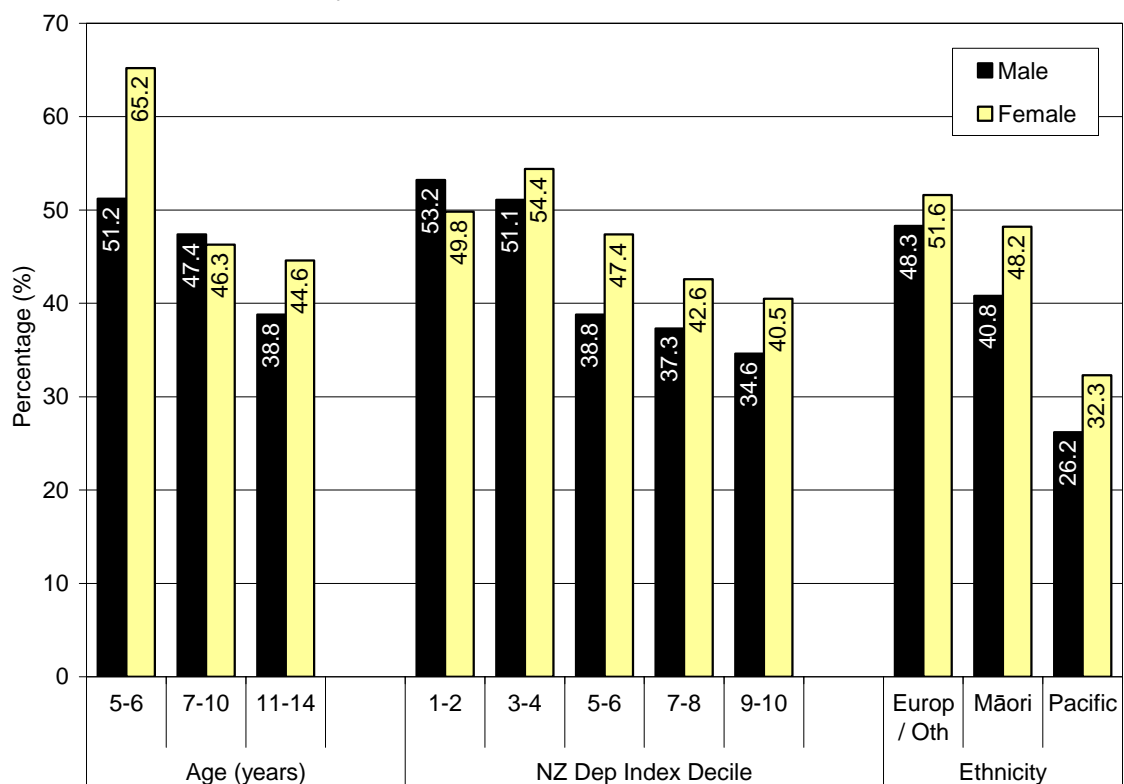
Travel to and From School

Included in the physical activity questions was one which asked, “How many times during the past week did you walk, bike, skate or scooter to or from school?” Analysis of those who did not travel to school by active means (e.g. were driven to school by car) suggested that:

1. The proportion of children transported to school decreased significantly with age, for both genders.
2. Pacific children were significantly less likely to be transported to school than European / Other children
3. The proportion of children transported to school decreased with increasing NZDep deprivation, although only for males did differences between those in the most and least deprived NZDep areas reach statistical significance (Figure 61).

Note: While travel to and from school is only one element of physical activity undertaken by children in their everyday lives, the ability of the CNS02 Survey to capture elements of day-to-day physical activity, over and above those associated with sport or active leisure, may be one of the reasons why the findings of the CNS02 differ in some respects from those of the NZSPAS presented in the section which follows.

Figure 61. Proportion of Children 5-14 Years Who Did Not Travel to School by Active Means by Gender, Age, NZ Deprivation Index and Ethnicity, New Zealand National Children's Nutrition Survey 2002



Source: NZ National Children's Nutrition Survey 2002 [121]; Ethnicity is Prioritised (see Methods Section)

The New Zealand Sport and Physical Activity Surveys

During the course of 3 separate surveys (1997/98, 1998/99 and 2000/01) the Hillary Commission (now SPARC) interviewed the caregivers of 4,000 children and young people aged 5-17 years. Questions focused on the amount of time spent on either sport or active leisure during the past 2 weeks, with children being assigned to 1 of 4 groups (sedentary, relatively inactive, relatively active, highly active) based on their parent's responses and the criteria outlined in **Table 25**. A combined analysis of these 3 surveys suggested that:

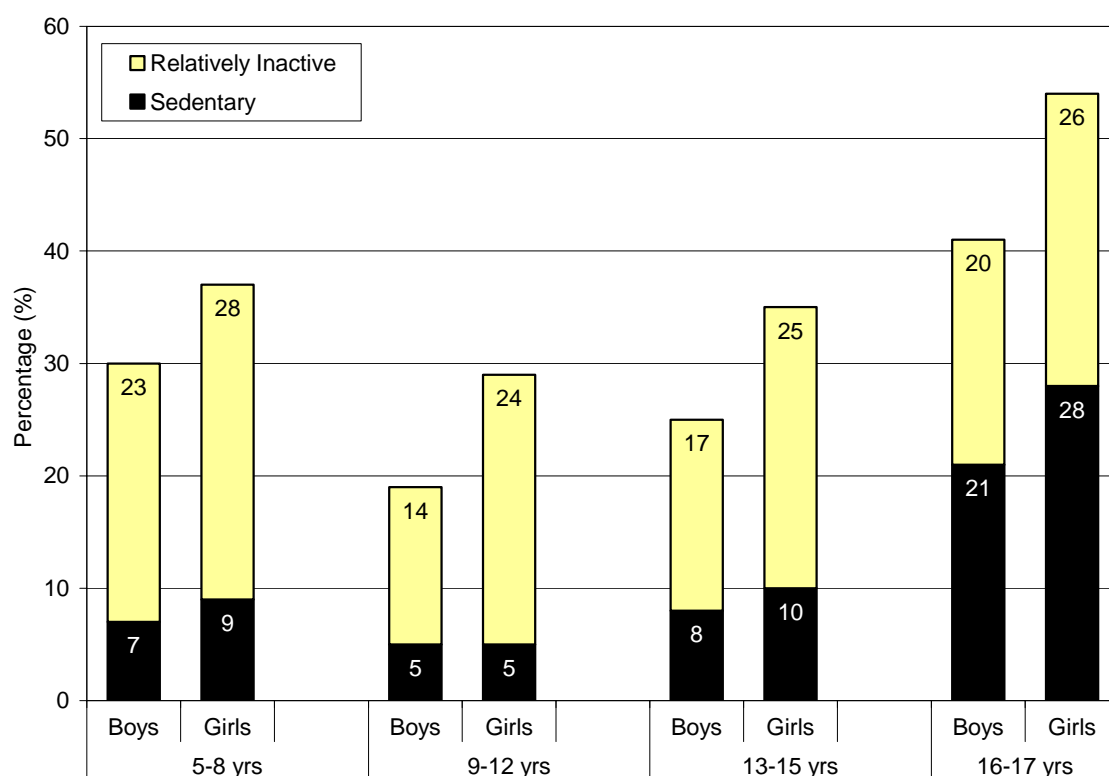
1. On average, 48% of Pacific children and young people 5-17 years were inactive (< 2.5 hours sport or active leisure in past 7 days) as compared to 32% of New Zealand young people as a whole.
2. At every age, females were more likely to be inactive than males (**Figure 62**).
3. Inactivity levels exhibited a J-shaped distribution with age, with overall inactivity levels in Pacific young people being highest for children 5-8 years (52%), followed by those 16-17 years of age (48%) (**Figure 63**).
4. Pacific children and young people (48%) had higher inactivity levels than Māori (29%), European (30%) and "Other" (41%) children and young people (**Figure 63**).
5. Young people's activity levels were influenced by their parent's activity levels, with only 25% of young people being inactive if their parents were highly active, as opposed to 43% being inactive if their parents were sedentary (**Figure 64**).

Table 25. Definitions of Physical Activity used in the New Zealand Sport and Physical Activity Surveys for Children Aged 5-17 Years, 1997-2001

Activity Level	Category	Description
Physically Inactive	Sedentary	No sport / leisure-time physical activities in the 2 weeks before the interview.
	Relatively Inactive	Took part in some leisure time physical activity in the 2 weeks before the interview (but not necessarily in the past 7 days) and all those who took part in <2.5 hours in the 7 days before the interview.
Physically Active	Relatively Active	Took part in at least 2.5 hours, but less than 5 hours of sport / leisure time physical activity in the 7 days before the interview.
	Highly Active	Took part in 5 hours or more of sport / leisure time physical activity in the 7 days before the interview.

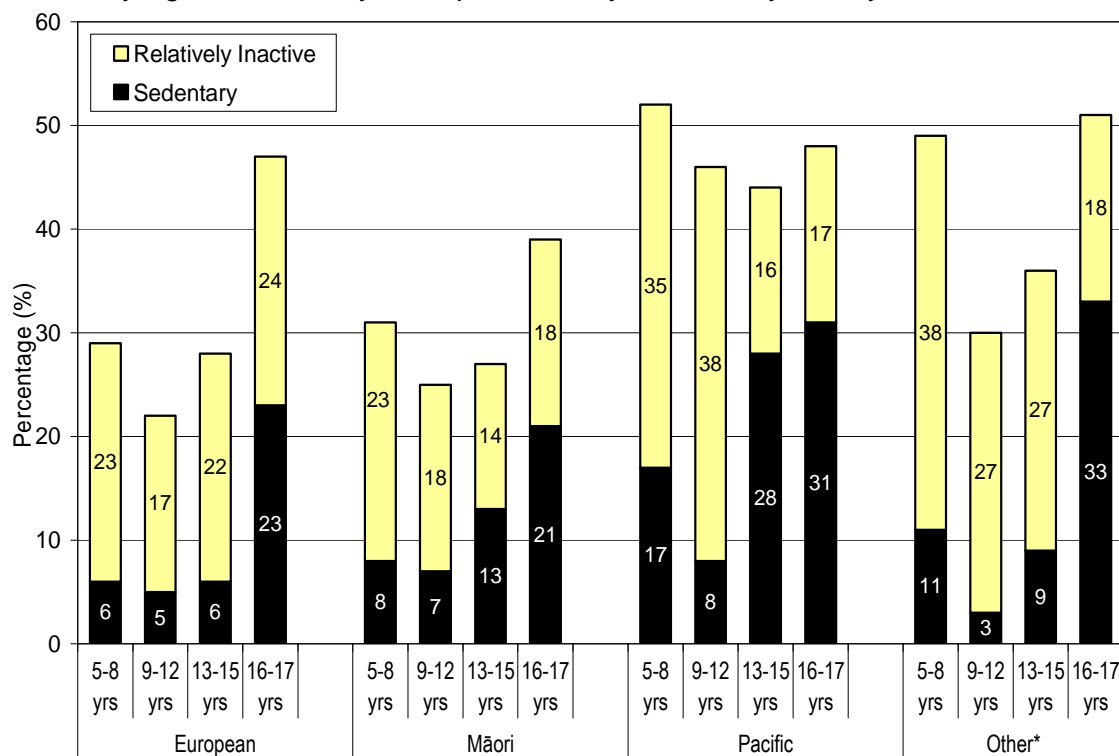
Source: Sport and Recreation NZ [136]

Figure 62. Children and Young People 5-17 Years Who Were Sedentary or Relatively Inactive by Gender and Age, NZ Sport and Physical Activity Surveys 1997-2001



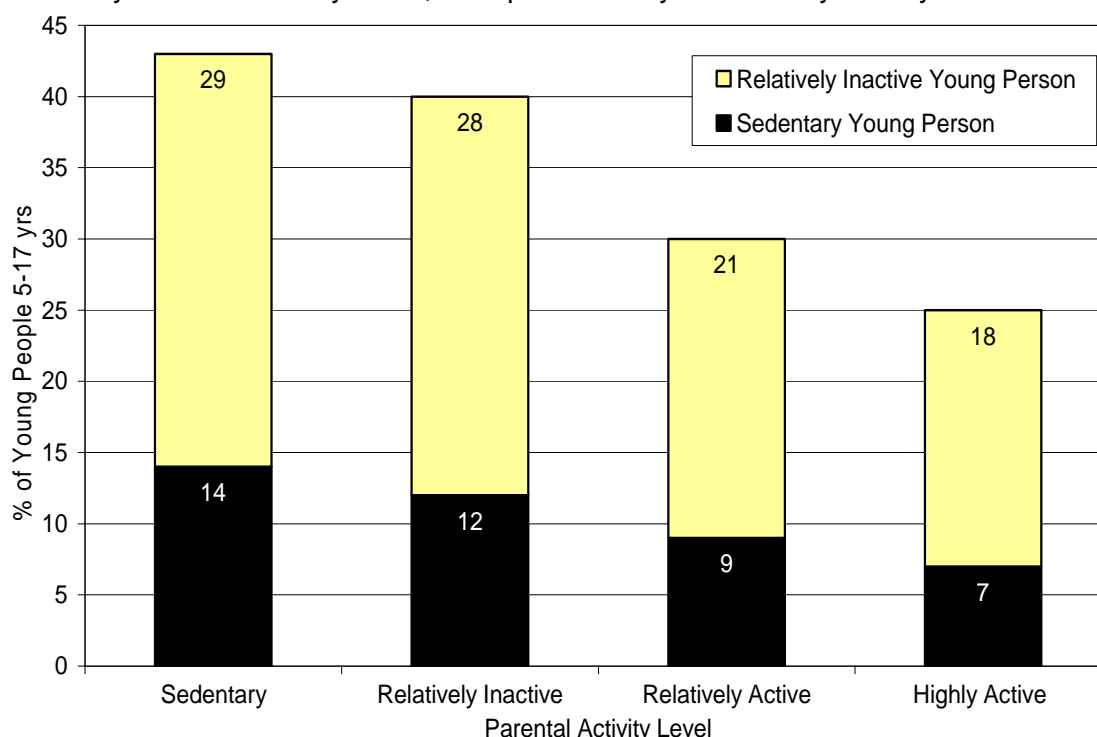
Source: Sport and Recreation NZ [136]

Figure 63. Children and Young People 5-17 Years Who Were Sedentary or Relatively Inactive by Age and Ethnicity, NZ Sport and Physical Activity Surveys 1997-2001



Source: Sport and Recreation NZ [137-140]. Note: Other includes Asian, African and Middle Eastern (see Methods Section for Ethnicity definition used)

Figure 64. Children and Young People 5-17 Years Who Were Sedentary or Relatively Inactive by Parental Activity Level, NZ Sport and Physical Activity Surveys 1997-2001



Source: Sport and Recreation NZ [136]

Summary

While data limitations make it difficult to determine whether increases in total energy intake or decreases in physical activity have played the greatest role in the current obesity epidemic, increasing physical activity remains one of the mainstays of New Zealand's current Healthy Eating, Healthy Action Strategy and thus an understanding of its determinants is of value in identifying potential intervention points for future strategy development. The NZ Children's Nutrition Survey provides limited information on physical activity in children, while the NZ Sport and Physical Activity Surveys have monitored children's participation in active sport and leisure since 1997. While methodological differences mean that the findings of these two surveys cannot be directly compared, a number of themes emerged from these surveys:

1. Approximately 32% of New Zealand children 5-17 years are inactive (NZSPAS).
2. Girls are more likely to be inactive than boys (NZSPAS and CNS02).
3. The proportion of children and young people who are inactive increases with age (NZSPAS and CNS02).
4. The physical activity levels of children and young people are influenced by the activity levels of their parents (NZSPAS).
5. During 1997-2001, the overall physical activity levels of New Zealand children and young people may have declined (NZSPAS).

In addition, an apparent contradiction between the two surveys emerged related to ethnic differences in physical activity. While the CNS02 suggested that European/Other children were the most inactive group, the NZSPAS suggested that Pacific children were at greatest risk. In interpreting these findings it must be remembered that these surveys used different methodologies. While the CNS02 interviewed children about both their daily activity levels and incidental physical activity (e.g. travel to school), NZSPAS was based on parental report and focused on participation in sports and

active leisure. It is possible that the CNS02 thus more readily captured elements of children's day to day activity, while the NZSPAS emphasised those elements relating to organised sport. In addition, the CNS02 combined European and Asian children into a single group, whereas the NZSPAS suggested that these two groups were quite different. Despite these limitations, these findings suggest that at a significant minority of Pacific children and young people in New Zealand are either sedentary or relatively inactive and that there is significant potential to achieve gains in physical activity within the context of the current obesity epidemic.



Risk and Protective Factors

Substance Use

Exposure to Cigarette Smoke in the Home

Introduction

Action on Smoking and Health (ASH) surveys suggest that during 2006, 49.2% of Pacific students aged 14-15 years had a parent who smoked, with 27.4% living in homes where people smoked inside. This is of concern as in New Zealand each year, it has been estimated that exposure to second hand smoke results in:

- 500 hospital admissions for chest infections in children <2 years
- 15,000 episodes of childhood asthma
- 27,000 GP consultations for asthma and respiratory problems
- 1,500 operations to treat glue ear
- 50 cases of meningococcal disease [141]

In addition, in utero exposure to cigarette smoke has been associated with a number of adverse outcomes including intrauterine growth restriction, sudden infant death syndrome, impaired cognitive development and childhood behavioural problems [142]. Furthermore, it has been suggested that the financial costs of smoking impact disproportionately on children in low income families, with up to 14% of non-housing related income in one study being spent on the purchase of tobacco related products [143]. Finally, parental smoking significantly increases the likelihood that children will smoke during their adolescent years [144], which if continued, increases their risk of outcomes such as ischemic heart disease, lung cancer and chronic obstructive respiratory disease in later life.

Estimates of the proportion of New Zealand children exposed to cigarette smoke in their homes vary, from as high as 26.5% amongst 14-15 year olds in a recent ASH Survey [145], to as low as 9.5% (daily exposure) in a recent research report [146]. The same report also suggests that while 19.6% of the general population smokes, only 47% of smokers smoke inside their homes. Reasons given for outdoor smoking practices included not wanting to expose others to second hand smoke and setting a good example for children [146]. The extent to which such outdoor smoking practices protect children from passive smoke exposure remains unclear however, with one recent New Zealand study suggesting that hair nicotine levels in children were significantly elevated in smoking households irrespective of whether family members smoked inside or outside their homes [147]. In contrast, another study (using different exposure measures) suggested that while environmental tobacco smoke and its contaminants (e.g. dust and surface contamination) were 5-7 times higher in households where smokers tried to protect their infants by smoking outside, such exposures were 3-8 times higher again amongst those who continued to smoke indoors (i.e. outside smoking practices, while not being able to confer full protection, nevertheless did reduce the amount of exposure infants and young children had to tobacco smoke and its contaminants within the home) [148].

The following section reviews the exposure of Pacific children in New Zealand to cigarette smoke within their homes using two different data sources: the % of Year 10 students reporting exposure to cigarette smoke in their homes in ASH's annual surveys and the % of children <15 years living in a household with a smoker at the 1996 and 2006 Censuses.



Data Source and Methods

Definition

1. Proportion of Year 10 students with parents who smoke or who live in a home with smoking inside
2. Proportion of Children <15 years who Live in a Household with a Smoker (Census)

Data Source and Interpretation

1. *Proportion of Year 10 students with parents who smoke or who live in a home with smoking inside*
ASH Surveys

Numerator: Number of year 10 students who report that one or both parents smoke or who live in a house where smoking is allowed inside

Denominator: Number of Year 10 Students surveyed

Interpretation: Action on Smoking and Health (ASH) was established in 1982 with the aim of reducing smoking and smoking related premature deaths. While the Ministry of Health provides funding for the annual national Year 10 Smoking Survey, ASH manages the data collection and oversees its analysis [145]. Since 1999, ASH has conducted surveys of smoking behaviour in Year 10 (14-15 yrs) students, collecting information from >30,000 students annually. In 2000 and 2001, >70% of schools in New Zealand participated, and of these 70% of enrolled students took part [144]. Questionnaires are self administered and cover demographic variables as well as smoking related issues. Survey forms with instructions are mailed to all secondary schools and teachers supervise the completion of the questionnaires by students. It has been suggested that such a design means it is not always clear how the sample has been selected and how consistently the survey has been administered, however, the large sample size and annual frequency makes the survey useful for monitoring smoking behaviour of Year 10 students in New Zealand, and a useful tool for understanding trends and risk factors for smoking initiation [149].

Ethnicity Classification Used: In ASH Surveys, students may choose more than one ethnic group, with a prioritisation algorithm being used to assign students with multiple responses to a single ethnicity as follows: Māori > Pacific > Asian > European > Other [150].

2. *Proportion of Children <15 years who Live in a Household with a Smoker*

Census

Numerator: Number of children 0-14 yrs who live in a household with someone who answered yes to the Census question “Do you smoke cigarettes regularly (that is one or more per day)?”

Denominator: The number of children 0-14 years at the Census

Interpretation: Census data categorises those >15 years into two groups: smokers and non smokers, with missing responses being assigned to the non-smoking category. Thus Census data may underestimate the proportion of smokers, as the number with missing information is unspecified. In addition, because at the time of writing the NZDep2006 Index had not been released, 2006 Census meshblocks have been back mapped to their NZDep scores at the 2001 Census, with new meshblocks taking on the NZDep2001 score of the largest of the meshblocks from which they were derived. Differences in the way in which ethnicity questions were structured between the two Censuses also mean that information on ethnicity between 1996 and 2006 may not be strictly comparable. These issues must be borne in mind when interpreting the figures in the section which follows.

Indicator Category Proxy B

Statistical Significance Testing

ASH Survey Data: Where the results of statistical significance testing were available in published reports, these have been indicated in the text (i.e. the terms *significant* or *not significant* have been used to communicate the significance of the observed associations). *Census Data:* 95% confidence intervals have been provided for rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus unless specifically indicated, the associations described do not imply statistical significance or non-significance.

New Zealand Data and Trends

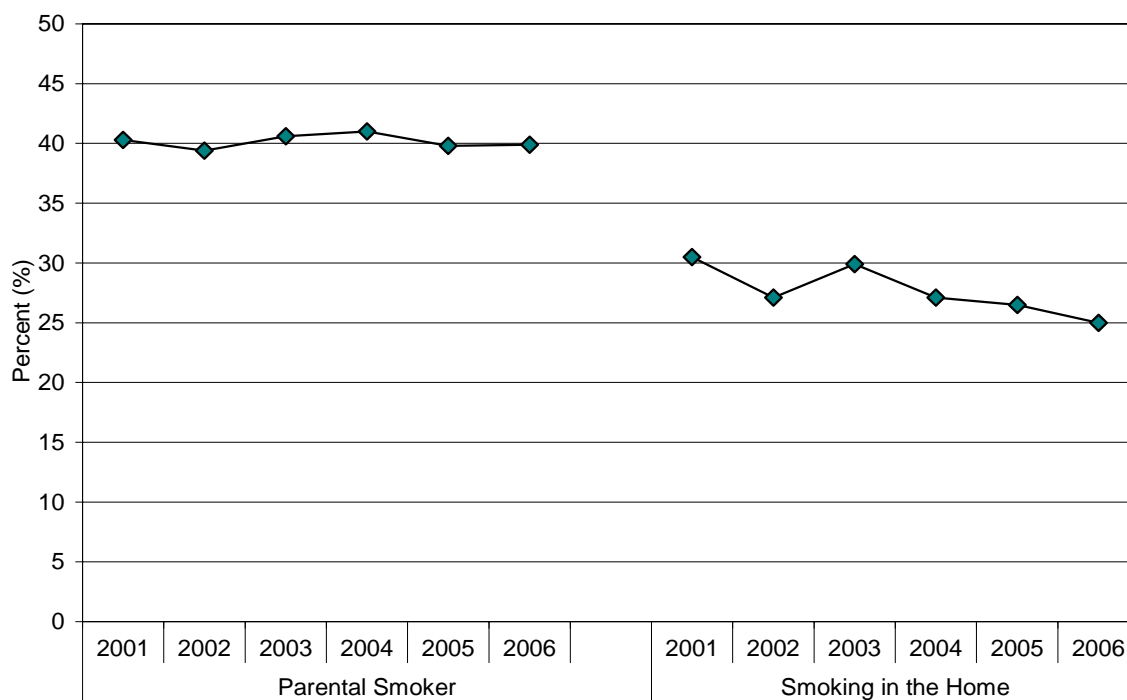
Exposure to Cigarette Smoke in the Home: ASH Survey Data

Since 2001, ASH's annual surveys of the smoking behaviour of Year 10 students have included a question on parental smoking (“Which of these people smoke? (tick one or more that apply), mother, father, older brother or sister, best friend, none of these”), as well as a question on exposure to cigarette smoke within the home (“Do people smoke inside your house?”) [144]. The following section uses ASH Survey data to explore trends in parental smoking behaviour and exposure to cigarette smoke within the home for young people aged 14-15 years during 2001-2006.

Trends in Parental and Household Smoking Behaviour

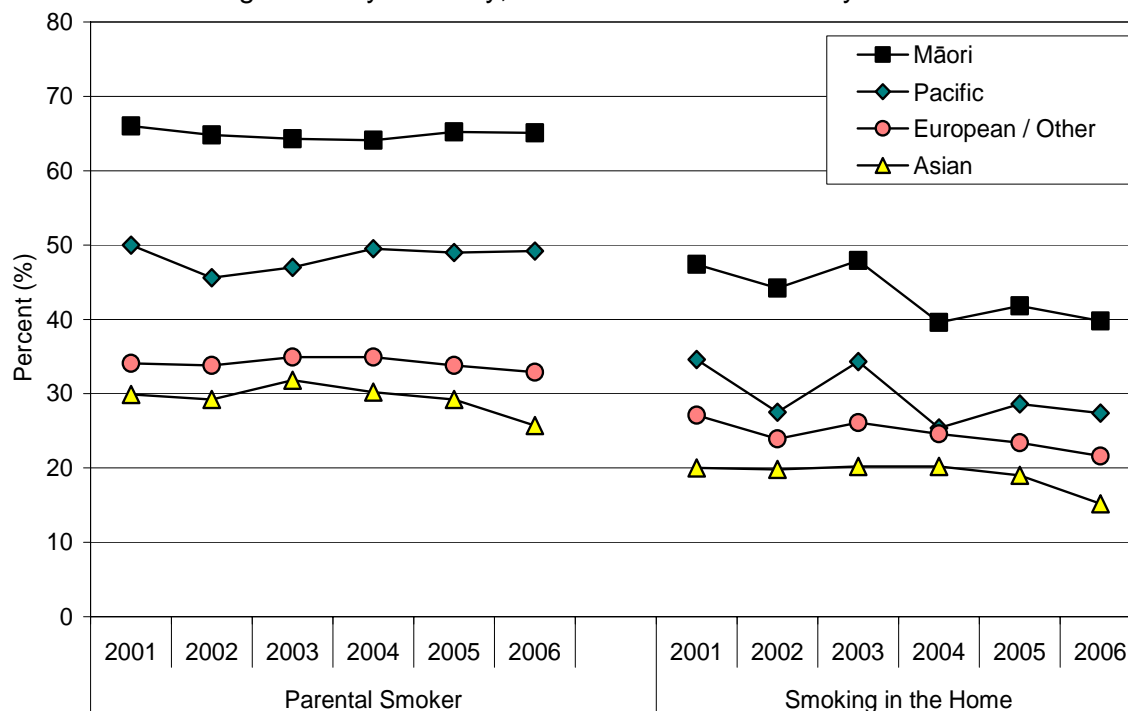
In New Zealand during 2001-2006, the proportion of Year 10 students with a parent(s) who smoked changed little, being 40.3% in 2001 and 39.9% in 2006. In contrast, the proportion of students who lived in homes where smoking was permitted inside *declined significantly*, from 30.5% in 2001 to 25.0% in 2006 (**Figure 65**).

Figure 65. Proportion of Year 10 Students with Parents Who Smoke or Who Live in a Home with Smoking Inside, New Zealand ASH Surveys 2001-2006



Source: NZ ASH Surveys

Figure 66. Proportion of Year 10 Students with Parents Who Smoke or Who Live in a Home with Smoking Inside by Ethnicity, New Zealand ASH Surveys 2001-2006



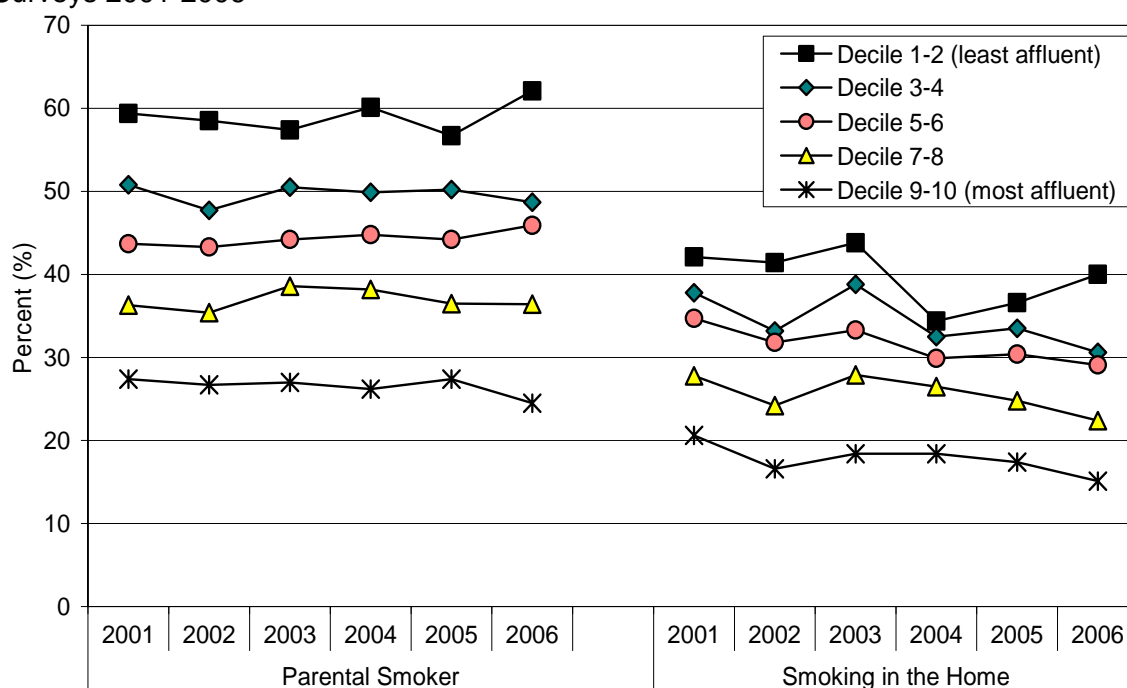
Source: NZ ASH Surveys; Ethnicity is Prioritised (see Methods Section for Details)

Ethnic Differences in Parental and Household Smoking Behaviour

Parental Smoking: In New Zealand during 2001-2006, there were *no significant changes* in parental smoking rates for Pacific students, with 50.0% of students having parents who smoked in 2000, as compared to 49.2% in 2006. While Māori students also experienced *no significant change* in parental smoking rates (2001 66.0% and 2006 65.1%), rates for European / Other (2001 34.1% to 32.9%) and Asian (2001 29.9% to 2006 25.7%) students *declined significantly*. Throughout this period, parental smoking rates for Pacific students were intermediate between those of Māori and European students.

In Home Smoke Exposure: While similar ethnic differences were seen for exposure to cigarette smoke in the home, exposures were lower than parental smoking rates might predict, potentially suggesting the presence of in-house non-smoking policies in families of all ethnic groups. In contrast to parental smoking, the proportion of Pacific students exposed to smoking in their homes *declined significantly*, from 34.6% in 2001 to 27.4% in 2006. Similar declines were seen for other ethnic groups (47.4% to 39.8% for Māori; 27.1% to 21.6% for European / Other; and 20.0% to 15.2% for Asian students) (**Figure 66**).

Figure 67. Proportion of Year 10 Students with Parents Who Smoke or Who Live in a Home with Smoking Inside by School Socioeconomic Decile, New Zealand ASH Surveys 2001-2006



Source: NZ ASH Surveys

Socioeconomic Differences in Parental and Household Smoking Behaviour

Parental Smoking: Similarly, with the exception of students attending schools in the most affluent areas, parental smoking rates by school socioeconomic (SES) decile *did not change significantly* during 2001-2006, with the proportion of Year 10 students reporting at least one parent smoking remaining persistently elevated for those attending schools in the most deprived areas.

In Home Smoke Exposure: Exposure to smoking within the home also exhibited a marked socioeconomic gradient (school decile 1-2 > 3-4 > 5-6 > 7-8 > 9-10), although exposures were much lower than parental smoking rates might predict, again suggesting the presence of in house non-smoking policies for all socioeconomic

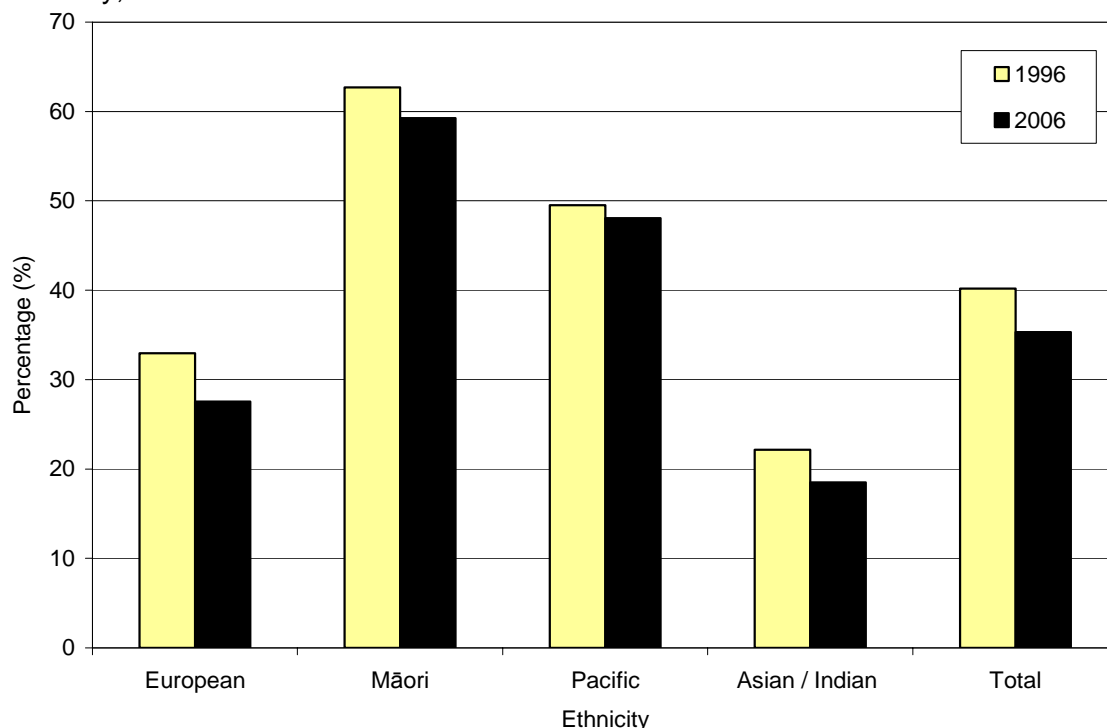
groups. In contrast to parental smoking, exposure to smoking within the home *declined significantly* for all socioeconomic groups (42.1% to 40.0% for schools in the most deprived (decile 1-2) areas; 34.7% to 29.1% for schools in average (decile 5-6) areas; and 20.6% to 15.1% for schools in the most affluent (decile 9-10) areas (**Figure 67**).

Exposure to Cigarette Smoke in the Home: Census Data

Total Smoking Exposure and Ethnic Differences

In New Zealand during 1996, 49.5% of Pacific children (0-14 yrs) lived in a household with a smoker, with household smoking rates being intermediate between those of Māori (62.7%) and European (32.9%) children. Similarly in 2006, 48.1% of Pacific children lived in a household with a smoker, with rates being *significantly lower* than for Māori (59.3%) children, but *significantly higher* than for European (27.5%) children (**Figure 68, Table 26**).

Figure 68. Proportion of Children 0-14 Years Living in a Household with a Smoker by Ethnicity, New Zealand at the 1996 and 2006 Censuses



Source: Statistics New Zealand; Ethnicity is Level 1 Prioritised

Socioeconomic Differences

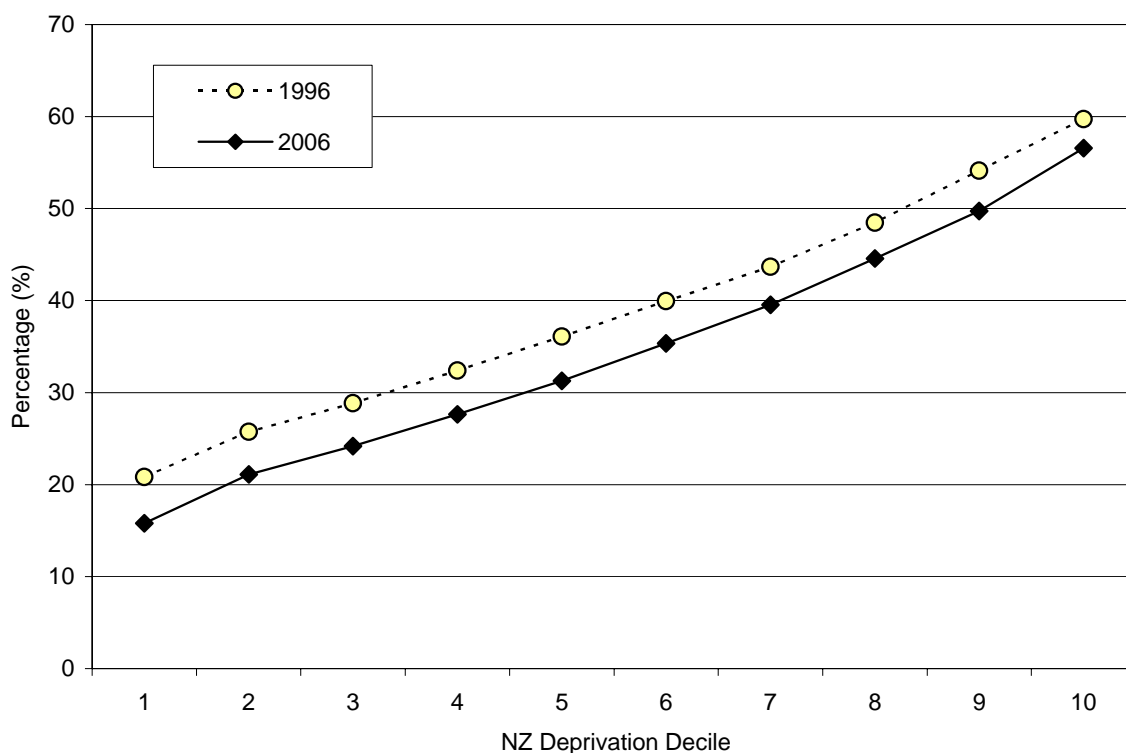
There were also socioeconomic differences in the proportion of New Zealand children living in households with a smoker during 1996, with rates rising from 20.8% for those living in the most affluent (Decile 1) areas, to 59.7% for those living in the most deprived (Decile 10) areas. While by 2006 rates had declined for all socioeconomic groups, *significant differences* still remained, with the proportion of children living in a household with a smoker rising from 15.8% for those living in the most affluent areas to 56.6% for those in the most deprived areas (**Figure 69, Table 26**).

Relationship Between Socioeconomic Status and Ethnicity

In addition, at both the 1996 and 2006 Censuses, while the proportion of children living in a household with a smoker increased with increasing socioeconomic deprivation for each of New Zealand's largest ethnic groups, at nearly every level of socioeconomic

deprivation, household smoking rates remained higher for Māori > Pacific > European > Asian / Indian children. Thus during 2006, the proportion of Pacific children living in a household with a smoker rose from 27.3% for those in the most affluent (Decile 1) areas, to 50.8% for those in the most deprived (Decile 10) areas (**Figure 70**).

Figure 69. Proportion of Children 0-14 Years Living in a Household with a Smoker by NZ Deprivation Index Decile, New Zealand at the 1996 and 2006 Censuses



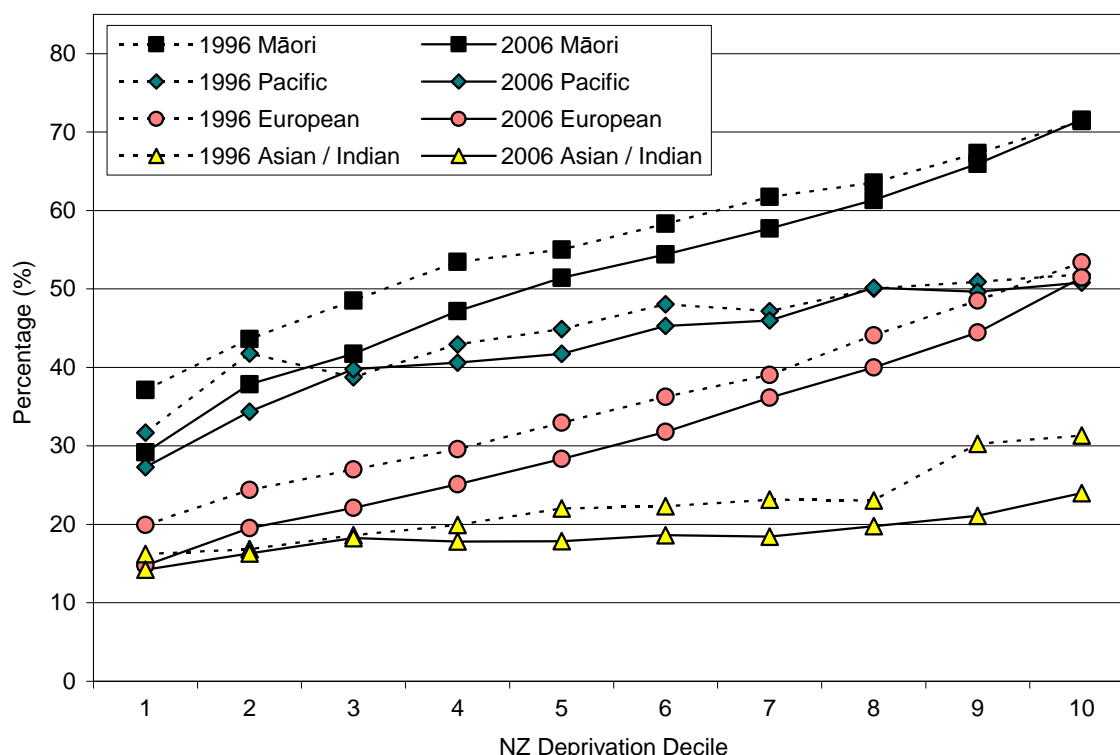
Source: Statistics New Zealand

Table 26. Proportion of Children 0-14 Years Living in a Household with a Smoker by Ethnicity and NZ Deprivation Index Decile, New Zealand at the 2006 Census

Variable	Percent	RR	95% CI	Variable	Percent	RR	95% CI
NZ Deprivation Index Decile				Prioritised Ethnicity			
1	15.80	1.00		Māori	59.26	2.15	2.14-2.16
2	21.10	1.34	1.31-1.37	Pacific	48.06	1.74	1.72-1.76
3	24.19	1.53	1.50-1.56	European	27.55	1.00	
4	27.65	1.75	1.72-1.78	Asian/Indian	18.49	0.67	0.66-0.68
5	31.26	1.98	1.94-2.02				
6	35.36	2.24	2.20-2.28				
7	39.53	2.50	2.46-2.54				
8	44.58	2.82	2.77-2.87				
9	49.75	3.15	3.10-3.20				
10	56.57	3.58	3.52-3.64				

Source: Statistics New Zealand; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Figure 70. Proportion of Children 0-14 Years Living in a Household with a Smoker by Ethnicity and NZ Deprivation Index Decile, New Zealand at the 1996 and 2006 Censuses



Source: Statistics New Zealand; Ethnicity is Level 1 Prioritised

Summary

In New Zealand during 2006, Action for Smoking and Health (ASH) Surveys suggested that 49.2% of Pacific Year 10 students had a parent who smoked, with smoking rates for Pacific parents being intermediate between those of Māori and European parents. Exposures were also higher for students attending schools in the most deprived areas. While socioeconomic and ethnic differences were also observed for exposure to smoke in the home, exposures were lower than parental smoking rates might predict, potentially suggesting the presence of in-house non-smoking practices among families of all socioeconomic and ethnic groups. Data from the 2006 Census painted a similar picture, with 48.1% of Pacific children living in a household with a smoker and exposures being intermediate between those of Māori and European children. Rates were also *significantly* higher for those in the more deprived areas.

Tobacco Use in Young People

Introduction

ASH Surveys suggest that in New Zealand during 2006, 21.4% of Pacific girls and 13.9% of Pacific boys aged 14-15 years smoked at least monthly, with 13.0% of girls and 8.5% of boys smoking on a daily basis. Other factors associated with higher smoking rates nationally included gender (female > male), relative socioeconomic deprivation (school decile: least affluent > more affluent), parental smoking (both parents > one parent > neither parent)[151], pocket money (larger amounts > smaller amounts) [152] and peer smoking behaviour [153].

The disparities highlighted by this survey are a cause of concern, as the Christchurch Longitudinal Study has shown that amongst adolescents, the transition from non-smoking to smoking is largely a one way process that accelerates with age and that once teenagers graduate to a given smoking status, return to earlier stages is uncommon [154]. These findings are also supported by overseas research, which suggests that 33-50% of young people who try smoking (even a few cigarettes), become regular smokers, with the transition taking on average 2-3 years. Once smoking regularly, the well documented signs of nicotine dependence and withdrawal become as evident amongst adolescents, as they do in the adult population [155]. As a consequence, adolescent smoking is one of the key predictors of adult smoking behaviour, with ¾ of adult smokers trying their first cigarettes and becoming daily smokers before the age of 18 years. Early onset smoking in turn, has been associated with an increased risk of heavy smoking and smoking related diseases[155], including coronary heart disease, stroke, lung cancer and chronic obstructive lung disease and in the context of passive smoking, childhood respiratory disease, fetal growth restriction and SIDS [141]. Thus any initiatives which reduce the uptake of smoking amongst Pacific adolescents will likely have far reaching effects, not only for the current generation of Pacific young people as they reach adulthood, but also for the next generation of Pacific children who, as a result of their parent's smoking, are likely to be exposed to cigarette smoke in utero and during their early years.

The following section reviews information on smoking behaviour amongst Pacific young people in New Zealand using data from the annual ASH Year 10 Surveys, which collect information on the smoking behaviour of >30,000 14-15 year old secondary school students each year, as well as the Census (1996 and 2006), which collects information on the number of young people aged >15 years who smoke on a regular basis.

Data Source and Methods

Definition

1. Proportion of Year 10 Students who are Daily Smokers
2. Proportion of Young People 15-24 years who are Regular Smokers

Data Source and Interpretation

1. *Proportion of Year 10 Students who are Daily Smokers*

ASH Surveys

Numerator: Number of Year 10 Students who are regular smokers (ASH Year 10 Survey)

Denominator: Number of Year 10 Students surveyed (ASH Year 10 Survey)

Interpretation: Action on Smoking and Health (ASH) was established in 1982 with the aim of reducing smoking and smoking related premature deaths. While the Ministry of Health provides funding for the annual national Year 10 Smoking Survey, ASH manages the data collection and oversees its analysis [145]. Since 1999, ASH has conducted surveys of smoking behaviour in Year 10 (14-15 yrs) students, collecting information from >30,000 students annually. In 2000 and 2001, >70% of schools in New Zealand participated, and of these 70% of enrolled students took part [144]. Questionnaires are self administered and cover demographic variables as well as smoking related issues.

Survey forms with instructions are mailed to all secondary schools and teachers supervise the students' completion of the questionnaires. It has been suggested that such a design means it is not always clear how the sample has been selected and how consistently the survey has been administered, however, the large sample size and annual frequency makes the survey useful for monitoring smoking behaviour of Year 10 students in New Zealand, and a useful tool for understanding trends and risk factors for smoking initiation [149].

Ethnicity Classification Used: In ASH Surveys, students may choose more than one ethnic group, with a prioritisation algorithm being used to assign students with multiple responses to a single ethnicity as follows: Māori > Pacific > Asian > European > Other [150].

2. Proportion of Young People 15-24 years who are Regular Smokers

Census

Numerator: The number of young people aged 15-24 yrs who answered yes to the Census question "Do you smoke cigarettes regularly (that is one or more per day)?"

Denominator: The number of young people 15-24 years at the Census

Interpretation: Census data categorises those >15 years into two groups: smokers and non smokers, with missing responses being assigned to the non-smoking category. Thus Census data may underestimate the proportion of smokers, as the number with missing information is unspecified. In addition, because at the time of writing the NZDep2006 Index had not been released, 2006 Census meshblocks have been back mapped to their NZDep scores at the 2001 Census, with new meshblocks taking on the NZDep2001 score of the largest of the meshblocks from which they were derived. Differences in the way in which ethnicity questions were structured between the two Censuses also mean that information on ethnicity between 1996 and 2006 may not be strictly comparable. These issues must be borne in mind when interpreting the figures in the section which follows.

Indicator Category Ideal B

Statistical Significance Testing

ASH Survey Data: Where the results of statistical significance testing were available in published reports, these have been indicated in the text (i.e. the terms *significant* or *not significant* have been used to communicate the significance of the observed associations). **Census Data:** 95% confidence intervals have been provided for rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus unless specifically indicated, the associations described do not imply statistical significance or non-significance.

ASH Survey Data

New Zealand Trends

In New Zealand during 1999-2006, the proportion of Year 10 students who were self reported daily smokers *declined significantly*, from 15.6% in 1999 to 8.2% in 2006. Similarly, the proportion who had never smoked *increased significantly*, from 31.6% in 1999 to 53.8% in 2006 (**Figure 71**).

Gender and Ethnicity

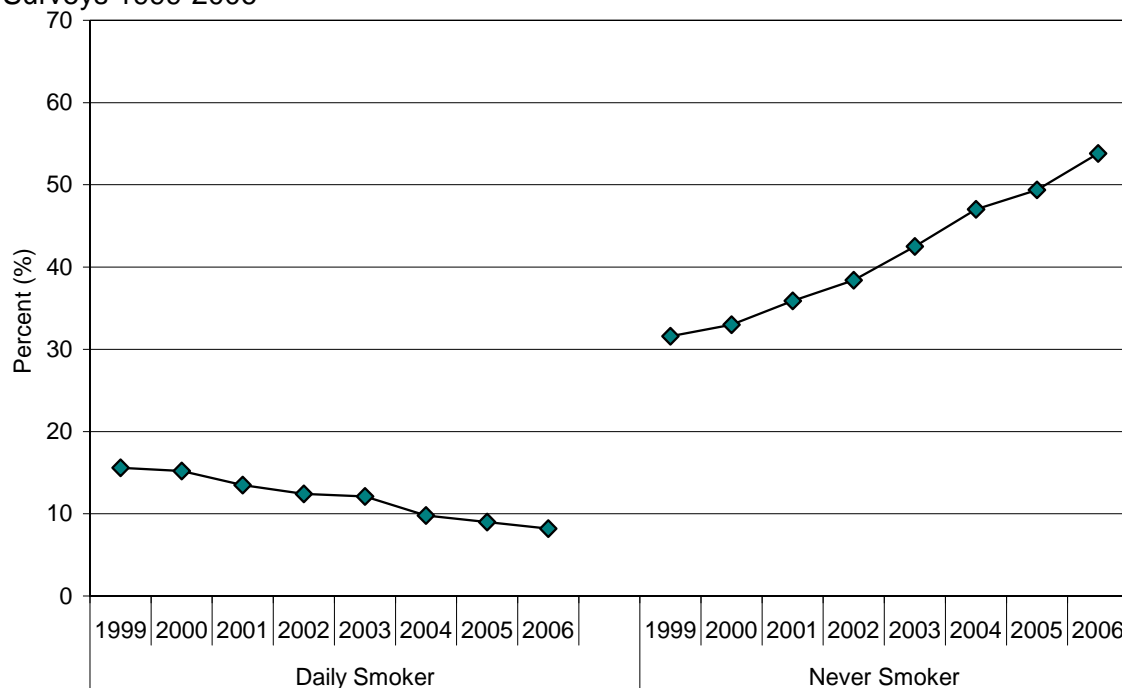
During 1999-2006, daily smoking rates for Pacific students *declined significantly*, with rates for girls falling from 23.0% in 1999 to 13.0% in 2006 (-44%) and rates for boys falling from 16.6% in 1999 to 8.5% in 2006 (-46%). While rates for other ethnic groups also *declined significantly* (Māori female -29%; Māori Male -38%; Asian female -66%; Asian male -54%; European / Other female -51%; European / Other male -66%) smoking rates for Pacific students remained intermediate between those of Māori and European students. In addition, while daily smoking rates for Pacific and Māori students were higher for females, daily smoking rates for Asian students were higher for males (**Figure 72**). Once broken down by Pacific ethnic group and gender, daily smoking rates during 2004-2006 were highest for Cook Island (23.8%) > Tongan (13.8%) > Niue and Samoan (10.9% and 10.6%) > Other Pacific (8.5%) girls. In contrast, daily smoking rates were higher for Niue (15.8%) > Cook Island (13.8%) > Tongan (11.4%) > Samoan (8.3%) > Other Pacific (6.2%) boys (**Figure 73**).

Socioeconomic Status

During 1999-2006, there were also socioeconomic differences in daily smoking rates in Year 10 students, with rates being highest for those attending schools in the least affluent areas. While gender differences were again evident, these diminished as the

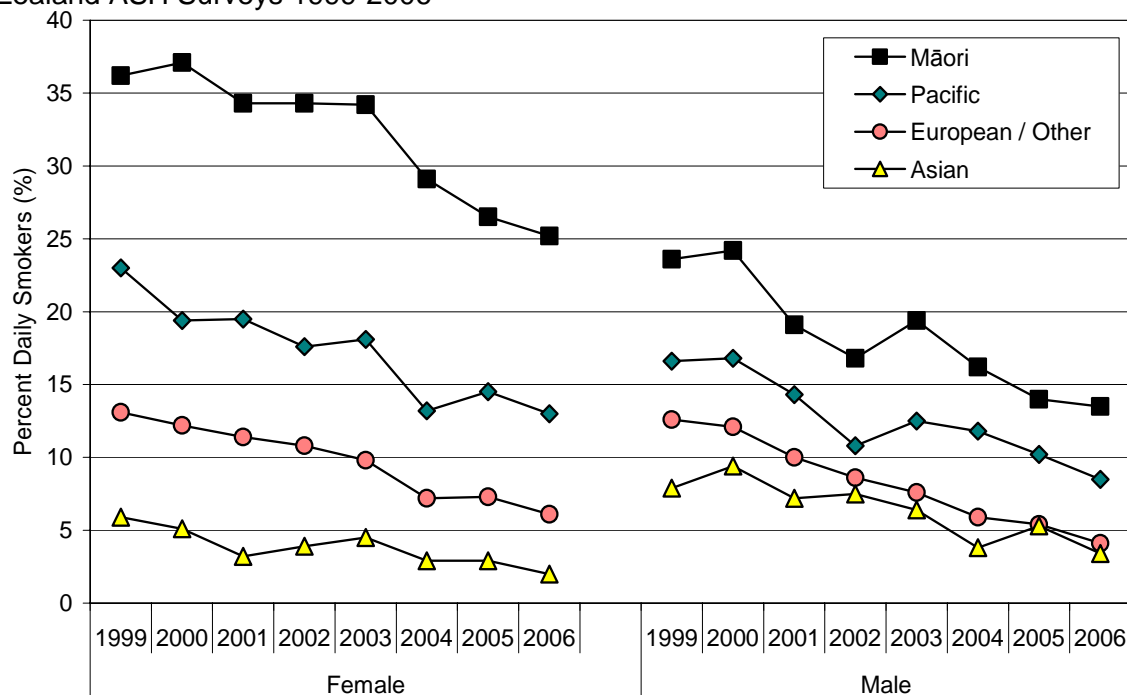
level of affluence increased, with the marked female predominance evident in schools in the least affluent areas virtually disappearing in the most affluent schools (**Figure 74**). Daily smoking rates *declined significantly* for all school socioeconomic deciles, although once adjusted for ethnicity, declines were greatest for the most affluent schools (Decile 1-2 (least affluent) females -22%, males -26%; Decile 5-6 (average) females -36%, males -58%; Decile 9-10 (most affluent) females -62%, males -69%).

Figure 71. Daily vs. Never Smoking Rates in Year 10 Students, New Zealand ASH Surveys 1999-2006



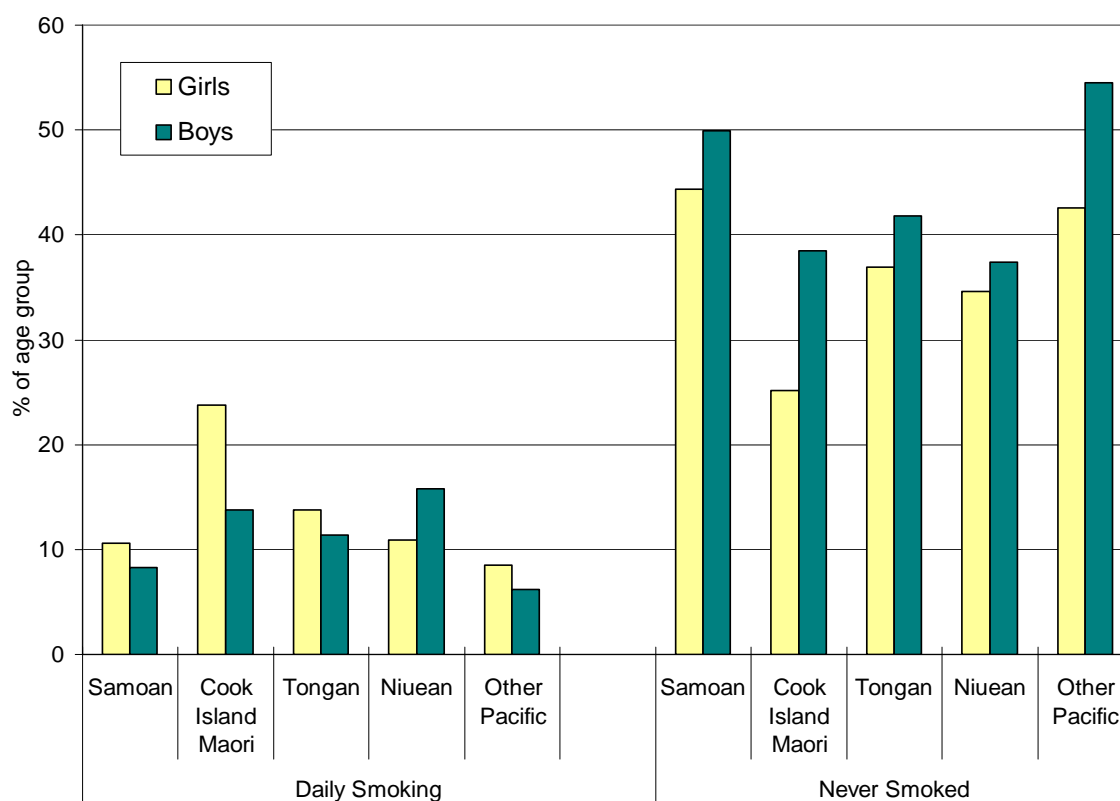
Source: NZ ASH Surveys

Figure 72. Daily Smoking Rates in Year 10 Students by Gender and Ethnicity, New Zealand ASH Surveys 1999-2006



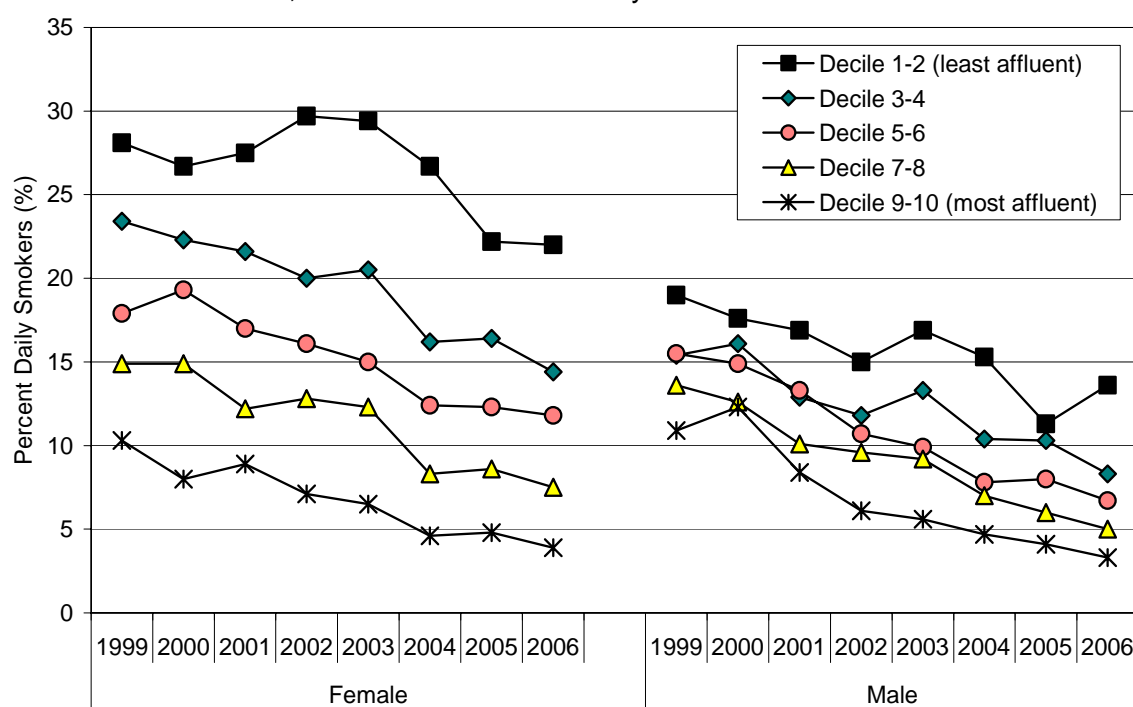
Source: NZ ASH Surveys; Ethnicity is Prioritised (see Methods Section for details)

Figure 73. Daily vs. Never Smoking Rates in Year 10 Pacific Students by Ethnic Group, NZ ASH Surveys 2004-2006 Combined



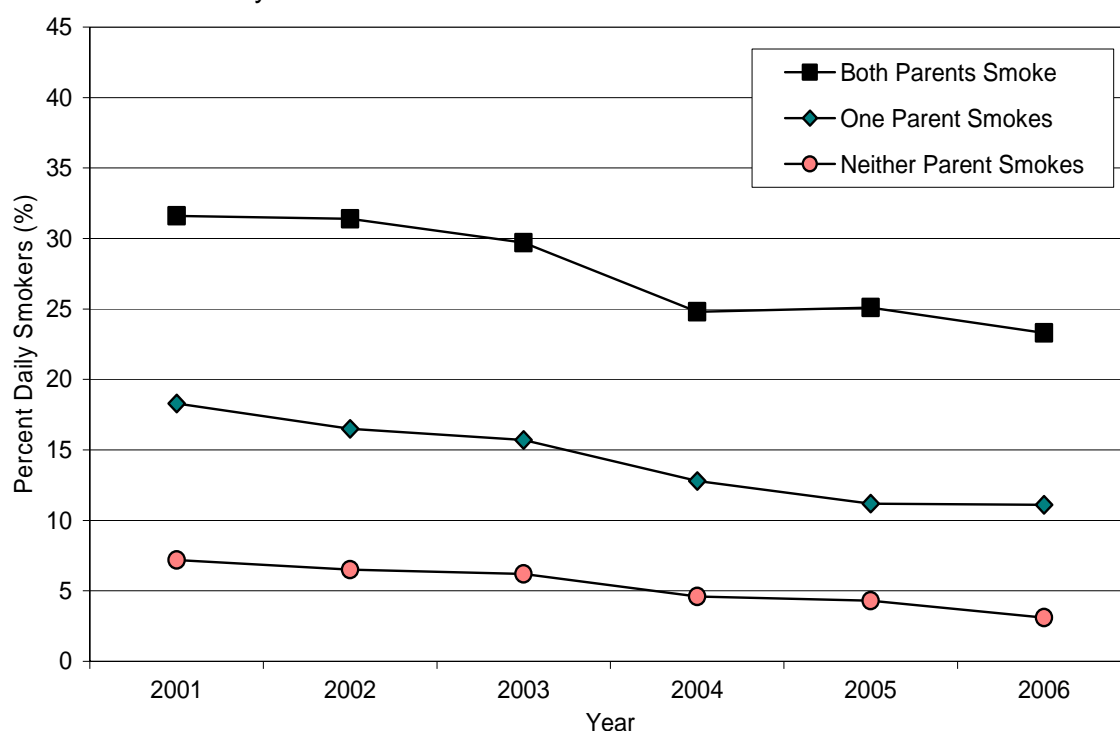
Source: NZ ASH Surveys

Figure 74. Daily Smoking Rates in Year 10 Students by Gender and School Socioeconomic Decile, New Zealand ASH Surveys 1999-2006



Source: NZ ASH Surveys

Figure 75. Daily Smoking Rates in Year 10 Students by Parents Smoking Status, New Zealand ASH Surveys 2001-2006



Source: NZ ASH Surveys

Parental Smoking

During 2001-2006, daily smoking rates were highest for students for whom both parents smoked > one parent smoked > neither parent smoked (**Figure 75**). While daily smoking rates *declined significantly* for all 3 groups, once relative changes had been adjusted for age, sex and ethnicity, smoking rates declined more slowly for those with two smoking parents (both parents -27%; one parent -40%; neither parent -55%).

1996 and 2006 Censuses

At both the 1996 and 2006 Censuses respondents aged ≥ 15 years were asked, “Do you smoke cigarettes regularly (that is one or more per day)?” The figures in this section refer to the young people (15-24 years) who answered yes to this question.

Ethnic Differences

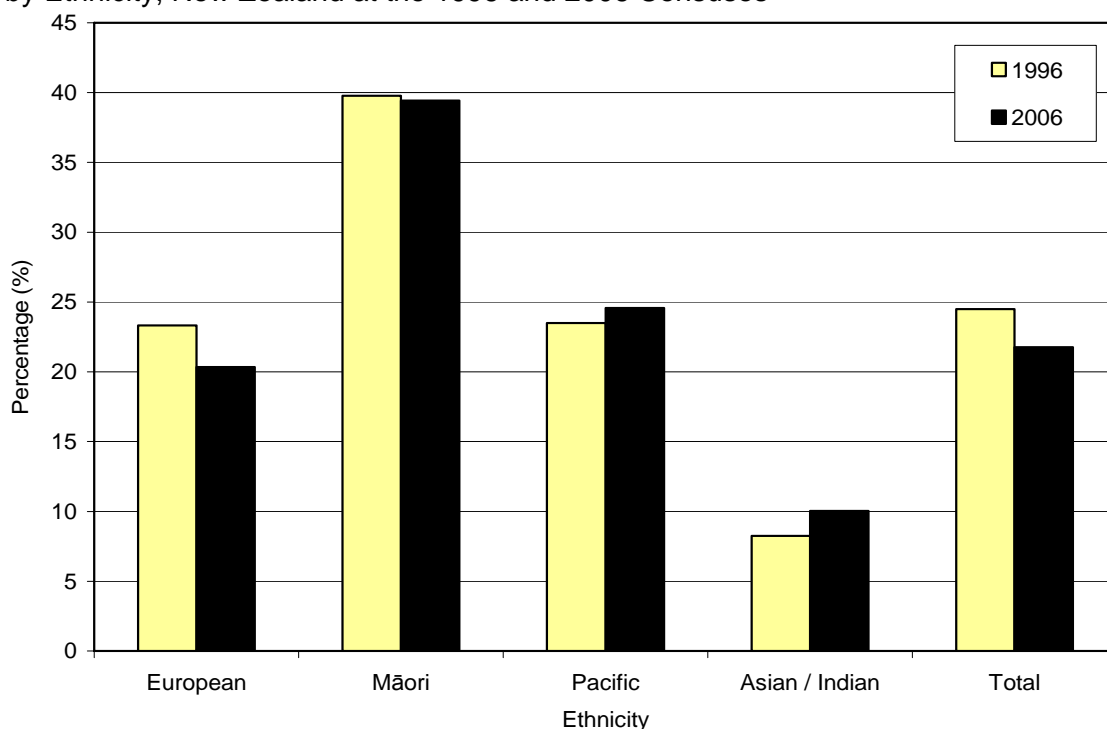
In New Zealand during 1996, 23.5% of Pacific young people (15-24 yrs) reported smoking cigarettes regularly, as compared to 24.5% of young people nationally. During this period, smoking rates for Pacific young people were intermediate between those of Māori (39.8%) and European (23.3%) young people. By 2006, 24.6% of Pacific young people smoked regularly, as compared to 21.8% nationally, with smoking rates being *significantly lower* than for Māori (39.4%) young people, but *significantly higher* than for European (20.3%) young people (**Figure 76, Table 27**). Care must be taken when interpreting ethnic differences in smoking rates between Censuses however, as the questions relating to ethnicity differed slightly in these two periods.

Socioeconomic Differences

During 1996 there were also marked socioeconomic differences in the proportion of young people who were regular smokers, with rates rising progressively from 14.9% amongst those living in the most affluent (Decile 1) areas, to 33.8% amongst those living in the most deprived (Decile 10) areas. By 2006, while smoking rates had declined for all socioeconomic groups, *significant differences* remained, with rates

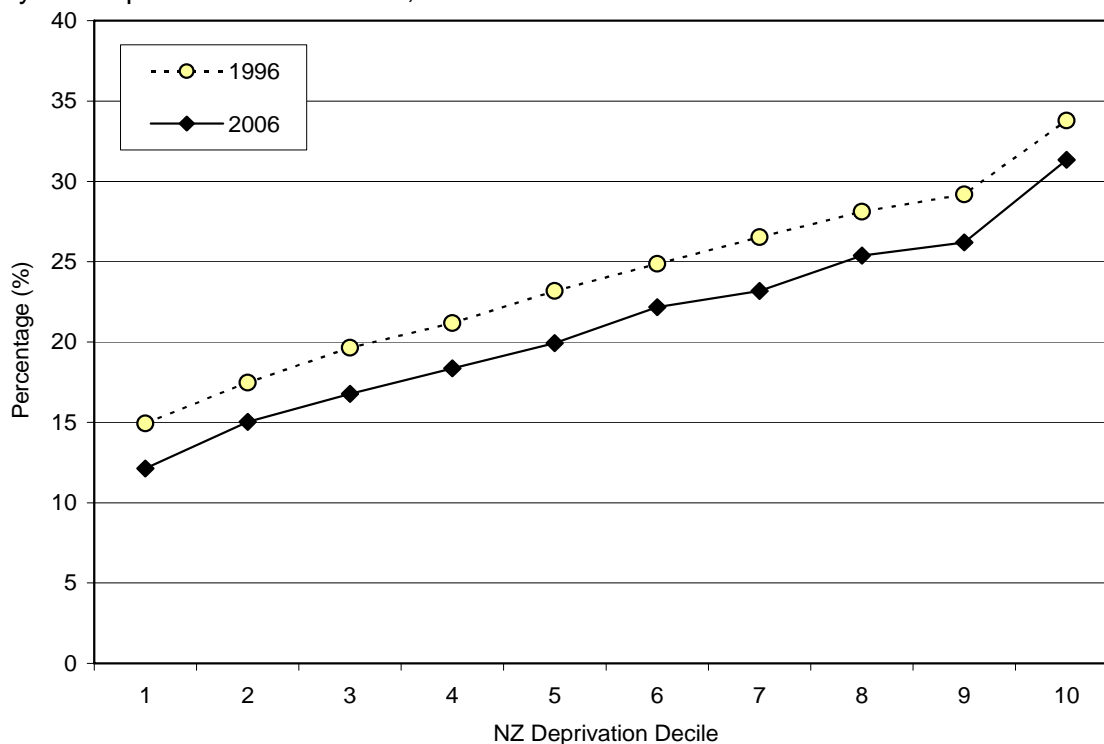
increasing from 12.1% amongst those living in the most affluent areas, to 31.3% amongst those in the most deprived areas (**Figure 77, Table 27**).

Figure 76. Proportion of Young People Aged 15-24 Years who were Regular Smokers by Ethnicity, New Zealand at the 1996 and 2006 Censuses



Source: Statistics New Zealand Ethnicity is Level 1 Prioritised

Figure 77. Proportion of Young People Aged 15-24 Years who were Regular Smokers by NZ Deprivation Index Decile, New Zealand at the 1996 and 2006 Censuses



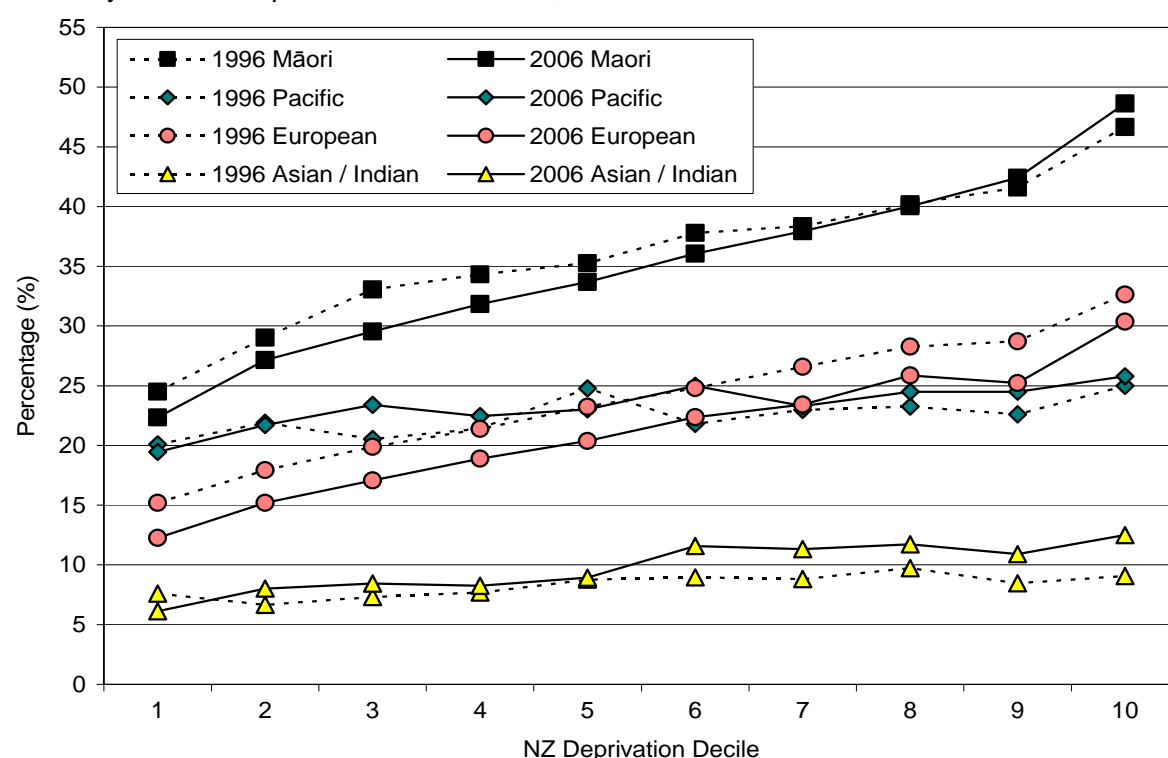
Source: Statistics New Zealand

Table 27. Proportion of Young People Aged 15-24 Years Who Were Regular Smokers by Ethnicity and NZ Deprivation Index Decile, New Zealand at the 2006 Census

Variable	Percent	RR	95% CI	Variable	Percent	RR	95% CI
NZ Deprivation Index Decile				Prioritised Ethnicity			
1	12.12	1.00		Māori	39.43	1.94	1.92-1.96
2	15.02	1.24	1.20-1.28	Pacific	24.58	1.21	1.19-1.23
3	16.76	1.38	1.34-1.42	European	20.35	1.00	
4	18.35	1.51	1.46-1.56	Asian/Indian	10.03	0.49	0.48-0.50
5	19.93	1.64	1.59-1.69				
6	22.16	1.83	1.78-1.88				
7	23.18	1.91	1.86-1.96				
8	25.38	2.09	2.03-2.15				
9	26.21	2.16	2.10-2.22				
10	31.33	2.58	2.51-2.65				

Source: Statistics New Zealand; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Figure 78. Proportion of Young People Aged 15-24 yrs who were Regular Smokers by Ethnicity and NZ Deprivation Index Decile, New Zealand at the 1996 & 2006 Censuses



Source: Statistics New Zealand; Ethnicity is Level 1 Prioritised

Relationship between Socioeconomic Status and Ethnicity

At both the 1996 and 2006 Censuses, while the proportion of young people who were smokers increased with increasing socioeconomic deprivation for each of New Zealand's ethnic groups, at nearly every level of deprivation, smoking rates remained higher for Māori > Pacific and European > Asian / Indian young people. For Pacific young people during 2006, the gradient was relatively modest however, with smoking

rates rising from 19.5% for those in the most affluent (Decile 1) areas, to 25.8% for those in the most deprived (decile 10) areas (**Figure 78**).

Summary

In New Zealand during 1999-2006, Action for Smoking and Health (ASH) Surveys suggest that daily smoking rates for Pacific students declined, with rates for girls falling by 44% and rates for boys falling by 46%. While smoking rates for other ethnic groups also declined, rates for Pacific students remained intermediate between those of Māori and European students. Once broken down by Pacific ethnic group and gender, daily smoking rates during 2004-2006 were highest for Cook Island > Tongan > Niue and Samoan > Other Pacific girls. In contrast, daily smoking rates were highest for Niue > Cook Island > Tongan > Samoan > Other Pacific boys. Data from the 2006 Census suggested that 24.6% of Pacific young people aged 15-24 years smoked regularly, as compared to 21.8% of young people nationally, with smoking rates again being intermediate between those of Māori and European young people. Such differences are of concern, as if left unaddressed they potentially signal ongoing disparities in later adult health outcomes, as well in-utero and early childhood exposures as the current generation of Pacific young people begin their own families in future years.



Alcohol Related Harm

Introduction

The Alcohol Advisory Council (ALAC)'s annual survey estimated that in New Zealand during 2005, 80% of young people aged 12-17 years had tried alcohol, 53% were current drinkers and that 22% drank at least once a week. In addition, 44% of males and 30% of females reported binge drinking (≥ 5 drinks) on their last drinking occasion [156]. Using this information, ALAC grouped young people into 4 main categories:

1. **Non-Drinkers:** 48% of young people; usually <13 years and / or attending church.
2. **Supervised Drinkers:** 21% of young people; usually 14+ years; at school and drinking fortnightly, monthly or less; typically at home with their parents / whanau. Supervised drinkers tended to consume ≤ 2 drinks per occasion and be concerned about the short term (e.g. behaviour, hangovers) and long term (e.g. health, weight) effects of alcohol.
3. **Social Binge Drinkers:** 16% of young people. This group tended to drink regularly (\geq every two weeks) and to binge (52% drank ≥ 5 drinks on the last occasion), mainly with their friends on weekends or holidays. Social binge drinkers tended to be 16+ years of age, at school and to drink for the social benefits (e.g. comradeship, sense of belonging, confidence) and because everyone else was drinking.
4. **Uncontrolled Binge Drinkers:** 16% of young people. This group were typically male, drank \geq once a week and binge drank (54% drank ≥ 5 drinks on the last occasion). Uncontrolled binge drinkers were generally ≥ 16 years of age, less likely to be at school (approximately 1/3 were in employment) and frequently drank to enjoy the physical "buzz", or with the intention of getting drunk [156].

While these figures suggest that many New Zealand young people are either non-drinkers or drink infrequently under the supervision of their parents / whanau, the high number of binge drinkers has potential public health consequences, with the Youth 2000 Survey (a survey of 9,699 secondary school students [157]), noting that of those who had ever drunk alcohol:

1. 28% had got into trouble
2. 26% done something they would not normally do (e.g. breaking rules / law)
3. 14% had got into a fight
4. 13% had had an injury or accident
5. 12% had had sex while drunk and later regretted it
6. 27% had ridden in a car driven by someone potentially drunk in the last month
7. 8% had driven a car while potentially drunk in the last month

Such adverse outcomes are of particular relevance in the context of the recent debate on the minimum age for purchasing alcohol in New Zealand, which in 1999 was lowered from 20 to 18 years. Since that time a number of studies have suggested possible negative health consequences in the areas of emergency department attendances and hospital admissions for injuries, traffic crashes and intoxication [158] [159] [160]. But while initiatives aimed at reducing the availability of alcohol to under-age young people are seen as one way of reducing the burden of alcohol related harm [157], the 2001 National Alcohol Strategy suggests that such supply based strategies are most effective when adopted in conjunction with demand reduction strategies (e.g. education, labelling, advertising) and problem limitation initiatives (e.g. host responsibility in licensed premises and private venues) [161].

The following section explores the potential impact of alcohol on (non-emergency department) hospital admissions amongst Pacific young people 15-24 years. In this

context, alcohol is often seen as a contributory cause to a range of hospital admissions (e.g. in an alcohol related traffic crash, alcohol will only be listed after the primary diagnosis (e.g. fractured femur) and external causes (e.g. vehicle occupant in transport accident) have been recorded). As a consequence, the following section includes all (non-emergency department) admissions in which alcohol was listed in the first 15 diagnoses, or the first 10 external causes (injury admissions) of the National Minimum Dataset. While it is likely that such an approach will be subject to significant undercounting, as it relies on the thoroughness of hospital staff in documenting all relevant contributory causes (see Methods Section for estimate of undercount), it is nevertheless hoped that such an approach will serve to identify “the tip of the iceberg” in terms of the contribution alcohol use makes to hospital admissions in this age group.

Data Source and Methods

Definition

Hospital Admissions in Young People 15-24 Years Where Alcohol Was Mentioned in the First 15 Diagnostic Codes, or the First 10 External Cause Codes in the Case of an Injury

Data Source

Numerator: National Minimum Dataset: Alcohol related hospital admissions included those with any mention of an alcohol related condition in the first 15 diagnostic codes, or the first 10 external cause codes (ICD-10 F10 Mental and Behavioural Disorders Due to Alcohol; T51 Toxic Effects of Alcohol; ICD-10 E codes X45 Accidental Poisoning by and Exposure to Alcohol; X65 Intentional Self Poisoning by and Exposure to Alcohol; Y15 Poisoning by and Exposure to Alcohol of Undetermined Intent; Y90-91 Evidence of Alcohol Involvement Determined by Blood Alcohol Level or Level of Intoxication.

Denominator: Census

Indicator Category Bookmark C

Notes on Interpretation

All cross sectional analyses were undertaken using ICD-10 coding. Time series and regional analysis have not been provided for this indicator, as inconsistencies in the way in which contributory diagnoses (e.g. alcohol use) are recorded may have influenced temporal and regional variations in this indicator.

Extent of Undercounting: A 2000 study of the role alcohol played in injury attendances at an Auckland emergency department noted 35% of injured patients had consumed alcohol prior to their injury, a figure considerably higher than the usual 10-18% reported overseas [162]. An analysis of New Zealand emergency department cases for the period 2000-05 using the methodology described above (age 15-24 yrs in the NMDS), found that 10.3% of injury cases had a mention of alcohol, while only 4.5% of injury cases admitted beyond the emergency department setting (the group reviewed in this section) had alcohol as a listed cause. As a result, the figures contained in this section are likely to underestimate the burden of alcohol related morbidity amongst the youth population and when interpreting the data contained in this section, this must be borne in mind.

Statistical Significance Testing

95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

New Zealand Distribution

Age

In New Zealand during 2002-2006, alcohol related hospital admissions were relatively infrequent in children, but rose rapidly amongst those in their early teens, reaching a plateau in the late teens / early 20s (**Figure 79**).

Nature of Alcohol Related Admissions

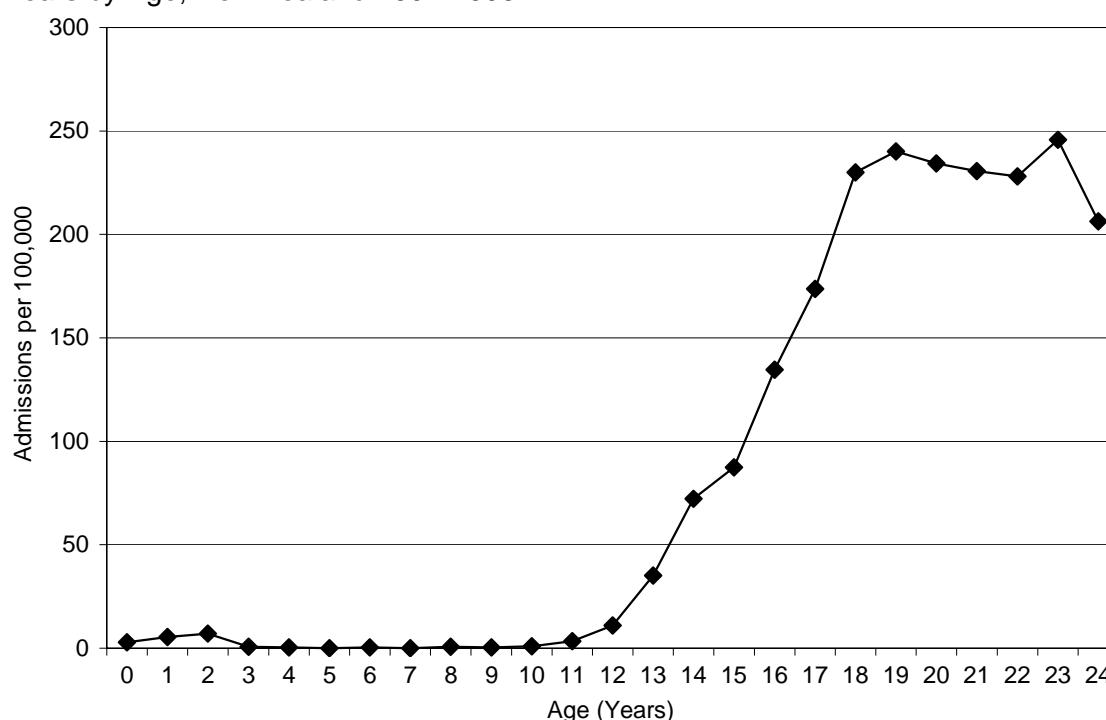
Alcohol was listed as a contributory cause in a large number of the hospital admissions for young people during 2002-2006. Analysis of the primary diagnosis for each of these admissions suggested that only 11.2% had acute intoxication or poisoning by alcohol listed as the primary diagnosis. In 34.7% of cases an injury was the primary diagnosis, with head injuries and injuries of the upper limbs playing a particularly prominent role. In addition, a further 28.3% of admissions had a mental health condition listed as the

primary diagnosis, with schizophrenia making up the single largest diagnostic category in this group. Finally 10.9% of admissions had poisoning by other drugs or substances listed as their primary reason for admission (**Table 28**). In interpreting these figures however, it must be remembered that as a result of inconsistent uploading of emergency department cases to the National Minimum Dataset emergency department cases have been removed (**Appendix 1**). These figures thus potentially reflect the more severe end of spectrum, as it is likely that many cases of intoxication or minor alcohol related injuries are dealt with and discharged in the emergency department setting. In addition, it is likely that these figures represent an undercount, as they rely on hospital staff at the time of discharge listing alcohol use as a contributory cause, something which may be reported inconsistently over time and across the country.

Injury Admissions with Alcohol as a Contributory Cause

An analysis of those who were admitted with a primary diagnosis of injury and alcohol use listed as a contributory cause found that 21.0% of these injuries were associated with episodes of intentional self harm, 19.0% were sustained as a result of an assault and a further 13.8% were sustained while the young person was the occupant of a vehicle. Of note, a large proportion of vehicle accidents were not with other vehicles, but arose as a result of the car crashing into a stationary object, or in a non-collision situation (e.g. vehicle overturning). Finally 13.6% of injuries resulted from a fall and a further 11.4% from contact with sharp glass (**Table 29**).

Figure 79. Alcohol Related Hospital Admissions in Children and Young People 0-24 Years by Age, New Zealand 2002-2006



Source: Numerator - National Minimum Dataset; Denominator - Census; Admissions with any mention of alcohol in first 15 diagnostic codes or first 10 external cause codes; Emergency Department discharges removed

Table 28. Alcohol Related Hospital Admissions in Young People Aged 15-24 Years by Primary Diagnosis, New Zealand 2002-2006

ICD-10	Condition	Number 2002-06	Rate per 100,000	% of Total
Mental and Behavioural Disorder Codes				
F100	Alcohol Intoxication	486	17.8	9.0
F102	Alcohol Dependence	130	4.8	2.4
F101 F103-F109	Other Mental/Behavioural Disorder due to Alcohol	99	3.6	1.8
F20	Schizophrenia	510	18.7	9.4
F21-F29	Other Schizotypal and Delusional Disorders	246	9.0	4.5
F31	Bipolar Affective Disorder	128	4.7	2.4
F32-F33	Depression/Recurrent Depressive Disorder	190	7.0	3.5
F43	Reaction to Stress/Adjustment Disorders	142	5.2	2.6
F00-F99*	Other Mental and Behavioural Disorders	317	11.6	5.9
Digestive System Codes				
K226 K292 K920	Upper Gastrointestinal Bleeding/Gastritis	97	3.6	1.8
K00-K99*	Other Gastrointestinal Conditions	77	2.8	1.4
Injury and Poisoning Codes				
T51	Toxic Effect of Alcohol	120	4.4	2.2
T36-50	Poisoning*	589	21.6	10.9
S00-S09	Head Injuries	838	30.8	15.5
S42 S52 S62	Upper Limb Fractures	105	3.9	1.9
S50-51 S53-59	Other Elbow and Forearm Injuries	171	6.3	3.2
S60-61 S63-69	Other Wrist and Hand Injuries	257	9.4	4.7
S72 S82 S92	Lower Limb Fractures	156	5.7	2.9
S10-T79*	Other Injuries	351	12.9	6.5
All Other Diagnostic Codes				
Other	Other Conditions	404	14.8	7.5
Total		5413	198.7	100.0

Source: Numerator - National Minimum Dataset; Denominator - Census; Admissions with any mention of alcohol in first 15 diagnostic codes or first 10 external cause codes; Emergency Department discharges removed; Poisoning includes drugs, medicines, biological substances.

Table 29. Primary Cause of Alcohol Related Hospital Admissions Resulting in Injury in Young People 15-24 Years by Cause of Injury, New Zealand 2002-2006

Cause of Injury	Number 2002-2006	Rate per 100,000	% of Total
Pedestrian or Cyclist in Transport Accident	94	3.5	3.5
Vehicle Occupant: Collision with Stationery Object	184	6.8	6.9
Vehicle Occupant: Non-Collision e.g. Overturning	128	4.7	4.8
Vehicle Occupant: Other Transport Accident	57	2.1	2.1
Other Land Transport Accident	64	2.3	2.4
Falls	360	13.2	13.6
Contact with Sharp Glass	303	11.1	11.4
Accidental Poisoning	164	6.0	6.2
Intentional Self Harm	558	20.5	21.0
Assault by Bodily Force	288	10.6	10.9
Other Assault	214	7.9	8.1
Other Causes	238	8.7	9.0
Total	2,652	97.4	100.0

Source: Numerator - National Minimum Dataset; Denominator - Census; Admissions with any mention of alcohol in the 2nd- 15th diagnostic codes or 1st-10th external cause codes and with an injury as a primary diagnosis; Emergency Department discharges removed.

Table 30. Risk of Alcohol Related Hospital Admission in Young People Aged 15-24 Years by Ethnicity and NZ Deprivation Index Decile, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	86.26	1.00		1-2	99.75	1.00	
2	112.82	1.31	1.09-1.57	3-4	138.88	1.39	1.24-1.56
3	129.84	1.51	1.27-1.80	5-6	179.77	1.80	1.61-2.01
4	148.02	1.72	1.45-2.04	7-8	241.77	2.42	2.18-2.69
5	162.73	1.89	1.60-2.24	9-10	282.69	2.83	2.56-3.13
6	195.88	2.27	1.93-2.67	Prioritised Ethnicity			
7	238.53	2.77	2.37-3.24	Māori	383.46	2.08	1.96-2.20
8	244.83	2.84	2.43-3.32	Pacific	156.51	0.85	0.76-0.96
9	284.74	3.30	2.83-3.84	European	184.04	1.00	
10	280.58	3.25	2.79-3.79	Asian/Indian	23.20	0.13	0.10-0.16
Gender							
Female	134.31	1.00					
Male	262.33	1.95	1.84-2.06				

Source: Numerator - National Minimum Dataset; Denominator - Census; Rates are per 100,000 per year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted; Admissions with alcohol mentioned in first 15 diagnostic codes or first 10 external cause codes included; Emergency Department discharges removed.

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

In New Zealand during 2002-2006, alcohol related hospital admissions for Pacific young people were *significantly lower* than for Māori and European young people. Admissions were *significantly higher* however, for males and those in the more deprived areas (**Table 30**).

Alcohol Related Admissions Among Pacific Groups in New Zealand

During 2002-2006 (using the Sole / (Any) classification), alcohol related hospital admissions for Pacific young people were similar to those for non-Māori non-Pacific young people in each of the Sole and (Any) Groups (with the exception of (Any) and Sole Fijian and Sole Cook Island Māori young people, where rates were *significantly higher*) (**Table 31**). This was in contrast to comparisons with the European ethnic group, where rate ratios were significantly lower for (Prioritised) Pacific young people (**Table 30**). Such differences can possibly be explained however, by the much lower admission rates for Asian / Indian young people, who make up a significant minority of the non-Māori non-Pacific group.

Table 31. Distribution of Alcohol Related Hospital Admissions in Pacific Young People Aged 15-24 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Any Samoan	157	31.4	140.1	0.88	0.75-1.03
Any Tongan	56	11.2	140.9	0.89	0.68-1.16
Any Cook Island Māori	98	19.6	188.8	1.19	0.97-1.45
Any Niue	27	5.4	132.7	0.84	0.58-1.23
Any Fijian	22	4.4	263.4	1.66	1.09-2.52
Any Tokelauan	7	1.4	115.1	0.73	0.35-1.53
Any Other Pacific	13	2.6	178.3	1.12	0.65-1.93
Any Pacific	371	74.2	162.9	1.03	0.93-1.15
Any Māori	1,868	373.6	383.5	2.42	2.29-2.56
Non-Māori Non-Pacific	3,243	648.6	158.7	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Sole Samoan	93	18.6	129.4	0.82	0.67-1.01
Sole Tongan	42	8.4	159.0	1.00	0.74-1.36
Sole Cook Island Māori	61	12.2	228.8	1.44	1.12-1.85
Sole Niue	12	2.4	165.9	1.05	0.60-1.85
Sole Fijian	13	2.6	375.5	2.37	1.38-4.08
Sole Tokelauan	<5	s	s	s	s
Sole Other Pacific	9	1.8	249.8	1.57	0.82-3.02
Sole Pacific	238	47.6	167.7	1.06	0.93-1.21
Sole Māori	1,583	316.6	644.6	4.06	3.83-4.31
Non-Māori Non-Pacific	3,243	648.6	158.7	1.00	

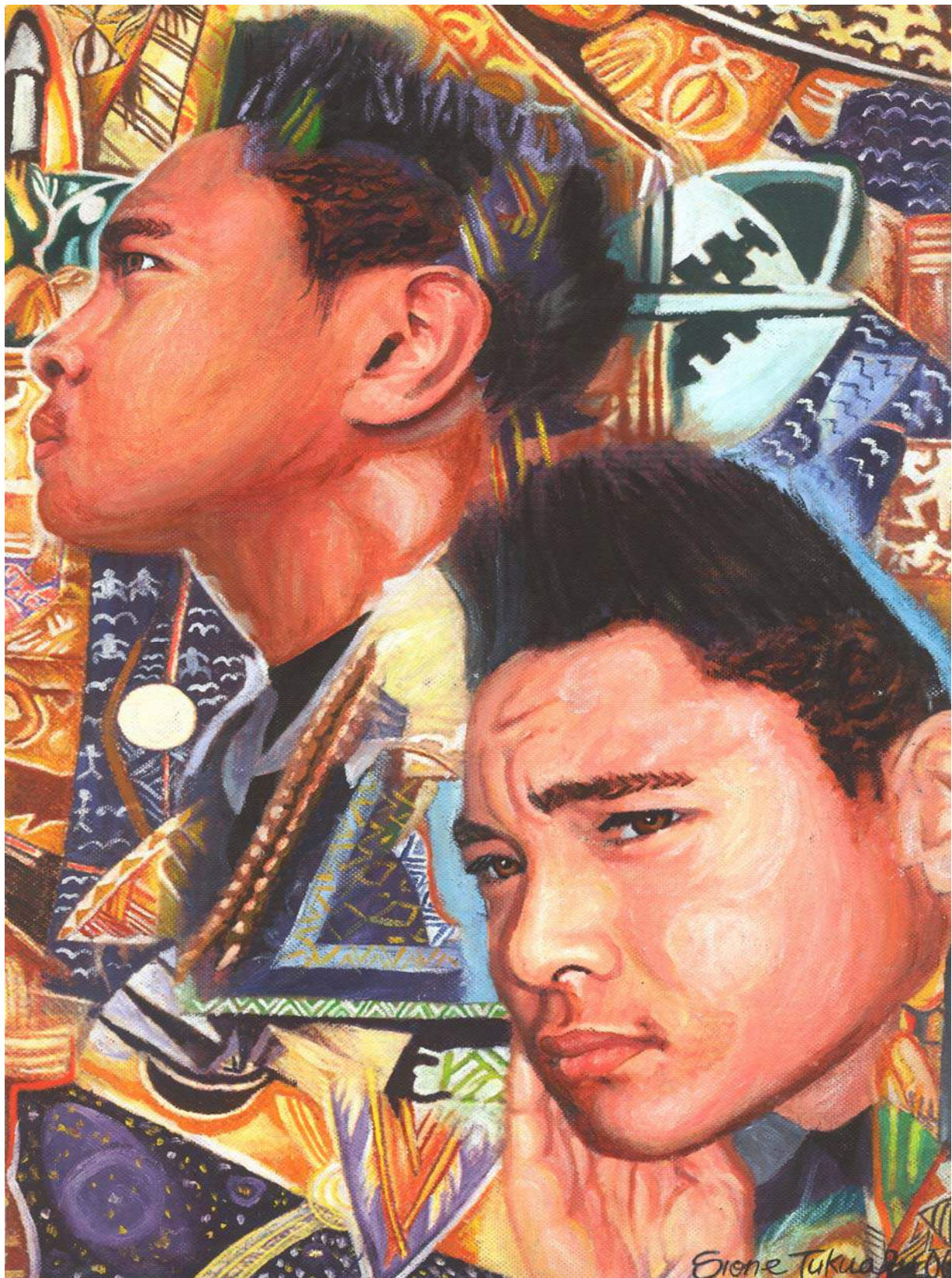
Source: Numerator - National Minimum Dataset; Denominator - Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate Ratios are compared to the non-Māori non-Pacific group and are unadjusted; s: Rate not calculated due to small numbers.

Summary

In New Zealand during 2002-2006 (using prioritised ethnicity), alcohol related hospital admissions for Pacific young people were *significantly lower* than for Māori and European young people. Admissions were *significantly higher* however, for males and those in the more deprived areas. During the same period (using the Sole / (Any) classification), alcohol related hospital admissions for Pacific young people were similar to those for non-Māori non-Pacific young people in each of the Sole and (Any) Groups (with the exception of (Any) and Sole Fijian and Sole Cook Island Māori young people, where rates were *significantly higher*). Significant methodological constraints however must be taken into consideration when interpreting this data, as with the removal of emergency department cases, these figures reflect the more severe end of spectrum. In addition, it is likely these figures represent an undercount, as they rely on hospital staff at the time of discharge listing alcohol as a contributory cause, something which may occur inconsistently over time or across the country. Nevertheless it is hoped that these figures can act as a starting point when considering the extent of alcohol related harm amongst Pacific young people in recent years.



Individual and Whanau Health and Wellbeing



Self Portrait by Sione Tukuafu
"Celebrating myself and my culture.... I have used symbols to visualise people uniting in place and time, with some natural elements... the birds and fish".

Viewpoint: Illness and Hospitalization in New Zealand Pacific Children

by Teuila Percival

Nothing matters more to Pacific people than the health, well-being and future success of our children. Our community's future is inextricably linked to their health and success. Child health in New Zealand over the last few decades has shown much improvement. We have seen a reduction in total infant mortality rate and a marked reduction in SIDS, the commonest post-neonatal cause of death in New Zealand infants [1]. Overall admission rates for asthma have declined. Both quality of life and survival for very premature and low birth weight infants have improved.

However New Zealand's rates of acute and chronic respiratory diseases and serious infections have either remained static or are increasing. Supposedly preventable diseases such as cellulitis are showing a persisting and alarming increase over the past decade. Common to all these conditions is an ethnic and socio-economic disparity in hospitalization rates. Indeed as we can see from the sections on infectious and respiratory disease in this Report, the burden for Pacific children is much higher than that of all other New Zealand children.

Traditionally we focus on common and serious conditions resulting in child hospitalisation. We see that Pacific children have the highest rates of admission for infectious diseases such as cellulitis, rheumatic fever and gastroenteritis. Similarly prior to the success of the Meningococcal B vaccine campaign, Pacific children had the highest rates of meningococcal disease. The acute infectious respiratory diseases, bronchiolitis and pneumonia are some of the most frequent causes of hospital admission for Pacific children outside the neonatal period. The rate of bronchiolitis admissions is nearly four and a half times that of NZ European and one and a half times that of Māori children. Similarly with pneumonia, admission rates are highest in Pacific children followed by Māori. The sequelae of severe and repeated lower respiratory disease may be the development of bronchiectasis, a chronic suppurative lung condition, resulting in ongoing morbidity and disability. This disease, as with acute respiratory diseases, shows marked ethnic and socio-economic disparity, with the rates being highest in Pacific children: almost three times that of Māori and over ten times that of European children.

Diseases such as pneumonia and bronchiolitis have traditionally been termed ambulatory sensitive hospitalisations (ASH), the assumption being that timely and effective primary healthcare will result in a reduction in admission rates. For Pacific children we have for years now seen very high rates of such conditions. The ethnic and socioeconomic disparities seen have resulted in single disease orientated health programmes in primary or secondary care to reduce such high rates. The premise being that the disparities reflect ethnic and socioeconomic inequalities in access to healthcare, with the solution seemingly in health service delivery. Increasingly this limited approach has been challenged. The disparate ethnic and socio-economic gradients seen may reflect gradients in health status and underlying determinants and not necessarily in health care [163], [164].

Certainly access to effective healthcare remains a significant factor for Pacific children. Our children, along with Māori, present to hospital with more severe disease than other New Zealand children [165] implying delay in presentation or difficulty with access. In Primary Care, as with adults, we find reduced access and quality of care for Pacific and Māori children despite more severe disease. As important as healthcare is however, it does not influence child health status as strongly as socioeconomic status and ethnicity. The socio-economic status of Pacific



children is well documented in other publication [74]. Our children, more than any other group live in the most deprived neighbourhoods, with lower household income, high rates of unemployment and benefit dependence. Over half of Pacific children live in the most deprived (NZDep decile 9 and 10) areas [74]. Housing is also an important determinant of Pacific children's health. The relationship between substandard and overcrowded housing and children's health is well documented for respiratory and other infectious diseases. Pacific children, more than any other group are likely to live in overcrowded homes.

An often cited and sentinel article by Mosley and Chen [2] provides a framework combining the social science research of socioeconomic and cultural determinants with medical research focusing on specific diseases, with the shared outcome being morbidity. This Report also draws on this important framework. Social, economic and cultural variables operate through a set of proximate determinants directly influencing the risk of disease and its associated morbidities. This framework provides us with multiple levels of intervention with which to improve the health of Pacific children. From legislation and government policy influencing proximal determinants such as Pacific family's household income, to health service funding focused on improving efficacy of primary care for Pacific children. Given the considerable and widespread burden of disease for Pacific children, interventions at all levels will be needed. Most importantly however, we do need to acknowledge that the solutions likely to have most influence may lie outside our health sector and that these will require some considerable sustained advocacy by clinicians and the Pacific community.



Individual and
Whanau Health
and Wellbeing

Total Morbidity
and Mortality

Most Frequent Causes of Hospital Admissions and Mortality

Introduction

Before considering any of the more detailed analyses of child and youth health outcomes which follow, it is worthwhile briefly reviewing the most frequent causes of hospital admission and mortality amongst New Zealand's Pacific children and young people during the past five years. It is hoped that the brief summary tables presented below will provide the reader with an overall context, within which to consider the relative importance of the various issues facing New Zealand's Pacific children and young people.

Data Source and Methods

Definition

1. Mortality in Children and Young People: Mortality in Infants (29-364 Days), Children 1-14 Years and Young People 15-24 Years by most frequent cause
2. Hospital Admissions in Children and Young People: Hospital Admissions in Children 0-14 Years and Young People 15-24 Years by most frequent cause

Data Sources and Interpretation

1. Mortality in Children and Young People

Numerator: National Mortality Collection: Deaths in Infants (post-neonatal 29-364 days), Children 1-14 years and Young People 15-24 years, by cause.

Denominator: Census: Number of children and young people

2. Hospital Admissions in Children and Young People

Numerator: National Minimum Dataset: Hospital admissions for children after the neonatal period (29 days -14 years) and for young people 15-24 years, by primary diagnosis. For acute and arranged admissions, the reason for the admission was derived from the primary diagnosis (ICD-10 code) as recorded in the NMDS, while for waiting list admissions the reason for the admission was derived from the primary procedure code. To maintain consistency with the figures in the injury and mental health sections, injury and mental health inpatient admissions with an Emergency Medicine specialty code (M05-M08) on discharge were excluded from this analysis (see discussion in Appendix 1 for the rationale for this).

Denominator: Census: Children and young people at the 2001 Census

Interpretation: Because admissions for pregnancy and childbirth varied in the way in which they were admitted by DHB (acute / arranged / waiting list), for the purposes of this analysis they were treated as a separate category of admission. NMDS coverage of therapeutic abortions is partial, so figures may not accurately reflect the total number of terminations undertaken during this period. There are also variations in the extent to which children and young people are admitted under ACC across the country.

Indicator Category Admissions: Proxy B-C; Mortality: Ideal B

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

New Zealand Distribution

Most Frequent Causes of Mortality

During 2000-2004, congenital anomalies and Sudden Infant Death Syndrome (SIDS) were the leading causes of post-neonatal mortality for (Any) Pacific babies, while injury / poisoning was the leading cause of mortality for both children and young people (Table 32).

Most Frequent Causes of Hospital Admission

During 2002-2006, the most frequent reasons for acute hospital admissions amongst (Any) Pacific children were for bronchiolitis, followed by injury / poisoning, pneumonia

and asthma, while for arranged admissions the most frequent reasons were for cancer / chemotherapy and injury / poisoning. The most frequent reasons for waiting list admissions were for the insertion of grommets, followed by dental procedures and surgery on the tonsils and adenoids (**Table 33**).

During 2002-2006, pregnancy and childbirth were the leading reasons for hospital admission amongst (Any) Pacific young people aged 15-24 years. In terms of other hospital admissions, injury / poisoning followed by skin infections and abdominal / pelvic pain were the leading reasons for acute admissions, while injury / poisoning followed by cancer / chemotherapy and dialysis were the leading reasons for arranged admission. Removal of internal fixation devices, followed by dental procedures and procedures on the skin and subcutaneous tissue were the leading causes of waiting list admissions for those aged 15-24 years (**Table 34**).

Table 32. Most Frequent Causes of Mortality Outside the Neonatal Period in (Any) Pacific Children and Young People 0-24 Years, New Zealand 2000-2004

Cause of Death	Number per 5 Year Period	Rate per 100,000	% of Deaths in Age Group
Post Neonatal (29-364 days)			
Congenital Anomalies	29	68.9	23.0
SIDS	28	66.5	22.2
Injury / Poisoning	21	49.9	16.7
Meningococcal Disease	6	14.3	4.8
Pneumonia	5	11.9	4.0
Other Diagnoses	37	87.9	29.4
Total Post Neonatal	126	299.4	100.0
Children 1-14 Years			
Injury / Poisoning	48	11.5	39.7
Congenital Anomalies	23	5.5	19.0
Cancer	16	3.8	13.2
Meningococcal Disease	4	1.0	3.3
Other Diagnoses	30	7.2	24.8
Total 1-14 Years	121	28.9	100.0
Young People 15-24 Years			
Injury / Poisoning	67	31.3	39.2
Suicide	41	19.1	24.0
Cancer	18	8.4	10.5
Congenital Anomalies	6	2.8	3.5
Rheumatic Fever / Heart Disease	5	2.3	2.9
Meningococcal Disease	3	1.4	1.8
Other Diagnoses	31	14.5	18.1
Total 15-24 Years	171	79.8	100.0

Source: Numerator-National Mortality Collection; Denominator-Census; (Any) Pacific Includes children and young people who identify as Pacific in ANY of their three first ethnic groups.

Table 33. Most Frequent Causes of Post-Neonatal Hospital Admission for (Any) Pacific Children 0-14 Years, New Zealand 2002-2006

Primary Diagnosis / Procedure	Number per 5 year period	Rate per 1,000	% of Type	% of Total
Acute Admissions (by Primary Diagnosis)				
Bronchiolitis	6,061	12.6	12.0	8.5
Injury / Poisoning	5,655	11.7	11.2	7.9
Pneumonia	4,841	10.1	9.6	6.8
Asthma	4,729	9.8	9.4	6.6
Gastroenteritis	3,301	6.9	6.6	4.6
Skin Infections	3,195	6.6	6.3	4.5
Viral Infections NOS	3,024	6.3	6.0	4.2
Acute URTI NOS	2,380	4.9	4.7	3.3
Urinary Tract Infections	1,150	2.4	2.3	1.6
Fever of Unknown Origin	761	1.6	1.5	1.1
Abdominal/Pelvic Pain	706	1.5	1.4	1.0
Other Diagnoses	14,520	30.2	28.9	20.4
Total	50,323	104.6	100.0	70.7
Arranged Admissions (by Primary Diagnosis)				
Cancer / Chemotherapy	1,013	2.1	17.9	1.4
Injury / Poisoning	521	1.1	9.2	0.7
Dental Conditions	328	0.7	5.8	0.5
Immune Disorders	288	0.6	5.1	0.4
Dialysis	225	0.5	4.0	0.3
Skin Infections	144	0.3	2.5	0.2
Other Diagnoses	3,131	6.5	55.4	4.4
Total	5,650	11.7	100.0	7.9
Waiting List Admissions (by Primary Procedure)				
Grommets	3,914	8.1	26.8	5.5
Dental Procedures	3,634	7.5	24.9	5.1
Tonsils and Adenoids	771	1.6	5.3	1.1
Middle Ear Reconstruction	385	0.8	2.6	0.5
Skin/Subcutaneous Tissue	378	0.8	2.6	0.5
Inguinal Hernia Repair	336	0.7	2.3	0.5
No Procedure Listed	872	1.8	6.0	1.2
Other Procedures	4,304	8.9	29.5	6.0
Total	14,594	30.3	100.0	20.5
ACC Admissions				
ACC Covered	598	1.2	100.0	0.8
Total	71,165	147.9	100.0	100.0

Source: Numerator-National Minimum Dataset; Denominator-Census; (Any) Pacific includes children who identify as Pacific in ANY of their three first ethnic groups; Injury and Mental Health Emergency Department Cases Removed (See Appendix 1 for Rationale).

Table 34. Most Frequent Causes of Hospital Admission for (Any) Pacific Young People 15-24 Years, New Zealand 2002-2006

Primary Diagnosis / Procedure	Number per 5 year period	Rate per 1,000	% of Type	% of Total
Reproductive Admissions (by Primary Diagnosis)				
Early Pregnancy Loss	1,105	9.7	6.3	2.8
Therapeutic Abortion*	1,192	10.5	6.7	3.1
Pregnancy & Delivery	15,372	135.0	87.0	39.6
Total	17,669	155.2	100.0	45.5
Acute Admissions (by Primary Diagnosis)				
Injury / Poisoning	3,452	15.2	22.7	8.9
Skin Infections	975	4.3	6.4	2.5
Abdominal/Pelvic Pain	924	4.1	6.1	2.4
Mental Health	772	3.4	5.1	2.0
Asthma	562	2.5	3.7	1.4
Urinary Tract Infections	501	2.2	3.3	1.3
Gastroenteritis	437	1.9	2.9	1.1
Appendicitis	412	1.8	2.7	1.1
Pneumonia	370	1.6	2.4	1.0
Other Diagnoses	6,791	29.8	44.7	17.5
Total	15,196	66.7	100.0	39.1
Arranged Admissions (by Primary Diagnosis)				
Injury / Poisoning	515	2.3	15.5	1.3
Cancer / Chemotherapy	320	1.4	9.6	0.8
Dialysis	198	0.9	6.0	0.5
Mental Health	86	0.4	2.6	0.2
Other Diagnoses	2,206	9.7	66.3	5.7
Total	3,325	14.6	100.0	8.6
Waiting List Admissions (by Primary Procedure)				
Removal Internal Fixation Device	217	1.0	9.5	0.6
Dental Procedures	151	0.7	6.6	0.4
Skin / Subcutaneous Tissue	148	0.6	6.5	0.4
Tonsils and Adenoids	128	0.6	5.6	0.3
No Procedure Listed	139	0.6	6.1	0.4
Other Procedures	1,492	6.6	65.6	3.8
Total	2,275	10.0	100.0	5.9
ACC Admissions				
ACC Covered	373	1.6	100.0	1.0
Total	38,838	170.5	100.0	100.0

Source: Numerator-National Minimum Dataset; Denominator-Census; (Any) Pacific includes young people who identify as Pacific in ANY of their three first ethnic groups; Injury and Mental Health Emergency Department Cases Removed (See Appendix 1 for Rationale); NMDS coverage of therapeutic abortions is partial, so figure may not accurately reflect the number of terminations during this period.

Summary

During 2000-2004, congenital anomalies and SIDS were the leading causes of post-neonatal mortality for (Any) Pacific babies, while injury / poisoning was the leading cause of mortality for both children and young people. During 2002-2006, the most frequent reasons for acute hospital admissions amongst (Any) Pacific children were for bronchiolitis, injury / poisoning and pneumonia; for arranged admissions they were for cancer / chemotherapy and injury / poisoning; and for waiting list admissions they were for the insertion of grommets, followed by dental procedures. For (Any) Pacific young people pregnancy and childbirth were the leading reasons for hospital admission. In terms of other hospital admissions, injury / poisoning and skin infections were the leading reasons for acute admissions; injury / poisoning followed by cancer / chemotherapy the leading reasons for arranged admission; and removal of internal fixation devices, followed by dental procedures the leading causes of waiting list admissions.





Individual and Whanau Health and Wellbeing

Whanau Wellbeing

Family Composition

Introduction

In New Zealand during the past 25 years, there has been a marked shift away from two-parent families, with an increase in the proportion of families headed by single parents. While the majority of single parent families are headed by women (84% in 2001), Census data suggests that sole parents are not a homogeneous group, but reflect a diversity of experience including those who have never been married (more commonly in their teens-20s), those who are separated or divorced (more commonly in their 30s-40s), those who are widowed (more commonly in their 50s-60s) and those who remain married but who do not live together for a variety of reasons (e.g. partner living overseas). In addition, for many children in sole parent families, both parents maintain an active parenting role through shared custody arrangements [166].

Family composition and the number of children growing up in sole parent families are important for a number of reasons. Firstly, the role family composition plays in the socioeconomic resources available to dependent children was recently highlighted by the 2004 Living Standards Survey, which suggested that 42% of sole parent families lived in significant or severe hardship, as compared to only 14% of two parent families [44]. Such hardship resulted in families postponing children's doctors or dentists visits, children sharing a bed, wearing poorly fitting clothes or shoes, or going without wet weather clothing. In addition, the survey noted that sole parent families were more likely to be reliant on Benefits (sole-parent 62% vs. two-parent 6%) and that much of the differences in living standards between sole and two parent families was due to the former's greater reliance on benefits as their primary source of income [44].

Secondly, for a significant number of children, living in a sole-parent family has arisen out of parental separation. A large body of literature now suggests that children who experience parental separation during childhood achieve less well across a range of outcomes (e.g. educational attainment, mental and emotional health, social conduct, substance use, early onset sexual behaviour) [167] [168]. Others would argue however, that the magnitude of these differences is not large and that many children are not adversely affected [168], with those who are adversely affected being influenced by other exacerbating factors (e.g. a decline in family income, declines in the mental health of custodial parents, exposure to interparental conflict and compromised parenting). In reality, it is likely that many of these factors interact to influence children's wellbeing.

In addition, the associations are not always straight forward, with a number of studies suggesting that where parental relationships are highly conflicted and children are drawn into the conflict, or where a child's relationship with a parent is poor, children may actually benefit from parental separation [167] [168]. Further adding to this complexity is the finding that in situations where a sole parent remarries, the outcome for their children often differs little from those remaining in a sole parent family, even if their socioeconomic circumstances improve [168]. As a consequence, not only do sole-parent families reflect a diversity of experience, but the impacts that changes in family composition have on children's physical and psychological wellbeing may also vary, depending on individual family circumstances and the impact parental separation has on their socioeconomic position.

The following section explores the proportion of Pacific children <15 years living in one and two parent households at the 2001 and 2006 Censuses. While data limitations (see *Notes on Interpretation*) mean that the figures presented in this section may underestimate the true proportion of children experiencing parental separation, or living



in blended family settings, it is nevertheless hoped they will provide a broad overview of the distribution of Pacific children living in sole parent households during this period.

Data Source and Methods

Definition

Proportion of Children <15 Years Living in One and Two Parent Households

Data Source

Numerator: NZ Census: Number of children living in one and two parent households, where the dependent child was home on Census night.

Denominator: NZ Census: Total number of children <15 years who were home on Census night

Ethnicity Measure: Level 1 Prioritised Ethnicity

Indicator Category

Proxy C

Notes on Interpretation

The breakdown into "Couple with Children" and "One Parent with Children" is made without regard to the relationship between the child and caregiver (e.g. a couple with children may refer to a de-facto couple, a married couple, grandparents caring for a dependent grandchild, a mother living with a partner who is not the child's biological parent) and thus may underestimate the proportion of children who have experienced parental separation, as well as the proportion living in blended family settings.

Statistical Significance Testing

95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

New Zealand Distribution and Trends

During 1976-2001, the proportion of sole-parent families with dependent children in New Zealand increased progressively, from 10.4% of families in 1976 to 29.2% in 2001. Similarly the proportion of two-parent families declined, from 89.6% in 1976 to 70.8% in 2001 (**Figure 80**).

Ethnic Differences

In New Zealand during 2006, 30.8% of Pacific children <15 years lived in sole parent households, as compared to 25.2% nationally. Similarly 69.2% of Pacific children lived in two parent households as compared to 74.8% for New Zealand as a whole. Overall a *significantly higher* proportion of Māori > Pacific > European and Asian / Indian children lived in sole parent households during 2006. Similar ethnic differences were seen during 2001 (**Figure 81, Table 35**).

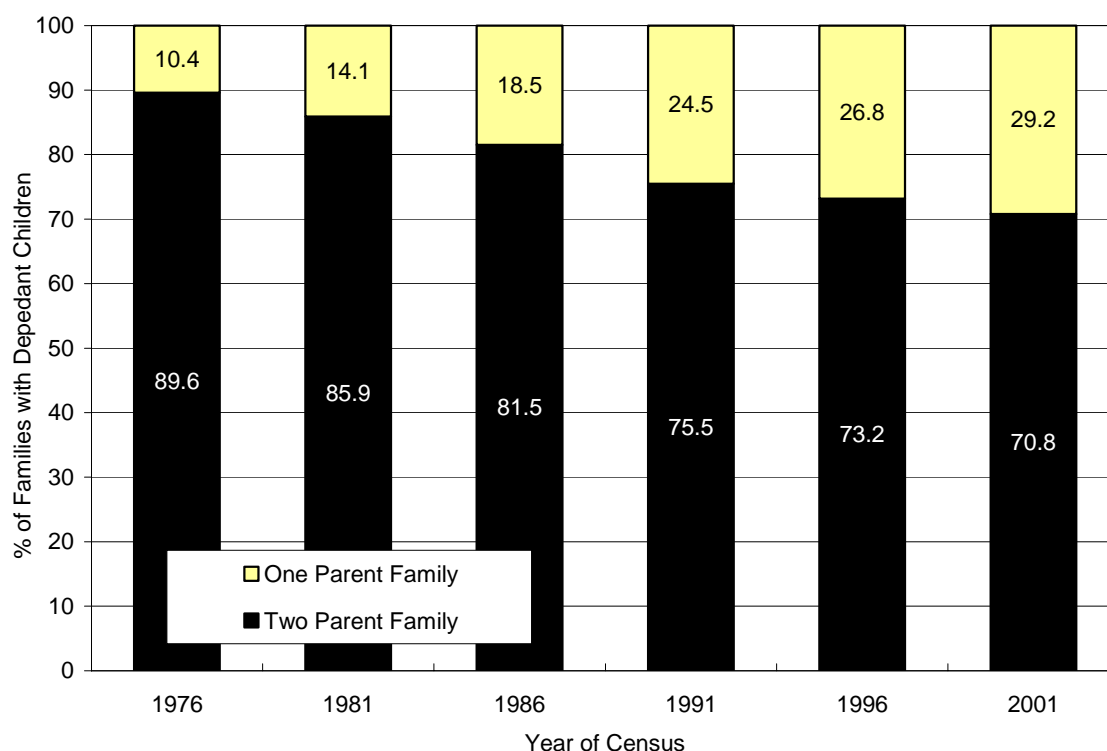
Socioeconomic Differences

There were also marked socioeconomic differences in the proportion of Pacific children living in sole parent households during 2006, with rates rising progressively from 11.4% amongst those living in the most affluent (Decile 1) areas, to 34.8% amongst those living in the most deprived (Decile 10) areas. In comparison, for New Zealand as a whole, 7.4% of children living in the most affluent areas lived in sole parent households as compared to 47.1% amongst those living in the most deprived areas. Similar socioeconomic differences were seen during 2001 (**Figure 82, Table 35**).

Relationship between Socioeconomic Status and Ethnicity

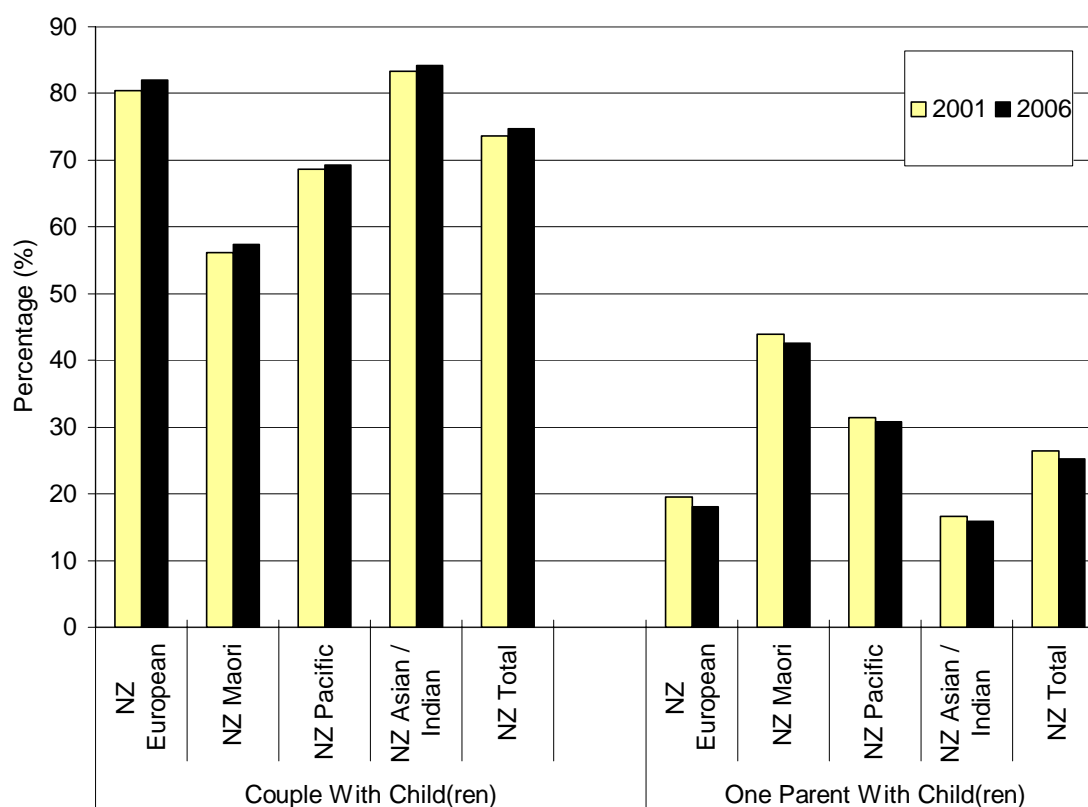
Once broken down by NZDep deprivation, the proportion of Pacific children living in sole parent households was intermediate between those of Māori and Asian / Indian children. When compared to European children however, the pattern was more inconsistent, with higher proportions of Pacific children living in sole parent households in the more affluent areas, but lower proportions living in sole parent households in the more deprived (NZDep decile 9-10) areas (**Figure 83**).

Figure 80. Families with Dependent Children by Family Type, New Zealand at the 1976-2001 Censuses



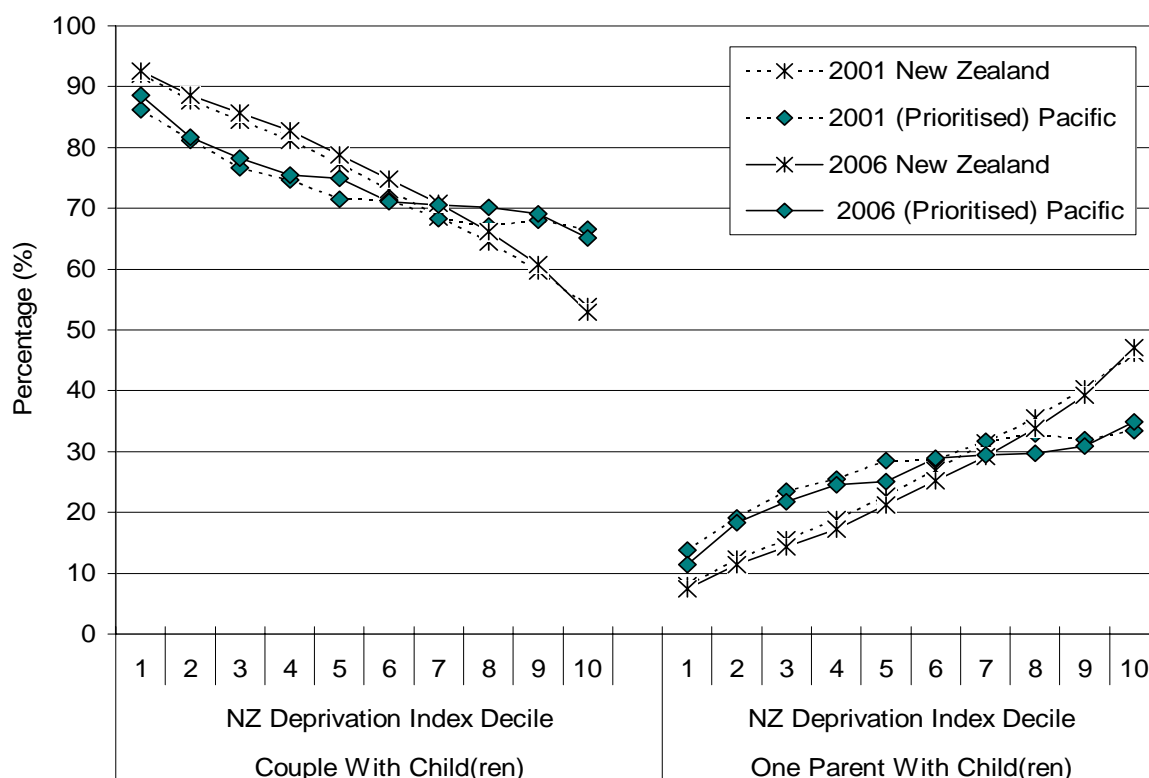
Source: Statistics New Zealand

Figure 81. Proportion of Children <15 Years Living in One and Two Parent Households by Ethnicity, New Zealand at the 2001 and 2006 Censuses



Source: Statistics New Zealand; Ethnicity is Level 1 Prioritised.

Figure 82. Proportion of Children <15 Years Living in One and Two Parent Households by NZ Deprivation Index Decile, New Zealand at the 2001 and 2006 Censuses



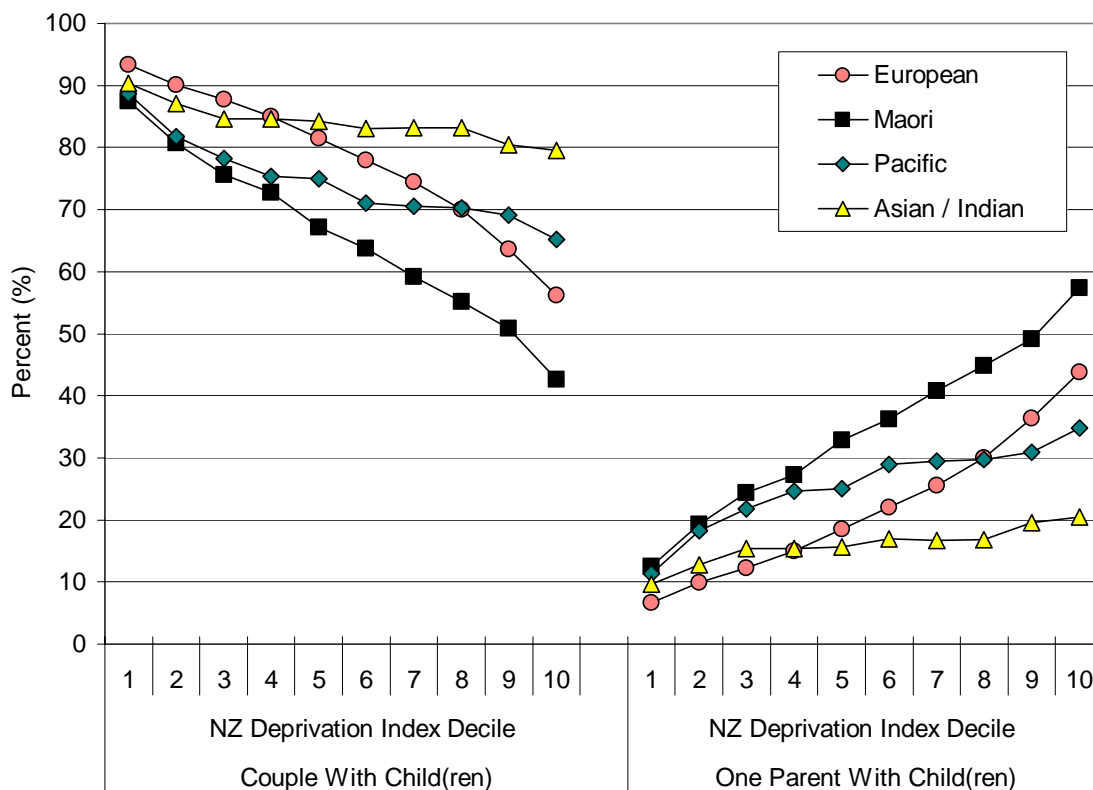
Source: Statistics New Zealand; Pacific Ethnicity is Level 1 Prioritised

Table 35. Proportion of Children <15 Years Living in One Parent Households by Ethnicity and NZ Deprivation Index Decile, New Zealand at the 2006 Census

Variable	Percent	RR	95% CI	Variable	Percent	RR	95% CI
NZDep Index Decile				Prioritised Ethnicity			
1	7.41	1.00		Māori	42.60	2.36	2.34-2.38
2	11.35	1.53	1.48-1.58	Pacific	30.78	1.70	1.68-1.72
3	14.38	1.94	1.88-2.00	European	18.06	1.00	
4	17.28	2.33	2.27-2.40	Asian/Indian	15.86	0.88	0.86-0.90
5	21.20	2.86	2.78-2.94				
6	25.24	3.41	3.32-3.50				
7	29.17	3.94	3.84-4.04				
8	33.75	4.55	4.43-4.67				
9	39.26	5.30	5.17-5.43				
10	47.11	6.36	6.21-6.52				

Source: Statistics New Zealand; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Figure 83. Proportion of Children <15 Years Living in One and Two Parent Households by Ethnicity and NZ Deprivation Index Decile, New Zealand at the 2006 Census



Source: Statistics New Zealand; Ethnicity is Level 1 Prioritised.

Summary

In New Zealand during the past 25 years, there has been a marked shift away from two-parent families, with the proportion of single parent families increasing from 10.4% in 1976 to 29.2% in 2001. During 2006, 30.8% of Pacific children <15 years lived in sole parent households, as compared to 25.2% nationally. Similarly 69.2% of Pacific children lived in two parent households as compared to 74.8% nationally. There were marked socioeconomic and ethnic differences in the proportion of children living in sole parent households during this period, with rates being *significantly higher* for Māori > Pacific > European and Asian / Indian children and those living in the most deprived areas. Once broken down by NZDep deprivation, the proportion of Pacific children living in sole parent households was intermediate between those of Māori and Asian / Indian children. When compared to European children however, the pattern was more inconsistent, with higher proportions of Pacific children living in sole parent households in the more affluent areas, but lower proportions living in sole parent households in the more deprived (NZDep decile 9-10) areas.



Individual and Whanau Health and Wellbeing

Perinatal - Infancy

Low Birth Weight: Small for Gestational Age and Preterm Birth

Introduction

Low Birth Weight (LBW) defined as a birth weight <2,500g, is determined by two factors, the duration of gestation and fetal growth. Babies are born LBW either because they are preterm (<37 weeks) or because they have failed to grow adequately in utero. LBW is a frequently used perinatal indicator in developing countries as it predicts neonatal morbidity and mortality, is easy to measure, and requires no knowledge of pregnancy duration. In developed countries however, where access to ultrasound scanning and antenatal care is readily available, it has been suggested that combining preterm birth and fetal growth restriction into a single indicator hinders preventative interventions, as the causes of the two conditions differ [169]. Thus fetal growth restriction and preterm birth are considered separately in the sections which follow.

Small for Gestational Age

Intrauterine growth restriction (IUGR) refers to a baby who has failed to reach its full in-utero growth potential. Because a baby's growth potential is often unknown, small for gestational age (SGA: birth weight <10th percentile for gestational age), is often used as a proxy for IUGR in statistical reports. In New Zealand, SGA rates have decreased in recent years, with the largest decreases occurring amongst Pacific and Māori women. Using New Zealand population percentile charts, SGA rates are highest amongst Indian>Asian>Māori>European>Pacific women and are significantly elevated amongst those living in the most deprived areas [170]. Other known risk factors for SGA include maternal smoking and poor nutritional status [171]. While New Zealand's SGA rates are decreasing, socioeconomic disparities in SGA are not. This is of concern as SGA has been associated with higher neonatal morbidity and mortality and it has been suggested that babies who are growth restricted at birth have a greater risk of coronary heart disease and diabetes in later life [172].

Preterm Birth

During the past two decades New Zealand's preterm birth rates have increased, with the largest increases occurring amongst those living in the most affluent areas and (during 1980-1994) amongst European / Other women [170, 173]. In recent years, preterm birth rates have been highest amongst Indian >Māori >European >Asian >Pacific women and those in the most deprived areas [170]. While infants born prematurely have higher neonatal mortality and morbidity, it is difficult to determine whether New Zealand's rising preterm rates will have detrimental impacts, as it remains unclear whether increases are due to increasing obstetric intervention and the selective delivery of high risk babies (as is occurring overseas), or whether they reflect a true rise in spontaneous preterm birth [174].

The following section explores preterm and SGA birth rates amongst Pacific babies in New Zealand using information available from the Birth Registration Dataset.

Data Source and Methods

Definition

1. Small for Gestational Age: Infants with a birth weight <10th percentile for their gestational age.
2. Preterm Birth: Infants born at less than 37 weeks gestation

Data Source

1. *Small for Gestational Age*

Numerator: Birth Registration Dataset (Appendix 2): Singleton live born babies whose birth weight was below the 10% percentile for gestational age. Because NZ Birth Weight Percentile Charts were only available for babies 24-44 weeks gestation, babies with gestations outside these ages were excluded.

Denominator: Birth Registration Dataset: All singleton live born babies registered 22-44 weeks gestation

2. Preterm Birth

Numerator: Birth Registration Dataset (Appendix 2): All singleton live born babies 20-36 weeks gestation

Denominator: Birth Registration Dataset: All singleton live born babies registered 20+ weeks gestation

Indicator Category Ideal B-C

Notes on Interpretation

The infant's ethnicity was that supplied by parents on the birth registration form; NZDep Index decile is based on the usual residential address at the time of birth registration (mapped to NZDep2001). SGA rates were calculated using birth weight percentile charts derived from New Zealand birth registration data for the years 1990-1991 [175]. Because of rising birth weights, SGA rates in later years may be lower than the conventional 10%. Total population charts have been used, rather than ethnic specific charts to highlight ethnic differences, although it is acknowledged that this may underestimate SGA rates for Pacific babies and overestimate SGA rates for Asian and Indian babies.

Statistical Significance Testing

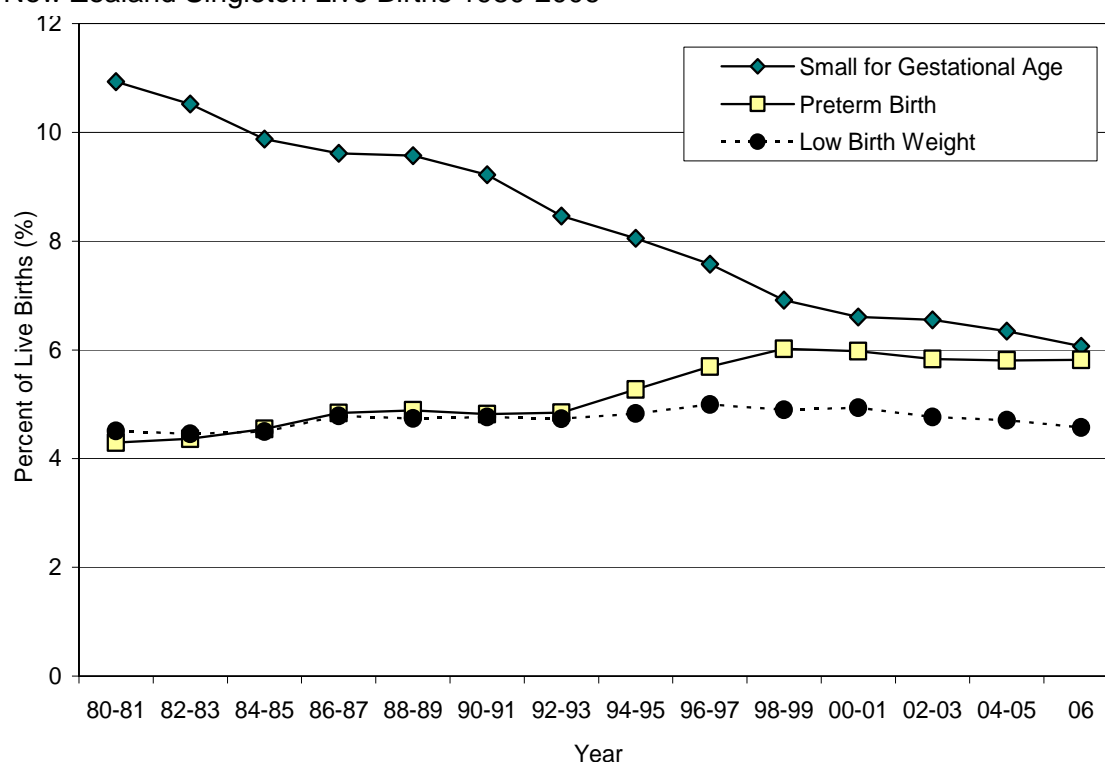
95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

New Zealand Distribution and Trends

New Zealand Trends

In New Zealand during 1980-2006, rates of preterm birth increased and then reached a plateau, while rates of small for gestational age declined. In contrast, rates of low birth weight remained relatively static during this period (**Figure 84**).

Figure 84. Rates of Small for Gestational Age, Preterm Birth and Low Birth Weight, New Zealand Singleton Live Births 1980-2006



Source: Birth Registration Dataset

Small for Gestational Age

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

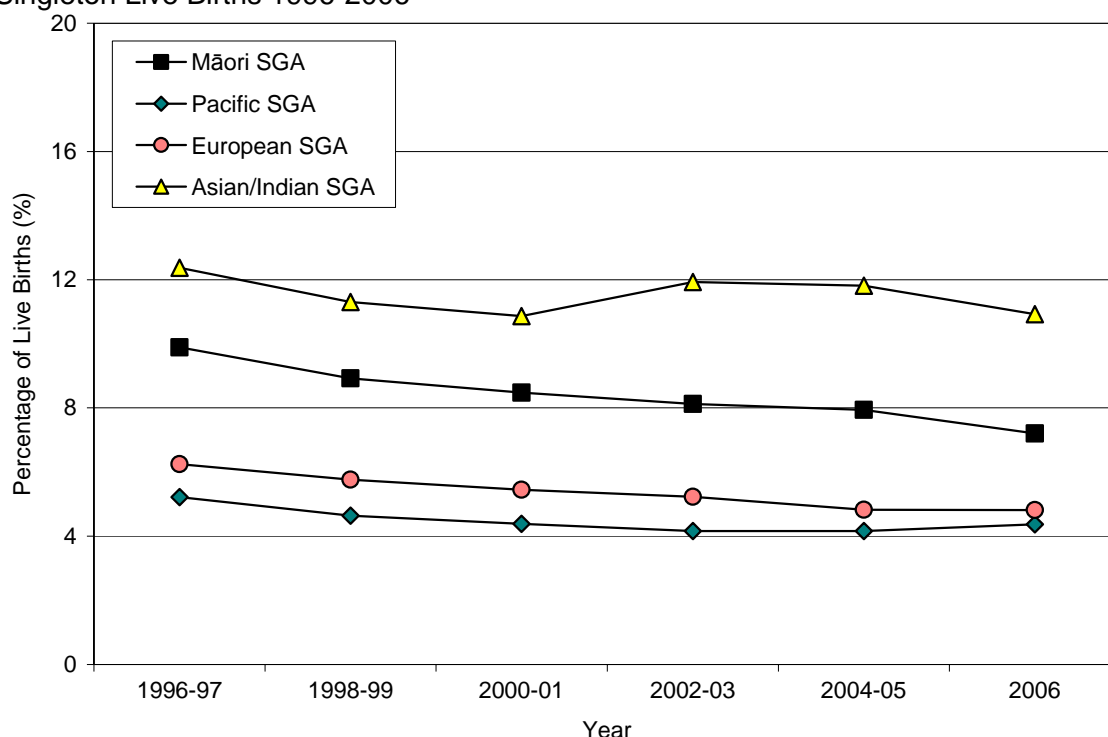
During 2002-2006, rates of SGA were *significantly* higher for Asian / Indian > Māori > European > Pacific babies and those living in the more deprived areas. These differences however, must be viewed within the context of the higher than average birth weight of Pacific babies and the potential inappropriateness of using total population birth weight charts to assess SGA rates in babies of different ethnic groups.

Table 36. Risk Factors for Small for Gestational Age, New Zealand Singleton Live Births 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	4.68	1.00		1-2	4.86	1.00	
2	5.04	1.08	0.99-1.17	3-4	5.38	1.11	1.05-1.17
3	5.28	1.13	1.04-1.23	5-6	5.82	1.20	1.14-1.27
4	5.47	1.17	1.08-1.27	7-8	6.91	1.42	1.35-1.49
5	5.40	1.16	1.07-1.26	9-10	7.73	1.59	1.51-1.67
6	6.17	1.32	1.22-1.42	Prioritised Ethnicity			
7	6.53	1.40	1.30-1.51	Māori	7.85	1.57	1.52-1.62
8	7.22	1.54	1.43-1.66	Pacific	4.20	0.84	0.79-0.89
9	7.60	1.62	1.51-1.74	European	4.99	1.00	
10	7.84	1.68	1.57-1.80	Asian/Indian	11.67	2.34	2.25-2.44
Gender							
Female	6.23	1.00					
Male	6.49	1.04	1.01-1.07				

Source: Birth Registration Dataset; Rate per 100 live births per year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Figure 85. Rates of Small for Gestational Age by Infant's Ethnic Group, New Zealand Singleton Live Births 1996-2006



Source: Birth Registration Dataset; Ethnicity is Level 1 Prioritised

Despite the drawbacks of total population percentile charts, ethnic specific percentile charts also have a number of distinct limitations, including the assigning of SGA rates of 10% to all ethnic groups, despite some groups having higher rates of factors likely to lead to pathological fetal growth restriction (e.g. exposure to cigarette smoke, socioeconomic deprivation), or fetal macrosomia (e.g. high maternal obesity rates). Thus ethnic differences in SGA need to be considered with these limitations in mind (**Table 36**). Similar ethnic differences were seen during 1996-2006 (**Figure 85**).

Small for Gestational Age Amongst Pacific Groups in New Zealand

During 2002-2006 (using the Sole / (Any) classification), SGA rates were *significantly* higher for Sole and (Any) Cook Island Māori babies than they were for non-Māori non-Pacific babies. In contrast, SGA rates for Sole and (Any) Tongan and Samoan babies were *significantly lower* than for non-Māori non-Pacific babies (**Table 37**).

Table 37. Distribution of Small for Gestational Age in Pacific Singleton Live Births by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100 (%)	RR	95% CI
Any Samoan	914	182.8	4.30	0.71	0.66-0.76
Any Tongan	292	58.4	3.10	0.51	0.45-0.57
Any Cook Island Māori	701	140.2	7.10	1.17	1.09-1.26
Any Niue	207	41.4	5.67	0.94	0.82-1.07
Any Fijian	75	15.0	5.65	0.93	0.75-1.16
Any Tokelauan	65	13.0	6.22	1.03	0.81-1.30
Any Other Pacific	66	13.2	4.76	0.79	0.62-1.00
Any Pacific	2,060	412.0	4.89	0.81	0.77-0.85
Any Māori	6,230	1,246.0	7.85	1.30	1.26-1.34
Non-Māori Non-Pacific	10,248	2,049.6	6.05	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100 (%)	RR	95% CI
Sole Samoan	373	74.6	3.96	0.65	0.59-0.72
Sole Tongan	85	17.0	1.74	0.29	0.23-0.36
Sole Cook Island Māori	211	42.2	7.80	1.29	1.13-1.47
Sole Niue	26	5.2	4.72	0.78	0.54-1.14
Sole Fijian	8	1.6	3.48	0.57	0.29-1.13
Sole Tokelauan	19	3.8	7.36	1.22	0.79-1.88
Sole Other Pacific	33	6.6	4.87	0.81	0.58-1.13
Sole Pacific	756	151.2	4.03	0.67	0.62-0.72
Sole Māori	3,113	622.6	10.01	1.65	1.59-1.71
Non-Māori Non-Pacific	10,248	2,049.6	6.05	1.00	

Source: Birth Registration Dataset; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate ratios are compared to the Non-Māori Non-Pacific group and are unadjusted.

Preterm Birth

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

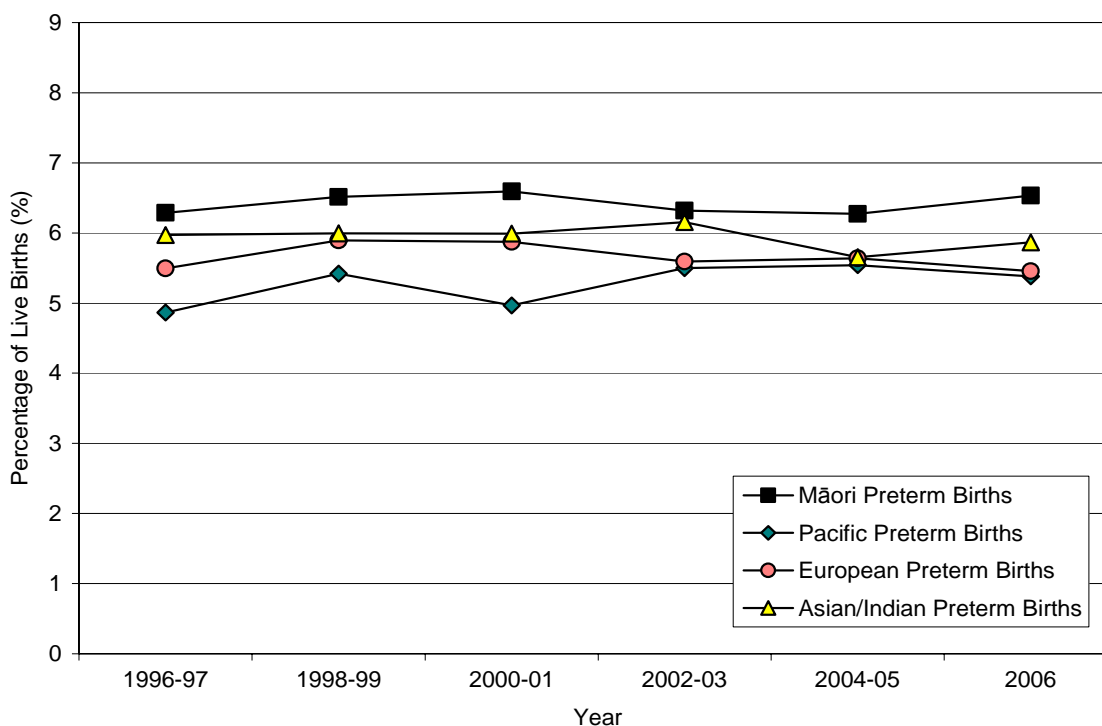
During 2002-2006, rates of preterm birth were *significantly higher* for Māori babies than they were for European or Pacific babies. Rates were also *significantly higher* for males and those in the more deprived areas (**Table 38**). Similar ethnic differences were seen during 1996-2006 (**Figure 86**).

Table 38. Risk Factors for Preterm Birth, New Zealand Singleton Live Births 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	5.30	1.00		1-2	5.306	1.00	
2	5.31	1.00	0.92-1.08	3-4	5.312	1.00	0.95-1.06
3	5.09	0.96	0.89-1.04	5-6	5.865	1.11	1.05-1.17
4	5.50	1.04	0.96-1.12	7-8	6.007	1.13	1.07-1.19
5	5.85	1.10	1.02-1.19	9-10	6.239	1.18	1.12-1.24
6	5.88	1.11	1.03-1.20	Prioritised Ethnicity			
7	6.17	1.16	1.08-1.25	Māori	6.346	1.14	1.10-1.18
8	5.87	1.11	1.03-1.19	Pacific	5.492	0.98	0.93-1.03
9	6.10	1.15	1.07-1.23	European	5.583	1.00	
10	6.36	1.20	1.12-1.29	Asian/Indian	5.883	1.05	1.00-1.11
Gender							
Female	5.47	1.00					
Male	6.15	1.12	1.09-1.15				

Source: Birth Registration Dataset; Note: Rate per 100 live births per year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted.

Figure 86. Rates of Preterm Birth by Baby's Ethnic Group, New Zealand Singleton Live Births 1996-2006



Source: Birth Registration Dataset; Ethnicity is Level 1 Prioritised

Preterm Birth Amongst Pacific Groups in New Zealand

During 2002-2006 (using the Sole / (Any) classification), preterm birth rates were *significantly higher* for Sole and (Any) Cook Island Māori babies than they were for non-Māori non-Pacific babies. In contrast, preterm birth rates were similar to those of non-Māori non-Pacific babies for the other Pacific groups, with the exceptions of (Any) Tongan and Sole Samoan babies, where rates were *significantly lower* (**Table 39**).

Table 39. Distribution of Preterm Births in Pacific Singleton Live Births by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100 (%)	RR	95% CI
Any Samoan	1,138	227.6	5.34	0.95	0.89-1.01
Any Tongan	474	94.8	5.03	0.89	0.81-0.97
Any Cook Island Māori	630	126.0	6.35	1.13	1.05-1.22
Any Niue	201	40.2	5.50	0.98	0.86-1.12
Any Fijian	80	16.0	6.02	1.07	0.86-1.32
Any Tokelauan	66	13.2	6.31	1.12	0.89-1.42
Any Other Pacific	94	18.8	6.76	1.20	0.99-1.46
Any Pacific	2,369	473.8	5.61	1.00	0.96-1.04
Any Māori	5,052	1,010.4	6.35	1.13	1.09-1.17
Non-Māori Non-Pacific	9,544	1,908.8	5.63	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100 (%)	RR	95% CI
Sole Samoan	447	89.4	4.73	0.84	0.77-0.92
Sole Tongan	252	50.4	5.15	0.92	0.81-1.04
Sole Cook Island Māori	195	39.0	7.19	1.28	1.12-1.47
Sole Niue	37	7.4	6.69	1.19	0.87-1.63
Sole Fijian	11	2.2	4.78	0.85	0.48-1.51
Sole Tokelauan	9	1.8	3.49	0.62	0.33-1.18
Sole Other Pacific	46	9.2	6.76	1.20	0.91-1.59
Sole Pacific	1,000	200.0	5.32	0.95	0.89-1.01
Sole Māori	2,230	446.0	7.14	1.27	1.21-1.33
Non-Māori Non-Pacific	9,544	1908.8	5.63	1.00	

Source: Birth Registration Dataset; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate ratios are compared to the Non-Māori Non-Pacific group and are unadjusted.

Summary

Low Birth Weight (LBW) defined as a birth weight <2,500g, is determined by two factors, the duration of gestation and fetal growth. Babies are born LBW either because they are preterm (<37 weeks) or because they have failed to grow adequately in utero. In New Zealand during 1980-2006, rates of preterm birth increased and then reached a plateau, while rates of small for gestational age (SGA) declined. In contrast, rates of low birth weight remained relatively static during this period.

SGA Birth: During 2002-2006 (using prioritised ethnicity), rates of SGA were *significantly* higher for Asian / Indian > Māori > European > Pacific babies and those in the more deprived areas. During the same period (using the Sole / (Any) classification), SGA rates were *significantly* higher for Sole and (Any) Cook Island Māori babies than they were for non-Māori non-Pacific babies. In contrast, SGA rates for Sole and (Any) Tongan and Samoan babies were *significantly lower* than for non-Māori non-Pacific babies.

Preterm Birth: During 2002-2006 (using prioritised ethnicity), rates of preterm birth were *significantly higher* for Māori > European and Pacific babies, males and those in the more deprived areas. During the same period (using the Sole / (Any) classification), preterm birth rates were *significantly higher* for Sole and (Any) Cook Island Māori babies than they were for non-Māori non-Pacific babies. In contrast, preterm birth rates were similar to non-Māori non-Pacific babies for the other Pacific groups, with the exceptions of (Any) Tongan and Sole Samoan babies, where rates were *significantly lower*.



Infant Mortality

Introduction

Mortality during the first year of life is higher than at any other point during childhood or adolescence. Infant mortality in New Zealand has been declining since the 1930s [176] with the most recent decreases being attributed to a fall in Sudden Infant Death Syndrome (SIDS) [177]. Declines, however, have not been equal for all ethnic groups, with higher SIDS rates amongst Māori since the National Cot Death Campaign began being attributed to differing risk factor profiles within the Māori community [178]. While risk of total infant mortality is generally higher amongst, Pacific>Māori>European/Other babies, males, and those living in the most deprived areas [176], analyses of total infant mortality may be of limited utility, if evidence based prevention strategies are to be developed which will reduce infant mortality in New Zealand in future years. This is because, while in the neonatal period many of the causes of mortality have their origins in the perinatal period (e.g. extreme prematurity, congenital anomalies), in the post-neonatal period issues such as SIDS, pneumonia and injuries play a much greater role. The following section explores infant mortality rates amongst Pacific infants in New Zealand using information available from the National Mortality Collection.

Data Source and Methods

Definition

Total Infant Mortality: Death of a live born infant prior to their first birthday

Neonatal Mortality: Death of a live born infant during the first 28 days of life

Post-Neonatal Mortality: Death of a live born infant >28 days but <365 days of life

Data Sources

Numerator: National Mortality Collection (Appendix 3): All deaths in the first year of life, using the definitions for total, neonatal and post neonatal mortality outlined above. Cause of death was derived from the main underlying cause of death (clinical code) using ICD-D 10 codes as follows: Extreme prematurity (ICD-9 765.0; ICD-10 P072), Congenital anomalies (ICD-9 740-759; ICD-10 Q00-Q99), Perinatal conditions (ICD-9 760-779; ICD-10 P00-P96), and Sudden Infant Death Syndrome (SIDS) (ICD-9 798.0; ICD-10 R95)

Denominator: Birth Registration Dataset: All live births 20+ weeks gestation.

Indicator Category Ideal B

Notes on Interpretation

For birth registration data, the infant's ethnicity was that supplied by parents on the birth registration form; NZDep Index decile was based on the usual residential address at the time of birth or death registration.

Statistical Significance Testing

95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

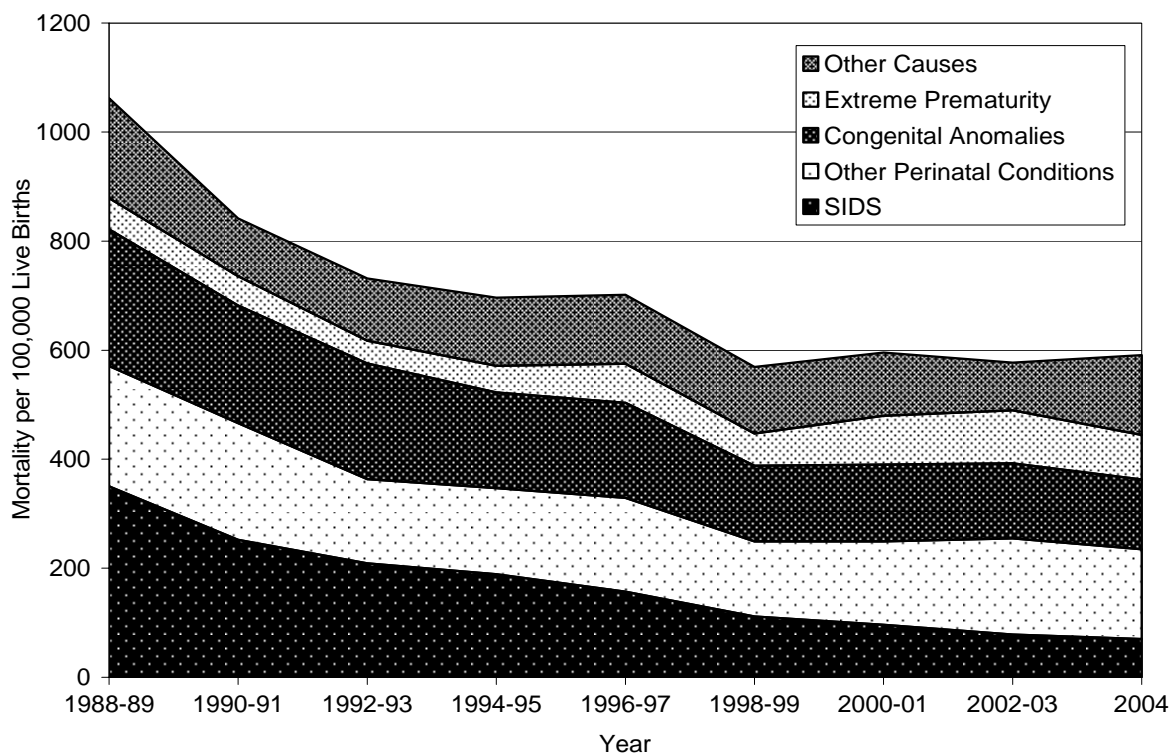
New Zealand Distribution and Trends

Total Infant Mortality

New Zealand Trends

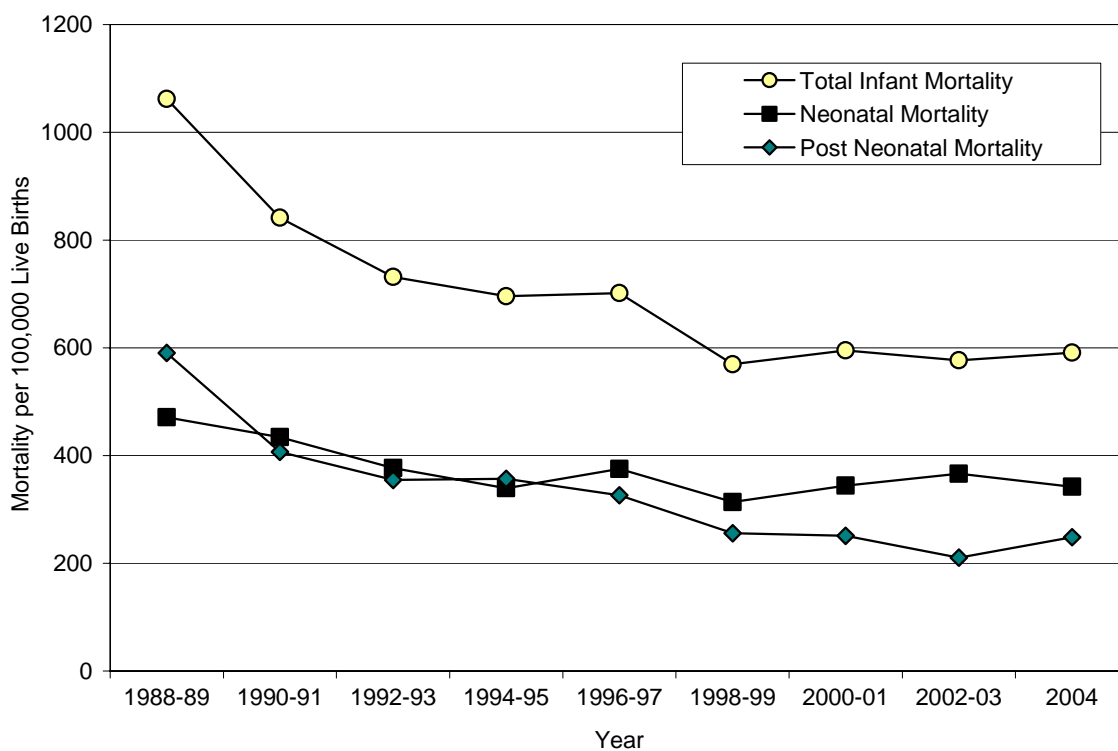
In New Zealand during 1988-2004, deaths due to SIDS and congenital anomalies have continued to decline, while deaths due to extreme prematurity and other perinatal conditions, after declining initially, have seen small increases during the past 3-4 years (**Figure 87**). As a result, while post neonatal mortality has continued to decline (with the exception of the 2004 year), neonatal mortality was more static during 1998-2004 (**Figure 88**).

Figure 87. Infant Mortality by Cause, New Zealand 1988-2004



Source: Numerator-National Mortality Collection; Denominator- Birth Registration Dataset

Figure 88. Total, Neonatal and Post-Neonatal Mortality in New Zealand 1988-2004

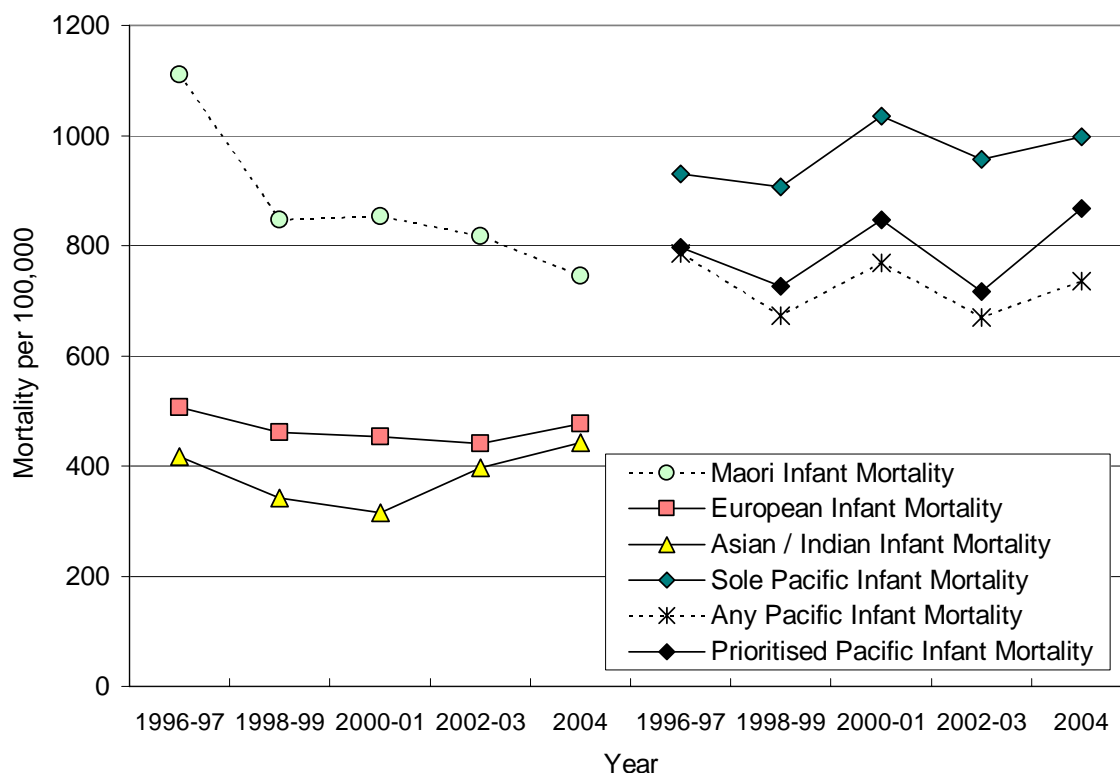


Source: Numerator-National Mortality Collection; Denominator- Birth Registration Dataset

Ethnic Trends in Total Infant Mortality

In New Zealand during 1996-2004, total infant mortality rates were higher for Sole Pacific than for Prioritised Pacific or Any Pacific infants. While small numbers make precise interpretation difficult, in general terms, infant mortality rates for Pacific infants were static during this period. Rates for Pacific infants were also higher than for European and Asian / Indian infants during this period (**Figure 89**).

Figure 89. Total Infant Mortality Rates by Ethnicity, New Zealand 1996-2004



Source: Numerator-National Mortality Collection; Denominator- Birth Registration Dataset; Ethnicity for Non-Pacific Groups is Level 1 Prioritised; Ethnicity for Pacific Groups also assigned using Any / Sole Classification (see page 11 for details)

Neonatal Mortality

Most Frequent Causes of Neonatal Mortality

In New Zealand during 2000-2004, the most frequent causes of neonatal mortality were extreme prematurity and congenital anomalies, with anomalies of the cardiovascular and central nervous system playing a particularly prominent role. Birth asphyxia however, was also a relatively important cause of neonatal death. Amongst (Any) Pacific babies during this period the pattern was similar, with extreme prematurity and congenital anomalies being the leading causes of neonatal mortality (**Table 40**).

Ethnic Trends in Neonatal Mortality

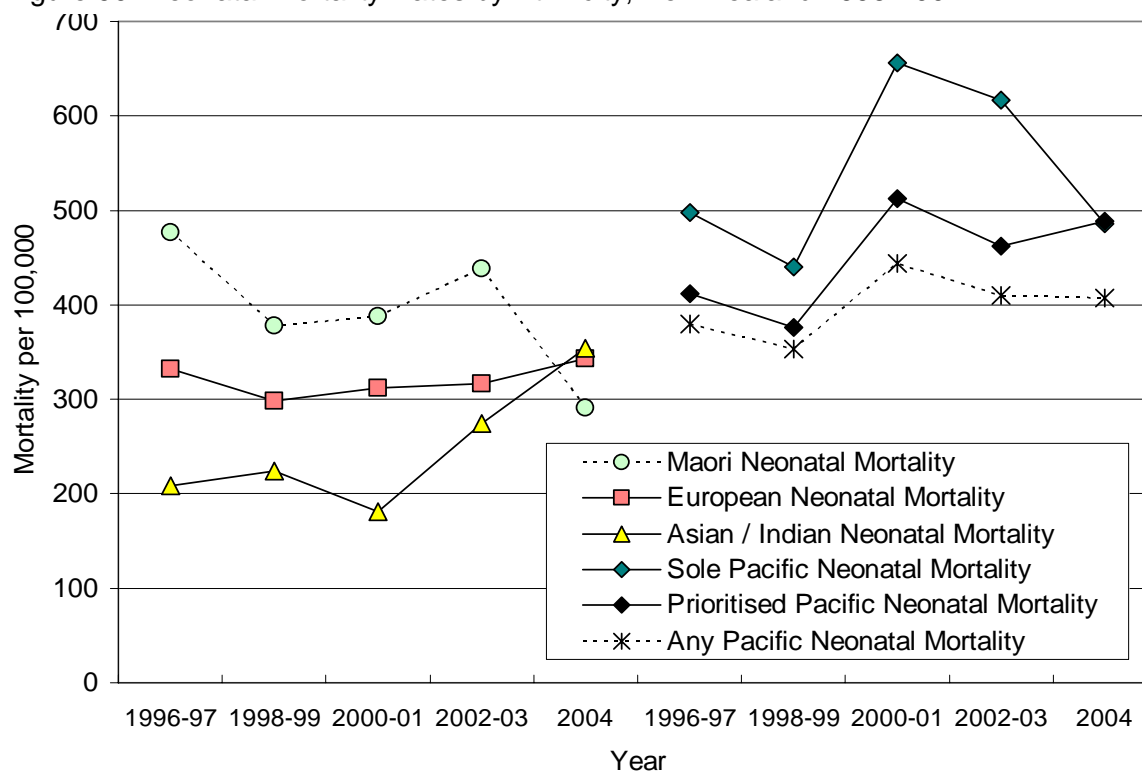
During 1996-2004, neonatal mortality rates were higher for Sole Pacific than for Prioritised or (Any) Pacific babies. While neonatal mortality rates for all three Pacific groups were higher than for European or Asian / Indian babies, neonatal mortality rates for (Any) and Prioritised Pacific babies were similar to those of (Prioritised) Māori babies (**Figure 90**).

Table 40. Causes of Neonatal Mortality (0-28 days), New Zealand 2000-2004

Cause of Death	Number: Total 2000-04		Number: Annual Average		Rate per 100,000 Live Births		% of Deaths	
New Zealand								
Extreme Prematurity	253		50.6		89.4		25.4	
Congenital Anomaly: CVS*	76	255	15.2	51.0	26.9	90.1	7.6	25.6
Congenital Anomaly: CNS*	34		6.8		12.0		3.4	
Congenital Anomaly: Other	145		29		51.2		14.5	
Intrauterine/ Birth Asphyxia	57		11.4		20.1		5.7	
SIDS	16		3.2		5.7		1.6	
Suffocate /Strangle in Bed	10		2.0		3.5		1.0	
Other Causes	407		81.4		143.8		40.8	
Total	998		199.6		352.6		100.0	
(Any) Pacific								
Extreme Prematurity	56		11.2		133.1		31.5	
Congenital Anomaly: CVS*	12	36	2.4	7.2	28.5	85.5	6.7	20.2
Congenital Anomaly: CNS*	6		1.2		14.3		3.4	
Congenital Anomaly: Other	18		3.6		42.8		10.1	
Intrauterine/ Birth Asphyxia	11		2.2		26.1		6.2	
SIDS	3		0.6		7.1		1.7	
Other Causes	72		14.4		171.1		40.4	
Total	178		35.6		422.9		100.0	

Source: Numerator-National Mortality Collection; Denominator- Birth Registration Dataset; CVS: cardiovascular system; CNS: central nervous system; (Any) Pacific: Includes children and young people who identify as Pacific in ANY of their three first ethnic groups

Figure 90. Neonatal Mortality Rates by Ethnicity, New Zealand 1996-2004



Source: Numerator-National Mortality Collection; Denominator- Birth Registration Dataset; Ethnicity for Non-Pacific Groups is Level 1 Prioritised; Ethnicity for Pacific Groups also assigned using Any / Sole Classification (see page 11 for details)

Risk Factors: Congenital Anomalies & Extreme Prematurity/Perinatal Conditions

During 2000-2004, risk of mortality from congenital anomalies was *significantly higher* for Pacific infants than for European infants. Rates were also *significantly higher* for those living in the most deprived (Decile 9-10) areas (**Table 41**). During the same period, risk of mortality from extreme prematurity / perinatal conditions was *significantly higher* for Pacific infants than for European or Asian / Indian infants. Mortality was also *significantly higher* for males and those living in the most deprived (Decile 9-10) areas (**Table 42**).

Table 41. Risk Factors for Infant Mortality due to Congenital Anomalies, New Zealand 2000-2004

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Quintile				Prioritised Ethnicity			
1-2	103.99	1.00		Māori	118.0	0.90	0.70-1.15
3-4	108.04	1.04	0.70-1.55	Pacific	185.3	1.42	1.06-1.91
5-6	129.92	1.25	0.86-1.82	European	130.7	1.00	
7-8	132.52	1.27	0.88-1.82	Asian/Indian	130.6	1.00	0.68-1.46
9-10	163.47	1.57	1.12-2.20				
Gender							
Female	123.8	1.00					
Male	140.8	1.14	0.93-1.40				

Source: Numerator-National Mortality Collection; Denominator- Birth Registration Dataset; Note: Rate per 100,000 live births per year, based on all infants <1 year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Table 42. Risk Factors for Infant Mortality due to Extreme Prematurity and Other Perinatal Conditions, New Zealand 2000-2004

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Quintile				Prioritised Ethnicity			
1-2	203.5	1.00		Māori	281.6	1.21	1.02-1.43
3-4	218.2	1.07	0.81-1.42	Pacific	386.9	1.66	1.35-2.04
5-6	233.1	1.15	0.88-1.51	European	233.3	1.00	
7-8	240.5	1.18	0.91-1.53	Asian/Indian	177.0	0.76	0.55-1.05
9-10	356.4	1.75	1.38-2.22				
Gender							
Female	237.4	1.00					
Male	281.6	1.19	1.03-1.38				

Source: Numerator-National Mortality Collection; Denominator- Birth Registration Dataset; Note: Rate per 100,000 live births per year, based on all infants < 1 year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted.

Post-Neonatal Mortality

Most Frequent Causes of Post-Neonatal Mortality

In New Zealand during 2000-2004, the most frequent causes of post-neonatal mortality were SIDS and congenital anomalies, although conditions arising during the perinatal period still also played a role. In addition, a large number of babies were identified as dying as a result of suffocation or strangulation in bed, although it is possible that some of these may have been coded as SIDS cases in previous years. For (Any) Pacific infants during this period the pattern was similar, with congenital anomalies and SIDS being the leading causes of post-neonatal mortality, followed by suffocation / strangulation in bed (**Table 43**).

Table 43. Causes of Post-Neonatal Mortality (29-364 days), New Zealand 2000-2004

Cause of Death	Number: Total 2000-2004		Number: Annual Average		Rate per 100,000 Live Births		% of Deaths	
New Zealand								
SIDS	221		44.2		78.1		33.3	
Suffocation/Strangulation in Bed	54		10.8		19.1		8.1	
Unspecified Causes	29		5.8		10.2		4.4	
Congenital Anomalies: CVS	46	121	9.2	24.2	16.3	42.8	6.9	18.2
Congenital Anomalies: CNS	22		4.4		7.8		3.3	
Congenital Anomalies: Other	53		10.6		18.7		8.0	
Injury and Poisoning	37		7.4		13.1		5.6	
Other Perinatal Conditions	58		11.6		20.5		8.7	
Other Specified Causes	144		28.8		50.9		21.7	
Total	664		132.8		234.6		100.0	
(Any) Pacific								
SIDS	28		5.6		65.5		22.2	
Suffocation/Strangulation in Bed	16		3.2		38.0		12.7	
Unspecified Causes	7		1.4		16.6		5.6	
Congenital Anomaly: CNS	10	29	2.0	5.8	23.8	68.9	7.9	23.0
Congenital Anomaly: CVS	9		1.8		21.4		7.1	
Congenital Anomaly: Other	10		2.0		23.8		7.9	
Perinatal Conditions	11		2.2		26.1		8.7	
Injury / Poisoning	5		1.0		11.9		4.0	
Other Specified Causes	30		6.0		71.3		23.8	
Total	126		25.2		299.4		100.0	

Source: Numerator-National Mortality Collection; Denominator- Birth Registration Dataset; Note: CVS: cardiovascular system; CNS: central nervous system; (Any) Pacific Includes children and young people who identify as Pacific in ANY of their three first ethnic groups.

Table 44. Risk Factors for Infant Mortality due to Sudden Unexpected Death in Infancy, New Zealand 2000-2004

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Quintile				Prioritised Ethnicity			
1-2	22.6	1.00		Māori	289.2	6.31	4.81-8.28
3-4	79.0	3.49	1.74-7.00	Pacific	110.5	2.41	1.60-3.64
5-6	63.1	2.79	1.38-5.66	European	45.8	1.00	
7-8	122.7	5.43	2.81-10.50	Asian/Indian	21.1	0.46	0.19-1.14
9-10	239.8	10.61	5.61-20.06				
Gender							
Female	105.7	1.00					
Male	130.4	1.23	0.99-1.53				

Source: Numerator-National Mortality Collection; Denominator- Birth Registration Dataset; Note: SUDI comprises SIDS, suffocation / strangulation in bed and unspecified causes; Rate per 100,000 live births per year, based on all infants <1 year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted.

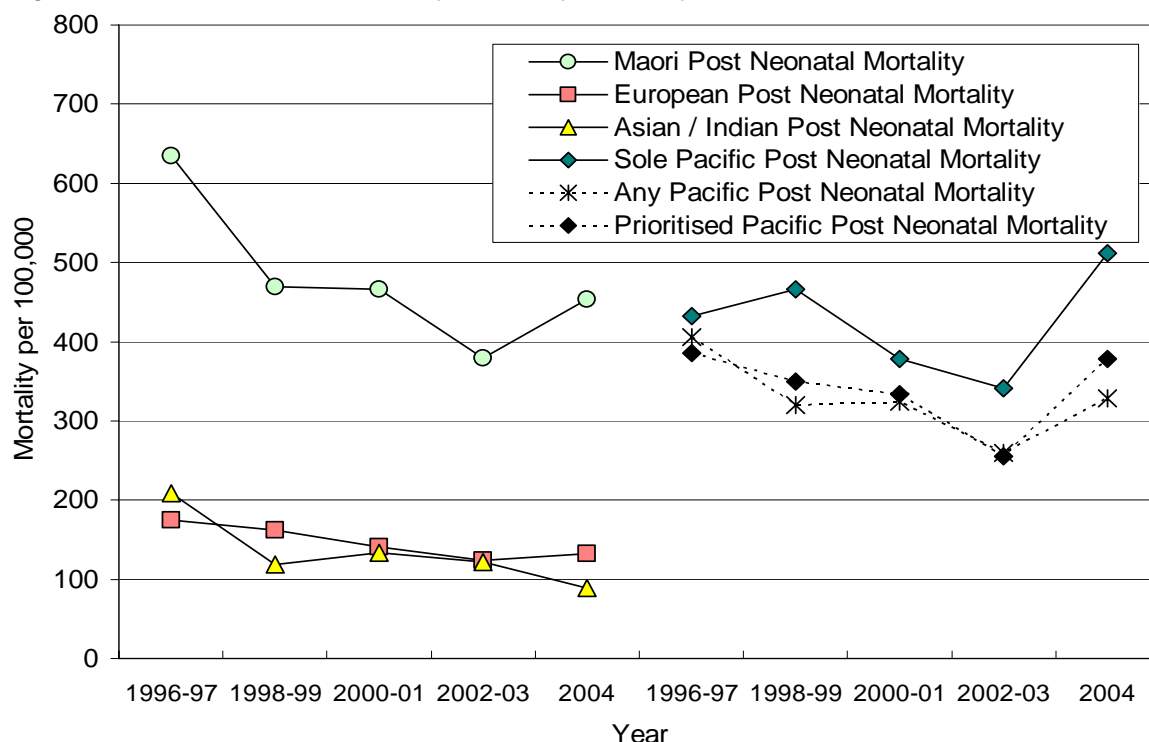
Risk Factors for Sudden Unexpected Death in Infancy (SUDI)

During 2000-2004, risk of SUDI (a composite category combining SIDS, suffocation / strangulation in bed and unspecified causes) was *significantly higher* for Māori > Pacific > European and Asian / Indian infants and those living in the more deprived NZDep areas (Table 44).

Ethnic Trends in Post-Neonatal Mortality

During 1996-2006, post-neonatal mortality rates were higher for Sole Pacific than for Prioritised or (Any) Pacific babies. In addition, rates for all 3 Pacific groups were higher than for European or Asian / Indian babies (Figure 91).

Figure 91. Post-Neonatal Mortality Rates by Ethnicity, New Zealand 1996-2004



Source: Numerator-National Mortality Collection; Denominator- Birth Registration Dataset; Ethnicity for Non-Pacific Groups is Level 1 Prioritised; Ethnicity for Pacific Groups also assigned using Any / Sole Classification (see page 11 for details)

Summary

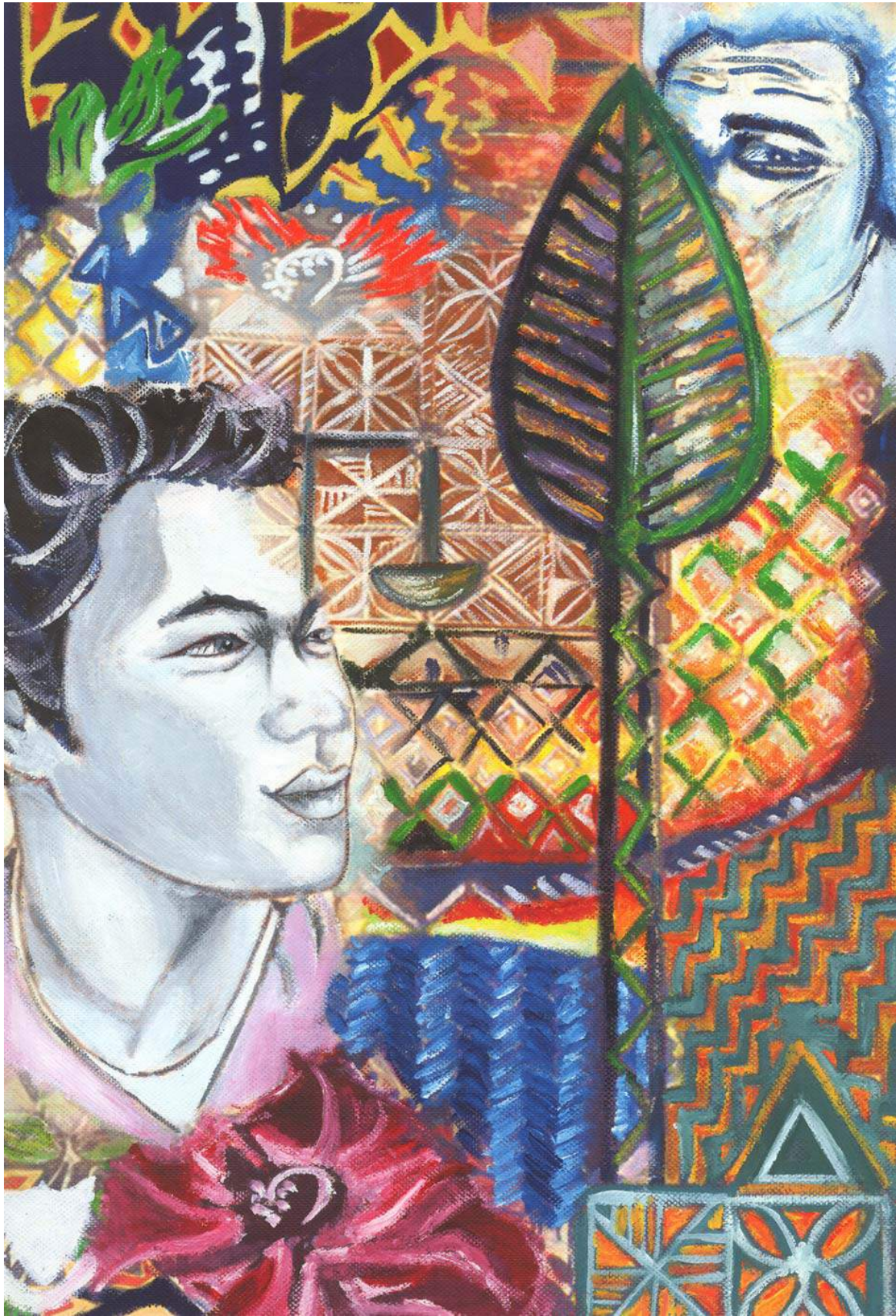
Neonatal Mortality: In New Zealand during 2000-2004, the most frequent causes of neonatal mortality in (Any) Pacific babies were extreme prematurity and congenital anomalies. Risk of mortality from congenital anomalies was *significantly higher* for Pacific infants than for European infants. Risk was also *significantly higher* for those living in the most deprived areas. Risk of mortality from extreme prematurity / perinatal conditions was *significantly higher* for Pacific infants than for European or Asian / Indian infants. Risk was also *significantly higher* for males and those living in the most deprived areas.

Post-Neonatal Mortality: During 2000-2004, the most frequent causes of post-neonatal mortality in (Any) Pacific babies were congenital anomalies and SIDS, followed by suffocation / strangulation in bed. Risk of SUDI (a composite category combining SIDS, suffocation / strangulation in bed and unspecified causes) was *significantly higher* for Māori > Pacific > European and Asian / Indian infants and those living in the more deprived NZDep areas.



Individual and Whanau Health and Wellbeing

Well Health



Self Portrait by Michael Lea
"The patterns and colour symbolise my cultural identity"

Viewpoint: Maternal and Well Child Issues

by Minnie Strickland

This report on the *Health of Pacific Children and Young People in New Zealand* is informative and timely. It highlights, yet again, the ethnic disparities that continue to exist in this country; which poses a challenge about future health care for Pacific children. A discussion about child health must include maternal health, since women need care prior to conception to enhance the potential outcomes for themselves and their offspring.

Approximately half of pregnancies in New Zealand are unplanned [179]. One cohort showed that 60% of mothers of Pacific infants had not planned their pregnancies [180]. The foetus is particularly vulnerable during the early days of pregnancy, often before most women know they are pregnant. The key concerns for unplanned pregnancies are alcohol intake, lack of folic acid supplementation and the use of cigarettes, drugs and medications [179].

New Zealand has one of the highest teenage pregnancy rates in the world [181]. In New Zealand, teenage pregnancy increases the risk of both preterm birth and small for gestational age (SGA) [182]. This report highlights during the period 2002-2006 teenage birth rates in Pacific women were significantly higher than the NZ European average. Of note, teenage births amongst New Zealand's Pacific Groups were highest in Cook Islands Māori women followed by Niue women.

It is widely accepted that good antenatal care is an important means of decreasing the risk of maternal and peri-natal mortality [183], [181], [182]. Research suggests that women who initiate their antenatal care later than the first trimester have poorer outcomes, such as low birth weight and pre-term birth [184]. Some studies suggest that approximately 40-70% of Pacific women tend to initiate antenatal care late and attend fewer visits than other women. A study in 2000 showed that 26.6% of mothers of Pacific infants initiated antenatal care late, and this finding was an improvement in comparison to previous research. That same study showed the maternal factors significantly associated with late initiation of antenatal care were high parity, first pregnancy, not being employed prior to pregnancy and Cook Islands Māori ethnicity [185].

Low Birth Weight is a frequently used peri-natal indicator as it predicts neonatal morbidity and mortality [170]. SGA and Preterm birth rates have been highlighted in this report and overall have decreased in recent years for Pacific babies. This trend is not seen in Cook Islands Māori babies as they have significantly higher SGA rates and Preterm birth rates than NZ European babies. It is clear that a focused strategy to inform Cook Islands Māori women about the benefits of early and adequate attendance of antenatal care is needed.

The benefits of breastfeeding (for both infant and mother) are numerous and well documented [186],[187]. The data presented in this report shows that the breastfeeding rates for Pacific babies in June 2005-2006 at <6 weeks, 3 months and 6 months were lower than the European/Other babies and similar to Māori babies. Furthermore, during this period there was a marked tapering off in exclusive/full breastfeeding rates as the infant aged. This suggests that the WHO recommendations of exclusive breastfeeding for 6 months, with the introduction of complementary food and continued breastfeeding thereafter were not met. One study of mothers of Pacific infants identified factors significantly associated with not exclusively breastfeeding. These included, amongst others, smoking, not seeing a midwife during pregnancy and having a home visit for the infant from a traditional healer. As suggested by the authors, the use of traditional healers will require further investigation within the New Zealand context [188].



Well Child

It is well documented that access to quality primary healthcare is associated with better health outcomes. This report identifies that enrolments of Pacific children and young people in Primary Health Organisations were higher than all other ethnic groups during October and December of 2006. Although this is encouraging news, there is also a paucity of Pacific ethnic-specific data in this report about accessing general practice services for this age group. Survey data from 1996 – 2004 highlighted that there seems to be an unmet need for general practitioner services in 13% of children and 20% of young people. The cost and lack of transport or inability to get an appointment soon enough or at a suitable time were cited as reasons for not seeing a GP.

In 2002 the Tamariki Ora Well Child Framework was developed to meet the increasing needs of children and their families. In 2006 over 90% of infants born in New Zealand were enrolled with Plunket, the leading Well Child Provider in this country. In the same period the proportion of Pacific Plunket enrolled children, who attended the 5 core visits offered in the first year of life, was intermediate between European/Other and Māori ethnic groups. Despite these trends over 75% of Pacific and Māori infants enrolled with Plunket attended Core 2- Core 5 visits. Unfortunately participation in future core visits decreased with increasing age. To date there is no national register of Well Child contacts and therefore the proportion of children who receive each scheduled contact is unknown.

Immunisation continues to be a priority population objective of the New Zealand Health Strategy. The report data shows improvements in the number of Pacific children fully immunized at 2 years from 53.1% to 80.7% in 1996 to 2005. In spite of these gains the Ministry of Health target of 95% has not been reached. Of concern is data from the National Immunisation Register during April-July 2007 which showed 59.3% of 6 month old children were fully immunised with lower rates seen in Māori and Pacific infants. The importance of timely immunisation has been documented and during the 1995 – 1997 pertussis epidemic delay in receipt of any of the three infant doses of pertussis vaccine was associated with a four-fold increased risk of hospitalisation with pertussis. Furthermore, delay in receiving the first vaccine dose is one of the strongest and most consistent predictors of subsequent incomplete immunisation [79].

Hearing Screening and Oral health are part of the Well Child checks. Hearing loss in infants is not often suspected by parents or health professionals until speech and language difficulties become apparent [189]. Hearing loss in Māori and Pacific children is diagnosed later than non-Māori, non-Pacific children. Pacific infants are over-represented in hearing loss statistics with 13.5% of notifications compared with 10.9% of the population in 2005 [190], [191] This report highlights that during 1993-2006, there was a gradual decline in audiometry failure rates at school entry across New Zealand. However, audiometry failure rates were highest for Pacific children and consistently lower for European/Other and Asian children.

The Ministry of Health's vision for oral health is "Good oral health for all, for life". The Strategic Vision for Oral health in New Zealand Report cites the inequalities in oral health and in access to oral health services have become increasingly evident in Māori, Pacific, rural and low socioeconomic populations [192]. It is highlighted in this report that Pacific children are worse off than European/Other children when it comes to oral health with lower proportions of Pacific and Māori children being caries free at 5 years. In 2005 only 50.7% of children aged 5 years had access to fluoridated drinking water based on the fluoridation status of the school rather than home. The Government has indicated that it will be investing in a strengthened community-based oral health service for young people and this is one step forward in improving the oral health of our Pacific children [192].

Recommendations:

1. To consider the establishment and implementation of a national register of Well Child contacts.
2. That a focused strategy to inform Pacific mothers, especially Cook Island Māori mothers, about the early and adequate attendance at antenatal visits be prioritised.
3. To consider further research into oral health in Pacific children due to the paucity of information that is currently available.



Immunisation

Introduction

Immunisation is among the most successful and cost-effective public health interventions [193, 194]. There are many celebrated successes including the eradication of smallpox in 1977, a worldwide decrease in poliomyelitis by 99% since 1988, and the elimination of measles from many parts of the world [193, 195]. Immunisation not only confers protection for individuals, but its benefits also extend to the community as a whole, via its effects on 'herd immunity' [196]. In addition, immunisation offers the potential to reduce socioeconomic disparities in vaccine preventable disease.

The New Zealand Childhood Immunisation Schedule offers free immunisations protecting against nine vaccine preventable diseases; Diphtheria, Tetanus, Pertussis (whooping cough), Poliomyelitis, Hepatitis B, Haemophilus influenzae type b, Measles, Mumps and Rubella. In addition, the Schedule offers publicly funded immunisation to those at risk of influenza, tuberculosis, and pneumococcal disease. Epidemic strain Meningococcal B immunisation is offered as a special programme (Table 45).

Table 45. Immunisation Schedule for Children Aged 0-11 Years, New Zealand 2006

Age	Immunisation given						Special programme
	DTaP-IPV	Hib-Hep B	Hep B	Hib	MMR	dTap-IPV*	MeNZB
6 weeks	•	•					•
3 months	•	•					•
5 months	•		•				•
10 months							•
15 months				•	•		
4 years	•				•		
11 years						•	

Source: Ministry of Health [197]; Key: D: diphtheria, d: adult diphtheria; T: tetanus; aP: acellular Pertussis, ap: adult acellular Pertussis; Hib: *Haemophilus influenzae* type b; Hep B: hepatitis B, IPV: inactivated polio vaccine; MMR: measles, mumps, rubella; MeNZB: meningococcal B vaccine. *dTap-IPV will be given in 2006–7 so children complete four doses of polio vaccine.

In New Zealand, immunisation coverage at two years of age is lower than that of many other developed countries, and rates of vaccine preventable disease are higher [196]. The Ministry of Health has thus included childhood immunisation in the 13 priority population health objectives in the New Zealand Health Strategy and has set a target of 95% coverage in children, which has not yet been met [196]. In order to improve coverage, recent changes to the immunisation programme have been instituted including [197]:

1. **Outreach immunisation services** which have been established in 16 DHBs for the follow-up of missed or delayed immunisations
2. **National Immunisation Register (NIR):** Implemented in 2004 the NIR collected immunisation information for the MeNZB programme, and in 2005 began collecting immunisation information on all individuals born after a specified date (which varies by DHB). The NIR aims to benefit individuals by facilitating the delivery of immunisation services and providing an accurate immunisation history. In the future it will provide valuable national and regional immunisation coverage information.

The following section reviews the available information on immunisation coverage for Pacific children in New Zealand, as well as selected vaccine preventable diseases nationally. It only reviews those immunisations included in New Zealand's routine Immunisation Schedule (**Table 45**) and thus does not include Meningococcal Disease (page 263) and Tuberculosis (page 280). Pertussis in children < 1 year is covered in more detail on page 304.

Data Source and Methods

Definition

1. Immunisation Coverage: Proportion of children who are fully immunised at 2 years of age
2. Immunisation Coverage: Proportion of Children Fully Immunised by Milestone Age (6 months, 12 months, 18 months)
3. Hospital Admissions for Vaccine Preventable Diseases covered by the NZ Immunisation Schedule
4. Notifications for Vaccine Preventable Diseases covered by the NZ Immunisation Schedule

Data Source and Interpretation

1. Immunisation Coverage at 2 Years

National Immunisation Coverage Surveys

Numerator: Children who are fully immunised at 2 years old

Interpretation: National Immunisation Surveys were conducted in 1992 and 2005, with a survey conducted in the Northern Region in 1996 utilising methods developed by the World Health Organisation.

Ethnicity Classification: Ethnicity was only reported for surveys conducted in 1996 and 2005.

2. Immunisation Coverage by Milestone Age

National Immunisation Register (NIR)

Numerator: Children on the NIR who reach the Milestone Age within the specified time period and who are fully immunised

Denominator: All children on the NIR who reach the Milestone Age within the specified time period

Interpretation: The NIR is a computerised information system that records immunisation details for New Zealand children. Information is collected on all children born after a specified date, the birth cohort. This date varies by DHB as NIR implementation was rolled out during 2005 starting with Counties Manukau and Waitemata in April and culminating with Nelson Marlborough in December 2005. Babies born in maternity facilities have their details sent directly to the NIR from discharge data. For babies born at home, Lead Maternity Carers are requested to send information to the NIR. Migrant children and children born to New Zealand citizens overseas, whose date of birth falls within the birth cohort, are registered at their first point of contact with primary health care services. After an immunisation event, immunisation information is sent to the NIR by the provider electronically or via paper/fax. An individual or parent/caregiver may choose not to have any further health information collected on the NIR (i.e., they opt-off). When an individual chooses to opt-off the NIR, their NHI, date of birth, DHB, date of opting off and immunisation events recorded prior to opting-off is retained in order to provide an accurate denominator for coverage calculations [198].

3. Hospital Admissions for Vaccine Preventable Diseases

National Minimum Dataset

Numerator: Hospital admissions for children and young people 0-24 years with a primary diagnosis of Diphtheria (ICD10 A36), Tetanus (ICD10 A33-A35), Pertussis ((A37), Poliomyelitis(A80), Hepatitis B (B16, B181, B180), Measles (B05), Mumps (B26) and Rubella (B06).

Denominator: NZ Census projected usual resident population

Interpretation: Note that Haemophilus influenzae type b cannot be identified via ICD-10 coding. The age range for hospital admissions differs for that used for notifications for VPD.

4. Notifications for Vaccine Preventable Diseases

The Institute of Environmental Science and Research (ESR)

Numerator: Notifications of Diphtheria, Tetanus, Pertussis, Poliomyelitis, Hepatitis B, Haemophilus influenzae type b, Measles, Mumps and Rubella in children and young people aged 0-19 years.

Denominator: 2001 Census usual resident population

Interpretation: Please note that the age range for notifications differs for that used for hospital admissions for VPD. All of the infectious diseases immunised against in New Zealand are notifiable under the Health Act 1956 and the Tuberculosis Act 1948. Notification data are recorded on a computerised database (EpiSurv) that sends data weekly to the ESR. Additional data is collected for some notifiable disease from laboratory-based surveillance and the NZ Paediatric Surveillance Unit (polio and congenital rubella). An assessment of sensitivity was made in 2003 using reporting on meningococcal disease which showed the sensitivity of meningococcal surveillance to be probably in excess of 87%. The system is inherently less sensitive for surveillance of chronic infection, notably hepatitis B infection [199].

Indicator Category Ideal B-C

Statistical Significance Testing

With the exception of Immunisation Coverage Survey data, tests of statistical significance have not been applied to data in this section, and thus any associations described do not imply statistical significance or non-significance.

Immunisation Coverage: National Surveys

Immunisation coverage surveys were undertaken in 1991/92, 1996 (Northern Region only) and 2005 using methodology developed by the World Health Organisation. A gradual improvement in the number of children fully immunised at two years of age has been demonstrated with <60% of children fully immunised in 1991/92 compared with 77.4% in 2005 (**Table 46**).

Table 46. Proportion of Children Fully Immunised at 2 Years of Age, New Zealand 1991/92, 1996, 2005

Year	Region					
	n	Northern	Central-Northern	Central-Southern	Southern	Total
1991/92 ¹	706	55.4% (47.7-62.9)	54.5% (46.9-61.9)	58.4% (50.8-65.7)	57.1% (49.4-64.5)	NR
1996 ²	775	63.1% (59.1-67.1)				
2005 ³	1,563	75.8% (72.0-79.6)	76.6% (70.4-82.8)	76.9% (72.4-81.3)	82.3% (77.1-87.6)	77.4% (75.3-79.5)

Sources: ¹Communicable Disease NZ [200]; ²North Health [201]; ³Ministry of Health [202]; Notes: Regions in 1991/96 correspond to Regional Health Authorities. Regions in 2005: Northern includes Northland, Waitemata, Auckland & Counties Manukau; Central-Northern includes Bay of Plenty, Lakes, Tairāwhiti, Taranaki & Waikato; Central-Southern includes Capital & Coast, Hawke's Bay, Hutt, MidCentral, Nelson Marlborough, Wairarapa & Whanganui; Southern includes Canterbury, Otago, South Canterbury, Southland & West Coast. NR: not reported. Percentages are followed by 95% Confidence Intervals.

Ethnicity

During 1996, survey data suggested that 53.1% of Pacific children in the North Health Region were fully immunised at 2 years, as compared to 63.1% nationally. During this period, coverage rates were *significantly higher* for European children than they were for Pacific or Māori children. While by 2005, immunisation coverage rates appear to have improved for all ethnic groups, differences in geographic coverage mean that these rates may not be strictly comparable. Nevertheless, during 2005 80.7% of Pacific children were fully immunised at 2 years of age, with coverage rates for Pacific children being similar to those of European / Other and Asian children (**Table 47**).

Table 47. Number of Children Fully Immunised at 2 Years of Age by Ethnicity, New Zealand 1996, 2005

Ethnicity	North Health Regional Survey ¹		National Survey ²	
	1996 (n=775)		2005 (n=1563)	
	%	95% CI	%	95% CI
Māori	44.6	35.5-53.7	69.0	63.7-74.3
Pacific	53.1	43.7-62.5	80.7	73.7-87.6
European/Other	72.3	67.5-77.1	80.1	77.4-82.9
Asian			79.8	71.4-88.2
Total	63.1	59.1-67.1	77.4	75.3-79.5

Sources: ¹North Health [201]; ²Ministry of Health [202]. The North Health Region included Northland and North, West Central and South Auckland.

Coverage: The National Immunisation Register

Immunisation coverage is measured at the 'milestone ages' of 6 months, 12 months, 18 months, 24 months, 5 years and 12 years. If a child has received all of their age appropriate immunisations by the time they have reached the milestone age they are fully immunised (**Table 45**). The National Immunisation Register began collecting data in 2005, so data is only available for the 6, 12 and 18 month milestone ages.

6 Months: During the second quarter of 2007, 54.2% of Pacific children were fully immunised at 6 months, as compared to 59.3% nationally. During this period, coverage rates for Pacific children were intermediate between those of Māori (41.0%) and NZ European (64.9%) children (**Figure 92**). Immunisation rates for children living in the most deprived NZDep areas were similar to the national average, with the lowest rates being seen amongst children living in NZDep decile 3-6 areas (**Figure 93**). Because the 6 month milestone occurs shortly after the 5 month immunisation event is due, those fully immunised at 6 months represent children who received their first three immunisations on time.

12 Months: Between 6 and 12 months, no extra immunisations are scheduled; thus, there is time for a child to 'catch up' and receive their 6 week, 3 or 5 month immunisations before turning one year. Consequently, 78.1% of Pacific children who turned one year during the second quarter of 2007 were fully immunised, as compared to 81.0% nationally. Again coverage rates for Pacific children were intermediate between those of Māori (70.7%) and NZ European (86.4%) children (**Figure 92**).

18 Months: By 18 months, the proportion of Pacific children who were fully immunised had fallen to 60.3%, as compared to 63.7% nationally. This decline, (compared to coverage rates at 12 months) may have occurred as a result of children who were fully immunised at 12 months not receiving their 15 month immunisations prior to turning 18 months of age. Again coverage rates for Pacific children were intermediate between those of Māori (50.7%) and NZ European (69.5%) children (**Figure 92**).

Vaccine Preventable Disease

Hospital Admissions

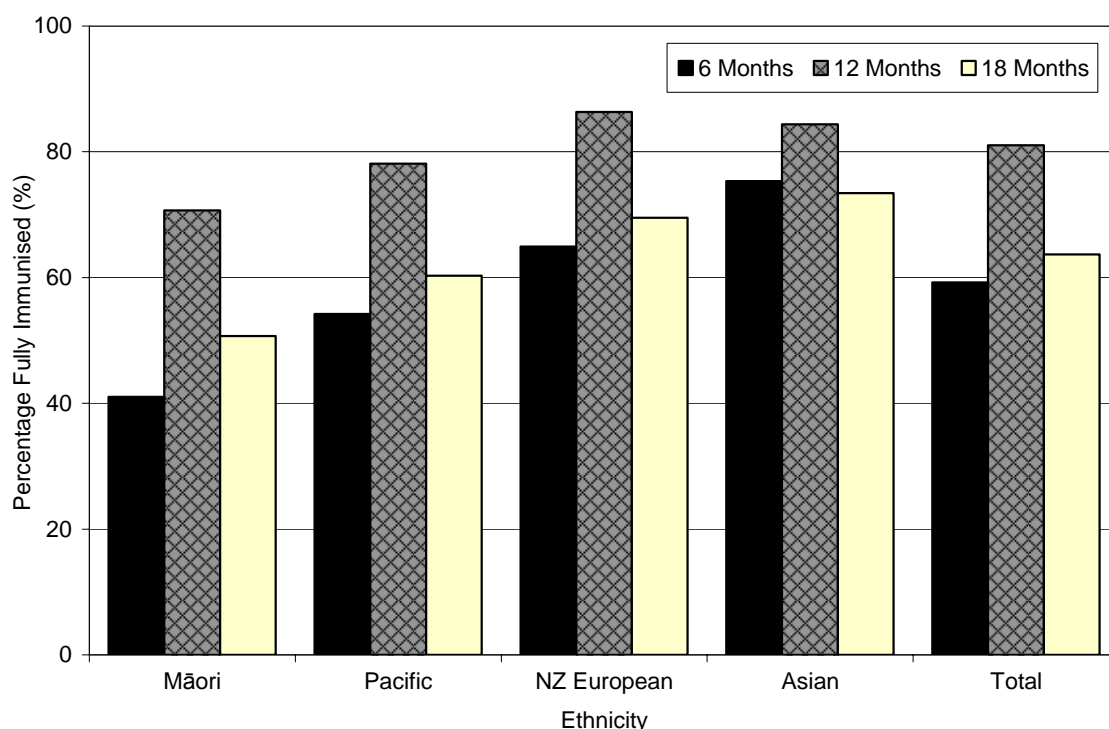
There were 836 hospital admissions for vaccine preventable diseases (VPD) in New Zealand children and young people during 2002-2006, with 79% being for Pertussis infection (**Table 48**). Hospital admissions for VPDs however most likely represent more severe presentations, and are likely to under represent the real burden of VPD in children and young people.

Notifications

During 2002-2006, 5389 cases of VPD were notified in New Zealand children aged 0-19 years. Pertussis was the most frequently notified VPD followed by mumps, measles, and rubella (**Table 49**).

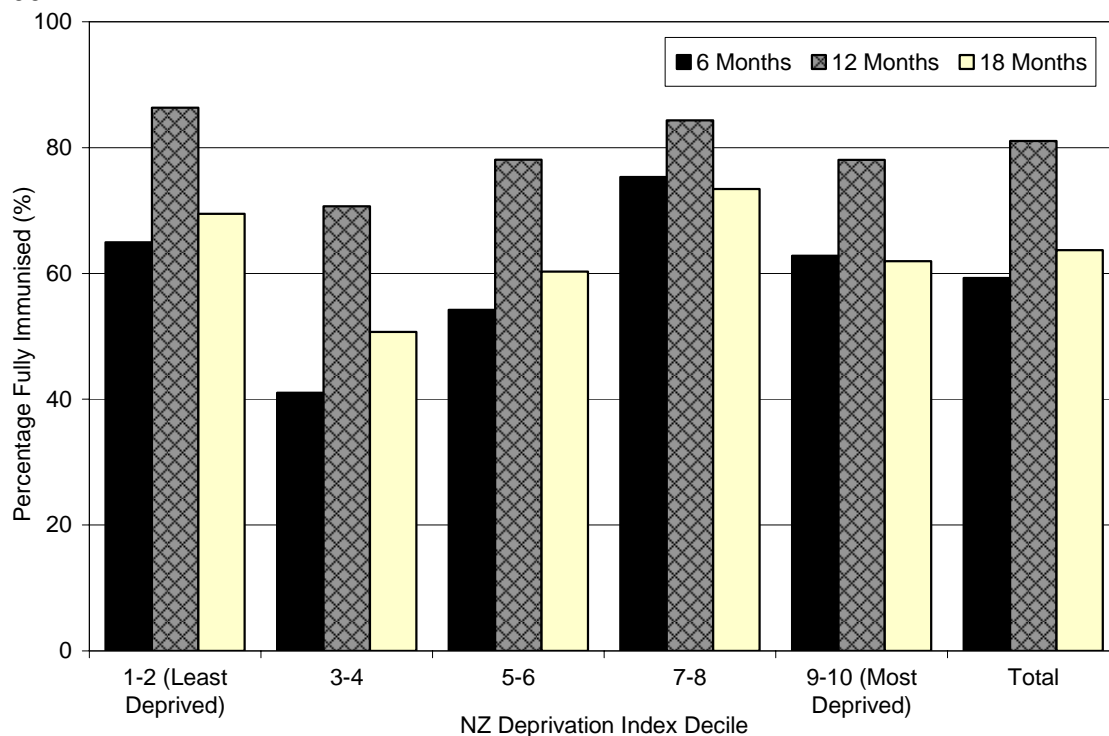


Figure 92. Immunisation Coverage for Children Enrolled on the National Immunisation Register by Milestone Age and Ethnicity, New Zealand 1 April - 1 July 2007



Source: Ministry of Health [203]; Note: Includes children enrolled on the NIR, who turned the milestone age within the quarter and who had received all of their age appropriate immunisations (6 months n=15,790; 12 months n=14,923; 18 months n=13,437). MeNZB immunisations excluded.

Figure 93. Immunisation Coverage for Children Enrolled on the National Immunisation Register by Milestone Age and NZ Deprivation Index, New Zealand 1 April - 1 July 2007



Source: Ministry of Health [203]; Note: Includes children enrolled on the NIR, who turned the milestone age within the quarter and who had received all of their age appropriate immunisations (6 months n=15,790; 12 months n=14,923; 18 months n=13,437). MeNZB immunisations excluded.

Table 48. Hospital Admissions for Selected Vaccine Preventable Diseases in Children and Young People 0-24 Years, New Zealand 2002-2006

Vaccine Preventable Disease (VPD)	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	% of VPD Admissions
Pertussis	659	131.8	9.4	78.8
Chronic Hepatitis B	87	17.4	1.2	10.4
Acute Hepatitis B	30	6	0.4	3.6
Mumps	29	5.8	0.4	3.5
Measles	20	4	0.3	2.4
Rubella	8	1.6	0.1	1.0
Tetanus	<5	0.6	s	0.4
Total	836	167.2	11.9	100.0

Source: Numerator-National Minimum Dataset; Denominator-Census; Note: Vaccine Preventable Diseases include only those on the Routine Immunisation Schedule. During 2001-05 there were no admissions for Diphtheria or Polio. *Haemophilus Influenzae* type b cannot be identified via ICD-10 coding. s= number too small to calculate rates

Table 49. Notifications of Selected Vaccine Preventable Diseases in Children and Young People 0-19 Years, New Zealand 2002-2006

Vaccine Preventable Disease (VPD)	2002	2003	2004	2005	2006	Number: Total 2002-2006	Number: Annual Average	Rate
Pertussis	818	433	2065	1236	354	4906	981.2	85.6
Mumps	48	40	31	45	34	198	39.6	3.5
Measles	19	60	29	19	19	146	29.2	2.5
Rubella	32	24	23	13	7	99	19.8	1.7
Hib	0	8	<5	<5	7	21	4.2	0.4
Acute Hepatitis B	<5	5	<5	5	5	17	3.4	0.3
Tetanus	0	0	0	0	<5	<5	s	s
Diphtheria	<5	0	0	0	0	<5	s	s
Total	919	570	2151	1322	427	5389	1077.8	94.1

Source: Institute of Environmental Science and Research (ESR) [204]; Note: VPDs listed are those on the Routine Immunisation Schedule. Rate is per 100,000. Hib: *Haemophilus influenzae* type b. No cases of poliomyelitis occurred during 2002-2006. s= number too small to calculate rate.

Summary

Immunisation is among the most successful and cost-effective public health interventions and access to immunisation is a priority population objective of the New Zealand Health Strategy [100, 193]. Survey data suggests that New Zealand's immunisation coverage rates have improved over the past two decades, with the proportion of children fully immunised at 2 years of age increasing from <60% in 1991/92 to 77% in 2005. During the second quarter of 2007, data from the National Immunisation Register suggested that the proportion of Pacific children who were fully immunised was 54.2% at 6 months, 78.1% at 12 months and 60.3% at 18 months of age. During this period, coverage rates for Pacific children were intermediate between those of Māori and European children.

Hearing Screening

Introduction

Hearing in infants and young children is essential for speech and language development and its loss during early life may lead to disability, the extent of which depends on the severity and timing of the loss [205]. Hearing loss is often divided into two categories: sensorineural hearing loss, arising from problems in the cochlear or auditory nerve (e.g. inherited conditions, congenital anomalies, extreme prematurity or in-utero infections[205]) and conductive hearing loss arising from problems in the middle or external ear (e.g. chronic otitis media with effusion).

The Well Child Tamariki Ora National Schedule outlines the following timeframe for the screening and surveillance of young children for hearing loss (**Appendix 9**):

1. Newborn (0-5 days): Lead Maternity Carer (LMC) / paediatricians screen children for risk factors of sensorineural hearing loss e.g. severe neonatal jaundice, extreme prematurity, in-utero infections, cranio-facial anomalies, family history of congenital hearing loss. Where risk factors are present children are referred to an audiologist for diagnostic assessment.
2. Hearing Surveillance and Surveillance for Otitis Media with Effusion by Well Child Provider at 6 week, 3, 5, 10, 15 and 24 month visits and referral if hearing impairment or otitis media with effusion suspected.
3. Age 3 Years: Screening at registered pre-school venues using tympanometry to detect chronic middle ear effusion. Immediate referral if evidence of obstruction or perforation, otherwise referral following 2 failed tympanometry tests with a 10-16 week test-retest interval.
4. Age 5 Years: Screening of all school new entrants with audiometry and tympanometry to detect undiagnosed hearing loss or persistent middle ear disorder. Immediate referral if hearing loss is marked, otherwise referral following 2 failed tests with a 10-16 week test-retest interval.

Despite this comprehensive schedule, evidence would suggest that the screening of newborn infants for “risk criteria” has not led to a reduction in the age of detection of hearing loss, with the average age at detection during 1991-2000 being 28.6 months and “risk factor” approaches (even if achieving 100% coverage, which may not be the case nationally) only picking up 40% of children [206]. The following section reviews the results of screening for hearing loss at school entry in Pacific children in New Zealand during the past 14 years.

Data Source and Methods

Definition

1. New Entrant Hearing Screening Coverage: Number of new entrant children screened, divided by the number enrolled in each school region at the beginning of July.
2. Failure of Pure Tone Audiometry: At least two thresholds 45dB or greater (this result is an immediate referral to audiology services if tympanometry is normal, or to the GP or specialist ear nurse if the tympanometry is abnormal). At least one threshold exceeding the screening levels of 30dB (500Hz) or 20dB (1000-4000Hz)- this results in the child being scheduled for a retest at the next visit (in 10-16 weeks time)

Data Source

New Zealand Hearing Screening Reports produced by the National Audiology Centre

Indicator Category Proxy B-C

Notes on Interpretation

Hearing screening information in this section was obtained from the National Audiology Centre's annual reports for the period 2005-06. The National Audiology centre in turn receives this information from Vision Hearing Technicians and Public Health Nurses employed by DHBs and Health Trusts throughout NZ.

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

Coverage

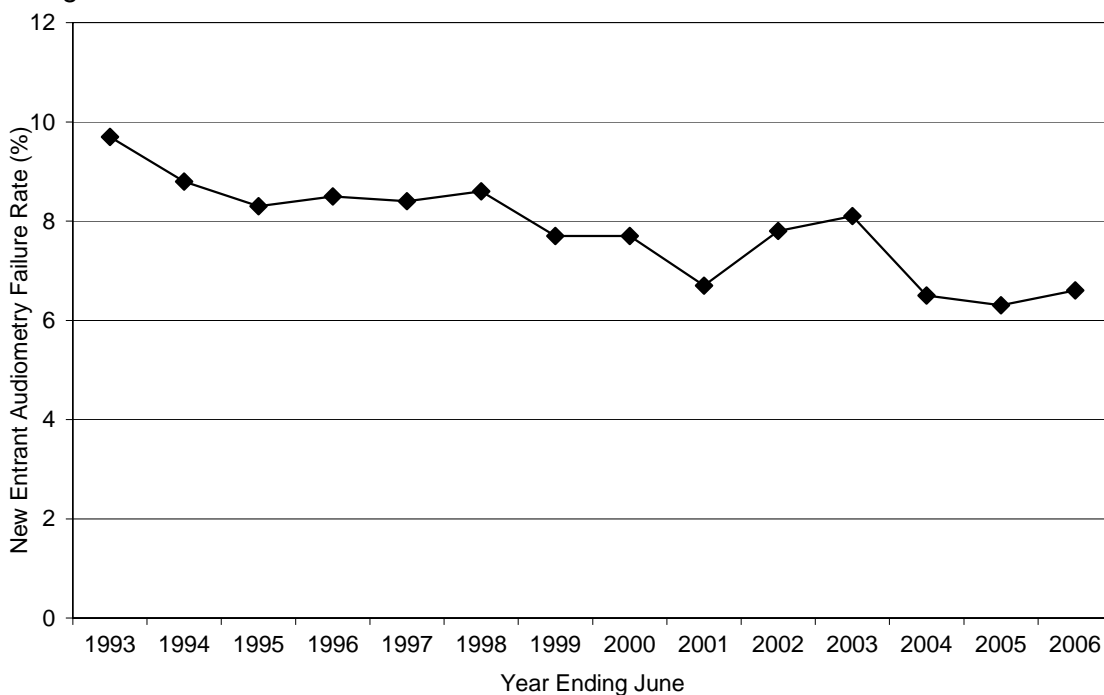
Nationally, coverage for hearing screening at school entry during the year ending June 2005 was 89%, while coverage during the year ending June 2006 was 99%.

Audiometry Failure Rates at School Entry

New Zealand Trends and Ethnic Differences

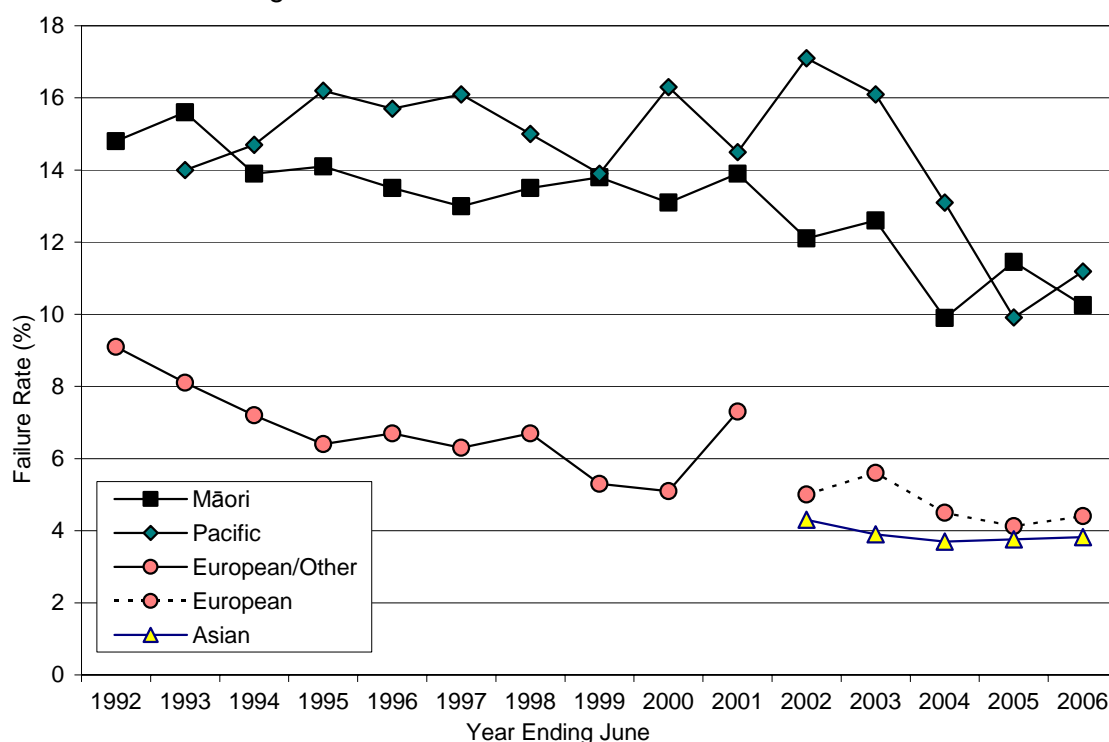
In New Zealand during 1993-2006, there was a gradual decline in audiometry failure rates at school entry, with overall rates falling from 9.7% in 1993, to 6.6% in 2006 (**Figure 94**). While rates for Pacific children also declined during this period, (from 14.0% in 1992 to 11.2% in 2006), most of this decline occurred during 2002-2006. In addition, rates for Pacific children remained higher than for European / Other (1993-2001) and European and Asian (2002-2006) children throughout this period. Screening failure rates for Pacific children were also higher than for Māori children for the majority of this period (**Figure 95**).

Figure 94. Audiometry Failure Rates at School Entry (5 Years), New Zealand Years Ending June 1993-2006



Source: National Audiology Centre (via Greville Consulting)

Figure 95. Audiometry Failure Rates at School Entry (5 Years) by Ethnicity, New Zealand Years Ending June 1993-2006



Source: National Audiology Centre (via Greville Consulting)

Summary

Hearing in infants and young children is essential for speech and language development and its loss during early life may lead to disability, the extent of which depends on the severity and timing of the loss. While the proportion of Pacific children failing their school entry audiometry tests declined during 2002-2006, rates remained persistently higher than for European and Asian children. Adequate referral and follow up for children failing their audiometry tests is essential, in order to ensure that they reach their full potential during their early years of education.

Oral Health

Introduction

While up until the early 1990s, dental caries rates amongst New Zealand children were gradually declining, in more recent years rates have become static or even increased slightly. Large ethnic, socioeconomic and regional disparities also remain, with Māori and Pacific children and those living in socioeconomic disadvantage being consistently more likely to experience poorer oral health outcomes [207]. In addition, while water fluoridation has been shown to reduce dental decay by up to 50%, and to be particularly effective in reducing socioeconomic and ethnic disparities in dental caries [208], during 2005 only 50.7% of New Zealand's 5 year olds lived in communities with fluoridated water supplies.

The School Dental Service was established in 1921 and currently provides basic preventative and restorative dental care for preschoolers and primary and intermediate school children via its team of dental therapists. While enrolment of preschool age children was only 56% in 1997, enrolment of school age children is high (>95%) [208]. Children are seen annually, unless deemed to be at high risk of dental disease, when 6-monthly visits are indicated. After Year 8 (Form 2), adolescents are eligible for dental care under the General Dental Benefit system up until the age of 18 years. This care is provided by private dentists working under contract with local DHBs. In addition, since 1988, dental caries data has been collected and reported on annually by the School Dental Service. The following section explores oral health outcomes for Pacific children in New Zealand using School Dental Service data provided by the Ministry of Health.

Data Sources and Methods

Definition

1. Percentage of Children Caries Free at 5 years
2. Mean DMFT (Decayed, Missing or Filled Teeth) Score at 12 Years (Year 8)
3. Proportion of 5 year old and Year 8 children who completed dental treatment

Data Sources

1. *Percentage of Children Caries Free at 5 Years*

Numerator: The total number of children aged 5 years whose deciduous teeth are caries free on completion of treatment with the school dental service

Denominator: The total number of 5 year olds who completed treatment with the school dental service

2. *Mean DMFT Scores at 12 Years (Year 8)*

Numerator: Total number of permanent teeth of children aged around 12 years that are decayed, missing (due to caries) or filled on completion of treatment in Year 8 prior to leaving the School Dental Service

Denominator: Total number of Year 8 children completing treatment with the school dental service

3. *Proportion of 5 and 12 Year Old Children who Completed Treatment*

Numerator: The number of 5 year old children who completed treatment prior to turning 6 years old, and the number of Year 8 children (aged approximately 12 years) that completed treatment in Year 8

Denominator: The number of 5 and 12 year old children at the 2006 Census

Indicator Category Ideal C

Notes on Interpretation

The oral health data used in this section were obtained from the Ministry of Health, which has collated information from the School Dental Service for the period 1990-2006. Once children are enrolled with the dental service they are seen, assessed and have appropriate treatment prescribed. Upon completion of set treatment, dental health status data is collected on 5 year olds and children in Year 8 (aged approximately 12 years). Therefore, unless treatment is completed prior to a child turning 6 years old or prior to discharge from the dental service in Year 8, a child's dental status is not recorded in the national dataset. In regions where the proportion completing treatment is less than 100% it is likely that the oral health status of children is worse than reported because children with no dental caries will have data collected on assessment. In this section, fluoridation status refers to the water supply of the school which the student attended, rather than the fluoridation status of the area in which they resided.

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance.

Ethnicity Classification

School Dental Services use the ethnicity information entered on each child's school record by school staff using the Ministry of Education's categories (Māori, Pacific and Other), with recent reports suggesting that the validity of this information may be unclear [209].

New Zealand Distribution and Trends

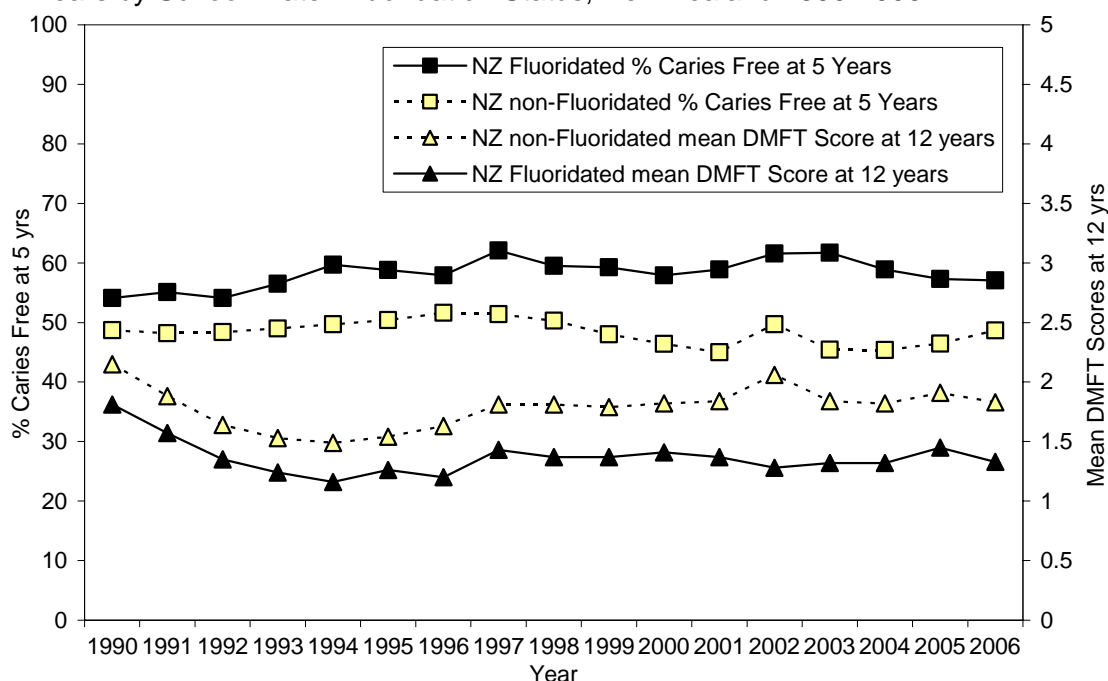
Fluoridation Status

During 2006, School Dental Service data indicate that 85.9% of Pacific children aged 5 years in New Zealand had access to fluoridated drinking water. This information is based on the fluoridation status of the child's school however, rather than the area in which they lived.

New Zealand Trends

During 1990-2006, the percentage of New Zealand children who were caries free at 5 years was consistently higher for those attending schools with fluoridated water supplies. Similarly, mean DMFT scores were consistently higher for children attending schools without access to fluoridated water (**Figure 96**).

Figure 96. Percentage of Children Caries Free at 5 Years and Mean DMFT Scores at 12 Years by School Water Fluoridation Status, New Zealand 1990-2006



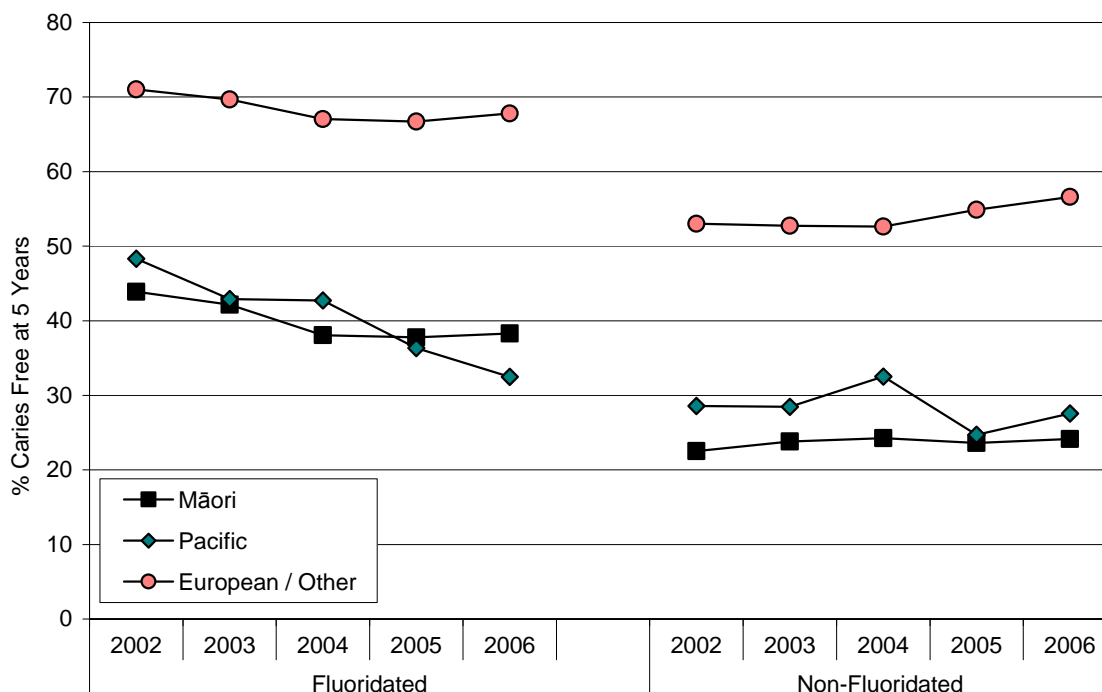
Source: Ministry of Health

Ethnic Differences

During 2002-2006, a higher proportion of Pacific children were caries free in schools with fluoridated water supplies. While the proportion of Pacific children who were caries free in fluoridated areas declined (48.3% in 2002 to 32.5% in 2006), the proportion who were caries free in non-fluoridated areas was more static (28.6% in 2002 to 27.5% in 2006). Throughout this period, a lower proportion of Pacific and Māori children were caries free at 5 years than European children, in both fluoridated and non-fluoridated areas (**Figure 97**). Similarly, mean DMFT scores were lower for Pacific children in fluoridated areas. Mean DMFT scores at 12 years for Pacific children in fluoridated areas rose (1.53 in 2002 to 1.74 in 2006), while mean DMFT scores in non-fluoridated

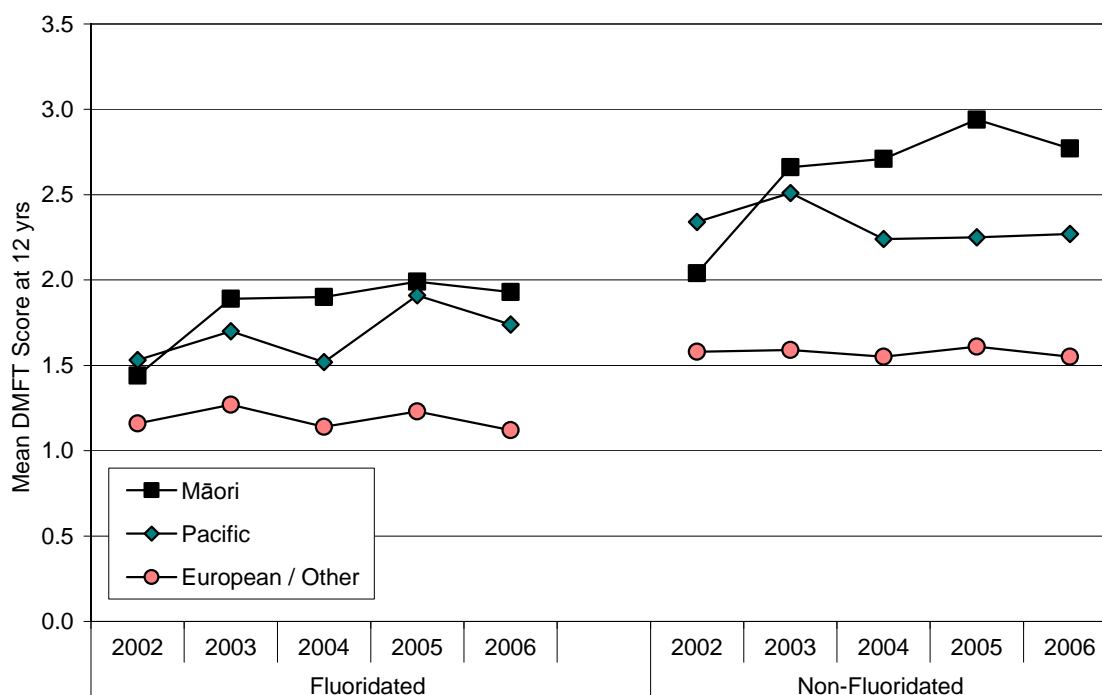
areas were more static (2.34 in 2002 to 2.27 in 2006). In comparative terms, Māori and Pacific children had higher mean DMFT scores at 12 years than European children, in both fluoridated and non-fluoridated areas (**Figure 98**).

Figure 97. Percentage of Children Caries Free at 5 Years by Ethnicity and the Fluoridation Status of their School's Water Supply, New Zealand 2002-2006



Source: Ministry of Health; See Methods Section for Notes on Ethnicity Classification Used

Figure 98. Mean DMFT Scores at 12 Years by Ethnicity and the Fluoridation Status of the School's Water Supply, New Zealand 2002-2006



Source: Ministry of Health; See Methods Section for Notes on Ethnicity Classification Used

Issues with Interpretation

Information on dental health status is only collected on 5 year old children and those in Year 8 (approximately 12 years) who have been assessed and completed treatment. If a new entrant is not seen prior to turning 6, then their data will not be recorded. Similarly, if a prescribed course of treatment is not completed prior to a child turning 6, or prior to the completion of Year 8, then no data is collected on that child. In 2005, the proportion of children who had completed treatment at 5 years and thus contributed data was 69%, while the proportion contributing data in Year 8 was 80%. These figures potentially suggest that the number of children with poor oral health outcomes may be underestimated in these analyses.

Summary

During 2006, School Dental Service data indicate that 85.9% of Pacific children aged 5 years in New Zealand had access to fluoridated drinking water. This information is based on the fluoridation status of the child's school however, rather than the area in which they lived. While being higher than the national average, this is still of concern, as during 1990-2006 the percentage of children who were caries free at 5 years was consistently lower, and the mean DMFT score at 12 years was consistently higher for those attending schools without a fluoridated water supply. During 2002-2006, a higher proportion of Pacific children were caries free in schools with fluoridated water supplies. While the proportion of Pacific children who were caries free in fluoridated areas declined, the proportion who were caries free in non-fluoridated areas was more static. Throughout this period, a lower proportion of Pacific and Māori children were caries free at 5 years than European children, in both fluoridated and non-fluoridated areas. Similarly, mean DMFT scores were lower for Pacific children in fluoridated areas. Mean DMFT scores at 12 years for Pacific children in fluoridated areas rose, while mean DMFT scores in non-fluoridated areas were more static. In comparative terms, Māori and Pacific children had higher mean DMFT scores at 12 years than European children, in both fluoridated and non-fluoridated areas.



Individual and Whanau Health and Wellbeing

Safety

Total and Unintentional Injuries

Introduction

Outside of the perinatal period, injury is the leading cause of mortality for New Zealand children aged 0-14 years, with motor vehicle accidents being the leading cause of injury related death [210, 211] and falls being the leading cause of injury related hospital admission [212]. While males are over represented in nearly all injury categories, the type of injury also varies significantly with the developmental stage of the child (e.g. deaths due to choking are highest amongst infants, while drowning deaths are highest amongst children 1-4 years [210]). In terms of interventions aimed at addressing the high rates of injury amongst New Zealand children, a number of existing prevention strategies have shown promise (e.g. child restraints, traffic calming). Others however remain inadequately implemented (e.g. pool fencing), or await further development and testing (e.g. interventions to reduce child driveway deaths)[210].

Injuries are also the leading cause of hospital admission and death amongst young people 15-24 years, with motor vehicle accidents being the single most frequent cause in both categories [211, 213]. Non-accidental injuries also make a significant contribution, with self inflicted injuries and those arising from assault both being higher amongst young people than children 0-14 years [210-213]. Risk factors for injury related death include gender, ethnicity and age, with rates being highest amongst males, Māori young people and those in their late teens and early 20's [214]. Injury related hospital admissions show a similar pattern, although admissions due to falls, sport injuries and non-road traffic injuries have been lower amongst Māori than non-Māori in recent years [214].

The following section explores injury related hospital admissions and mortality among Pacific children and young people in New Zealand from all causes, before reviewing two injury categories in more detail: Unintentional Non-Transport Related Injuries and Injuries arising from Land Transport Accidents. While injuries sustained as the result of an assault are reviewed in a later section of this Stream, self inflicted injuries are considered in the section on Suicide and Self Harm in the Mental Health Stream.

Data Source and Methods

Definition

Hospital Admissions and Deaths from Injury in Children 0-14 Years and Young People 15-24 Years

Data Source

Admissions Numerator: National Minimum Dataset: Hospital admissions for children and young people 0-24 years with a primary diagnosis of injury (ICD-9 800-995: ICD-10 S00-T79). Causes of injury were assigned using the external cause code (E code). The following were excluded: 1) Those with an E code ICD-9 E870-879: ICD-10 Y40-Y84 (complications of medical/surgical care), ICD-9 E930-949 (adverse effects of drugs in therapeutic use) and ICD-9 E929, E969, E959 (late effects (>1 year) of injury); 2) Admissions with an Emergency Medicine Specialty code (M05-M08) on discharge (see Appendix 1);

Deaths Numerator: National Mortality Collection: Deaths of children and young people 0-24 years with a clinical code (cause of death) attributed to injury (ICD-9 E800-995: ICD-10 V01-Y36). Excluded were deaths with an E code ICD-9 E870-879: ICD-10 Y40-Y84 (complications of medical/surgical care), ICD-9 E930-949 (adverse effects of drugs in therapeutic use) and ICD-9 E929, E969, E959 (late effects (>1 year) of injury).

Causes of Injury Numerator: Causes of injury were assigned using the first E code in ICD10 as follows: Transport Accidents, Pedestrian (V01-V09), Cyclist (V10-V19), Motorbike (V20-29), 3-Wheeler (V30-39), Vehicle Occupant (V40-79), Other Land Transport (V80-89, V98-99); Falls (W00-W19), Mechanical Forces: Inanimate (W20-W49), Mechanical Forces: Animate (W50-64), Drowning/Submersion (W65-74), Accidental Threat to Breathing (W75-W84), Electricity/Fire/Burns (W85-X19), Accidental Poisoning (X40-X49), Intentional Self Harm (X60-84), Assault (X85-Y09), Undetermined Intent (Y10-Y34).

Broader Categories included Transport Accidents (V01-V89, V98-V99) and Unintentional Non-Transport Injuries (W00-W74, W85-X49). Transport accidents were assigned to traffic or non-traffic related categories based on the fourth digit of the External Cause code as outlined in the ICD-10 Tabular List of Diseases. For time series analyses broader diagnostic categories (as well as those relating to accidental threats to breathing, assault and self inflicted injuries) were also back mapped to ICD-9 (with coding for each of these categories available on request).

Denominator: NZ Census

Indicator Category Admissions: Proxy C; Mortality: Ideal B

Notes on Interpretation

The limitations of the National Minimum Dataset are discussed at length in Appendix 1. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data, particularly those which relate to injuries.

Statistical Significance Testing

95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

All Injuries

Most Frequent Causes of Injury Related Hospital Admission and Mortality

Injury Mortality: During 2000-2004, accidental threats to breathing followed by transport accidents were the leading causes of injury related mortality amongst (Any) Pacific children, although drowning also featured prominently in this age group. (Note: Care must be taken when interpreting accidental threat to breathing figures, as there may be some cross over with SIDS, with the majority of deaths occurring in infants < 1 year and whilst they were in bed). For (Any) Pacific young people, transport accidents (particularly vehicle occupant), followed by suicide were the leading causes of injury related mortality (**Table 50**).

Table 50. Most Frequent Causes of Injury Related Mortality in (Any) Pacific Children and Young People 0-24 Years, New Zealand 2000-2004

Injury Type	Total: 2000- 2004	Annual Average	Rate per 100,000	% of Injury Deaths
Children 0-14 Years				
Accidental Threat to Breathing	20	4	4.3	27.4
Drowning / Submersion	14	3	3.0	19.2
Transport Accident: Pedestrian	14	3	3.0	19.2
Transport Accident: Vehicle Occupant	5	1	1.1	6.8
Transport Accident: Other	4	1	0.9	5.5
Assault	5	1	1.1	6.8
Other Causes	11	2	2.4	15.1
Total	73	15	15.8	100.0
Young People 15-24 Years				
Suicide	41	8	19.1	37.6
Transport Accident: Vehicle Occupant	39	8	18.2	35.8
Transport Accident: Other	7	1	3.3	6.4
Accidental Poisoning	5	1	2.3	4.6
Assault	5	1	2.3	4.6
Drowning / Submersion	5	1	2.3	4.6
Other Causes	7	1	3.3	6.4
Total	109	22	50.9	100.0

Source: Numerator-National Mortality Collection; Denominator-Census; (Any) Pacific includes children and young people who identify as Pacific in ANY of their three first ethnic groups.

Hospital Admissions: In New Zealand during 2002-2006, falls followed by inanimate mechanical forces were the leading causes of injury related hospital admission for (Any) Pacific children, while the order was reversed for (Any) Pacific young people. Transport related injuries as a group however made a significant contribution in both age groups. While assaults and intentional self harm also featured prominently for young people, both categories of injury were less frequent in children (**Table 51**).

Table 51. Most Frequent Causes of Injury Related Hospital Admission for (Any) Pacific Children and Young People 0-24 Years, New Zealand 2002-2006

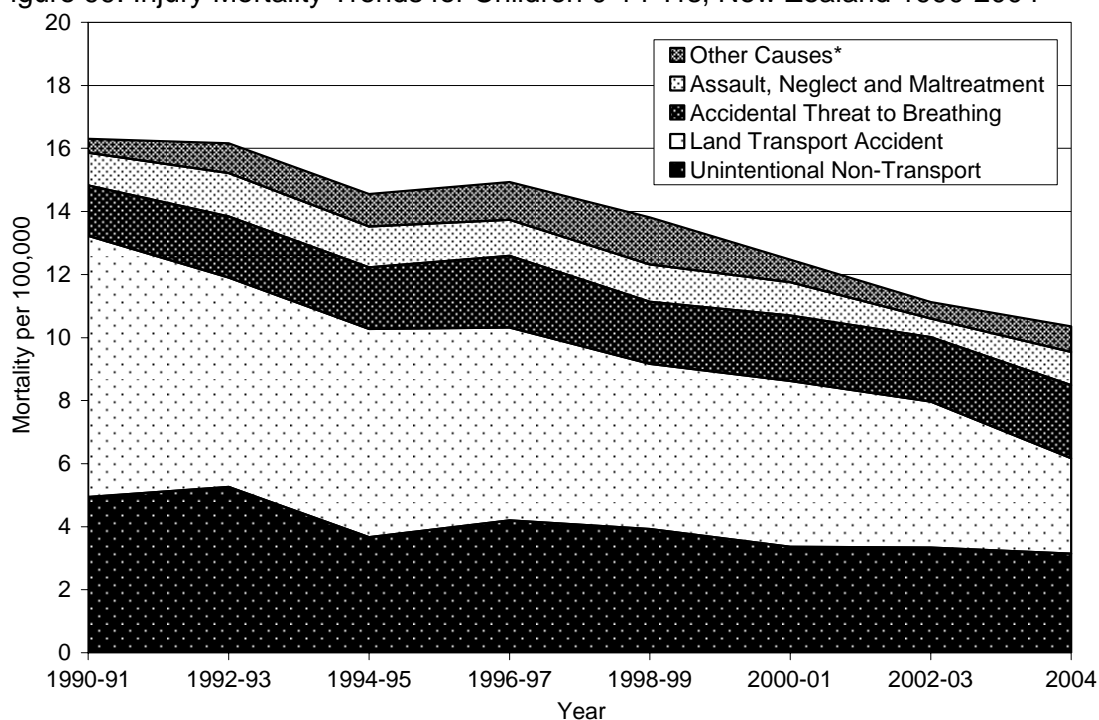
Mode of Injury	Number: Total 2002-06	Number: Annual Average	Rate per 100,000	% of Total
Children 0-14 Years				
Falls	2,696	539.2	560.1	39.9
Mechanical Forces: Inanimate	2,073	414.6	430.7	30.7
Transport Accident: Cyclist	241	48.2	50.1	3.6
Transport Accident: Pedestrian	230	46.0	47.8	3.4
Transport Accident: Vehicle Occupant	133	26.6	27.6	2.0
Transport Accident: Motorbike	12	2.4	2.5	0.2
Transport Accident: Other	26	5.2	5.4	0.4
Electricity / Fire / Burns	364	72.8	75.6	5.4
Mechanical Forces: Animate	270	54.0	56.1	4.0
Accidental Poisoning	184	36.8	38.2	2.7
Assault	140	28.0	29.1	2.1
Accidental Threat to Breathing	35	7.0	7.3	0.5
Intentional Self Harm	19	3.8	3.9	0.3
Drowning / Submersion	15	3.0	3.1	0.2
Undetermined Intent	11	2.2	2.3	0.2
Other Causes	304	60.8	63.2	4.5
Total	6,753	1350.6	1403.0	100.0
Young People 15-24 Years				
Mechanical Forces: Inanimate	1,217	243.4	534.3	28.3
Falls	852	170.4	374.1	19.8
Assault	651	130.2	285.8	15.1
Mechanical Forces: Animate	382	76.4	167.7	8.9
Transport Accident: Vehicle Occupant	368	73.6	161.6	8.6
Transport Accident: Pedestrian	71	14.2	31.2	1.7
Transport Accident: Cyclist	39	7.8	17.1	0.9
Transport Accident: Motorbike	38	7.6	16.7	0.9
Transport Accident: Other	27	5.4	11.9	0.6
Intentional Self Harm	168	33.6	73.8	3.9
Electricity / Fire / Burns	48	9.6	21.1	1.1
Accidental Poisoning	44	8.8	19.3	1.0
Undetermined Intent	13	2.6	5.7	0.3
Other Causes	383	76.6	168.2	8.9
Total	4,301	860.2	1888.4	100.0

Source: Numerator-National Minimum Dataset; Denominator-Census; (Any) Pacific Includes children and young people who identify as Pacific in ANY of their three first ethnic groups; Mechanical Forces: Inanimate includes being accidentally struck/crushed/injured by an object/implement

Trends in Injury Mortality

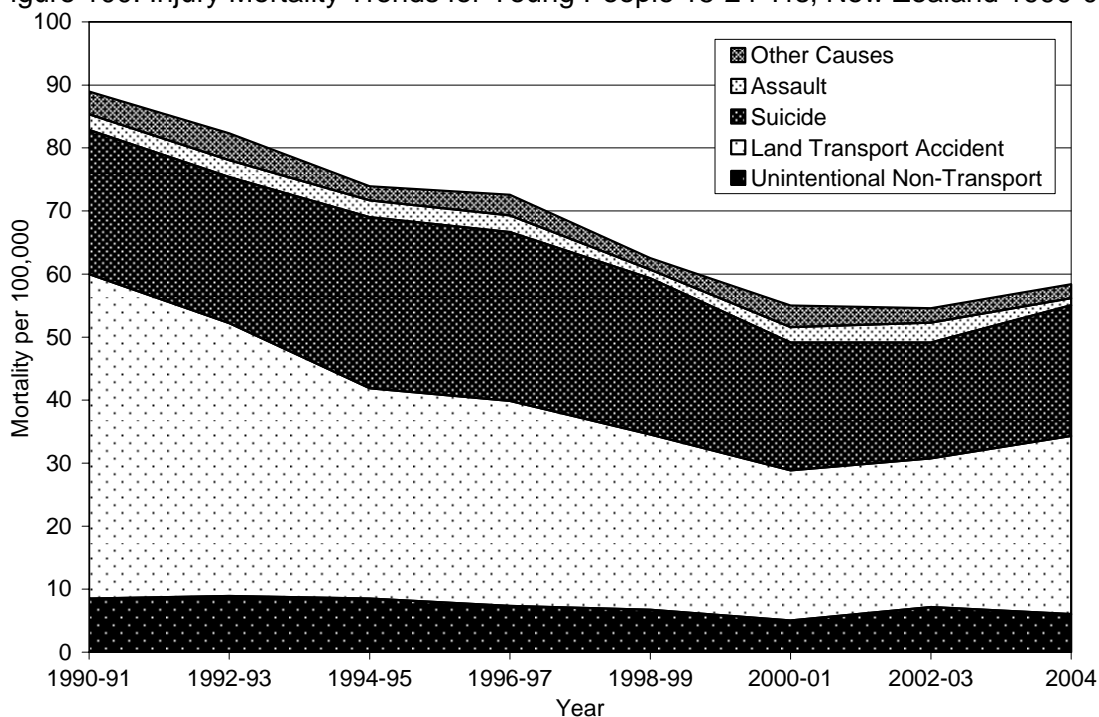
During 1990-2004, injury mortality for children gradually declined, with the largest absolute declines being in the land transport accident category (where rates fell from 8.3 per 100,000 in 1990-91 to 3.0 per 100,000 in 2004) (**Figure 99**). In contrast, while injury related mortality for those aged 15-24 years also declined during 1990-2001, upswings in land transport and unintentional non-transport injury deaths during 2002-2004 resulted in a small increase in overall mortality during this period (**Figure 100**).

Figure 99. Injury Mortality Trends for Children 0-14 Yrs, New Zealand 1990-2004



Source: Numerator-National Mortality Collection; Denominator-Census

Figure 100. Injury Mortality Trends for Young People 15-24 Yrs, New Zealand 1990-04



Source: Numerator-National Mortality Collection; Denominator-Census

Unintentional Non-Transport Injuries

Trends in Mortality

In New Zealand during 1990-2004, unintentional non-transport injury deaths (e.g. due to falls, mechanical forces, drowning, burns, poisoning) in children (0-14 years) gradually declined. While rates also declined for young people (15-24 years) during 1990-2001, an upswing in rates was evident during 2002-2004 (**Figure 101**).

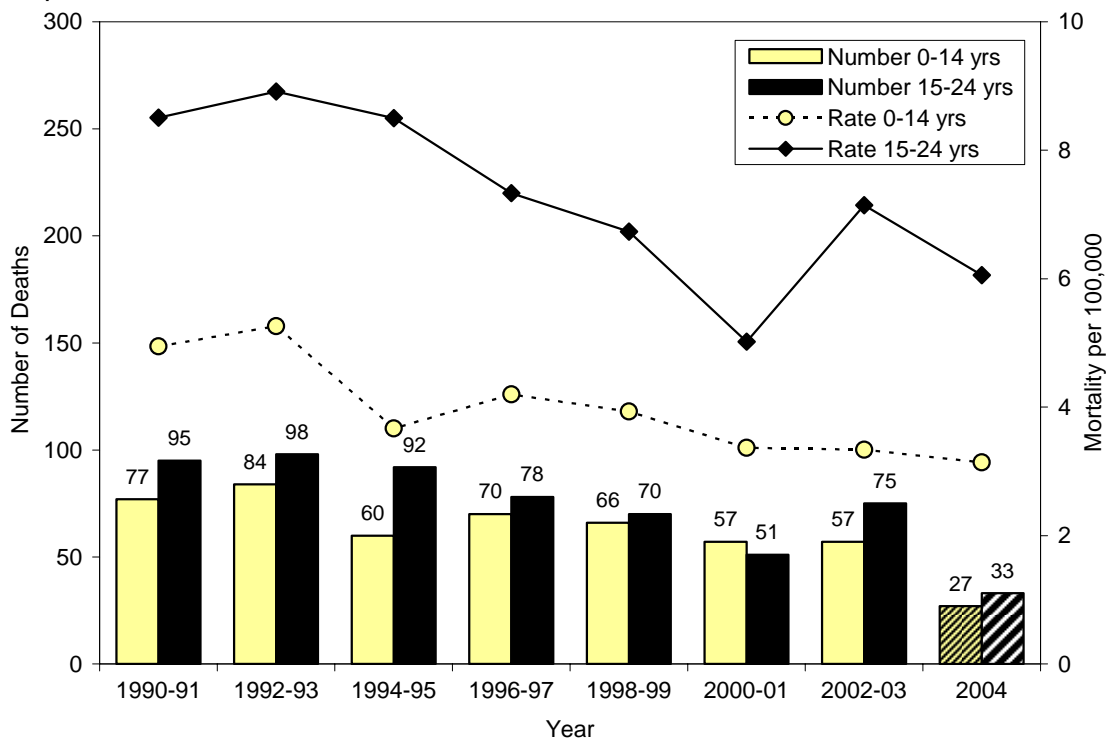
Gender and Age Differences

When broken down by age, unintentional non-transport related injury admissions were lowest amongst those <1 year, but then rose rapidly to peak between one and two years of age. While for females, rates declined throughout childhood and were lowest amongst those in their late teens and early 20s, for males this decline was much less marked, with admission rates amongst males in their late teens and early 20s being much higher than for females. With the exception of infants aged 1 year, a similar gender imbalance was seen for mortality (**Figure 102**). When broken down by cause, admissions for falls peaked in those aged 5 years, while accidental poisoning, inanimate mechanical forces and exposure to electricity / fire / burns were highest amongst those aged 1-2 years (**Figure 103**).

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

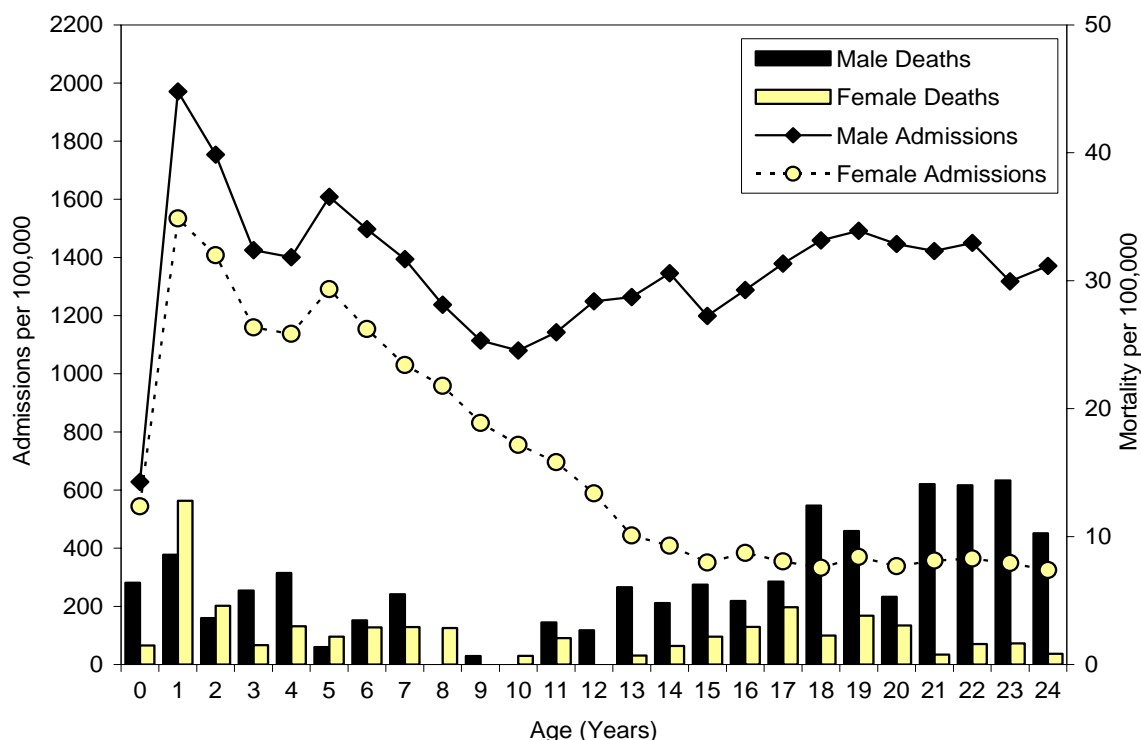
During 2002-2006, hospital admissions for unintentional non-transport injuries were *significantly higher* for Pacific and Māori > European > Asian Indian children and young people, males and those in living in the more deprived areas. While gender differences (male > female) were seen in both age groups, the male predominance was more marked in 15-24 year olds (**Table 52**, **Table 53**). During 1996-2004 mortality from unintentional non-transport injuries was generally higher for Māori children and young people (**Figure 104**).

Figure 101. Deaths from Unintentional Non-Transport Injuries in Children and Young People 0-24 Years, New Zealand 1990-2004



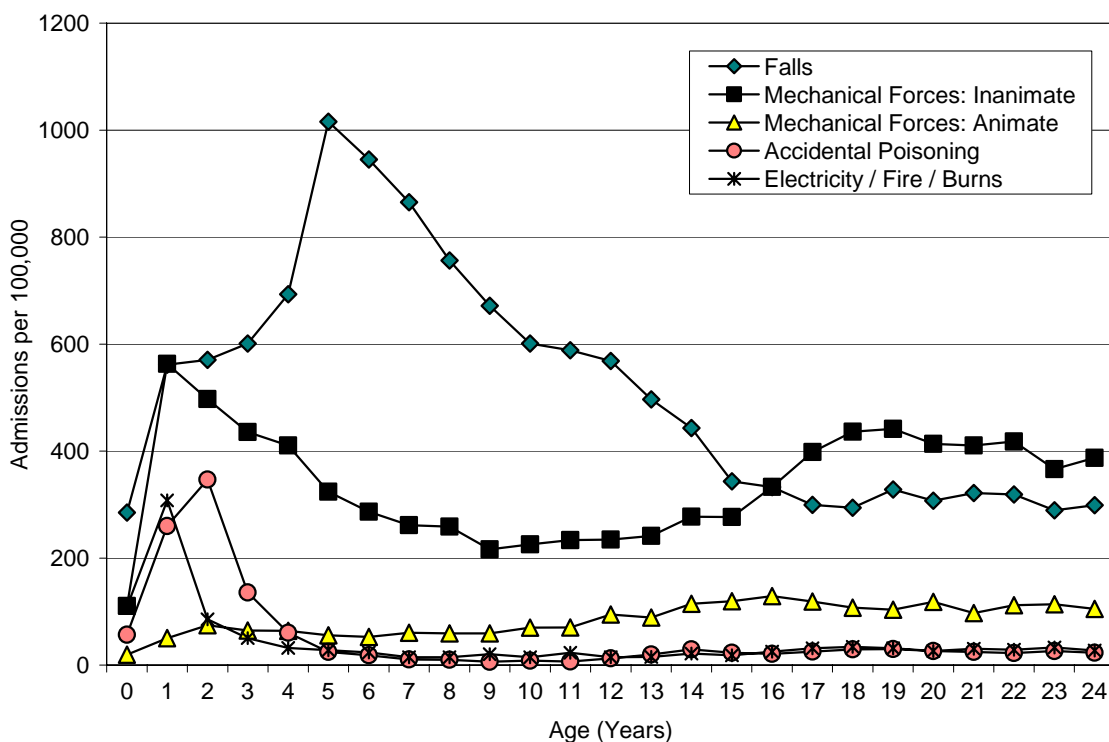
Source: Numerator-National Mortality Collection; Denominator-Census; Note: Deaths for 1990-2003 are per 2 year period. Deaths for 2004 are for single year only

Figure 102. Hospital Admissions (2002-2006) and Deaths (2000-2004) due to Unintentional Non-Transport Injuries in New Zealand Children and Young People 0-24 Years by Age and Gender



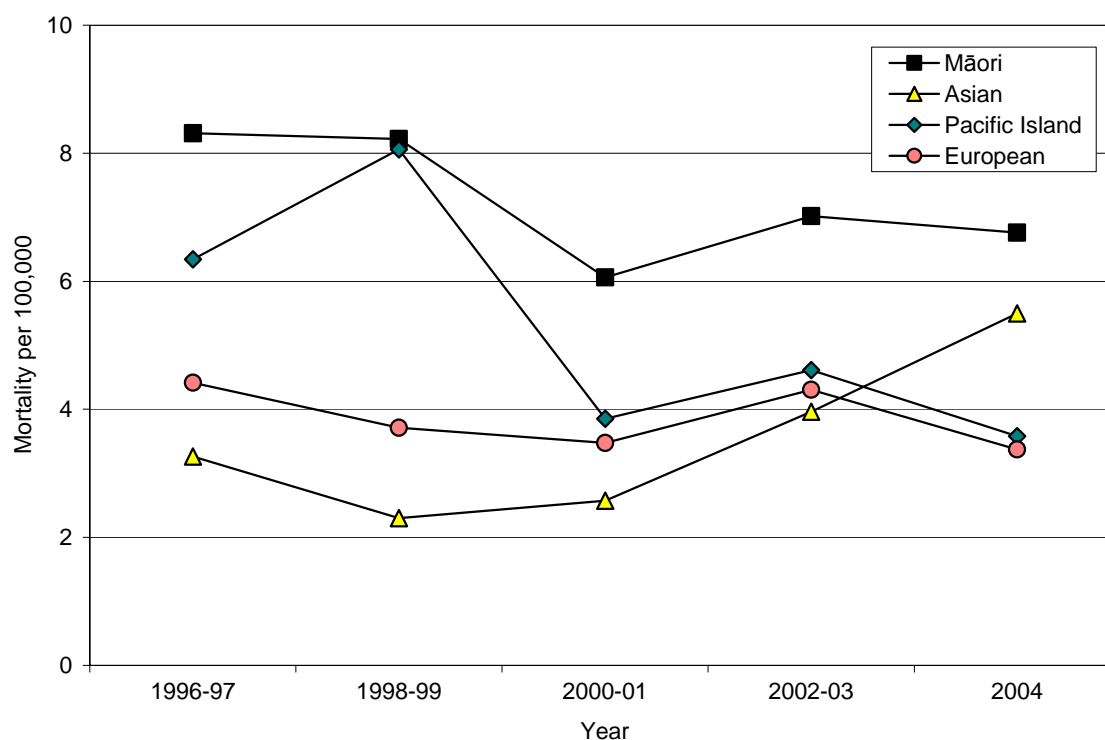
Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Census

Figure 103. Hospital Admissions for Unintentional Non-Transport Injuries in Children and Young People 0-24 Years by Age and Cause, New Zealand 2002-2006



Source: Numerator-National Minimum Dataset; Denominator-Census

Figure 104. Deaths due to Unintentional Non-Transport Injuries in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2004



Source: Numerator-National Mortality Collection; Denominator-Census; Ethnicity is Level 1 Prioritised

Table 52. Risk Factors for Hospital Admission due to Unintentional Non-Transport Injury in Children 0-14 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	789.28	1.00		1-2	789.53	1.00	
2	789.78	1.00	0.95-1.05	3-4	915.89	1.16	1.12-1.20
3	838.63	1.06	1.01-1.11	5-6	1052.88	1.33	1.29-1.37
4	995.01	1.26	1.20-1.32	7-8	1281.30	1.62	1.57-1.67
5	987.72	1.25	1.19-1.31	9-10	1504.32	1.91	1.86-1.97
6	1118.11	1.42	1.36-1.48	Prioritised Ethnicity			
7	1200.03	1.52	1.46-1.59	Māori	1270.47	1.14	1.12-1.16
8	1359.01	1.72	1.65-1.79	Pacific	1375.56	1.23	1.19-1.27
9	1524.63	1.93	1.85-2.01	European	1116.82	1.00	
10	1487.55	1.88	1.81-1.96	Asian/Indian	684.86	0.61	0.58-0.64
Gender							
Female	919.08	1.00		Male	1335.65	1.45	1.42-1.48

Source: Numerator-National Minimum Dataset; Denominator-Census; Note: Rate per 100,000. Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Table 53. Risk Factors for Hospital Admission due to Unintentional Non-Transport Injury in Young People 15-24 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	594.77	1.00		1-2	632.05	1.00	
2	668.16	1.12	1.04-1.20	3-4	753.78	1.19	1.13-1.25
3	735.34	1.24	1.16-1.33	5-6	775.80	1.23	1.17-1.29
4	772.43	1.30	1.21-1.39	7-8	887.82	1.40	1.34-1.46
5	740.13	1.24	1.16-1.33	9-10	1105.97	1.75	1.68-1.83
6	809.54	1.36	1.27-1.45	Prioritised Ethnicity			
7	813.87	1.37	1.28-1.46	Māori	1134.17	1.33	1.29-1.37
8	957.64	1.61	1.51-1.72	Pacific	1210.63	1.42	1.36-1.48
9	1075.84	1.81	1.70-1.93	European	853.85	1.00	
10	1137.07	1.91	1.80-2.03	Asian/Indian	292.06	0.34	0.32-0.36
Gender							
Female	352.76	1.00		Male	1379.88	3.91	3.79-4.04

Source: Numerator-National Minimum Dataset; Denominator-Census; Note: Rate per 100,000. Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Hospital Admissions for Unintentional Non-Transport Injuries Amongst Pacific Groups in New Zealand

During 2002-2006 (using the Sole / (Any) classification), unintentional non-transport injury admissions for children in each of New Zealand's largest Sole Pacific groups were *significantly higher* than for non-Māori non-Pacific children. While admissions for (Any) Samoan and Tongan children were also *significantly higher* than for non-Māori non-Pacific children, admissions for (Any) Cook Island Māori, Niue and Tokelauan children were *significantly lower* (**Table 54**). Admissions for young people in each of New Zealand's largest Sole Pacific groups were also *significantly higher* than for non-Māori non-Pacific young people, as were admissions for (Any) Samoan, Tongan and Fijian young people (**Table 55**).

Table 54. Hospital Admissions for Unintentional Non-Transport Injuries in Pacific Children 0-14 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Any Samoan	2,768	553.6	1,154.2	1.09	1.05-1.13
Any Tongan	1,204	240.8	1,219.8	1.16	1.10-1.23
Any Cook Island Māori	976	195.2	844.3	0.80	0.75-0.85
Any Niue	347	69.4	804.3	0.76	0.68-0.84
Any Fijian	162	32.4	1,142.1	1.08	0.93-1.26
Any Tokelauan	112	22.4	807.6	0.76	0.63-0.91
Any Other Pacific	205	41.0	1,450.5	1.37	1.20-1.57
Any Pacific	5,602	1,120.4	1,163.9	1.10	1.07-1.13
Any Māori	12,612	2,522.4	1,270.5	1.20	1.18-1.22
Non-Māori Non-Pacific	31,034	6,206.8	1,055.7	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Sole Samoan	2,127	425.4	1,710.3	1.62	1.55-1.69
Sole Tongan	960	192.0	1,648.2	1.56	1.46-1.66
Sole Cook Island Māori	660	132.0	1,554.7	1.47	1.36-1.59
Sole Niue	187	37.4	2,037.0	1.93	1.67-2.23
Sole Fijian	79	15.8	1,836.4	1.74	1.40-2.17
Sole Tokelauan	63	12.6	1,645.8	1.56	1.22-1.99
Sole Other Pacific	145	29.0	2,478.6	2.35	2.00-2.76
Sole Pacific	4,285	857.0	1,725.7	1.63	1.58-1.68
Sole Māori	10,071	2,014.2	2,320.9	2.20	2.15-2.25
Non-Māori Non-Pacific	31,034	6,206.8	1,055.7	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate ratios are compared to the Non-Māori Non-Pacific group and are unadjusted

Table 55. Hospital Admissions for Unintentional Non-Transport Injuries in Pacific Young People 15-24 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Any Samoan	1,223	244.6	1,091.5	1.41	1.33-1.49
Any Tongan	512	102.4	1,288.6	1.66	1.52-1.81
Any Cook Island Māori	412	82.4	793.8	1.03	0.93-1.14
Any Niue	153	30.6	751.8	0.97	0.83-1.14
Any Fijian	116	23.2	1,388.9	1.79	1.49-2.15
Any Tokelauan	56	11.2	920.9	1.19	0.92-1.55
Any Other Pacific	111	22.2	1,522.6	1.97	1.64-2.37
Any Pacific	2,545	509.0	1,117.4	1.44	1.38-1.50
Any Māori	5,525	1105.0	1,134.2	1.46	1.42-1.51
Non-Māori Non-Pacific	15,821	3164.2	774.2	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Sole Samoan	1,014	202.8	1,410.6	1.82	1.71-1.94
Sole Tongan	438	87.6	1,657.8	2.14	1.95-2.35
Sole Cook Island Māori	287	57.4	1,076.6	1.39	1.24-1.56
Sole Niue	89	17.8	1,230.5	1.59	1.29-1.96
Sole Fijian	75	15.0	2,166.4	2.80	2.24-3.50
Sole Tokelauan	35	7.0	1,339.5	1.73	1.24-2.41
Sole Other Pacific	89	17.8	2,470.2	3.19	2.60-3.92
Sole Pacific	2,062	412.4	1,452.5	1.88	1.80-1.97
Sole Māori	4,645	929.0	1,891.5	2.44	2.37-2.52
Non-Māori Non-Pacific	15,821	3164.2	774.2	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate ratios are compared to the Non-Māori Non-Pacific group and are unadjusted

Land Transport Injuries

Traffic vs. Non-Traffic Related Land Transport Admissions

In New Zealand during 2002-2006, the majority of hospital admissions for injuries sustained while children and young people were the occupants of motor vehicles were traffic related (90.7%). In contrast, only 67.3% of pedestrian injuries, 43.9% of cyclist injuries and 37.1% of motorbike injuries were related to traffic accidents (**Table 56**).

Trends in Land Transport Mortality

During 1990-2004, while land transport mortality for children continued to decline, there was a small upswing in rates for young people during 2004 (**Figure 105**).

Differences by Age and Gender

During 2002-2006, hospital admissions for land transport injuries increased with age, peaking in the late teens/early twenties and thereafter declining. With the exception of during the first two years of life, admissions were higher for males than females at all ages. Mortality was also higher for those in their late teens/early 20s, with males again being overrepresented (**Figure 106**). When examined by cause, however, pedestrian

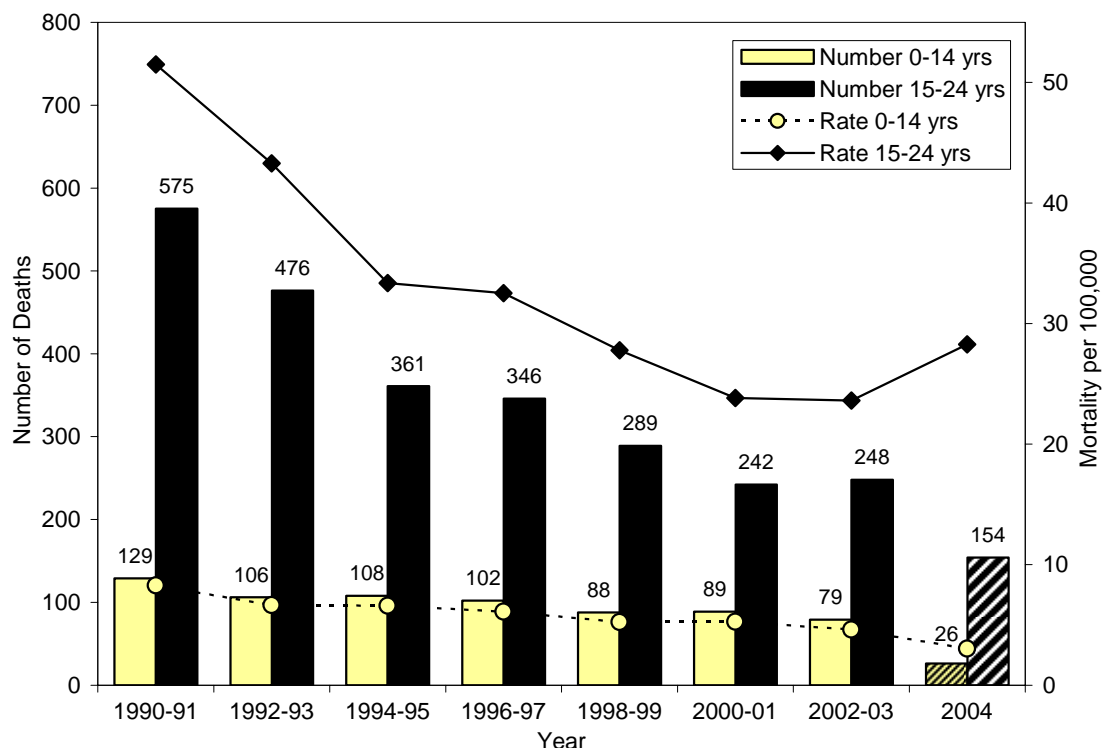
related injury admissions were highest for 1 year olds, while cycle related injuries were higher during late childhood/early adolescence and both motorbike and vehicle occupant injuries were highest during late adolescence/the early 20's (**Figure 107**).

Table 56. Hospital Admissions for Land Transport Injuries in Children and Young People 0-24 Years by Type, New Zealand 2002-2006

Type		Boarding or Alighting	Non-Traffic Accident	Traffic Accident	Unspecified Accident	Total
Vehicle Occupant	No.	118	432	6,444	111	7,105
	%	1.7	6.1	90.7	1.6	100.0
Motorbike	No.	<5	2,036	1,255	92	3,386
	%	0.1	60.1	37.1	2.7	100.0
Cyclist	No.	8	2,443	1,997	101	4,549
	%	0.2	53.7	43.9	2.2	100.0
Pedestrian	No.	0	525	1,281	98	1,904
	%	0.0	27.6	67.3	5.1	100.0
3 Wheeler	No.	0	10	<5	0	12
	%	0.0	83.3	16.7	0.0	100.0
Other Land Transport	No.	10	744	174	1,539	2,467
	%	0.4	30.2	7.1	62.4	100.0
Total	No.	139	6,190	11,153	1,941	19,423
	%	0.7	31.9	57.4	10.0	100.0

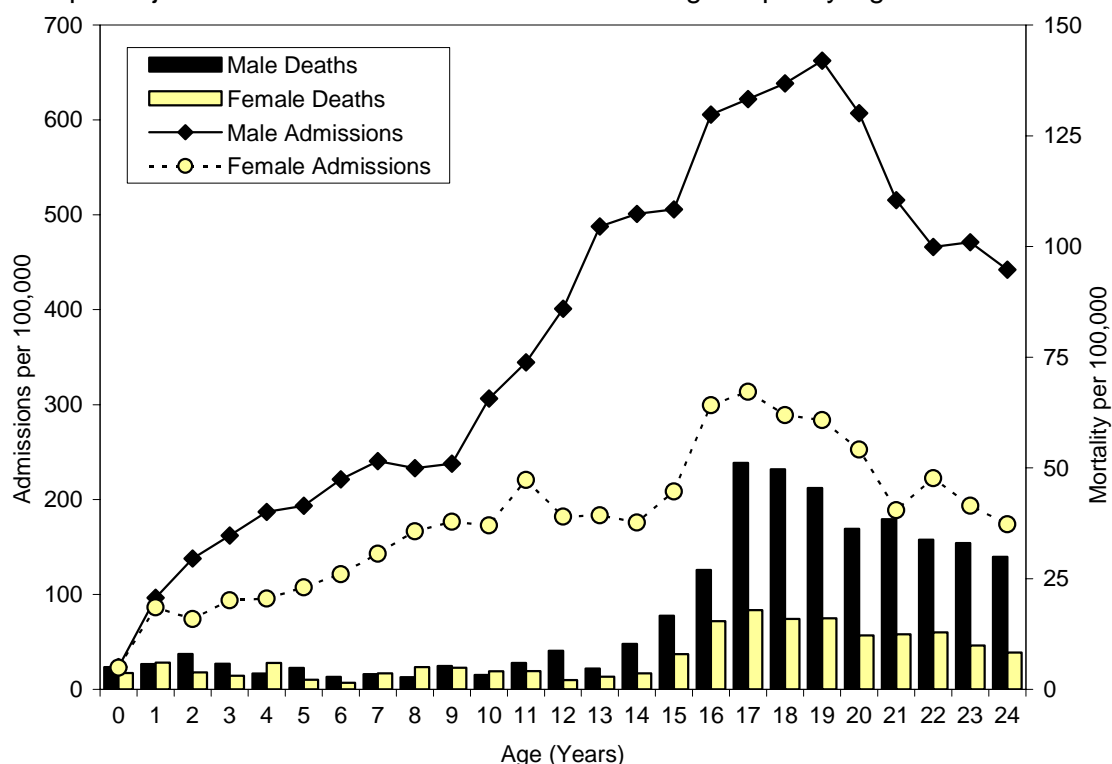
Source: Numerator-National Minimum Dataset; Denominator-Census; Note: A 'Traffic Accident' is any vehicle accident occurring on a public road. A 'Non-Traffic Accident' is any vehicle accident occurring entirely in any place other than a public road (i.e. occurring off-road). 'Boarding of Alighting' accidents are those which occur during the process of getting on/in or off/out of a vehicle

Figure 105. Deaths from Land Transport Injuries in Children and Young People 0-24 Years, New Zealand 1990-2004



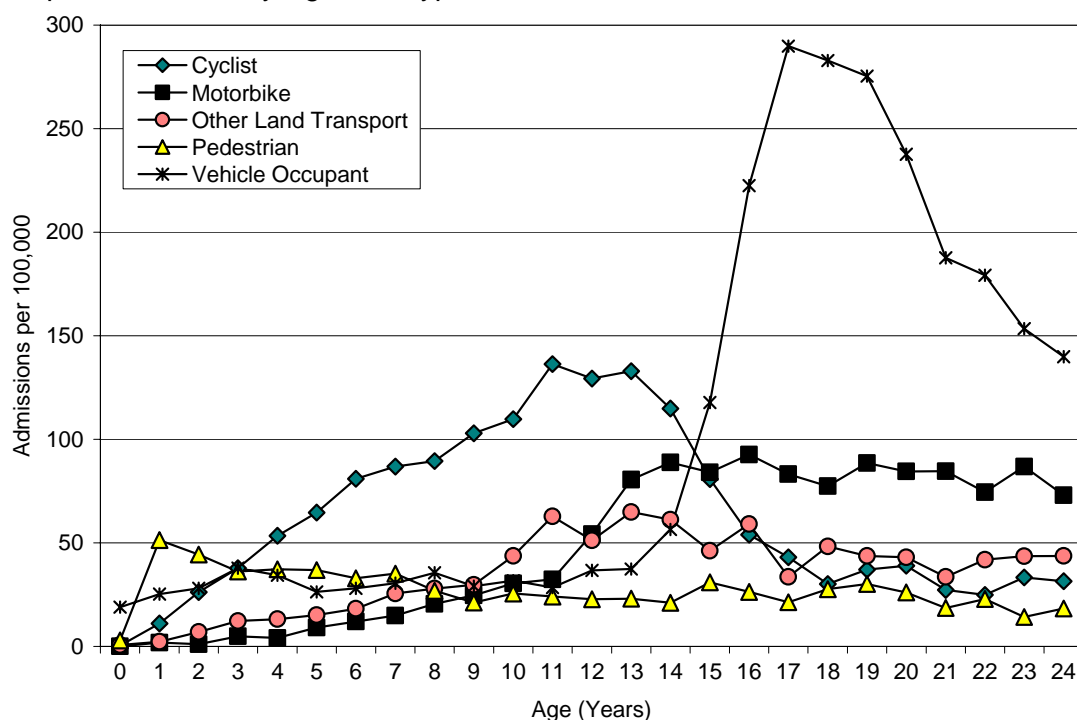
Source: Numerator-National Mortality Collection; Denominator-Census; Note: Deaths for 1990-2003 are per 2 year period. Deaths for 2004 are for single year only

Figure 106. Hospital Admissions (2002-2006) and Deaths (2000-2004) due to Land Transport Injuries in New Zealand Children and Young People by Age and Gender



Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Census

Figure 107. Hospital Admissions for Land Transport Injuries in Children and Young People 0-24 Years by Age and Type, New Zealand 2002-2006

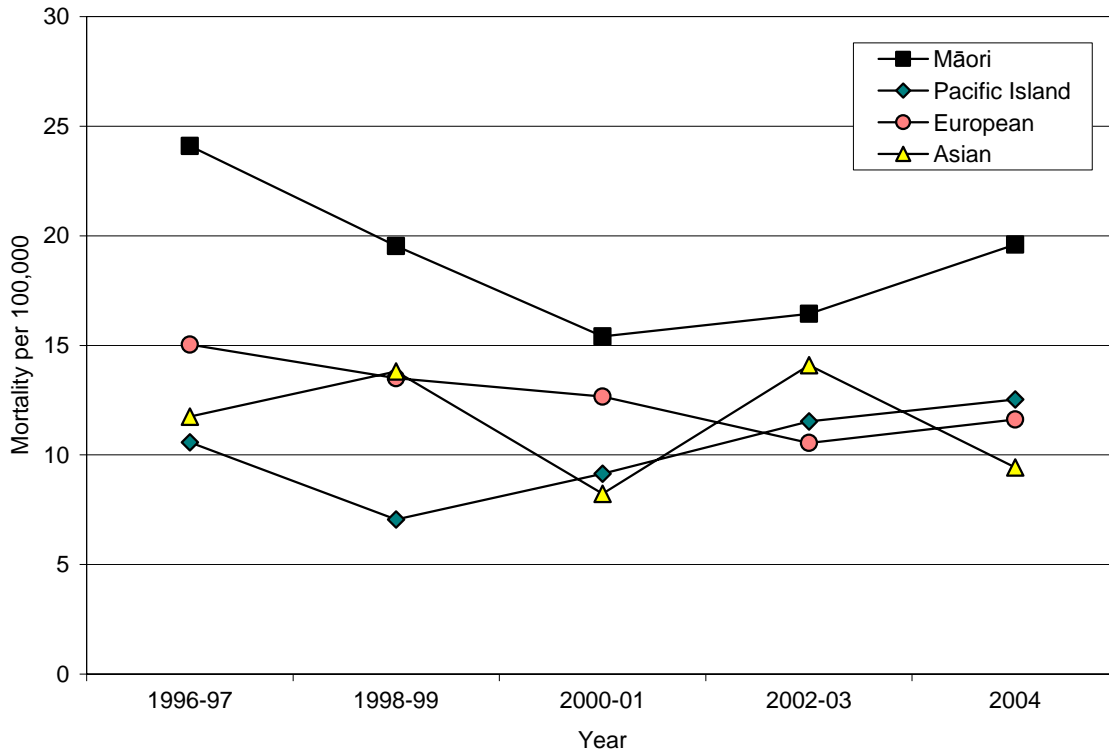


Source: Numerator-National Minimum Dataset; Denominator-Census

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

During 2002-2006, hospital admissions for land transport injuries were *significantly higher* for Māori > European > Pacific > Asian / Indian children and young people, males and those living in the more deprived areas (**Table 57, Table 58**). During 1996-2004, land transport mortality was consistently higher amongst Māori children and young people (**Figure 108**).

Figure 108. Deaths due to Land Transport Injuries in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2004



Source: Numerator-National Mortality Collection; Denominator-Census; Ethnicity is Level 1 Prioritised

Table 57. Risk Factors for Hospital Admission for Land Transport Injuries in Children 0-14 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	128.51	1.00		1-2	132.92	1.00	
2	137.52	1.07	0.95-1.20	3-4	168.02	1.26	1.16-1.36
3	148.36	1.15	1.03-1.29	5-6	186.71	1.40	1.30-1.51
4	188.14	1.46	1.31-1.63	7-8	217.06	1.63	1.51-1.76
5	166.44	1.30	1.16-1.45	9-10	262.98	1.98	1.85-2.12
6	207.01	1.61	1.45-1.79	Prioritised Ethnicity			
7	210.26	1.64	1.47-1.82	Māori	242.57	1.20	1.14-1.26
8	223.55	1.74	1.57-1.93	Pacific	156.64	0.78	0.72-0.85
9	265.23	2.06	1.86-2.28	European	201.66	1.00	
10	261.12	2.03	1.84-2.24	Asian/Indian	82.34	0.41	0.36-0.46
Gender							
Female	136.35	1.00		Male	255.92	1.88	1.80-1.97

Source: Numerator-National Minimum Dataset; Denominator-Census; Note: Rate per 100,000. Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Table 58. Risk Factors for Hospital Admission for Land Transport Injuries in Young People 15-24 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	271.72	1.00		1-2	311.57	1.00	
2	350.17	1.29	1.16-1.43	3-4	360.12	1.16	1.08-1.24
3	325.60	1.20	1.08-1.33	5-6	382.07	1.23	1.15-1.32
4	395.00	1.45	1.31-1.60	7-8	397.67	1.28	1.20-1.37
5	355.32	1.31	1.18-1.45	9-10	473.58	1.52	1.43-1.62
6	407.37	1.50	1.36-1.65	Prioritised Ethnicity			
7	409.98	1.51	1.37-1.66	Māori	487.74	1.10	1.05-1.15
8	386.04	1.42	1.29-1.56	Pacific	249.28	0.56	0.51-0.61
9	482.82	1.78	1.62-1.95	European	443.48	1.00	
10	464.05	1.71	1.56-1.88	Asian/Indian	135.82	0.31	0.28-0.34
Gender							
Female	243.94	1.00		Male	556.99	2.28	2.19-2.37

Source: Numerator-National Minimum Dataset; Denominator-Census; Note: Rate per 100,000. Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Hospital Admissions for Land Transport Injuries Amongst Pacific Groups in New Zealand

During 2002-2006 (using the Sole / (Any) classification), hospital admissions for land transport injuries amongst (Any) Samoan, Tongan, Cook Island Māori and Niue children were *significantly lower* than for non-Māori non-Pacific children. In the Sole Category, admissions for children in each of New Zealand's largest Pacific groups were similar to those of non-Māori non-Pacific children, with the exception of Fijian children, where rates were *significantly higher* (small numbers prevented valid comparisons for Tokelauan children) (**Table 59**). During the same period, admissions for young people in each of New Zealand's largest (Any) Pacific groups (with the exception of "Other" Pacific young people) were *significantly lower* than for non-Māori non-Pacific young people. In the Sole Category, admissions were *significantly lower* for Samoan, Tongan and Cook Island Māori young people than for non-Māori non-Pacific young people (**Table 60**).

Table 59. Hospital Admissions for Land Transport Injuries in Pacific Children 0-14 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Any Samoan	301	60.2	125.5	0.67	0.60-0.75
Any Tongan	131	26.2	132.7	0.71	0.60-0.84
Any Cook Island Māori	139	27.8	120.3	0.64	0.54-0.76
Any Niue	35	7.0	81.1	0.43	0.31-0.60
Any Fijian	27	5.4	190.4	1.01	0.69-1.47
Any Tokelauan	<5	s	s	s	s
Any Other Pacific	22	4.4	155.7	0.83	0.55-1.26
Any Pacific	642	128.4	133.4	0.71	0.65-0.77
Any Māori	2,408	481.6	242.6	1.29	1.23-1.35
Non-Māori Non-Pacific	5,513	1,102.6	187.5	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Sole Samoan	231	46.2	185.7	0.99	0.87-1.13
Sole Tongan	102	20.4	175.1	0.93	0.76-1.13
Sole Cook Island Māori	96	19.2	226.1	1.21	0.99-1.48
Sole Niue	18	3.6	196.1	1.05	0.66-1.67
Sole Fijian	20	4.0	464.9	2.48	1.60-3.84
Sole Tokelauan	<5	s	s	s	s
Sole Other Pacific	17	3.4	290.6	1.55	0.96-2.49
Sole Pacific	490	98.0	197.3	1.05	0.96-1.15
Sole Māori	1,987	397.4	457.9	2.44	2.32-2.57
Non-Māori Non-Pacific	5,513	1,102.6	187.5	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate ratios are compared to the Non-Māori Non-Pacific group and are unadjusted

Table 60. Hospital Admissions for Land Transport Injuries in Pacific Young People 15-24 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Any Samoan	265	53.0	236.5	0.60	0.53-0.68
Any Tongan	90	18.0	226.5	0.57	0.46-0.70
Any Cook Island Māori	98	19.6	188.8	0.48	0.39-0.59
Any Niue	36	7.2	176.9	0.45	0.32-0.62
Any Fijian	20	4.0	239.5	0.61	0.39-0.95
Any Tokelauan	14	2.8	230.2	0.58	0.34-0.98
Any Other Pacific	32	6.4	439.0	1.11	0.79-1.57
Any Pacific	543	108.6	238.4	0.60	0.55-0.65
Any Māori	2,376	475.2	487.7	1.23	1.18-1.29
Non-Māori Non-Pacific	8,078	1,615.6	395.3	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Sole Samoan	200	40.0	278.2	0.70	0.61-0.81
Sole Tongan	73	14.6	276.3	0.70	0.56-0.88
Sole Cook Island Māori	68	13.6	255.1	0.65	0.51-0.82
Sole Niue	19	3.8	262.7	0.66	0.42-1.03
Sole Fijian	10	2.0	288.9	0.73	0.39-1.36
Sole Tokelauan	8	1.6	306.2	0.77	0.39-1.54
Sole Other Pacific	19	3.8	527.3	1.33	0.85-2.08
Sole Pacific	404	80.8	284.6	0.72	0.65-0.80
Sole Māori	2,021	404.2	823.0	2.08	1.98-2.19
Non-Māori Non-Pacific	8,078	1,615.6	395.3	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate ratios are compared to the Non-Māori Non-Pacific group and are unadjusted

Summary

All Injuries: In New Zealand during 2002-2006, falls followed by inanimate mechanical forces were the leading causes of injury related hospital admission for (Any) Pacific children, while the order was reversed for (Any) Pacific young people. Transport related injuries as a group however made a significant contribution in both age groups. In contrast, during 2000-2004, accidental threats to breathing, followed by transport accidents were the leading causes of injury related mortality for (Any) Pacific children, while transport accidents, followed by suicide were the leading causes of injury related mortality for (Any) Pacific young people.

Unintentional Non-Transport Injuries: During 2002-2006 (using prioritised ethnicity), unintentional non-transport injury admissions were *significantly higher* for Pacific and Māori > European > Asian Indian children and young people, males and those in living in the more deprived areas. During the same period (using the Sole / (Any) classification), admissions for children in each of New Zealand's largest Sole Pacific groups, as well as those in the (Any) Samoan and Tongan groups, were *significantly higher* than for non-Māori non-Pacific children. Admissions for (Any) Cook Island Māori,

Niue and Tokelauan children however, were *significantly lower*. Similarly, admissions for young people in each of New Zealand's largest Sole Pacific groups were *significantly higher* than for non-Māori non-Pacific young people, as were admissions for (Any) Samoan, Tongan and Fijian young people.

Land Transport Injuries: During 2002-2006 (using prioritised ethnicity), land transport injury admissions were *significantly higher* for Māori > European > Pacific > Asian / Indian children and young people, males and those in the more deprived areas. During the same period (using the Sole / (Any) classification), admissions for (Any) Samoan, Tongan, Cook Island Māori and Niue children were *significantly lower* than for non-Māori non-Pacific children, while admissions for Sole Pacific groups were similar (with the exception of Sole Fijian children, where rates were *significantly higher*). Similarly, admissions for young people in each of New Zealand's largest (Any) Pacific groups (with the exception of "Other" Pacific) were *significantly lower* than for non-Māori non-Pacific young people, as were admissions for Sole Samoan, Tongan and Cook Island Māori young people.



Injuries Arising from Assault

Injuries Arising from Assault, Neglect and Maltreatment in Children

Longitudinal studies suggest that 4-10% of New Zealand children experience physical abuse and 11-20% experience sexual abuse during childhood and that the long term consequences for these children are significant [215]. During the 1990s, New Zealand ranked 3rd highest amongst rich nations for its child maltreatment death rates, with 49 children under the age of 15 years dying as a result of maltreatment between 1996 and 2000. This situation does not appear to have improved over time, with mortality rates almost doubling during the late 1980s and changing very little since then [216]. Mortality represents the tip of the iceberg however, with the number of notifications to the Department of Child Youth and Family (CYF) for possible abuse or neglect increasing each year. In 2005, a total of 59,313 notifications were recorded by CYF and of these, 78.7% were deemed to require further action. In 1999-2000, of those cases requiring further action, 50% were found to involve substantiated abuse, neglect or behavioural / relationship problems [217]. This is of concern, as in addition to the physical effects, research has shown that survivors of childhood abuse often suffer long term psychological sequelae including depression, post-traumatic stress disorder, substance abuse, suicide / suicide attempts and high risk sexual behaviour [218].

Injuries Arising from Assault in Young People

Data from Christchurch Longitudinal Health and Development study also noted that 23% of males and 14% of females reported an assault between the ages of 16 and 18 years. While gender specific rates differed, the study noted that the risk factors for assault were similar for males and females, and included childhood measures of behavioural disturbance and parental dysfunction, in addition to measures of adolescent participation in such factors as violent offending and the misuse of alcohol [219].

The following section explores hospital admissions and mortality from injuries arising from the assault, neglect or maltreatment of Pacific children (0-14 years), and from the assault of Pacific young people (15-24 years). Because it is likely that the contexts in which such injuries occur differ with age, data for children and young people are presented separately in the section which follows.

Data Source and Methods

Definition

1. Hospital Admissions for Injuries Sustained as the Result of Assault / Neglect / Maltreatment of Children Aged 0-14 Years, or as the Result of an Assault on a Young Person Aged 15-24 Years
2. Deaths from Injuries Sustained as the Result of Assault / Neglect / Maltreatment of Children Aged 0-14 Years, or as the Result of an Assault on a Young Person Aged 15-24 Years

Data Source and Interpretation

1. Hospital Admissions

Numerator: Admissions: National Minimum Dataset: Hospital admissions of children (0-14 years) and young people (15-24 years) with a primary diagnosis of injury (ICD9 800-995; ICD 10 S00-T79) and an external cause code of intentional injury (ICD-9 E960-968; ICD-10 X85-Y09) in any of the first 10 External Cause codes.

Denominator: NZ Census

Interpretation: As outlined in Appendix 1, in order to ensure comparability over time, all cases with an Emergency Department Specialty Code (M05-M08) on discharge were excluded

2. Mortality

Numerator: National Mortality Collection: Deaths in children (0-14 years) and young people (15-24 years) with a clinical code (cause of death) of Intentional Injury (ICD-9 E960-968; ICD-10 X85-Y09).

Denominator: NZ Census

Interpretation: The limitations of the National Minimum Dataset are discussed at length in Appendix 1. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data, particularly those which relate to injuries.

Indicator Category Admissions: Proxy C; Mortality: Ideal B

Statistical Significance Testing

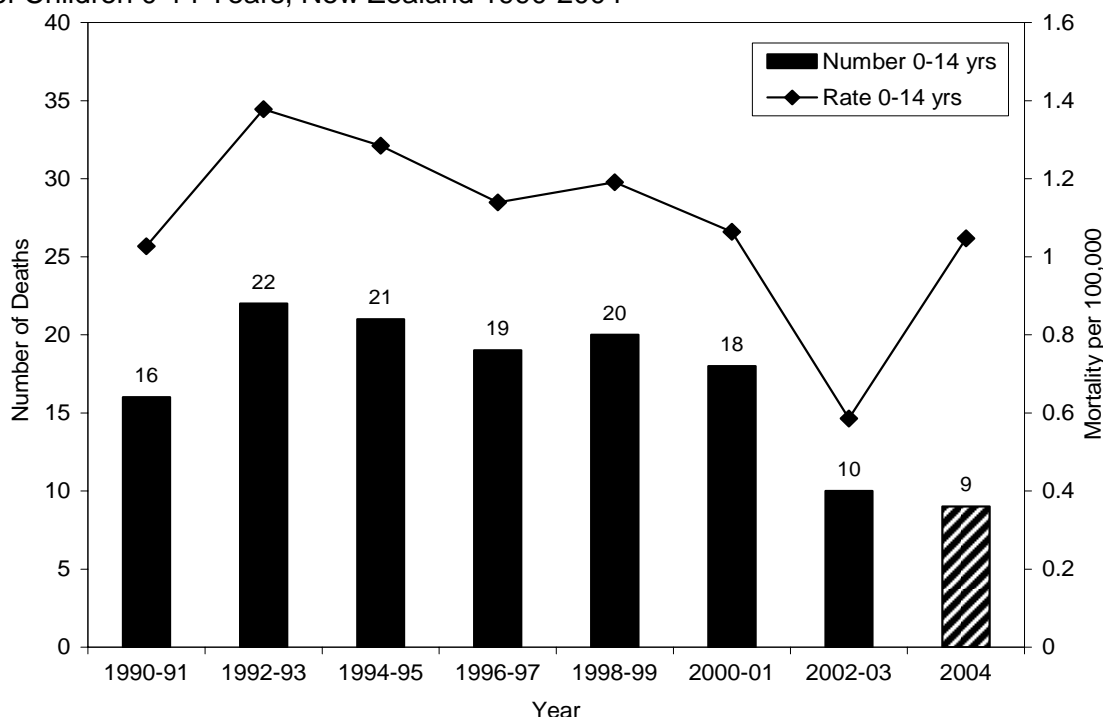
95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

Injuries Arising from the Assault of Children 0-14 Years

Trends in Mortality

In New Zealand during 1990-2001, there was a gradual decline in mortality from injuries sustained as the result of the assault, neglect or maltreatment of children, although rates during 2002-2004 have been more variable. Despite this, during 2004, 9 New Zealand children died as the result of an assault (**Figure 109**).

Figure 109. Mortality due to Injuries Arising from the Assault, Neglect or Maltreatment of Children 0-14 Years, New Zealand 1990-2004



Source: Numerator-National Mortality Collection; Denominator-Census; Note: Deaths for 1990-2003 are per 2 year period. Deaths for 2004 are for single year only.

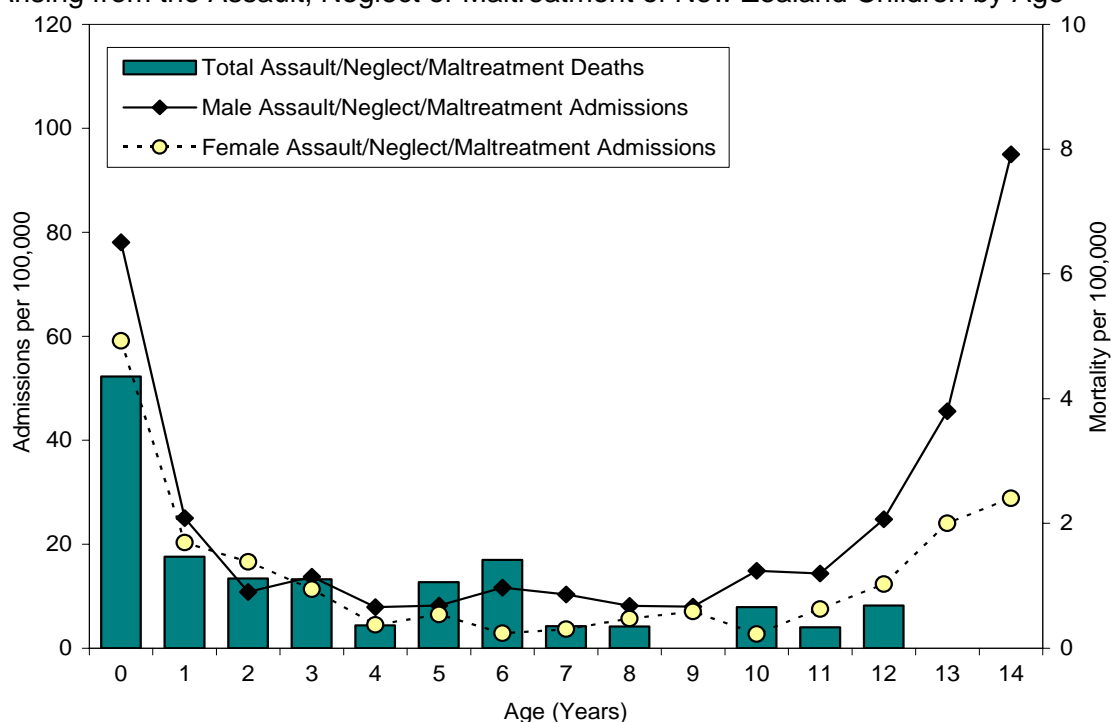
Distribution by Age and Gender

During 2002-2006, hospital admissions for injuries arising from the assault, neglect or maltreatment of children exhibited a U-shaped distribution by age, with rates being highest amongst those < 2 years and those > 11 years of age. In contrast, mortality during 2000-2004 was highest amongst children < 1 year. While the gender balance was relatively even during infancy and early childhood, admissions amongst males became more predominant as adolescence approached (**Figure 110**).

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

During 2002-2006, admissions for the assault, neglect or maltreatment of children were *significantly higher* for Pacific and Māori > European and Asian / Indian children, males and those living in the more deprived areas (**Table 61**).

Figure 110. Hospital Admissions (2002-2006) and Deaths (2000-2004) due to Injuries Arising from the Assault, Neglect or Maltreatment of New Zealand Children by Age



Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Census

Table 61. Risk Factors for Hospital Admission due to Injuries Arising from the Assault, Neglect or Maltreatment in Children 0-14 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Quintile				Prioritised Ethnicity			
1	6.86	1.00		Māori	35.76	2.88	2.47-3.36
2	10.90	1.59	1.14-2.21	Pacific	35.81	2.88	2.35-3.54
3	17.14	2.50	1.84-3.39	European	12.42	1.00	
4	22.78	3.32	2.48-4.45	Asian/Indian	9.57	0.77	0.53-1.12
5	37.51	5.47	4.16-7.19				
Gender							
Female	14.16	1.00					
Male	25.35	1.79	1.55-2.06				

Source: Numerator-National Minimum Dataset; Denominator-Census; Note: Rate per 100,000; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted.

Nature of the Injury Sustained

During 2001-2005, the type of intentional injury leading to hospital admission varied by the age of the child, with those in the 0-4 year age bracket tending to be assigned an ICD-10 Y07 "Maltreatment" code (including mental cruelty, physical abuse, sexual abuse or torture) while those in the 10-14 year age bracket were more likely to be assigned to ICD-10 Y04 "Assault by Bodily Force" (including unarmed brawl or fight). While it is tempting to speculate that this reflected to a transition away from assaults occurring within the family environment as age increased, the ICD-10 5th digit (describing the relationship of the victim to the perpetrator) was most frequently 9 (unspecified person), making such hypotheses difficult to substantiate.

During 2001-2005, the most common types of injury for children 0-4 years hospitalised for assault / maltreatment were superficial head injuries, followed by subdural haematomas and fractures of the face, femur and upper limbs. For children 10-14 years, nasal fractures followed by upper limb fractures predominated (**Table 62**).

Table 62. Nature of Injury Arising from Assault, Neglect and Maltreatment in Hospitalised Children 0-14 Years by Age Group, New Zealand 2001-2005

Nature of Injury	New Zealand	
	Number	%
Age 0-4 years		
Superficial Head Injury	63	18.6
Subdural Haemorrhage	61	18.0
Fractured Femur	25	7.4
Upper Limb Fracture	24	7.1
Skull / Face Fracture	22	6.5
Other Injuries	143	42.3
Total	338	100.0
Age 5-9 years		
Superficial Head Injury	17	15.3
Upper Limb Fracture	12	10.8
Open Head Wound	10	9.0
Skull / Face Fracture	5	4.5
Other Injuries	67	60.4
Total	111	100.0
Age 10-14 years		
Fractured Nasal Bones	66	15.8
Upper Limb Fracture	53	12.7
Concussion	38	9.1
Superficial Head Injury	18	4.3
Other Injuries	243	58.1
Total	418	100.0

Source: National Minimum Dataset

Assault, Neglect and Maltreatment Admissions Amongst Pacific Children in New Zealand

During 2002-2006 (using the Sole / (Any) classification), hospital admissions for injuries arising from the assault, neglect or maltreatment of children were *significantly higher* for Sole and (Any) Samoan, Tongan, Cook Island Māori and Fijian children than for non-Māori non-Pacific children. Most differences between individual Pacific groups however, did not reach statistical significance (**Table 63**).

Table 63. Hospital Admissions due to Injuries Arising from Assault, Neglect and Maltreatment in Pacific Children 0-14 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Any Samoan	64	12.8	26.7	2.13	1.63-2.78
Any Tongan	21	4.2	21.3	1.69	1.09-2.62
Any Cook Island Māori	44	8.8	38.1	3.03	2.22-4.14
Any Niue	9	1.8	20.9	1.66	0.86-3.22
Any Fijian	9	1.8	63.5	5.05	2.61-9.78
Any Tokelauan	<5	s	s	s	s
Any Other Pacific	<5	s	s	s	s
Any Pacific	145	29.0	30.1	2.40	1.98-2.91
Any Māori	355	71.0	35.8	2.85	2.46-3.30
Non-Māori Non-Pacific	369	73.8	12.6	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Sole Samoan	51	10.2	41.0	3.27	2.44-4.38
Sole Tongan	16	3.2	27.5	2.19	1.33-3.61
Sole Cook Island Māori	30	6.0	70.7	5.63	3.88-8.17
Sole Niue	<5	s	s	s	s
Sole Fijian	6	1.2	139.5	11.11	4.96-24.88
Sole Tokelauan	<5	s	s	s	s
Sole Other Pacific	<5	s	s	s	s
Sole Pacific	112	22.4	45.1	3.59	2.91-4.44
Sole Māori	298	59.6	68.7	5.47	4.70-6.37
Non-Māori Non-Pacific	369	73.8	12.6	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see pg 11 for details); Rate Ratios are compared to the non-Māori non-Pacific group and are unadjusted; s: Rates not calculated due to small numbers.

Injuries from Assault in Young People 15-24 Years

Trends in Mortality

In New Zealand during 1998-2004, assault mortality in young people fluctuated markedly. On average during 2000-2004, 13 young people each year died as the result of an assault (**Figure 111**).

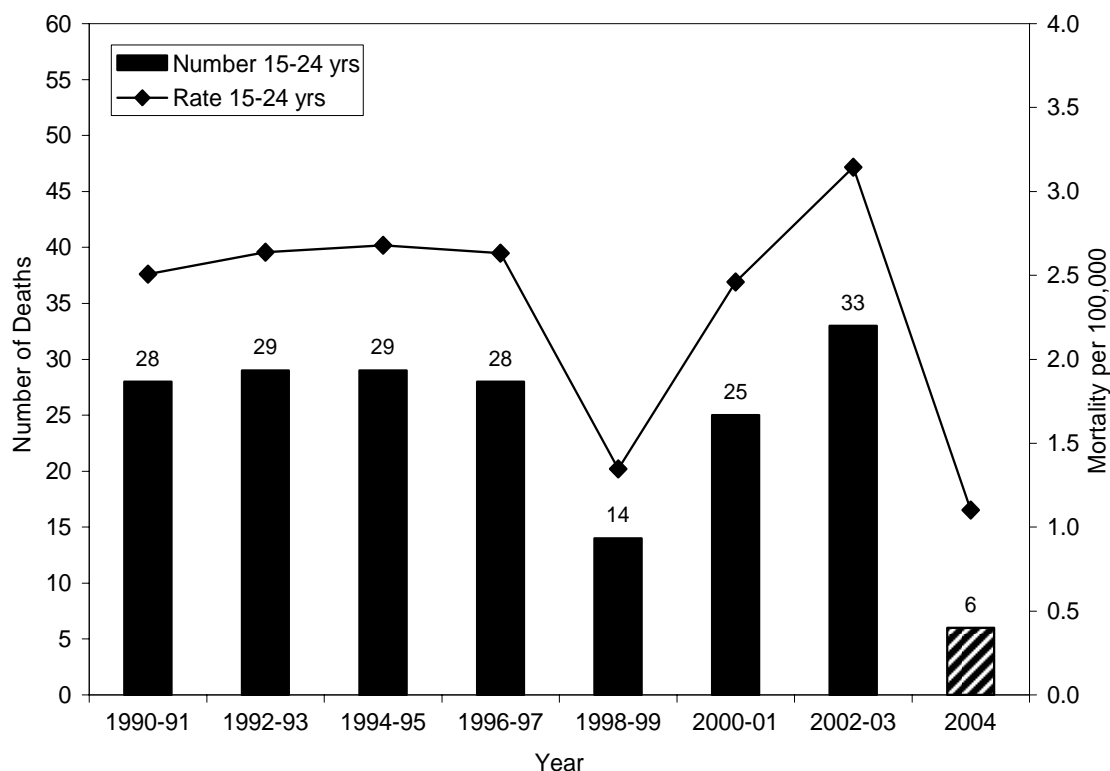
Age and Gender Differences

During 2002-2006, hospital admissions for assault in young men increased with age, reaching a peak in the mid-late teens and thereafter declining. In contrast, admissions for young women varied much less with age, and in addition were lower than for young men at all ages from 15-24 years (**Figure 112**).

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

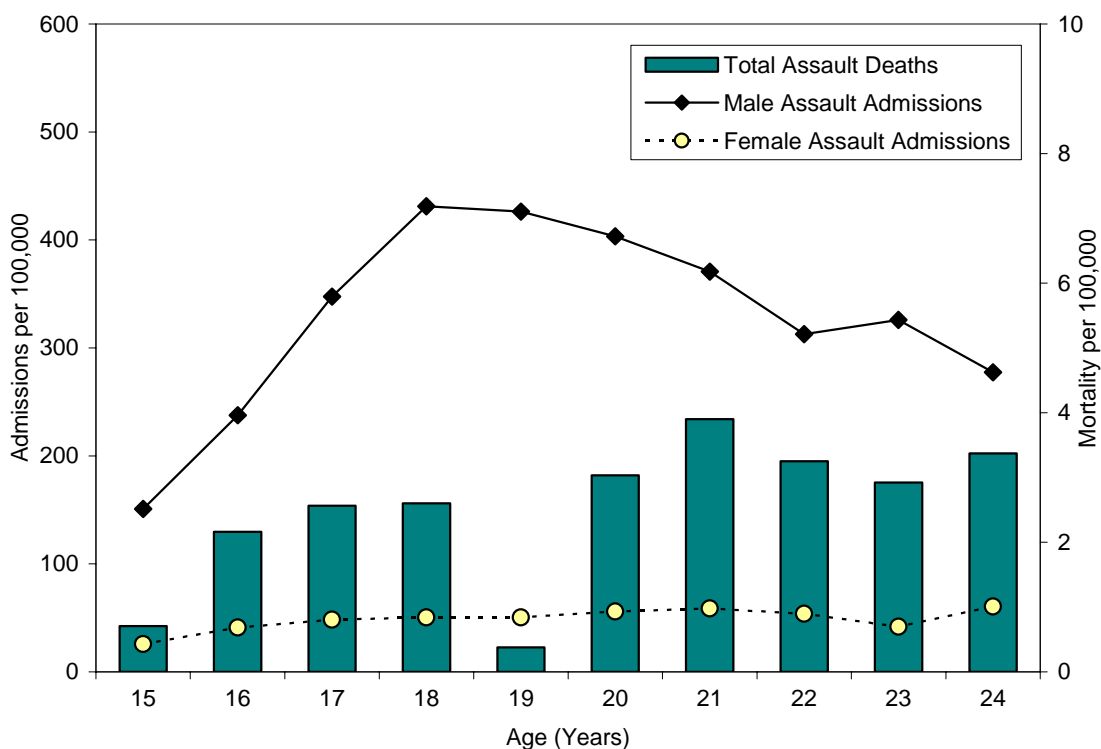
During 2002-2006, hospital admissions for assault were *significantly higher* for Māori and Pacific > European > Asian / Indian young people and those living in the more deprived areas. In addition, admissions were 6.76 times higher for young men than for young women during this period (**Table 64**).

Figure 111. Deaths from Assault in Young People 15-24 Years, New Zealand 1990-04



Source: Numerator-National Mortality Collection; Denominator-Census; Note: Deaths for 1990-2003 are per 2 year period. Deaths for 2004 are for single year only

Figure 112. Hospital Admissions (2002-2006) and Deaths (2000-2004) due to Assault in New Zealand Young People 15-24 Years by Age and Gender



Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Census

Table 64. Risk Factors for Hospital Admission due to Injuries Arising from Assault in Young People 15-24 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	91.87	1.00		1-2	101.45	1.00	
2	110.73	1.21	1.01-1.45	3-4	126.88	1.25	1.11-1.41
3	116.49	1.27	1.06-1.52	5-6	148.63	1.47	1.31-1.65
4	137.39	1.50	1.26-1.78	7-8	213.55	2.10	1.89-2.33
5	136.39	1.48	1.25-1.76	9-10	298.43	2.94	2.66-3.25
6	160.20	1.74	1.48-2.05	Prioritised Ethnicity			
7	191.54	2.08	1.77-2.44	Māori	345.28	2.27	2.13-2.42
8	234.33	2.55	2.19-2.97	Pacific	317.69	2.09	1.91-2.28
9	256.45	2.79	2.40-3.24	European	152.07	1.00	
10	341.74	3.72	3.21-4.31	Asian/Indian	45.79	0.30	0.25-0.35
Gender							
Female	48.32	1.00		Male	326.56	6.76	6.23-7.34

Source: Numerator-National Minimum Dataset; Denominator-Census; Note: Rate per 100,000. Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted.

Assault Admissions Amongst Pacific Young People in New Zealand

During 2002-2006 (using the Sole / (Any) classification), assault admissions for Pacific young people were *significantly higher* than for non-Māori non-Pacific young people in each of the Sole and (Any) Groups (with the exception of Tokelauan young people, where rates were similar). The majority of differences between individual Pacific groups however, did not reach statistical significance (**Table 65**).

Table 65. Distribution of Hospital Admissions due to Assault in Pacific Young People 15-24 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Any Samoan	317	63.4	282.9	2.04	1.82-2.29
Any Tongan	139	27.8	349.8	2.52	2.13-2.99
Any Cook Island Māori	120	24.0	231.2	1.67	1.39-2.00
Any Niue	48	9.6	235.9	1.70	1.28-2.26
Any Fijian	22	4.4	263.4	1.90	1.25-2.89
Any Tokelauan	11	2.2	180.9	1.30	0.72-2.35
Any Other Pacific	31	6.2	425.2	3.07	2.16-4.37
Any Pacific	663	132.6	291.1	2.10	1.93-2.29
Any Māori	1,682	336.4	345.3	2.49	2.34-2.64
Non-Māori Non-Pacific	2,834	566.8	138.7	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Sole Samoan	251	50.2	349.2	2.52	2.22-2.87
Sole Tongan	117	23.4	442.8	3.19	2.65-3.84
Sole Cook Island Māori	83	16.6	311.4	2.25	1.81-2.80
Sole Niue	24	4.8	331.8	2.39	1.60-3.57
Sole Fijian	11	2.2	317.7	2.29	1.27-4.14
Sole Tokelauan	6	1.2	229.6	1.66	0.75-3.69
Sole Other Pacific	24	4.8	666.1	4.80	3.22-7.16
Sole Pacific	527	105.4	371.2	2.68	2.44-2.94
Sole Māori	1,451	290.2	590.9	4.26	4.00-4.54
Non-Māori Non-Pacific	2,834	566.8	138.7	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate ratios are compared to the Non-Māori Non-Pacific group and are unadjusted.

Summary

Children 0-14 Years: In New Zealand during 2002-2006 (using prioritised ethnicity) admissions for the assault, neglect or maltreatment of children were *significantly higher* for Pacific and Māori > European and Asian / Indian children, males and those living in the more deprived areas. During the same period (using the Sole / (Any) classification), admissions were *significantly higher* for Sole and (Any) Samoan, Tongan, Cook Island Māori and Fijian children than for non-Māori non-Pacific children. Most differences between individual Pacific groups however, did not reach statistical significance.

Young People 15-24 Years: During 2002-2006 (using prioritised ethnicity), assault admissions were *significantly higher* for Māori and Pacific > European > Asian / Indian young people and those in the most deprived areas. During the same period (using the Sole / (Any) classification), assault admissions for Pacific young people were *significantly higher* than for non-Māori non-Pacific young people in each of the Sole and (Any) Groups (with the exception of Tokelauan young people, where rates were similar). The majority of differences between individual Pacific groups however, did not reach statistical significance.

CYF Notifications

Introduction

During the 1990s New Zealand ranked 3rd highest amongst rich nations for its child maltreatment death rates. Between 1996 and 2000, 49 children under the age of 15 years died as a result of maltreatment, with the highest rates being amongst those <5 years of age [216]. In New Zealand, Child Youth and Family (CYF) hold the statutory responsibility for protecting children from recurrent abuse and receive notifications from a variety of sources including the police, the education and health sectors, families / whanau and the general public. The appropriate handling of these notifications is crucial as failing to respond to a legitimate concern may, in the worst case scenario, lead to an avoidable death, while over-reacting to a non-substantiated concern may result in significant trauma for a child's family [220].

Since 2001, notifications recorded by CYF have doubled and while it is often assumed that this reflects an increase in the underlying rate of child abuse, recent research would suggest that changes in the behaviour of the child protection system have also played a significant role [220]. In understanding these changes, knowledge of the current child protection referral process is crucial, as of the large number of phone calls and faxes received by CYF each year, only a small proportion are forwarded to intake social workers for further review. Of those reviewed, an even smaller proportion result in a formal notification being lodged. At each point in this pathway, the notifier, telephone operator and intake social worker have to make a decision about whether to escalate the concern further, with these decisions often being made in the context of insufficient or conflicting information, time pressures and an increasing intolerance within the wider community for the consequences of child abuse.

That increases in CYF notifications over the past 6 years have resulted, at least in part, from changes within the system itself is suggested by a number of observations including [220]:

- Correlations between high profile media events and spikes in notifications
- A 300% rise in fax concerns following the introduction of after hours fax lodgement
- An increase in the average number of siblings per notification
- Exponential growth in Police Family Violence (POL400) referrals as a result of new processes and behaviours
- A sudden surge in demand relating to the roll out of a Call Centre

While to a certain extent, the increase in notifications has been accompanied by a decline in the percentage requiring investigation (86% required further investigation in 2000, as compared to 79% in 2005), recent evidence suggests that only 20% of avoidable child deaths in New Zealand are known to CYF [220]. In addition, while the new Police referral system (which refers children as a result of family violence (POL400) attendances) appears to be uncovering softer concerns, the uptake of the system is variable across the country and in many cases the system has served to identify new concerns of a similar level of severity to previous notifications [220]. As a consequence, while a large proportion of the increase in CYF notifications in recent years may have been due to changes within the system itself [220], it is likely that many of the victims of child abuse who present to health care settings each year remain undetected and that further effort is required to ensure that the health and safety needs of these children are met [221]. In this context, the recent Family Violence Intervention Guidelines recommend taking a thorough history for child abuse from high risk groups, the provision of emotional support for victims and the following of risk assessment, safety planning and referral pathways in clinical practice [221].

While at the time of writing, no ethnic specific data was available from CYF, the available evidence (see previous section on Injuries Arising from Assault in Children) would suggest that the issues associated with child maltreatment are at least as much of an issue for Pacific children in New Zealand as they are for other ethnic groups, and the information in the section which follows should be interpreted with this in mind.

Data Source and Methods

Definition

The number of notifications about children and young people recorded by Child, Youth and Family (CYF)

Data Source

Numerator: Notifications recorded by CYF

Denominator: Not applicable (see notes below)

Indicator Category

Proxy C

Notes on Interpretation

The number of notifications and further assessments required does not represent the number of distinct clients, as some clients had multiple notifications and assessments during the year. Similarly, the total number of assessment findings does not represent the number of client investigations, as some clients had multiple investigation records during the year. In addition, as some clients have more than one type of finding during an investigation, they may appear across several categories depending on the type of finding. Finally the number of assessments in a year does not directly relate to the number of notifications or further assessments, as there is a time lag between a further assessment being required and the investigation being completed. As a consequence, the figures presented in this section may overestimate the number of children referred to CYF, or the total number found to have experienced abuse in any given year.

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

NZ Distribution and Trends

Notifications and Numbers Requiring Further Investigation

During 2006 there were a total of 68,681 notifications recorded by CYF Offices, with 65.6% of these being thought to require further investigation. While these figures reflect a progressive increase in notifications since 2001, when 28,012 notifications were recorded, the proportion requiring further investigation declined (86.9% required further investigation in 2001). Nevertheless, the number of notifications requiring further investigation increased during this period, from 24,335 in 2001 to 45,041 in 2006 (**Table 66**). In interpreting these figures, it must be borne in mind that a single child may have been the subject of multiple notifications and that there were also significant changes to the notification system during this period.

Table 66. Number of Notifications Recorded by Child Youth and Family, New Zealand 2001-2006

Year	Notifications	Number Requiring Further Investigation	Percentage Requiring Further Investigation (%)
2001	28,012	24,335	86.9
2002	31,784	27,171	85.5
2003	39,008	32,856	84.2
2004	49,585	40,711	82.1
2005	59,313	46,706	78.7
2006	68,681	45,041	65.6

Source: Child Youth and Family

Assessment Findings for Cases Requiring Further Investigation

Of those notifications which were investigated further during 2001-2006, a large proportion resulted in no abuse being found, with the numbers in this category increasing as the period progressed. Where abuse was found however, emotional abuse, neglect and behavioural / relationship difficulties were particularly prominent, followed by physical abuse (**Table 67**). Because of the nature of the reporting system however, and the fact that a single case may appear in a number of different categories, it is difficult to determine from these figures what proportion of cases related predominantly to a particular type of abuse (e.g. physical, emotional, sexual).

Table 67. Outcome of Assessment for Children Notified to Child Youth and Family and Investigated Further, New Zealand 2001-2006

Year	Emotional Abuse	Physical Abuse	Sexual Abuse	Neglect	Behavioural / Relationship Difficulties	Self Harm / Suicidal	Abuse Not Found
2001	1,987	1,912	1,144	2,838	3,427	88	15,572
2002	2,115	1,967	1,228	2,980	3,406	100	13,974
2003	2,346	1,895	1,228	2,862	3,193	95	15,024
2004	3,806	2,331	1,405	3,820	4,278	180	21,515
2005	5,691	2,370	1,306	4,459	4,661	157	24,916
2006	7,204	2,378	1,294	4,376	4,738	166	26,283

Source: Child Youth and Family

Summary

In New Zealand, the agency with the statutory responsibility for protecting children from recurrent abuse is Child Youth and Family (CYF), who receive notifications from a variety of sources including the police, the education and health sectors, families / whanau and the general public. During 2006, there were 68,681 notifications recorded by CYF, with 65.6% requiring further investigation. While this reflects an increase since 2001, when 28,012 notifications were recorded, the proportion requiring further investigation has declined. Of the notifications investigated further during 2001-2006, a large proportion resulted in no abuse being found, with the numbers in this category increasing as the period progressed. Nevertheless, recent evidence suggests that only 20% of avoidable child deaths in New Zealand are known to CYF and it is likely that many of the victims of child abuse presenting to health care settings in New Zealand each year remain undetected [220]. While at the time of writing, no ethnic specific data was available from CYF, the available evidence would suggest that these issues are at least of as much importance for Pacific children in New Zealand and thus further effort is required to ensure that their health and safety needs are met.

Family Violence

Introduction

Te Rito: The NZ Family Violence Prevention Strategy [222] defines family violence as:

“a broad range of controlling behaviours commonly of a physical, sexual and / or psychological nature which typically involve fear, intimidation and emotional deprivation. It occurs within close interpersonal relationships”

Research has shown that witnessing family violence can have significant and long term impacts on children [223]. The Dunedin Longitudinal Study, in following a cohort of 980 children to 26 years noted that 24% reported violence or threats of violence directed from one parent to another and of these, 6% reported threats, 9% reported 1-4 incidents of physical violence and 10% reported ≥ 5 incidents. Regardless of who carried out the violence, 64% of young people witnessing family violence described themselves as being upset “a lot” or “extremely” and a further 23% reported being “a bit” upset [224]. Similarly, the Christchurch Longitudinal Study followed a cohort of 1,265 children to 18 years and noted that approximately 38% reported exposure to interparental violence, with violence varying from verbal assaults (35%) to more infrequent physical attacks (slap, hit or punch partner 6%). After adjusting for known confounders, exposure to interparental violence was associated with an increased risk of anxiety, conduct disorder and property crime (father initiated violence) and alcohol abuse / dependence (mother initiated violence) [225].

In terms of the determinants of family violence, the Christchurch Longitudinal Study noted that violence was initiated with equal frequency by mothers and fathers [225]. In contrast, the Dunedin Longitudinal Study noted that 55% of violence was by fathers only, 28% was by both partners and 16% was by mothers only [224]. Other estimates suggest that between 15-35% of women are hit or forced to have sex by their partners at least once in their lifetime, while only 7% of men report a similar type of abuse [221]. Exposure to interparental violence has also been found to be higher amongst those living in difficult socioeconomic circumstances, both in New Zealand [226] and overseas [227], with the Christchurch Longitudinal Study reporting that family violence was 2.8 times higher if a child’s mother was <20 yrs at their birth, was 2.4 times higher if a child’s mother was without formal qualifications and was 3.1 times higher if the family was in the lowest quartile for living standards [226]. Potential pathways for these associations include higher levels of stress and financial constraints that mitigate against leaving unsatisfactory relationships [227].

In developing regional responses, identifying children exposed to family violence needs to be given a high priority, not only because of the long term effects such exposures have on children’s psychological wellbeing, but also because of the potential overlaps between the occurrence of child abuse and partner abuse in families. While the actual figures are the subject of debate [228, 229], some estimates suggest that up to 30-60% of families who report one type of abuse, also experience the other type of abuse, with the likelihood of child abuse increasing with increasing partner abuse [221]. In this context, the 2002 Family Violence Intervention Guidelines, which integrate child and partner abuse strategies into a single document, suggest some starting points at the service delivery level including screening all females ≥ 16 years, or those with signs and symptoms of abuse using a validated screening tool, supporting and empowering those identified as being the victims of abuse and following appropriate risk assessment, safety planning and referral pathways in clinical settings [221]. Similar guidelines for children are outlined in the CYF Notifications section of this report.



In an attempt to highlight the extent to which family violence is an issue for Pacific children and young people in New Zealand the following section reviews Police POL400 attendances at family violence incidents. While only limited information is available on the ethnicity of victims of family violence, and Police are only involved in an estimated approximately 10% of the family violence incidents occurring in New Zealand each year [221], it is nevertheless hoped that these figures will provide some insights into the context within which family violence is occurring for a significant minority of Pacific children and young people each year.

Data Source and Methods

Definition

Police attendance at family violence incidents, as recorded by the Police POL400 Form

Police policy defines family violence as “violence which is physical, emotional, psychological and sexual and includes intimidation or threats of violence”. The term “family” includes parents, children, extended family members, whanau, or any other person involved in a relationship (e.g. partners, caregivers, boarders and flatmates), but does not include neighbours. The POL400 form is used whether or not an arrest is made, to report all Family Violence Offences, incidents and breaches of domestic protection orders. The nature of the incidents reported can vary from no offence being recorded, to the most serious forms of violence. Not all police attendances at this type of incident lead to charges being laid and situations can be resolved in a number of different ways.

Data Source

Numerator: Police (POL400) attendances at family violence incidents

Indicator Category

Proxy C

Notes on Interpretation

The information contained in this section relates to all Police POL400 attendances, irrespective of whether a child was present. In addition, the information relates to the total number of POL400 attendances rather than the number of families involved i.e. each separate attendance at a family violence incident results in a new POL400 record, making it possible for a single household to generate multiple POL400 attendances during the same year. In addition, as Police have increasingly focused on domestic violence over recent years, it is likely that more offences have been recognised and recorded as being domestic violence related than in earlier years. Additionally, the Police replaced their crime recording IT system in 2005 which made it easier for staff to record an offence as being domestic violence related. The combined effect of these changes is that they are likely to produce increases in recorded domestic violence over time, with a particularly steep increase in mid-2005. As a result, Police statistics for recorded domestic violence cannot be used to make inferences about trends in the underlying incidence of domestic violence over time.

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

New Zealand Distribution and Trends

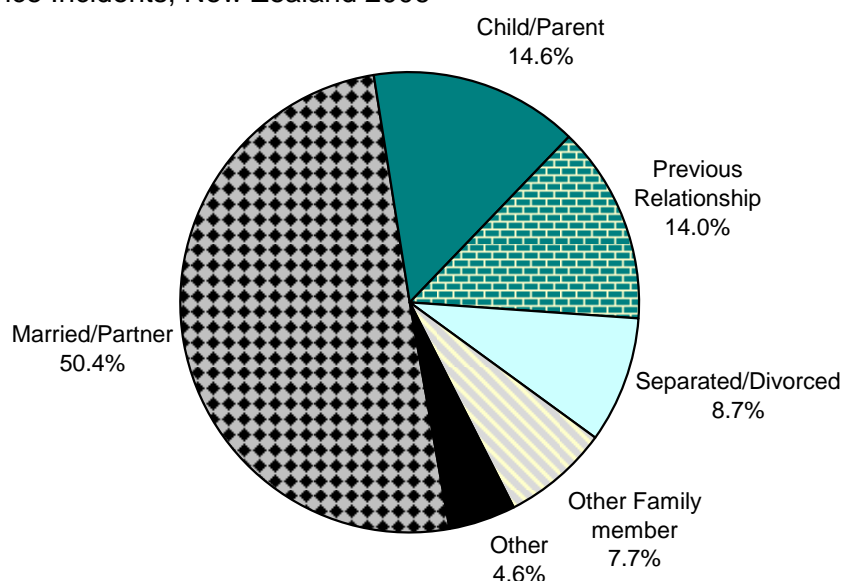
Presence of Children

Of the 61,743 family violence attendances in New Zealand during 2006 in which this information was recorded, children were present at 31,769 (51.5%).

Relationship between Victim and Offender

Of the 39,770 family violence attendances in which the relationship between the victim and the offender was recorded during 2006, in 50.4% of cases the victim was the spouse / partner of the offender, with a further 22.7% having been in a previous relationship (separated / divorced / past relationship) and in 14.6% of cases, the conflict was between a parent and child (**Figure 113**).

Figure 113. Relationship Between the Victim and Offender at Police Attendances for Family Violence Incidents, New Zealand 2006

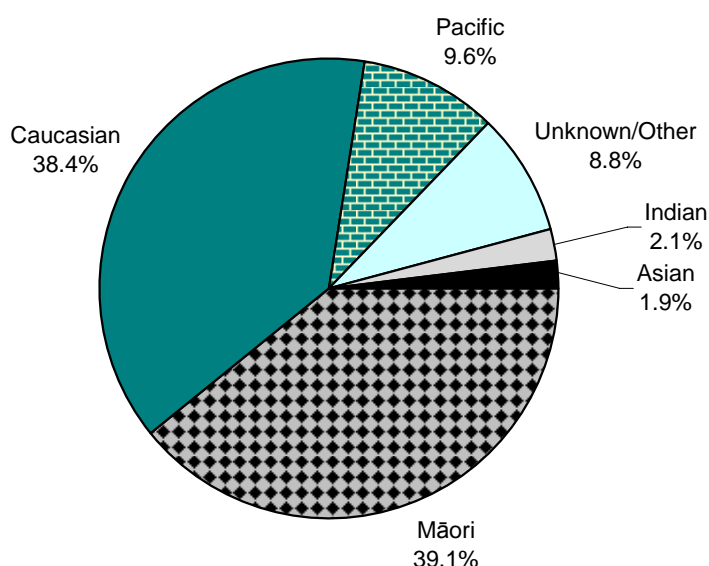


Source: NZ Police

Ethnicity of Victim

Of the 40,907 family violence attendances during 2006 where the ethnicity of the victim was recorded, 9.6% were Pacific. An additional 39.1% were Māori, 38.4% were Caucasian, 1.9% were Asian and 2.1% were Indian (**Figure 114**). While these figures do not suggest that Pacific families were markedly over represented in Police family violence attendances during this period, significant data limitations precluded the calculation of rates upon which valid ethnic comparisons could be made.

Figure 114. Ethnicity of the Victim at Police Attendances for Family Violence Incidents, New Zealand 2006

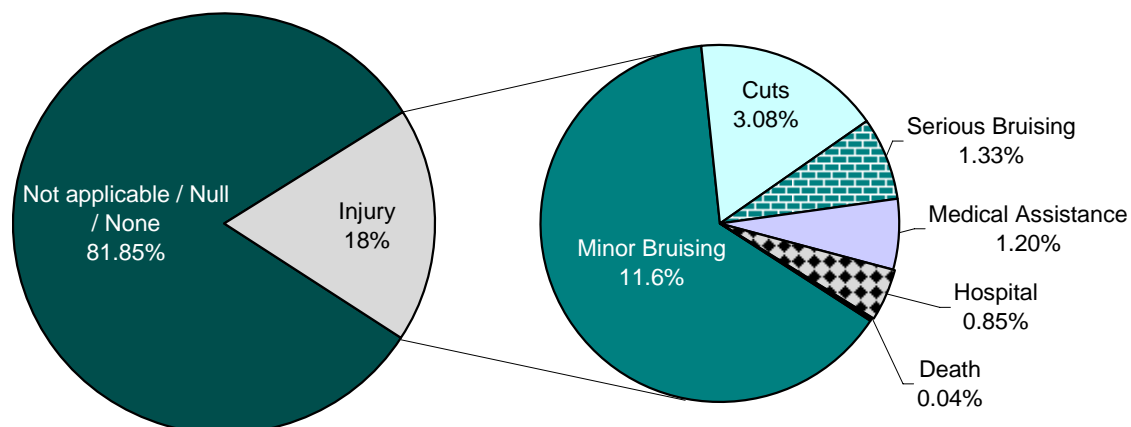


Source: NZ Police

Injuries Reported at Family Violence Attendances

Of the 61,741 family violence attendances during 2006 for which this information was recorded, in 81.9% of cases injuries were not reported. While the most common injuries were minor bruising (11.6%), cuts (3.1%) and serious bruising (1.3%), in 526 cases (0.85%) a hospital attendance was required and in 23 cases (0.04%) the incident resulted in a death (**Figure 115**).

Figure 115. Police Attendances at Family Violence Incidents Where Injuries Were Reported by Injury Type, New Zealand 2006

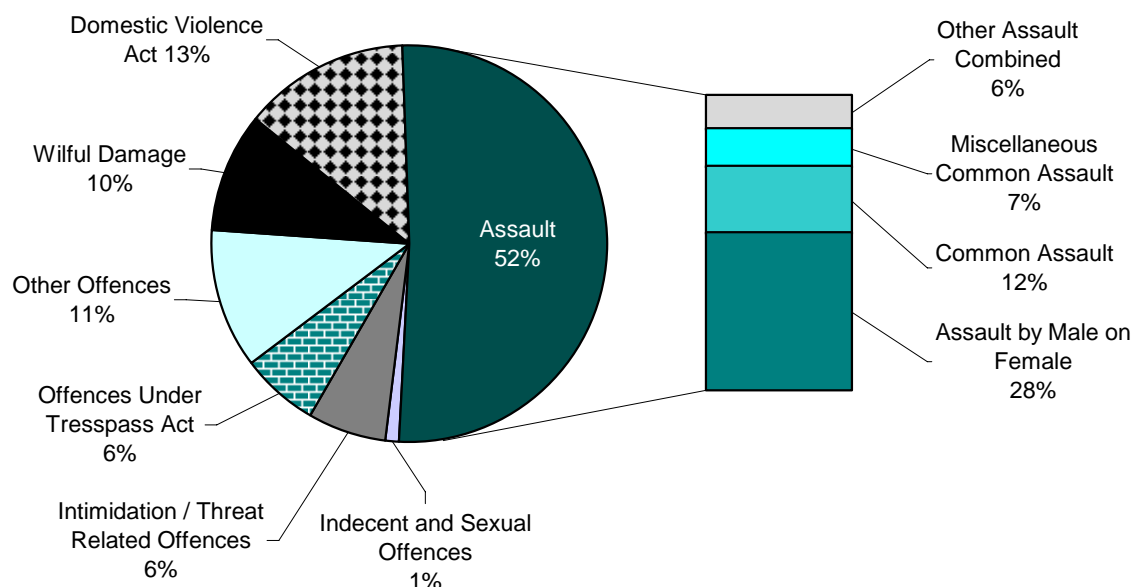


Source: NZ Police

Attendances Where an Offence was Disclosed

Police attendances at family violence incidents during 2006 resulted in a total of 24,820 offences being disclosed. While not all family violence attendances resulted in the disclosure of an offence and some attendances resulted in more than one offence, the nature of offences disclosed during this period gives some indication of the types of incidents occurring. Overall, 52% of the offences disclosed during 2006 related to assaults, with "assault by male on female" being the most common in this category (28% of all offences). In addition 13% of offences related to the Domestic Violence Act and a further 6% related to threats or intimidation (**Figure 116**).

Figure 116. Police Attendances at Family Violence Incidents Where an Offence was Disclosed by Offence Type, New Zealand 2006



Source: NZ Police

Summary

In New Zealand during 2006, 9.6% of the victims of family violence incidents attended by police (where ethnicity was recorded) were Pacific, although data limitations precluded the calculation of ethnic specific rates upon which valid comparisons could be made. During this period, children were present at 51.5% of the family violence incidents attended by Police. In addition, in 50% of cases the victim was the spouse / partner of the offender, with a further 23% having been in a previous relationship and in 15% of cases the conflict was between a parent and child. While in 82% of cases injuries were not reported, in 526 cases (0.85%) a hospital attendance was required and in 23 cases (0.04%) the incident resulted in a death. While it is difficult to use Police data to comment on trends in the prevalence of family violence amongst Pacific families over time, what Police data does suggest is that a large number of family violence incidents are occurring in New Zealand each year and that Pacific children and young people are likely to be present at a significant minority of these.





Individual and
Whanau Health
and Wellbeing

Infectious Disease

Serious Bacterial Infections

Introduction

A recent review of infectious disease control in New Zealand suggested that while well organised government-run infectious disease programmes had eliminated several zoonoses in the past (e.g. *Brucella abortis*, hydatids), more recently infectious disease control had been mixed. Rates for many conditions associated with poverty and overcrowding, such as rheumatic fever, tuberculosis and meningococcal disease are high by international standards and marked ethnic disparities remain, with rates for many of these conditions being higher for Pacific and Māori children and young people [230]. While a number of the infectious diseases of relevance to Pacific children and young people are explored in the sections which follow, this section considers serious bacterial infections collectively, in order to provide a broad overview of the impact these infections have on the health of Pacific children and young people in New Zealand.

Data Source and Methods

Definition

Hospital Admissions and Deaths due to Serious Bacterial Infections in those aged 0-24 years

Data Source

Admissions Numerator: National Minimum Dataset: Hospital admissions of children and young people (0-24 years) with a primary diagnosis of Meningococcal Disease (ICD-9 036; ICD-10 A39), Acute Rheumatic Fever or Rheumatic Heart Disease (ICD-9 390-398, ICD-10 I00-I02, I05-I09), Tuberculosis (ICD-9 010-018, ICD-10 A15-A19), Skin Infections (ICD-9 680-686, ICD-10 L00-L08), Bacterial or Unspecified Meningitis (ICD-9 320, 322, ICD-10 G00-G01, G039), Septic Arthritis (ICD-9 7110, 7119, ICD-10 M00-M01), Osteomyelitis (ICD-9 730, ICD-10 M86) or Mastoiditis (ICD-9 383, ICD-10 H70)

Deaths Numerator: National Mortality Collection: Deaths in children and young people (0-24 years) with serious bacterial infections as coded above

Denominator: NZ Census

Indicator Category Admissions: Proxy B; Mortality: Ideal B

Notes on Interpretation

The limitations of the National Minimum Dataset are discussed at length in Appendix 1. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data.

Statistical Significance Testing

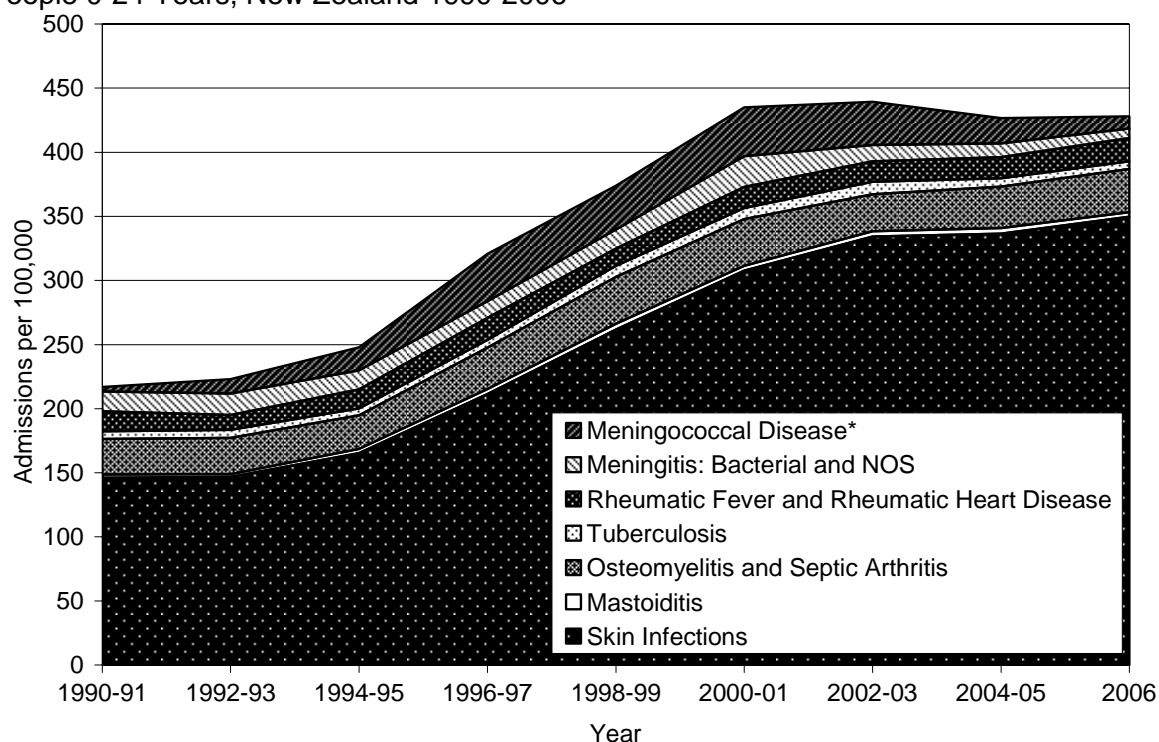
95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

New Zealand Distribution and Trends

New Zealand Trends and Age Differences

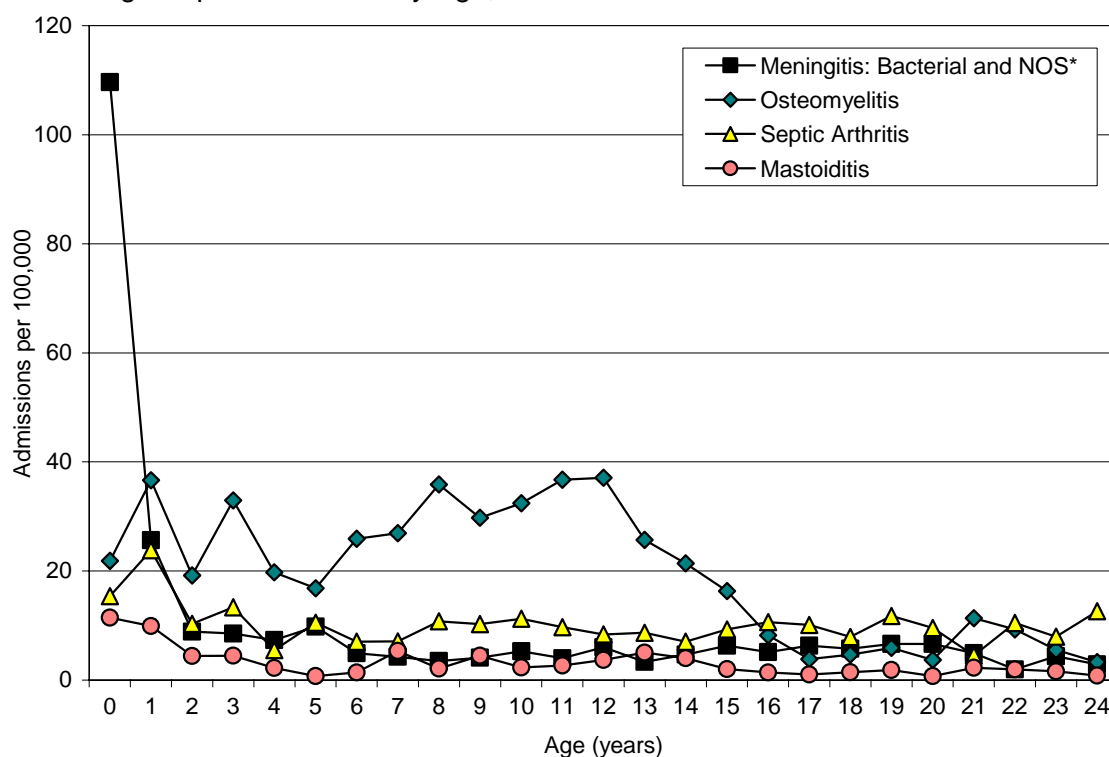
In New Zealand during 1990-2006, there were large increases in the number of children and young people admitted to hospital with serious bacterial infections. In absolute terms, much of this increase was due to a large rise in admissions for skin infections. Admissions for all other serious bacterial infections either remained static or increased, with the exception of meningococcal disease and meningitis, which both exhibited a downward trend during the early-mid 2000s (**Figure 117**). During 2002-2006, admissions for serious bacterial infections varied with age, with admissions for meningitis being highest <1 year, admissions for osteomyelitis being more common during childhood and admissions for septic arthritis and mastoiditis being more common <5 years of age (**Figure 118**).

Figure 117. Hospital Admissions for Serious Bacterial Infections in Children and Young People 0-24 Years, New Zealand 1990-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; *Meningococcal Disease also includes Meningococcal Meningitis

Figure 118. Hospital Admissions for Selected Serious Bacterial Infections in Children and Young People 0-24 Years by Age, New Zealand 2002-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; *Meningococcal Meningitis is included in Meningococcal Disease rather than in Bacterial Meningitis; For an analysis of Meningococcal Disease, Rheumatic Fever, Serious Skin Infection and Tuberculosis admissions by age, see relevant sections

Table 68. Hospital Admissions (2002-2006) and Mortality (2000-2004) due to Serious Bacterial Infections in New Zealand Children and Young People 0-24 Years

Diagnosis	Number: 5-Year Total	Number: Annual Average	Rate per 100,000	% of Total
(Any) Pacific Admissions (2002-2006)				
Skin Sepsis	4,464	892.8	629.5	73.7
Meningococcal Disease*	392	78.4	55.3	6.5
Acute Rheumatic Fever	376	75.2	53.0	6.2
Osteomyelitis	228	45.6	32.2	3.8
Rheumatic Heart Disease	148	29.6	20.9	2.4
Tuberculosis	146	29.2	20.6	2.4
Septic Arthritis	134	26.8	18.9	2.2
Bacterial Meningitis*	90	18.0	12.7	1.5
Meningitis NOS	49	9.8	6.9	0.8
Mastoiditis	31	6.2	4.4	0.5
Total	6,058	1211.6	854.4	100.0
New Zealand Admissions (2002-2006)				
Skin Sepsis	23,733	4,746.6	338.0	78.8
Meningococcal Disease*	1,624	324.8	23.1	5.4
Osteomyelitis	1,403	280.6	20.0	4.7
Acute Rheumatic Fever	864	172.8	12.3	2.9
Septic Arthritis	711	142.2	10.1	2.4
Tuberculosis	534	106.8	7.6	1.8
Bacterial Meningitis*	404	80.8	5.8	1.3
Meningitis NOS	325	65.0	4.6	1.1
Rheumatic Heart Disease	301	60.2	4.3	1.0
Mastoiditis	223	44.6	3.2	0.7
Total	30,122	6,024.4	429.0	100.0
New Zealand Deaths (2000-2004)				
Meningococcal Disease*	57	11.4	0.8	68.7
Meningitis: Bacterial & NOS*	16	3.2	0.2	19.3
Rheumatic Fever/Heart Disease	7	1.4	0.1	8.4
Other Bacterial Infections*	<5	s	s	s
Total	83	16.6	1.2	100.0

Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Census; (Any) Pacific Includes children and young people who identify as Pacific in ANY of their three first ethnic groups; *Meningococcal Disease includes Meningococcal Meningitis; *Other Bacterial Infections includes Osteomyelitis, Septic Arthritis, and Tuberculosis. s: Rates not calculated due to small numbers.

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

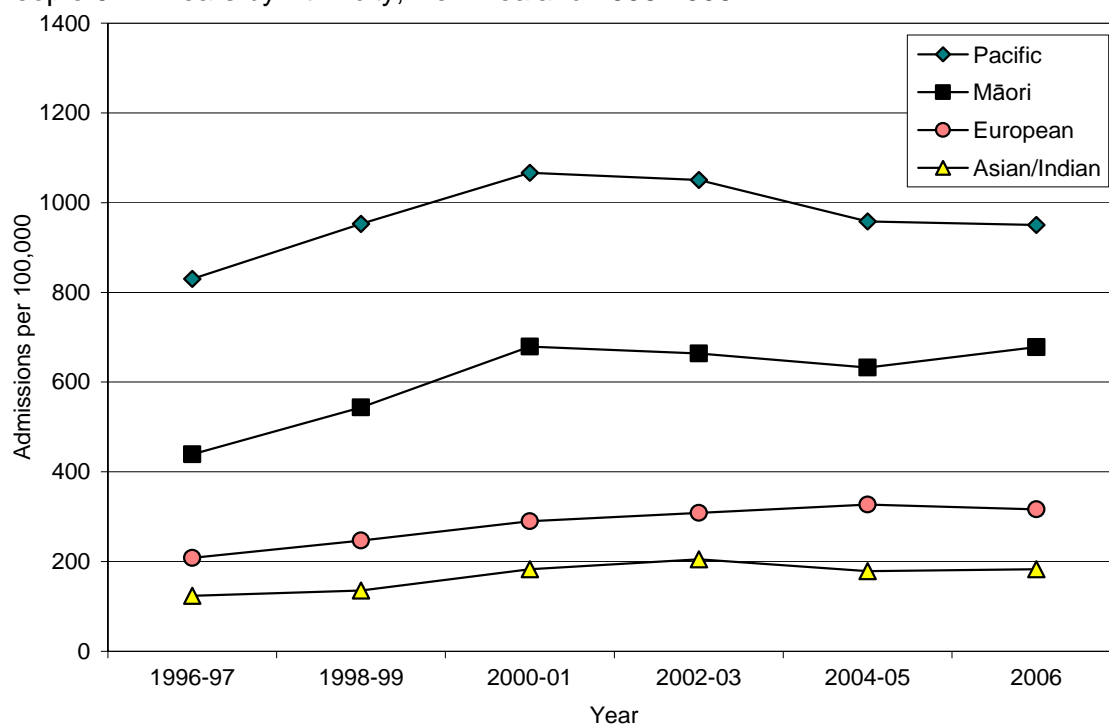
During 2002-2006, the most common reason for a serious bacterial infection admission in (Any) Pacific children and young people was for skin infections, which accounted for 73.7% of admissions in this category. Meningococcal disease however accounted for 68.7% of deaths nationally during 2000-2004 (**Table 68**). During 2002-2006, serious bacterial infection admissions were *significantly higher* for Pacific > Māori > European > Asian / Indian children and young people, males and those living in the more deprived areas (**Table 69**). Similar ethnic differences were seen during 1996-2006 (**Figure 119**).

Table 69. Risk Factors for Hospital Admissions due to Serious Bacterial Infections in Children and Young People 0-24 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	204.25	1.00		1-2	217.22	1.00	
2	230.38	1.13	1.05-1.22	3-4	285.85	1.32	1.26-1.39
3	255.60	1.25	1.16-1.34	5-6	343.56	1.58	1.51-1.66
4	316.68	1.55	1.45-1.66	7-8	475.57	2.19	2.10-2.29
5	303.14	1.48	1.38-1.59	9-10	723.86	3.33	3.20-3.47
6	383.11	1.88	1.76-2.01	Prioritised Ethnicity			
7	412.61	2.02	1.89-2.15	Māori	651.67	2.08	2.03-2.14
8	535.46	2.62	2.46-2.79	Pacific	988.91	3.15	3.05-3.25
9	636.75	3.12	2.94-3.31	European	313.83	1.00	
10	802.39	3.93	3.71-4.16	Asian/Indian	188.97	0.60	0.57-0.64
Gender							
Female	360.69	1.00					
Male	494.94	1.37	1.34-1.40				

Source: Numerator-National Minimum Dataset; Denominator-Census; Rate per 100,000; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted.

Figure 119. Hospital Admissions for Serious Bacterial Infections in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity is Level 1 Prioritised.

Serious Bacterial Infections Amongst Pacific Groups in New Zealand

During 2002-2006 (using the Sole / (Any) classification), serious bacterial infection admissions for Pacific children and young people were *significantly higher* than for non-Māori non-Pacific children and young people in each of the Sole and (Any) Groups. Within the (Any) Category, admissions were *significantly higher* for Samoan, Tongan and Tokelauan children and young people than they were for Cook Island Māori, Niue and Fijian children and young people. Within the Sole Category, admissions were *significantly higher* for Samoan, Tongan and Tokelauan children and young people than they were for Cook Island Māori and Fijian children and young people (**Table 70**).

Table 70. Distribution of Hospital Admissions for Serious Bacterial Infections in Pacific Children and Young People 0-24 Yrs by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Any Samoan	3,013	602.6	856.3	2.85	2.74-2.96
Any Tongan	1,362	272.4	983.8	3.28	3.10-3.47
Any Cook Island Māori	1,029	205.8	614.4	2.05	1.92-2.18
Any Niue	337	67.4	530.8	1.77	1.59-1.97
Any Fijian	114	22.8	506.0	1.69	1.41-2.03
Any Tokelauan	154	30.8	771.9	2.57	2.19-3.01
Any Other Pacific	276	55.2	1288.9	4.30	3.82-4.84
Any Pacific	6,058	1,211.6	854.4	2.85	2.77-2.94
Any Māori	9,644	1,928.8	651.7	2.17	2.12-2.23
Non-Māori Non-Pacific	14,952	2,990.4	300.1	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Sole Samoan	2,402	480.4	1223.9	4.08	3.91-4.26
Sole Tongan	1,095	219.0	1293.2	4.31	4.06-4.58
Sole Cook Island Māori	749	149.8	1083.7	3.61	3.36-3.88
Sole Niue	196	39.2	1194.2	3.98	3.46-4.58
Sole Fijian	61	12.2	786.6	2.62	2.04-3.37
Sole Tokelauan	93	18.6	1442.5	4.81	3.93-5.89
Sole Other Pacific	226	45.2	2390.8	7.97	7.00-9.07
Sole Pacific	4,881	976.2	1250.7	4.17	4.04-4.31
Sole Māori	8,021	1,604.2	1180.4	3.93	3.83-4.04
Non-Māori Non-Pacific	14,952	2,990.4	300.1	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification; Rate ratios are compared to the Non-Māori Non-Pacific group and are unadjusted.

Summary

In New Zealand during 2002-2006, the most common reason for a serious bacterial admission in (Any) Pacific children and young people was for skin infections, which accounted for 73.7% of admissions in this category. During 2002-2006 (using prioritised ethnicity), admissions were *significantly higher* for Pacific > Māori > European > Asian / Indian children and young people, males and those in the more deprived areas. Using the Sole / (Any) classification, admissions for Pacific children and young people were *significantly higher* than for non-Māori non-Pacific children and young people in each of the Sole and (Any) Groups. Within the (Any) Category, admissions were *significantly higher* for Samoan, Tongan and Tokelauan children and young people than for Cook Island Māori, Niue and Fijian children and young people, while within the Sole Category, admissions were *significantly higher* for Samoan, Tongan and Tokelauan children and young people than for Cook Island Māori and Fijian children and young people.

Meningococcal Disease

Introduction

Neisseria meningitidis is an organism frequently found in the nose and throat of asymptomatic carriers. Symptoms of invasive disease include fever, headache, drowsiness, irritability, vomiting and a petechial rash. Without appropriate antibiotic treatment, death from septicaemia or meningitis may occur within a relatively short period of time (hours). While meningococcal infections are only moderately communicable, crowded conditions concentrate the number of carriers and may reduce individual resistance to the organism [231].

New Zealand has been in the midst of an epidemic of serogroup B meningococcal disease since mid-1991, with earlier Ministry of Health prevention strategies focusing on epidemiological surveillance, public awareness campaigns, contact tracing and the offering of prophylactic antibiotics. Clinical trials of a tailor-made meningococcal B vaccine began in 2002 and following regulatory approval in July 2004, roll out of the MeNZB Vaccine Campaign occurred across the country (for those 6 months-19 years) during 2004-2005 [232]. While at the time of writing it is too early to fully evaluate the impact of this campaign, as the tables and figures in the section which follow will indicate, it is likely that it has already made a significant impact on the number of cases of invasive meningococcal disease amongst New Zealand children and young people in the past 1-2 years.

The following section explores hospital admissions from meningococcal disease amongst Pacific children and young people in New Zealand using information available from the National Minimum Dataset.

Data Source and Methods

Definition

Hospital Admissions and Deaths due to Meningococcal Disease in those aged 0-24 years

Data Source

Admissions Numerator: National Minimum Dataset: Hospital admissions of children and young people (0-24 years) with a primary diagnosis of Meningococcal Disease (ICD-9 036; ICD-10 A39)

Deaths Numerator: National Mortality Collection: Deaths in children and young people (0-24 years) with a clinical code (cause of death) attributed to Meningococcal Disease (ICD-9 036; ICD-10 A39)

Denominator: NZ Census

Indicator Category Admissions: Proxy B; Mortality: Ideal B

Notes on Interpretation

The limitations of the National Minimum Dataset are discussed at length in Appendix 1. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data.

Statistical Significance Testing

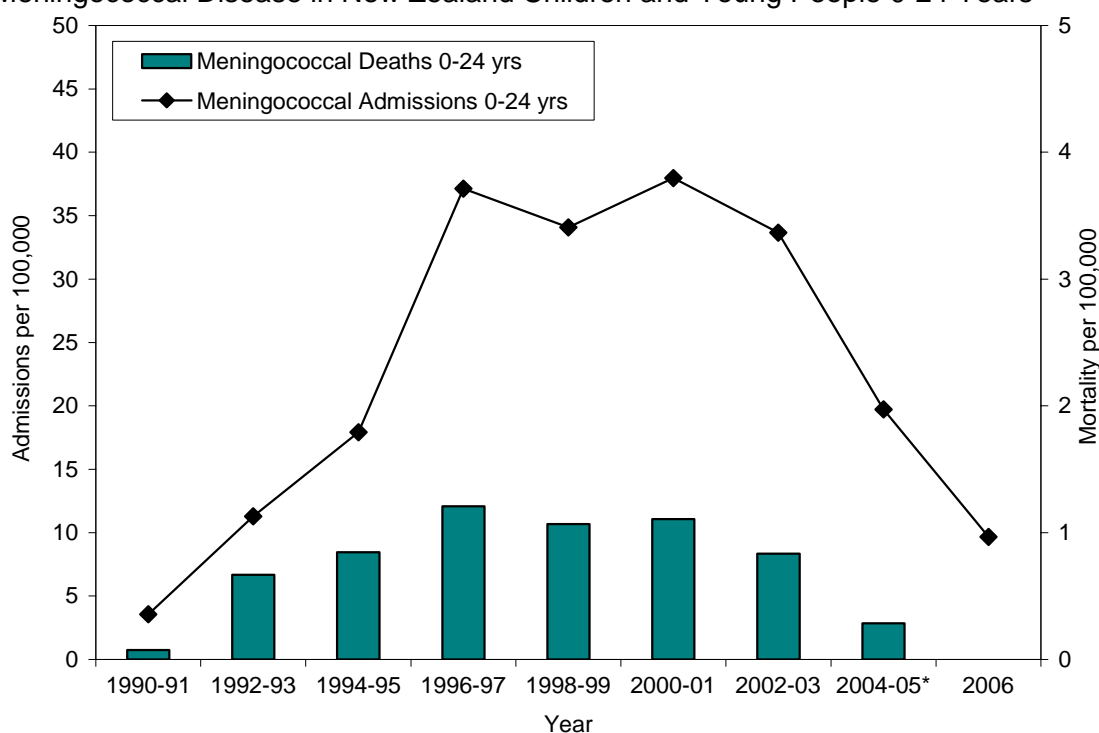
95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

New Zealand Distribution and Trends

New Zealand Trends and Age Distribution

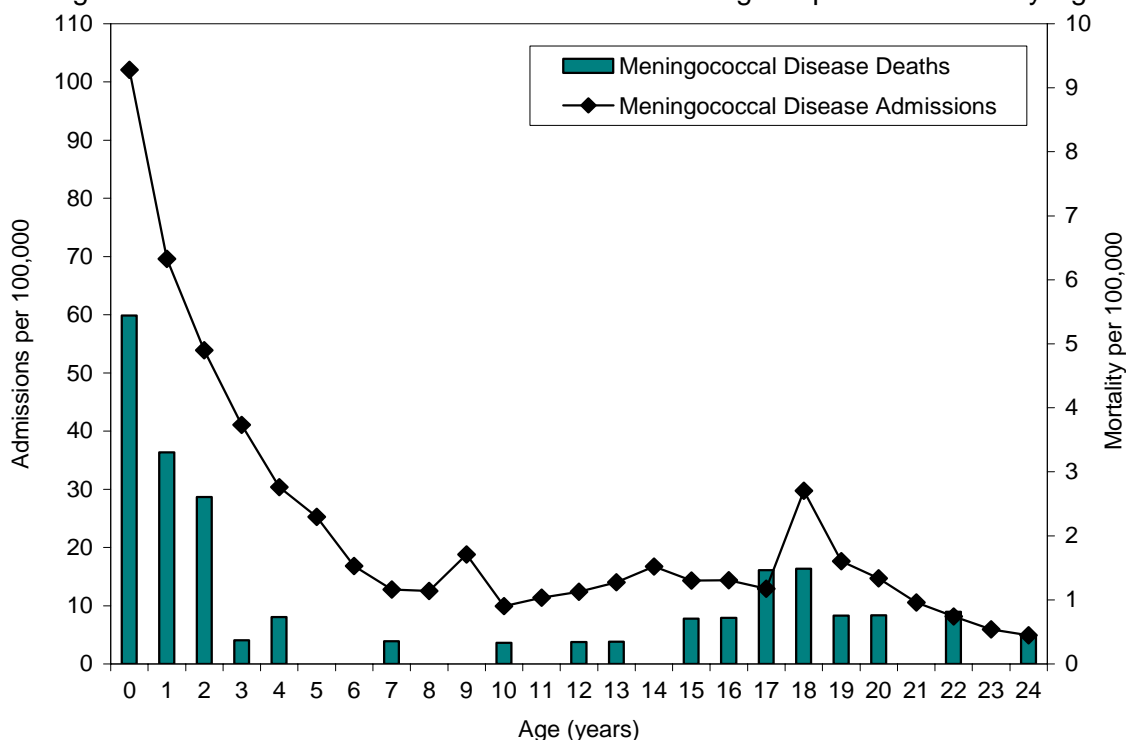
While during 1990-1997, New Zealand experienced large increases in hospital admissions and deaths from meningococcal disease, admissions have tapered off markedly since 2002-2003 (**Figure 120**). During 2002-2006, admissions were highest amongst children <5 years of age, although a smaller peak also occurred amongst those in their mid to late teens. Mortality during 2000-2004 exhibited a similar pattern (**Figure 121**).

Figure 120. Hospital Admissions (1990-2006) and Deaths (1990-2004) due to Meningococcal Disease in New Zealand Children and Young People 0-24 Years



Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Census; Deaths for 2004-05 are for 2004 only.

Figure 121. Hospital Admissions (2002-2006) and Deaths (2000-2004) due to Meningococcal Disease in New Zealand Children & Young People 0-24 Years by Age



Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Census

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

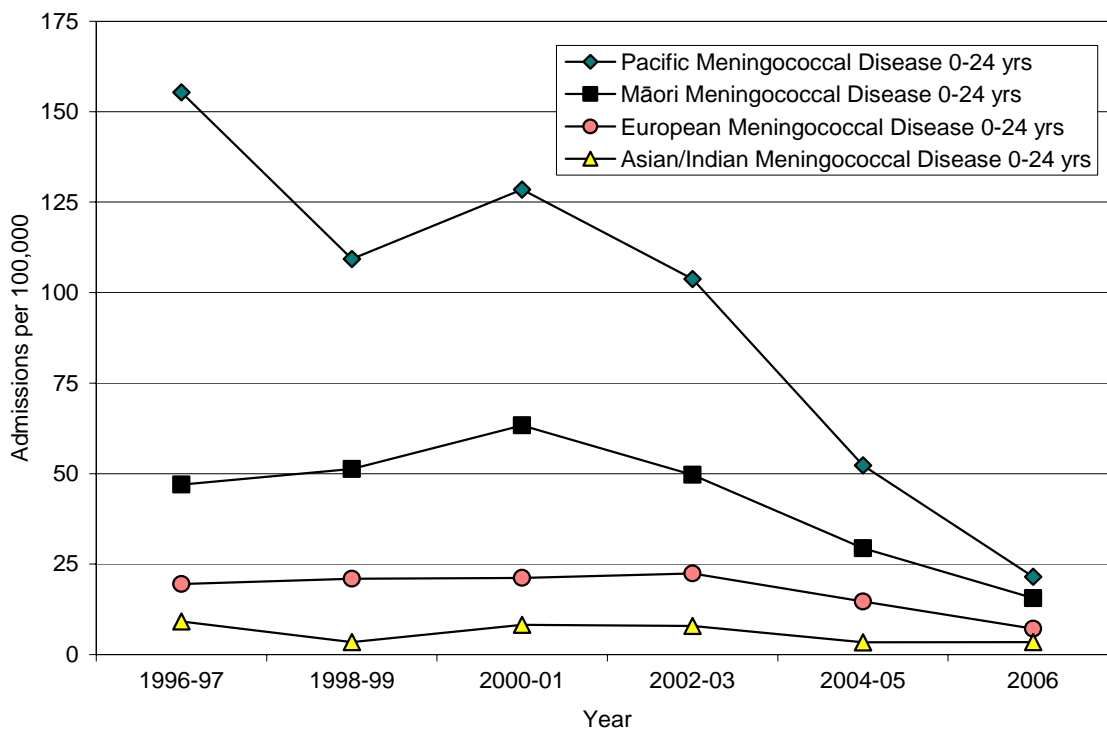
In New Zealand during 2002-2006, hospital admissions for meningococcal disease were *significantly higher* for Pacific > Māori > European > Asian / Indian children and young people, males and those living in the more deprived areas (**Table 71**). While similar ethnic differences were seen during 1996-2006, in absolute terms admission rates declined most rapidly for Pacific children and young people during this period (**Figure 122**).

Table 71. Risk Factors for Hospital Admission due to Meningococcal Disease in Children and Young People 0-24 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	10.44	1.00		1-2	9.84	1.00	
2	9.23	0.88	0.62-1.24	3-4	13.38	1.36	1.08-1.71
3	10.30	0.99	0.71-1.38	5-6	15.86	1.61	1.29-2.00
4	16.51	1.58	1.17-2.14	7-8	27.07	2.75	2.25-3.36
5	17.89	1.71	1.27-2.30	9-10	43.09	4.38	3.64-5.28
6	13.88	1.33	0.97-1.81	Prioritised Ethnicity			
7	23.01	2.21	1.67-2.93	Māori	34.6	2.13	1.90-2.39
8	30.92	2.96	2.26-3.87	Pacific	65.9	4.05	3.56-4.60
9	33.80	3.24	2.49-4.21	European	16.3	1.00	
10	51.46	4.93	3.83-6.34	Asian/Indian	5.0	0.31	0.22-0.44
Gender							
Female	20.60	1.00					
Male	25.50	1.24	1.12-1.37				

Source: Numerator-National Minimum Dataset; Denominator-Census; Rate per 100,000; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted.

Figure 122. Hospital Admissions due to Meningococcal Disease in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity is Level 1 Prioritised

Meningococcal Disease Amongst Pacific Groups in New Zealand

During 2002-2006 (using the Sole / (Any) classification), meningococcal disease admissions for Pacific children and young people were *significantly higher* than for non-Māori non-Pacific children in each of the Sole and (Any) Groups (with the exception of Tokelauan and Sole Fijian children and young people, where small numbers precluded a valid comparison). Within the (Any) Category, admissions were *significantly higher* for Tongan children and young people than for Samoan, Cook Island Māori and Niue children and young people. Within the Sole Category, admissions were *significantly higher* for Tongan children and young people than for Samoan and Cook Island Māori young people (**Table 72**).

Table 72. Distribution of Hospital Admissions due to Meningococcal Disease in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Any Samoan	182	36.4	51.7	3.46	2.94-4.07
Any Tongan	115	23.0	83.1	5.56	4.57-6.77
Any Cook Island Māori	61	12.2	36.4	2.44	1.88-3.17
Any Niue	22	4.4	34.7	2.32	1.52-3.54
Any Fijian	8	1.6	35.5	2.38	1.19-4.78
Any Tokelauan	<5	s	s	s	s
Any Other Pacific	18	3.6	84.1	5.63	3.53-8.98
Any Pacific	392	78.4	55.3	3.70	3.27-4.18
Any Māori	512	102.4	34.6	2.32	2.07-2.60
Non-Māori Non-Pacific	744	148.8	14.9	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Sole Samoan	148	29.6	75.4	5.05	4.23-6.02
Sole Tongan	97	19.4	114.6	7.67	6.21-9.48
Sole Cook Island Māori	45	9.0	65.1	4.36	3.23-5.89
Sole Niue	14	2.8	85.3	5.71	3.37-9.69
Sole Fijian	<5	s	s	s	s
Sole Tokelauan	<5	s	s	s	s
Sole Other Pacific	13	2.6	137.5	9.21	5.32-15.93
Sole Pacific	323	64.6	82.8	5.54	4.86-6.31
Sole Māori	414	82.8	60.93	4.08	3.62-4.60
Non-Māori Non-Pacific	744	148.8	14.9	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate Ratios compared to the non-Māori non-Pacific group and are unadjusted; s: Rate not calculated due to small numbers.

Summary

In New Zealand during 2002-2006 (using prioritised ethnicity), hospital admissions for meningococcal disease were *significantly higher* for Pacific > Māori > European > Asian / Indian children and young people, males and those living in the more deprived areas. While similar ethnic differences were seen during 1996-2006, in absolute terms admissions declined most rapidly for Pacific children and young people during this period.

Similarly during 2002-2006 (using the Sole / (Any) classification), meningococcal disease admissions for Pacific children and young people were *significantly higher* than for non-Māori non-Pacific children in each of the Sole and (Any) Groups (with the exception of Tokelauan and Sole Fijian children and young people where small numbers precluded a valid comparison). Within the (Any) Category, admissions were *significantly higher* for Tongan children and young people than for Samoan, Cook Island Māori and Niue children and young people, while within the Sole Category, admissions were *significantly higher* for Tongan children and young people than for Samoan and Cook Island Māori young people.



Rheumatic Fever

Introduction

Acute rheumatic fever is a delayed inflammatory reaction which develops in response to an inadequately treated group A streptococcal throat infection. It usually occurs in school-age children and may affect the brain, heart, joints, skin or subcutaneous tissue [231]. Recurrent episodes of rheumatic fever may result in the development of rheumatic heart disease, a progressive condition leading to damage, scarring and deformities of the heart valves and chordae tendineae [231]. While New Zealand's rheumatic fever rates have declined significantly during the past 30 years, they still remain higher than those of many other developed countries. Risk factors include age (school age children), ethnicity (Pacific>Māori>European), socioeconomic disadvantage and overcrowding [233]. Primary prevention focuses on the adequate treatment of streptococcal throat infections, while secondary prevention aims to ensure that those previously diagnosed with rheumatic fever receive monthly antibiotic prophylaxis, either for 10 years from their first diagnosis or until 21 years of age [233].

The following section explores hospital admissions for acute rheumatic fever and rheumatic heart disease amongst Pacific children and young people in New Zealand using information from the National Minimum Dataset.

Data Source and Methods

Definition

Hospital Admissions and Deaths from Acute Rheumatic Fever and Rheumatic Heart Disease in children and young people aged 0-24 years

Data Source

Admissions Numerator: National Minimum Dataset: Hospital admissions of children and young people (0-24 years) with a primary diagnosis of either acute rheumatic fever (ICD-9 390-392; ICD-10 I00-I02) or rheumatic heart disease (ICD-9 393-398; ICD-10 I05-I09)

Deaths Numerator: National Mortality Collection: Deaths in children and young people (0-24 years) with a clinical code (cause of death) attributed to either acute rheumatic fever (ICD-9 390-392; ICD-10 I00-I02) or rheumatic heart disease (ICD-9 393-398; ICD-10 I05-I09)

Denominator: NZ Census

Indicator Category: Admissions Proxy B; Mortality Ideal B

Notes on Interpretation

The limitations of the National Minimum Dataset are discussed at length in Appendix 1. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data.

Statistical Significance Testing

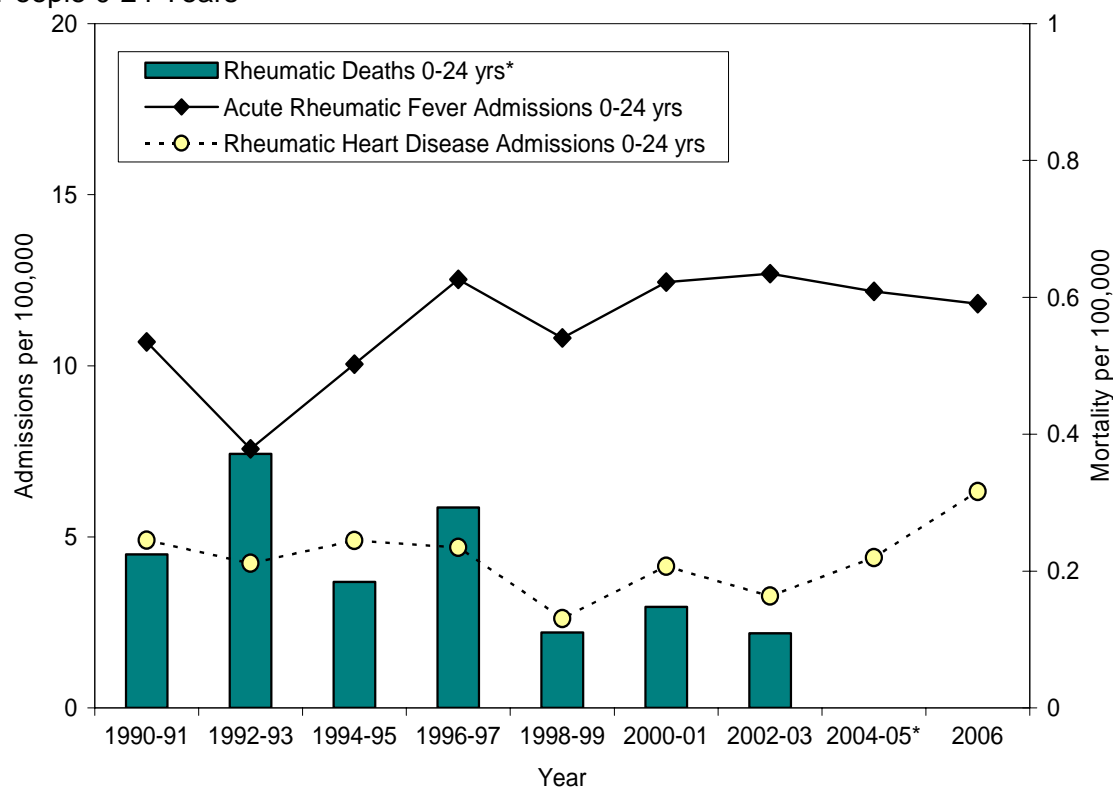
95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

New Zealand Distribution and Trends

New Zealand Trends and Age Distribution

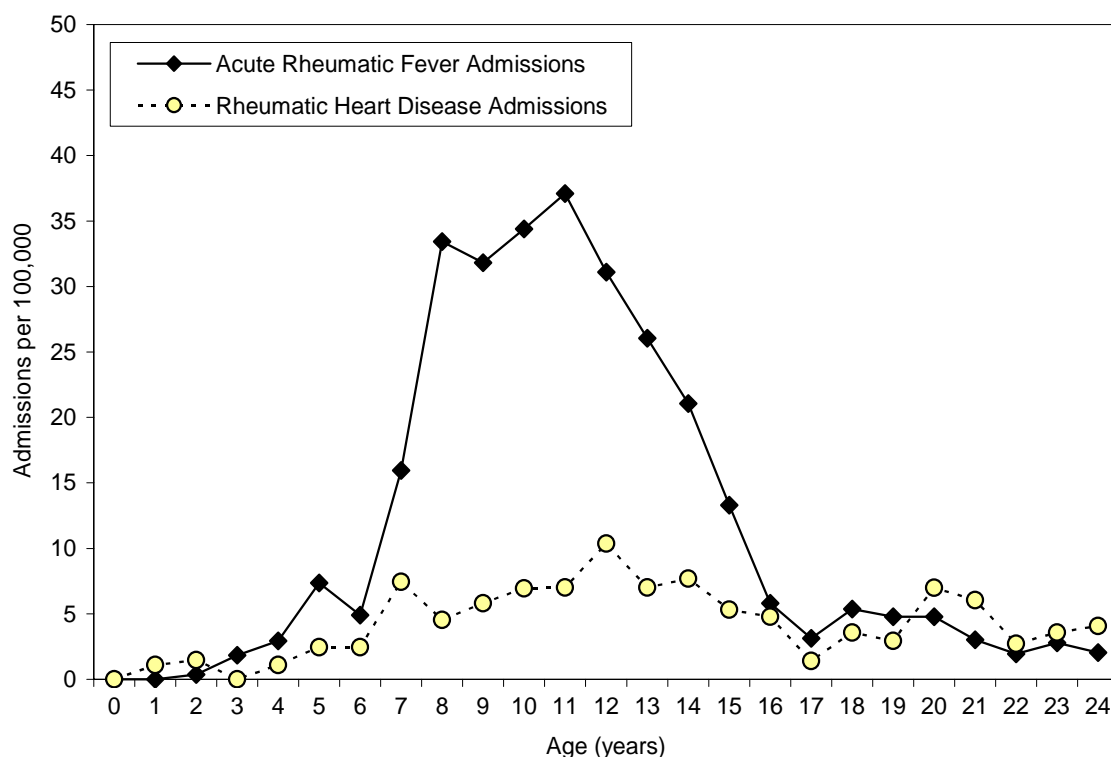
In New Zealand during 1996-2006, hospital admissions for acute rheumatic fever and rheumatic heart disease remained relatively static, while deaths averaged 2 per year during 1996-2004 (**Figure 123**). During 2002-2006, hospital admissions for acute rheumatic fever peaked in late childhood and early adolescence, while admissions for rheumatic heart disease were relatively constant (albeit at a low level) after 5 years of age (**Figure 124**). In contrast, deaths due to acute rheumatic fever and rheumatic heart disease were most frequent during the teenage years.

Figure 123. Hospital Admissions (1990-2006) and Deaths (1990-2004) from Acute Rheumatic Fever and Rheumatic Heart Disease in New Zealand Children and Young People 0-24 Years



Source: Numerators-National Minimum Dataset & Mortality Collection; Denominator-Census; *Rheumatic Deaths include Acute Rheumatic Fever & Rheumatic Heart Disease; *No deaths occurred in 2004.

Figure 124. Hospital Admissions due to Acute Rheumatic Fever and Rheumatic Heart Disease in Children and Young People 0-24 Years by Age, New Zealand 2002-2006



Source: Numerator-National Minimum Dataset; Denominator-Census

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

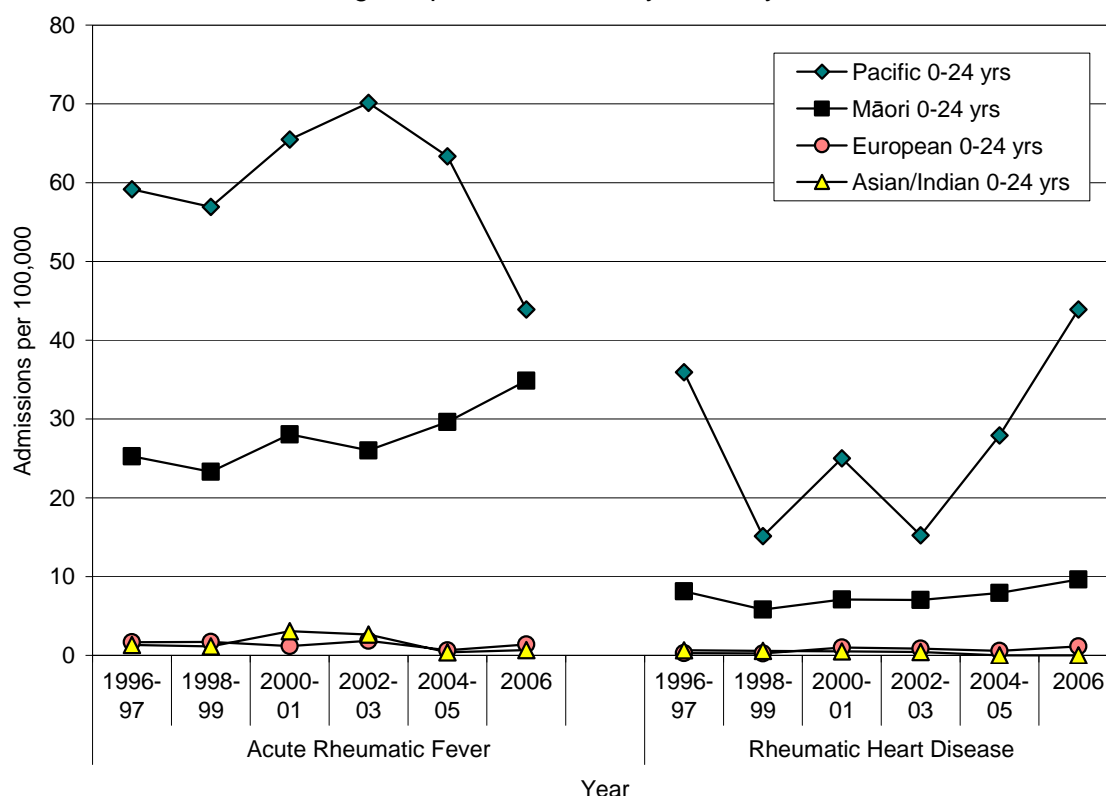
During 2002-2006, hospital admissions for acute rheumatic fever were *significantly higher* for Pacific > Māori > European and Asian / Indian children and young people, males and those living in the more deprived areas (**Table 73**). Similar ethnic differences were seen for both acute rheumatic fever and rheumatic heart disease during 1996-2006 (**Figure 125**).

Table 73. Risk Factors for Hospital Admission due to Acute Rheumatic Fever in Children and Young People 0-24 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				Prioritised Ethnicity			
1-2	1.20	1.00		Māori	29.26	22.97	17.18-30.70
3-4	3.29	2.74	1.54-4.86	Pacific	61.92	48.62	36.24-65.24
5-6	6.63	5.52	3.24-9.41	European	1.27	1.00	
7-8	9.41	7.83	4.66-13.16	Asian/Indian	1.26	0.99	0.47-2.09
9-10	34.42	28.65	17.43-47.08				
Gender							
Female	9.80	1.00					
Male	14.73	1.50	1.31-1.72				

Source: Numerator-National Minimum Dataset; Denominator-Census; Rate per 100,000 per year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Figure 125. Hospital Admissions due to Acute Rheumatic Fever and Rheumatic Heart Disease in Children & Young People 0-24 Years by Ethnicity, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity is Level 1 Prioritised

Acute Rheumatic Fever and Rheumatic Heart Disease Admissions for Amongst Pacific Groups in New Zealand

Acute Rheumatic Fever: During 2002-2006 (using the Sole / (Any) classification), acute rheumatic fever admissions for Pacific children and young people were *significantly higher* than for non-Māori non-Pacific children and young people in each of the Sole and (Any) Groups (with the exception of Fijian children and young people where small numbers prevented a valid analysis). While admissions were highest for Tokelauan children and young people, the majority of differences between individual Pacific groups did not reach statistical significance (**Table 74**).

Table 74. Distribution of Hospital Admissions for Acute Rheumatic Fever in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Any Samoan	188	37.6	53.4	31.3	24.24-40.46
Any Tongan	72	14.4	52.0	30.5	22.28-41.73
Any Cook Island Māori	83	16.6	49.6	29.1	21.47-39.31
Any Niue	20	4.0	31.5	18.5	11.35-30.06
Any Fijian	<5	s	s	s	s
Any Tokelauan	23	4.6	115.3	67.6	42.65-107.12
Any Other Pacific	20	4.0	93.4	54.8	33.64-89.09
Any Pacific	376	75.2	53.0	31.1	24.57-39.34
Any Māori	433	86.6	29.3	17.2	13.59-21.64
Non-Māori Non-Pacific	85	17.0	1.7	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Sole Samoan	146	29.2	74.4	43.6	33.38-56.98
Sole Tongan	57	11.4	67.3	39.5	28.22-55.20
Sole Cook Island Māori	61	12.2	88.3	51.7	37.24-71.88
Sole Niue	16	3.2	97.5	57.2	33.51-97.47
Sole Fijian	<5	s	s	s	s
Sole Tokelauan	13	2.6	201.6	118.2	65.98-211.82
Sole Other Pacific	12	2.4	126.9	74.4	40.68-136.16
Sole Pacific	308	61.6	78.9	46.3	36.39-58.83
Sole Māori	379	75.8	55.78	32.70	25.85-41.37
Non-Māori Non-Pacific	85	17.0	1.7	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate Ratios compared to the non-Māori non-Pacific group and are unadjusted; s: Rates not calculated due to small numbers.

Rheumatic Heart Disease: Similarly during 2002-2006, rheumatic heart disease admissions for Pacific children and young people were *significantly higher* than for non-Māori non-Pacific children and young people in each of the Sole and (Any) Groups (with the exception of Fijian, Tokelauan and Sole Niue children and young people where small numbers prevented a valid comparison). While admissions were *significantly higher* for "Other" Pacific children and young people than for the other

Pacific groups, small numbers meant that many other differences between individual Pacific groups did not reach statistical significance (**Table 75**).

Table 75. Distribution of Hospital Admissions for Rheumatic Heart Disease in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Any Samoan	74	14.8	21.0	25.6	17.45-37.43
Any Tongan	14	2.8	10.1	12.3	6.70-22.54
Any Cook Island Māori	42	8.4	25.1	30.5	19.82-46.87
Any Niue	5	1.0	7.9	9.6	3.78-24.22
Any Fijian	<5	s	s	s	s
Any Tokelauan	<5	s	s	s	s
Any Other Pacific	18	3.6	84.1	102.2	58.70-177.78
Any Pacific	152	30.4	21.4	26.1	18.45-36.78
Any Māori	117	23.4	7.9	9.6	6.73-13.72
Non-Māori Non-Pacific	41	8.2	0.8	1.0	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Sole Samoan	65	13.0	33.1	40.3	27.23-59.50
Sole Tongan	14	2.8	16.5	20.1	10.96-36.87
Sole Cook Island Māori	38	7.6	55.0	66.8	42.98-103.89
Sole Niue	<5	s	s	s	s
Sole Fijian	<5	s	s	s	s
Sole Tokelauan	<5	s	s	s	s
Sole Other Pacific	15	3.0	158.7	192.9	106.79-348.30
Sole Pacific	140	28.0	35.9	43.6	30.78-61.75
Sole Māori	99	19.8	14.57	17.71	12.31-25.48
Non-Māori Non-Pacific	41	8.2	0.8	1.0	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate Ratios compared to the non-Māori non-Pacific group and are unadjusted; s: Rates not calculated due to small numbers.

Summary

Acute Rheumatic Fever: During 2002-2006 (using prioritised ethnicity), acute rheumatic fever admissions were *significantly higher* for Pacific > Māori > European and Asian / Indian children and young people, males and those in the more deprived areas. Using the Sole / (Any) classification, acute rheumatic fever admissions were *significantly higher* than for non-Māori non-Pacific children and young people in each of the Pacific Sole and (Any) Groups (with the exception of Fijian children and young people where small numbers prevented a valid analysis). **Rheumatic Heart Disease:** Similarly during 2002-2006 (using the Sole / (Any) classification), rheumatic heart disease admissions were *significantly higher* than for non-Māori non-Pacific children and young people in each of the Pacific Sole and (Any) Groups (with the exception of Fijian, Tokelauan and Sole Niue children and young people where small numbers prevented a valid comparison).

Serious Skin Infections

Introduction

Bacterial skin infections are a common cause of hospitalisation in children, with the most frequently implicated organisms being *Staphylococcus aureus* and *Streptococcus pyogenes* [234]. Common clinical presentations include:

Cellulitis: A diffuse infection of the skin and subcutaneous tissue characterised by local heat, redness, pain, swelling and occasionally fever, malaise, chills and headache. Infection is more likely to develop in the presence of damaged skin and abscesses / tissue destruction may occur if antibiotics are not taken. [231].

Furuncles and Carbuncles: Commonly known as an abscess or boil, furuncles form tender, red, firm / fluctuant masses of walled off purulent material. They arise from infections of the hair follicle (usually involving *S. aureus*), which then enlarge and eventually open to the skin surface, allowing the purulent contents to drain. Carbuncles are an aggregate of infected hair follicles that form a broad, swollen, red and painful mass that usually opens and drains through multiple tracts. Associated symptoms may include fever and malaise [235].

New Zealand's hospital admission rates for childhood skin infection have increased in recent years and are currently double those of the USA and Australia [236]]. Admissions are highest during the summer months and are also higher for Māori and Pacific children and those living in the most deprived areas [236]. In developing interventions to reduce childhood skin infections, issues such as overcrowding, access to washing machines and first aid kits, exposure to insect bites, the cleaning and covering wounds and access to primary health care may all need to be addressed simultaneously (see Hunt 2004 [236] for a range of options at a DHB level). The following section explores hospital admissions for serious skin infections amongst Pacific children and young people in New Zealand using information available from the National Minimum Dataset.

Data Source and Methods

Definition

Hospital Admissions and Deaths due to Serious Skin Infections in those aged 0-24 years.

Serious skin infections include: staphylococcal scaled skin syndrome, impetigo, cutaneous abscess, furuncle and carbuncle, cellulitis (excluding peri-orbital cellulitis), acute lymphadenitis (excluding mesenteric adenitis), pilonidal cysts, and other local infections of the skin and subcutaneous tissue.

Data Source

Admissions Numerator: National Minimum Dataset: Hospital admissions of children and young people (0-24 years) with a primary diagnosis of a serious skin infection (ICD-9 680-686; ICD-10 L00-L08)

Deaths Numerator: National Mortality Collection: Deaths in children and young people (0-24 years) with a clinical code (cause of death) attributed to a serious skin infection (ICD-9 680-686; ICD-10 L00-L08)

Denominator: NZ Census

Indicator Category Admissions: Proxy B-C; Mortality: Ideal B

Notes on Interpretation

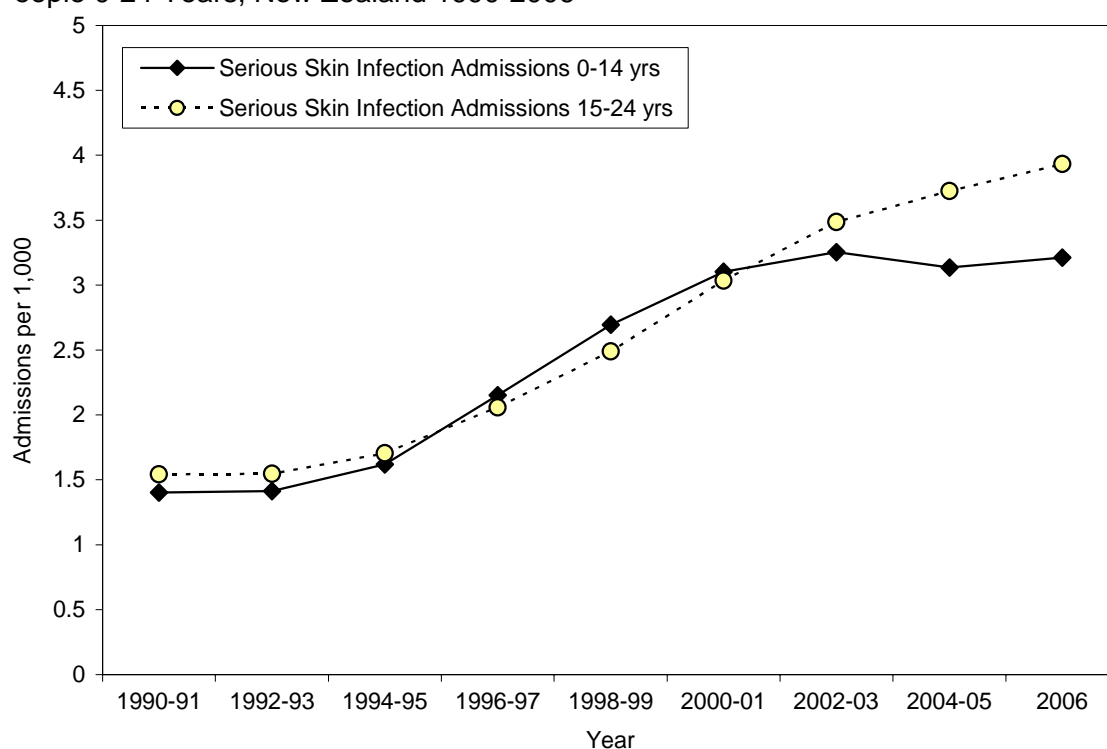
The limitations of the National Minimum Dataset are discussed at length in Appendix 1. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data.

Statistical Significance Testing

95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

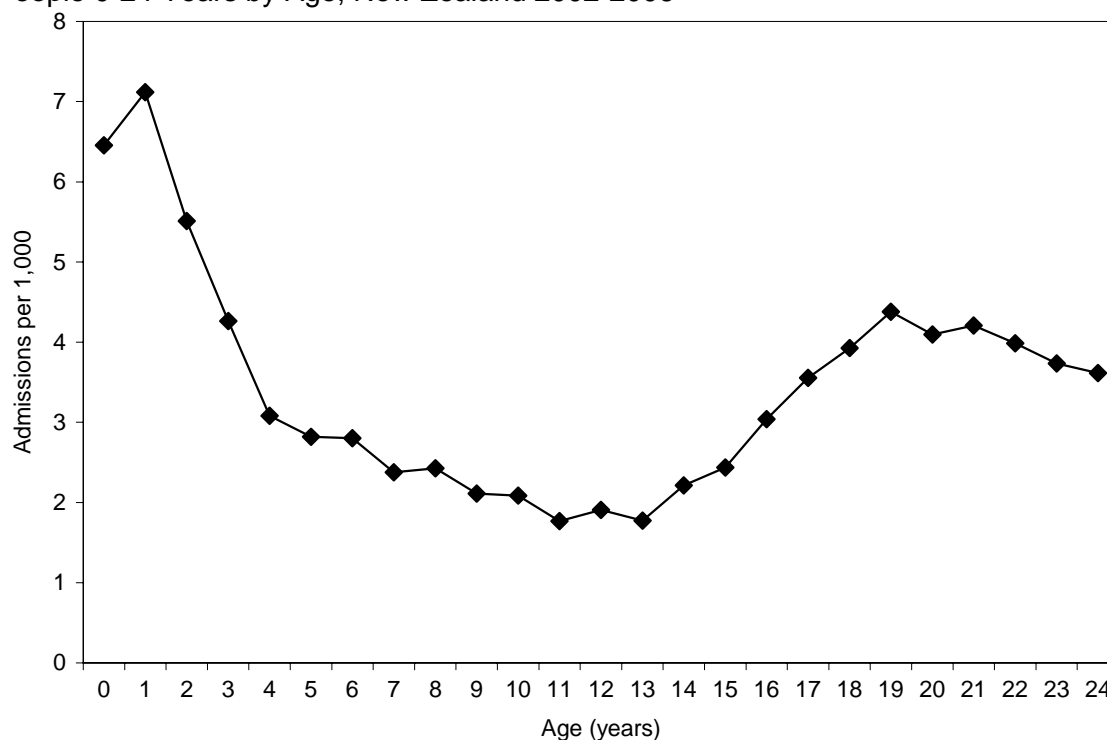
New Zealand Distribution and Trends

Figure 126. Hospital Admissions due to Serious Skin Infections in Children and Young People 0-24 Years, New Zealand 1990-2006



Source: Numerator-National Minimum Dataset; Denominator-Census

Figure 127. Hospital Admissions due to Serious Skin Infections in Children and Young People 0-24 Years by Age, New Zealand 2002-2006



Source: Numerator-National Minimum Dataset; Denominator-Census

New Zealand Trends and Age Distribution

In New Zealand during 1990-2006, hospital admissions for serious skin infections rose progressively, with the most rapid increases amongst children occurring during the mid-late 1990s (**Figure 126**). During 1990-2004 however, only one death was attributed to a serious skin infection in this age group. During 2002-2006, hospital admissions for serious skin infection had a bi-modal distribution, with the highest rates occurring amongst children <5 years of age, followed by young people in their late teens and early 20s (**Figure 127**).

Table 76. Risk Factors for Hospital Admission due to Serious Skin Infections in Children 0-14 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	1.29	1.00		1-2	1.38	1.00	
2	1.46	1.13	1.01-1.27	3-4	1.93	1.41	1.31-1.52
3	1.76	1.36	1.22-1.52	5-6	2.31	1.68	1.56-1.81
4	2.12	1.64	1.48-1.82	7-8	3.66	2.66	2.49-2.85
5	1.84	1.43	1.28-1.60	9-10	6.00	4.36	4.10-4.64
6	2.78	2.15	1.94-2.38	Prioritised Ethnicity			
7	3.00	2.32	2.10-2.56	Māori	5.24	2.77	2.66-2.88
8	4.30	3.32	3.02-3.65	Pacific	8.46	4.47	4.27-4.68
9	5.17	4.00	3.65-4.38	European	1.89	1.00	
10	6.68	5.16	4.72-5.64	Asian/Indian	1.66	0.88	0.80-0.96
Gender							
Female	3.00	1.00					
Male	3.39	1.13	1.09-1.17				

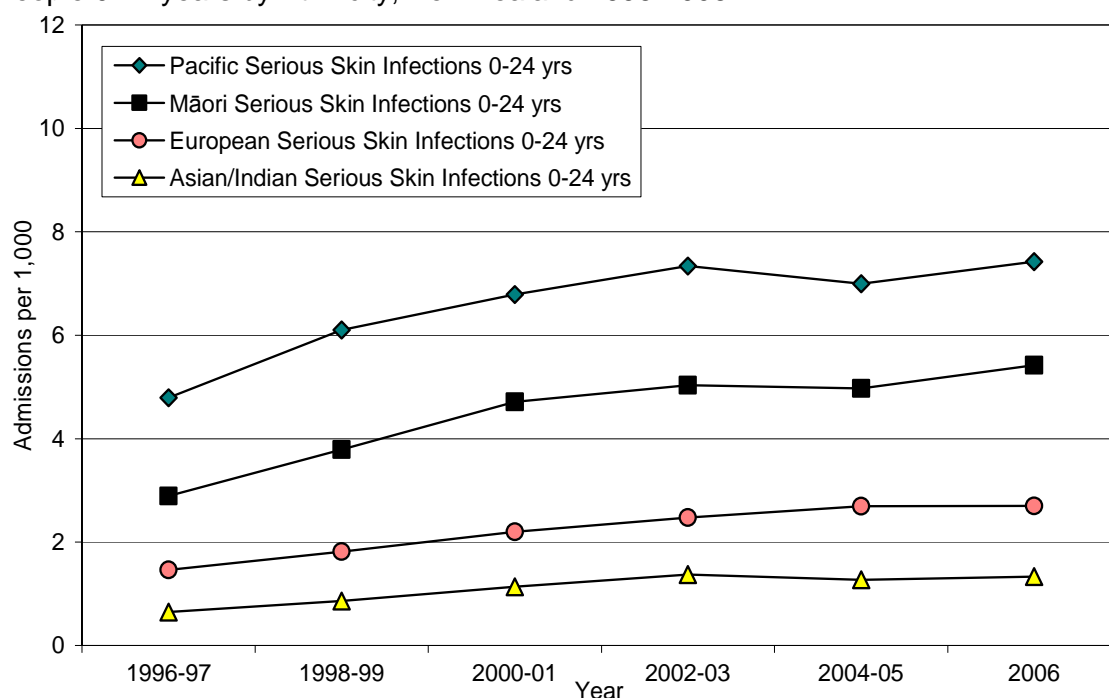
Source: Numerator-National Minimum Dataset; Denominator-Census; Rate per 1,000 per year. Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted.

Table 77. Risk Factors for Hospital Admission due to Serious Skin Infections in Young People 15-24 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	2.33	1.00		1-2	2.45	1.00	
2	2.57	1.11	0.99-1.25	3-4	2.94	1.20	1.11-1.30
3	2.59	1.11	0.99-1.24	5-6	3.52	1.44	1.34-1.55
4	3.30	1.42	1.27-1.58	7-8	4.06	1.65	1.54-1.77
5	3.30	1.42	1.27-1.58	9-10	4.78	1.95	1.82-2.09
6	3.74	1.60	1.44-1.78	Prioritised Ethnicity			
7	3.86	1.66	1.50-1.84	Māori	4.77	1.29	1.23-1.35
8	4.24	1.82	1.65-2.01	Pacific	4.87	1.31	1.22-1.40
9	4.69	2.01	1.82-2.22	European	3.72	1.00	
10	4.87	2.09	1.90-2.30	Asian/Indian	0.99	0.27	0.24-0.30
Gender							
Female	2.63	1.00					
Male	4.71	1.79	1.72-1.86				

Source: Numerator-National Minimum Dataset; Denominator-Census; Rate per 1,000 per year. Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Figure 128. Hospital Admissions due to Serious Skin infections in Children and Young People 0-24 years by Ethnicity, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity is Level 1 Prioritised.

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

During 2002-2006, hospital admissions for serious skin infections were *significantly higher* for Pacific > Māori > European > Asian / Indian children, males and those living in the more deprived areas (**Table 76**). Admissions in young people were significantly higher for Pacific and Māori > European > Asian / Indian young people, males and those in the more deprived areas (**Table 77**). Similar ethnic differences were seen during 1996-2006, with admissions increasing for all ethnic groups during this period (**Figure 128**).

Serious Skin Infections Amongst Pacific Groups in New Zealand

During 2002-2006 (using the Sole / (Any) classification), serious skin infection admissions were *significantly higher* than for non-Māori non-Pacific children in each of the Pacific Sole and (Any) Groups. Within the (Any) Category, admissions were *significantly higher* for Samoan, Tongan and "Other" Pacific children than for Cook Island Māori, Niue, Tokelauan and Fijian children. Within the Sole Category however, differences between individual Pacific groups were much less marked (**Table 78**). In contrast, only admissions for (Any) and Sole Samoan, Tongan and "Other" Pacific young people and Sole Tokelauan and Niue young people were *significantly higher* than for non-Māori non-Pacific young people (**Table 79**). Similarly, during 1996-2006, hospital admissions for serious skin infections were consistently higher for Tongan and Samoan children and young people than for Cook Island Māori children and young people in both the Sole and (Any) Categories (**Figure 129**).

Table 78. Distribution of Hospital Admissions due to Serious Skin Infections in Pacific Children 0-14 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR	95% CI
Any Samoan	1,755	351.0	7.32	3.95	3.74-4.17
Any Tongan	789	157.8	7.99	4.31	4.00-4.64
Any Cook Island Māori	574	114.8	4.97	2.68	2.46-2.92
Any Niue	205	41.0	4.75	2.56	2.23-2.94
Any Fijian	62	12.4	4.37	2.36	1.84-3.03
Any Tokelauan	76	15.2	5.48	2.96	2.36-3.71
Any Other Pacific	132	26.4	9.34	5.04	4.24-5.99
Any Pacific	3,437	687.4	7.14	3.85	3.69-4.02
Any Māori	5,204	1040.8	5.24	2.83	2.72-2.94
Non-Māori Non-Pacific	5,447	1089.4	1.85	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR	95% CI
Sole Samoan	1,383	276.6	11.12	6.00	5.66-6.36
Sole Tongan	624	124.8	10.71	5.78	5.32-6.28
Sole Cook Island Māori	416	83.2	9.80	5.29	4.79-5.84
Sole Niue	104	20.8	11.33	6.11	5.04-7.41
Sole Fijian	37	7.4	8.60	4.64	3.36-6.40
Sole Tokelauan	48	9.6	12.54	6.77	5.10-8.98
Sole Other Pacific	110	22.0	18.80	10.15	8.42-12.24
Sole Pacific	2,742	548.4	11.04	5.96	5.69-6.24
Sole Māori	4,316	863.2	9.95	5.37	5.16-5.59
Non-Māori Non-Pacific	5,447	1,089.4	1.85	1.00	

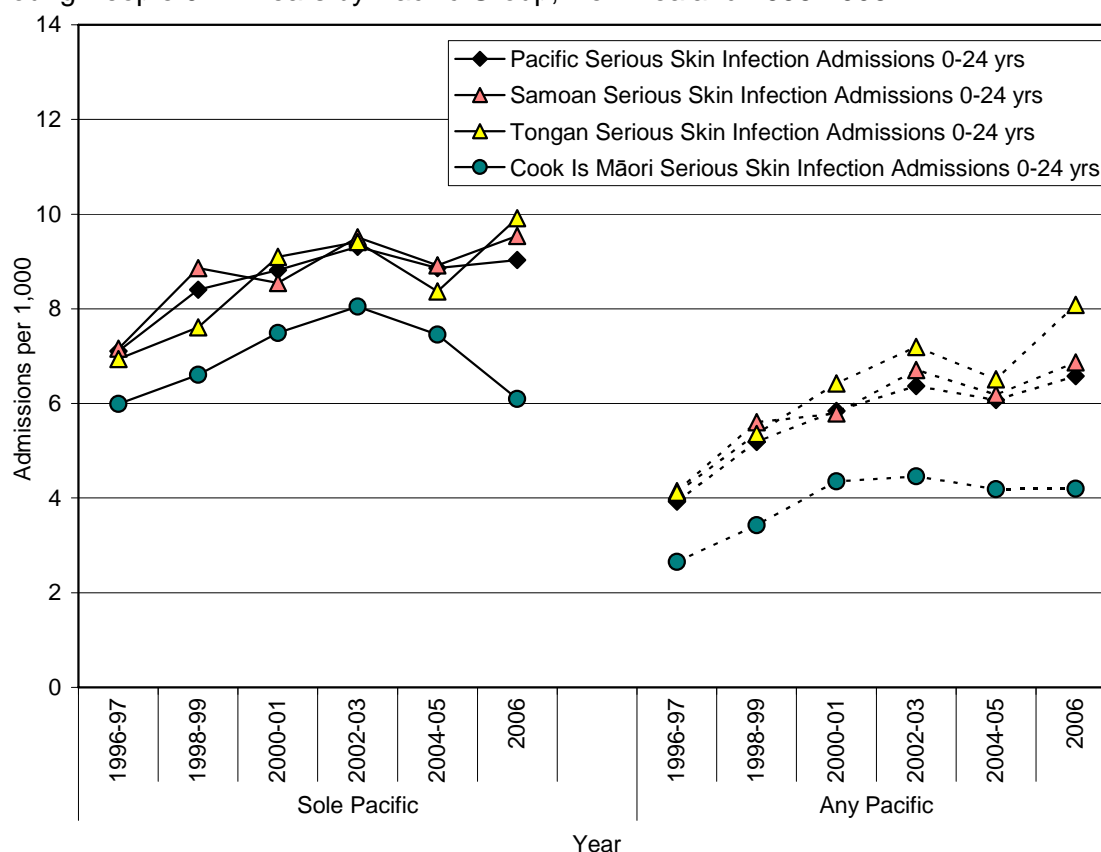
Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate ratios are compared to the Non-Māori Non-Pacific group and are unadjusted.

Table 79. Distribution of Hospital Admissions due to Serious Skin Infections in Pacific Young People 15-24 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR	95% CI
Any Samoan	543	108.6	4.85	1.47	1.35-1.60
Any Tongan	195	39.0	4.91	1.49	1.29-1.72
Any Cook Island Māori	145	29.0	2.79	0.85	0.72-1.00
Any Niue	51	10.2	2.51	0.76	0.58-1.00
Any Fijian	31	6.2	3.71	1.12	0.79-1.59
Any Tokelauan	29	5.8	4.77	1.44	1.00-2.07
Any Other Pacific	39	7.8	5.35	1.62	1.18-2.22
Any Pacific	1,025	205	4.50	1.36	1.27-1.45
Any Māori	2,326	465.2	4.77	1.45	1.38-1.52
Non-Māori Non-Pacific	6,748	1,349.6	3.30	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR	95% CI
Sole Samoan	438	87.6	6.09	1.85	1.68-2.04
Sole Tongan	146	29.2	5.53	1.67	1.42-1.97
Sole Cook Island Māori	97	19.4	3.64	1.10	0.90-1.34
Sole Niue	34	6.8	4.70	1.42	1.01-1.99
Sole Fijian	13	2.6	3.76	1.14	0.66-1.96
Sole Tokelauan	15	3.0	5.74	1.74	1.05-2.88
Sole Other Pacific	33	6.6	9.16	2.77	1.97-3.89
Sole Pacific	798	159.6	5.62	1.70	1.58-1.83
Sole Māori	1,918	383.6	7.81	2.37	2.25-2.49
Non-Māori Non-Pacific	6,748	1,349.6	3.30	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate ratios are compared to the Non-Māori Non-Pacific group and are unadjusted.

Figure 129. Hospital Admissions due to Serious Skin Infections in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details)

Summary

During 2002-2006 (using prioritised ethnicity), hospital admissions for serious skin infections were *significantly higher* for Pacific > Māori > European > Asian / Indian children, males and those living in the more deprived areas. Admissions in young people were significantly higher for Pacific and Māori > European > Asian / Indian young people, males and those in the more deprived areas. Similar ethnic differences were seen during 1996-2006, with admissions increasing for all ethnic groups during this period.

During 2002-2006 (using the Sole / (Any) classification), serious skin infection admissions were *significantly higher* than for non-Māori non-Pacific children in each of the Pacific Sole and (Any) Groups. Within the (Any) Category, admissions were *significantly higher* for Samoan, Tongan and "Other" Pacific children than for Cook Island Māori, Niue, Tokelauan and Fijian children. Within the Sole Category however, differences between individual Pacific groups were less marked. In contrast, only admissions for (Any) and Sole Samoan, Tongan and "Other" Pacific young people and Sole Tokelauan and Niue young people were *significantly higher* than for non-Māori non-Pacific young people. Similarly during 1996-2006, admissions were consistently higher for Tongan and Samoan children and young people than for Cook Island Māori children and young people in both the Sole and (Any) Categories.

Tuberculosis

Introduction

Tuberculosis (TB) is caused by *Mycobacterium tuberculosis*, an organism transmitted by the inhalation or ingestion of infected droplets. The disease usually affects the lungs, although infection of multiple organ systems can occur. Initial infection often goes unnoticed, with most infected individuals entering a latent phase. Progression to active TB occurs in about 5-15% of cases, with the risk of progression being influenced by the size of the infecting dose and the immunity of the individual exposed [237]. Persons with immunodeficiency (e.g. those with HIV), may progress to disseminated forms of the disease, involving multiple organs such as the liver, lungs, spleen, bone marrow and lymph nodes [231].

New Zealand's TB rates fell progressively during the first half of last century reaching a nadir of 295 cases in 1988 and thereafter remaining static at approximately 300-500 cases per year. Childhood TB has followed a similar pattern, although a clear resurgence of TB in children was evident during 1992-2001 [238]. In one recent review, New Zealand's childhood TB rates were highest amongst those <5 years of age, those living in the most deprived areas and those of African >Pacific Island >Māori >Asian >European ethnic origins. Most cases were identified by contact tracing or immigrant screening and the majority were thought to originate either as part of a local outbreak, or as a consequence of migration from high risk countries [238]. From a public health perspective, the mainstays of controlling TB infection remain the vaccination (BCG) of high risk neonates, case finding and treatment of active and latent infections, contact tracing and the selective screening of high risk groups [237].

The following section explores hospital admissions for TB amongst New Zealand's Pacific children and young people using information from the National Minimum Dataset.

Data Source and Methods

Definition

Hospital Admissions and Deaths due to Tuberculosis in those aged 0-24 years

Data Source

Admissions Numerator: National Minimum Dataset: Hospital admissions of children and young people (0-24 years) with a primary diagnosis of tuberculosis (ICD-9 010-018; ICD-10 A15-A19)

Deaths Numerator: National Mortality Collection: Deaths in children and young people (0-24 years) with a clinical code (cause of death) attributed to tuberculosis (ICD-9 010-018; ICD-10 A15-A19)

Denominator: NZ Census

Indicator Category Admissions: Proxy B-C; Mortality: Ideal B

Notes on Interpretation

The limitations of the National Minimum Dataset are discussed at length in Appendix 1. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data.

Statistical Significance Testing

95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

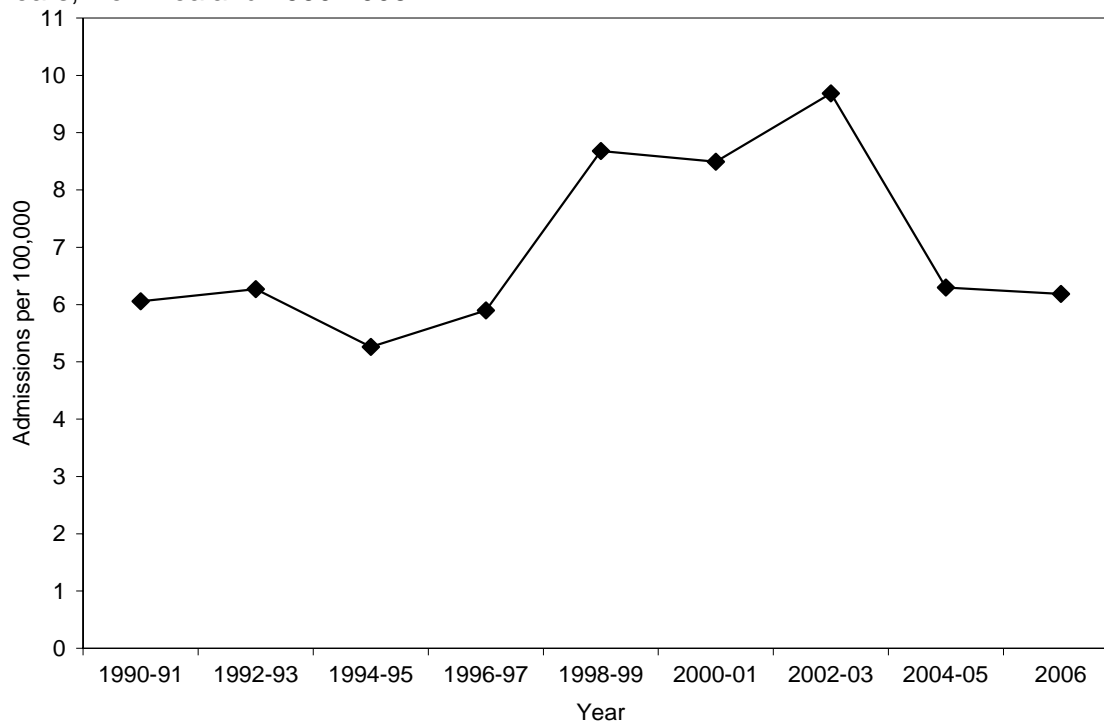
New Zealand Distribution and Trends

New Zealand Trends and Age Distribution

In New Zealand during the late 1990s-early 2000s, hospital admissions for TB gradually increased, although data for 2004-2006 suggest that admission rates may be beginning to taper off (**Figure 130**). In addition, during 1990-2004, three New Zealand

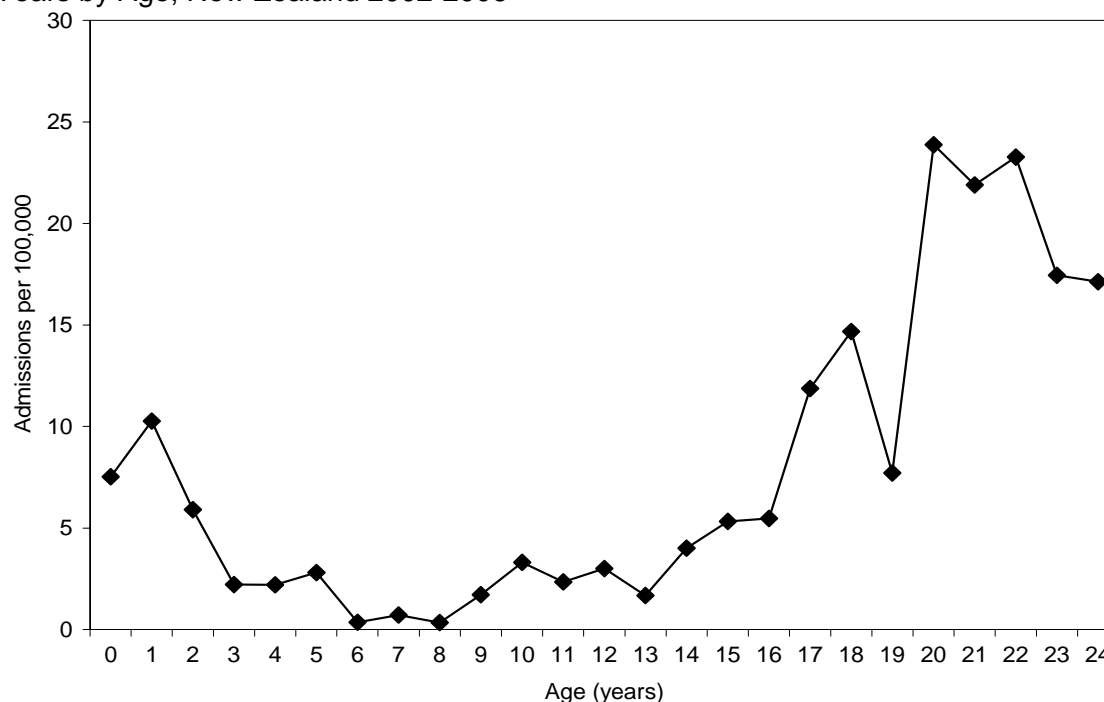
children / young people died as a result of TB. During 2002-2006, while there was a small peak amongst children <4 years of age, TB admissions were highest amongst young people in their late teens and early twenties (**Figure 131**).

Figure 130. Hospital Admissions for Tuberculosis in Children and Young People 0-24 Years, New Zealand 1990-2006



Source: Numerator-National Minimum Dataset; Denominator-Census

Figure 131. Hospital Admissions for Tuberculosis in Children and Young People 0-24 Years by Age, New Zealand 2002-2006



Source: Numerator-National Minimum Dataset; Denominator-Census

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

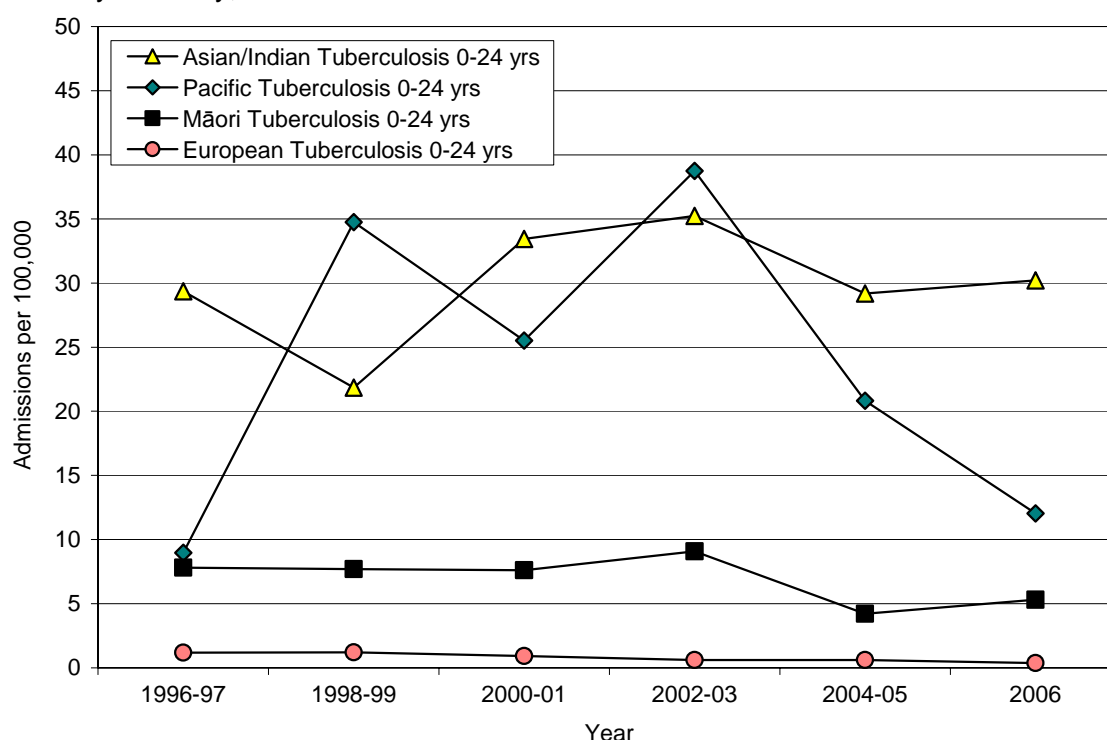
During 2002-2006, admissions for TB were *significantly higher* for Asian / Indian and Pacific > Māori > European children and young people, females and those living in the more deprived areas (**Table 80**). Similar ethnic differences were seen during 1996-2006 (**Figure 132**).

Table 80. Risk Factors for Hospital Admissions due to Tuberculosis in Children and Young People 0-24 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Quintile				Prioritised Ethnicity			
1-2	3.00	1.00		Māori	6.35	11.10	7.01-17.50
3-4	3.59	1.20	0.79-1.83	Pacific	25.95	45.18	29.1-70.10
5-6	6.79	2.26	1.56-3.28	European	0.57	1.00	
7-8	7.17	2.39	1.66-3.45	Asian/Indian	31.58	54.98	35.70-84.60
9-10	15.19	5.06	3.63-7.06				
Gender							
Female	8.32	1.00					
Male	6.92	0.83	0.70-0.98				

Source: Numerator-National Minimum Dataset; Denominator-Census; Rate per 100,000; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Figure 132. Hospital Admissions for Tuberculosis in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity is Level 1 Prioritised.

TB Admissions Amongst Pacific Groups in New Zealand

During 2002-2006 (using the Sole / (Any) classification), TB admissions for Pacific children and young people were *significantly higher* than for non-Māori non-Pacific children and young people in each of the Sole and (Any) Groups, with the exception of (Any) Niue children and young people (small numbers also prevented valid comparisons for Fijian and Tokelauan children and young people). Within the (Any) Category, admissions for Tongan and “Other” Pacific children and young people were *significantly higher* than for Samoan and Cook Island Māori children and young people. Within the Sole Category, admissions for “Other” Pacific children and young people were *significantly higher* than for other Pacific groups. Note: Rate ratios for Pacific children and young people, when compared to the non-Māori non-Pacific group, are much lower than when compared to the European group, due to the higher TB admission rates in Asian / Indian children and young people (**Table 81**).

Table 81. Distribution of Hospital Admissions due to Tuberculosis in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Any Samoan	43	8.6	12.2	2.06	1.50-2.84
Any Tongan	38	7.6	27.5	4.64	3.31-6.50
Any Cook Island Māori	19	3.8	11.3	1.92	1.21-3.05
Any Niue	6	1.2	9.5	1.60	0.71-3.59
Any Fijian	<5	s	s	s	s
Any Tokelauan	<5	s	s	s	s
Any Other Pacific	29	5.8	135.4	22.88	15.63-33.5
Any Pacific	146	29.2	20.6	3.48	2.85-4.24
Any Māori	94	18.8	6.4	1.07	0.85-1.35
Non-Māori Non-Pacific	295	59	5.9	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Sole Samoan	43	8.6	21.9	3.70	2.69-5.09
Sole Tongan	35	7.0	41.3	6.98	4.92-9.91
Sole Cook Island Māori	17	3.4	24.6	4.15	2.55-6.77
Sole Niue	6	1.2	36.6	6.18	2.75-13.87
Sole Fijian	<5	s	s	s	s
Sole Tokelauan	<5	s	s	s	s
Sole Other Pacific	29	5.8	306.8	51.82	35.41-75.84
Sole Pacific	141	28.2	36.1	6.10	4.99-7.46
Sole Māori	87	17.4	12.80	2.16	1.70-2.75
Non-Māori Non-Pacific	295	59	5.9	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate Ratios compared to the non-Māori non-Pacific group and are unadjusted; s: Rates not calculated due to small numbers.

Summary

In New Zealand during 2002-2006, TB admissions were *significantly higher* for Asian / Indian and Pacific > Māori > European children and young people, females and those in the more deprived areas. During the same period (using the Sole / (Any) classification), TB admissions for Pacific children and young people were *significantly higher* than for non-Māori non-Pacific children in each of the Sole and (Any) Groups, with the exception of (Any) Niue children and young people (small numbers prevented valid comparisons for Fijian and Tokelauan children and young people). Within the (Any) Category, admissions for Tongan and “Other” Pacific children and young people were *significantly higher* than for Samoan and Cook Island Māori children and young people. Within the Sole Category, admissions for “Other” Pacific children and young people were *significantly higher* than for other Pacific groups.

Gastroenteritis

Introduction

Acute gastroenteritis is a clinical syndrome produced by a variety of viral, bacterial and parasitic organisms. It results in inflammation of the stomach and intestines, leading to anorexia, nausea, vomiting, diarrhoea, fever, and abdominal discomfort. Onset is often abrupt and may result in the rapid loss of fluids and electrolytes [231]. Transmission is generally by the faecal-oral route, with the incubation period varying depending on the causative organism. In terms of aetiology, in one recent New Zealand study, 56% of hospital admissions with gastroenteritis (< 5 years of age) were of unknown aetiology, 41% were attributed to viruses and 3% to bacterial or parasitic causes [239].

In New Zealand gastroenteritis is one of the top 10 causes of hospital admissions amongst children, with admissions peaking during the winter months. [239]. Risk factors include young age (highest <2 years), Māori and Pacific ethnicity [239], a lack of breastfeeding, and attendance at day care settings [240]. In terms of reducing the burden of disease, it has been suggested that up to 60% of hospital admissions for gastroenteritis <5 years may be attributable to rotavirus infection [239], with one recent study estimating that 1 in 52 New Zealand children are hospitalised with rotavirus before they reach 3 years of age [241]. While an expensive rotavirus vaccine is currently available in the USA, it is hoped that the cost per dose will decrease as production increases, potentially offering an avenue for prevention in future years. In the meantime, improved access to oral rehydration solutions in the primary care setting and initiatives to promote breastfeeding may be of value in reducing admission rates at a population level.

The following section explores hospital admissions for gastroenteritis in Pacific children and young people in New Zealand using information from the National Minimum Dataset.

Data Source and Methods

Definition

Hospital Admissions and Deaths due to Gastroenteritis in those aged 0-24 years

Data Source

Admissions Numerator: National Minimum Dataset: Hospital admissions of children and young people with a primary diagnosis of gastroenteritis (ICD-9 001-009, 558.9, 787.0; ICD-10 A00-A09, K52, R11)

Deaths Numerator: National Mortality Collection: Deaths in children and young people with a clinical code (cause of death) attributed to gastroenteritis (ICD-9 001-009, 558.9, 787.0; ICD-10 A00-A09, K52, R11)

Denominator: NZ Census

Indicator Category Admissions: Proxy C; Mortality: Ideal B

Notes on Interpretation

The limitations of the National Minimum Dataset are discussed at length in Appendix 1. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data.

Statistical Significance Testing

95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

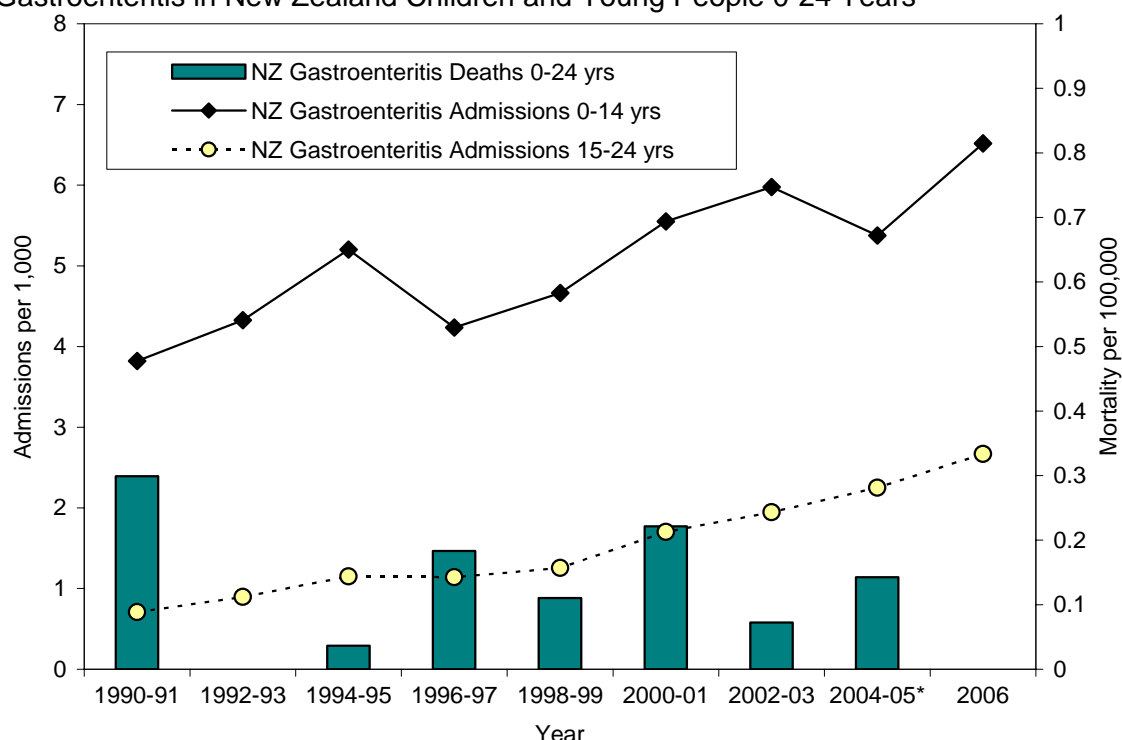
New Zealand Distribution and Trends

New Zealand Trends and Age Distribution

Hospital admissions for gastroenteritis amongst New Zealand children and young people have increased in recent years, while deaths have remained static at around 1-2 cases per year (**Figure 133**). During 2002-2006, admission rates for gastroenteritis

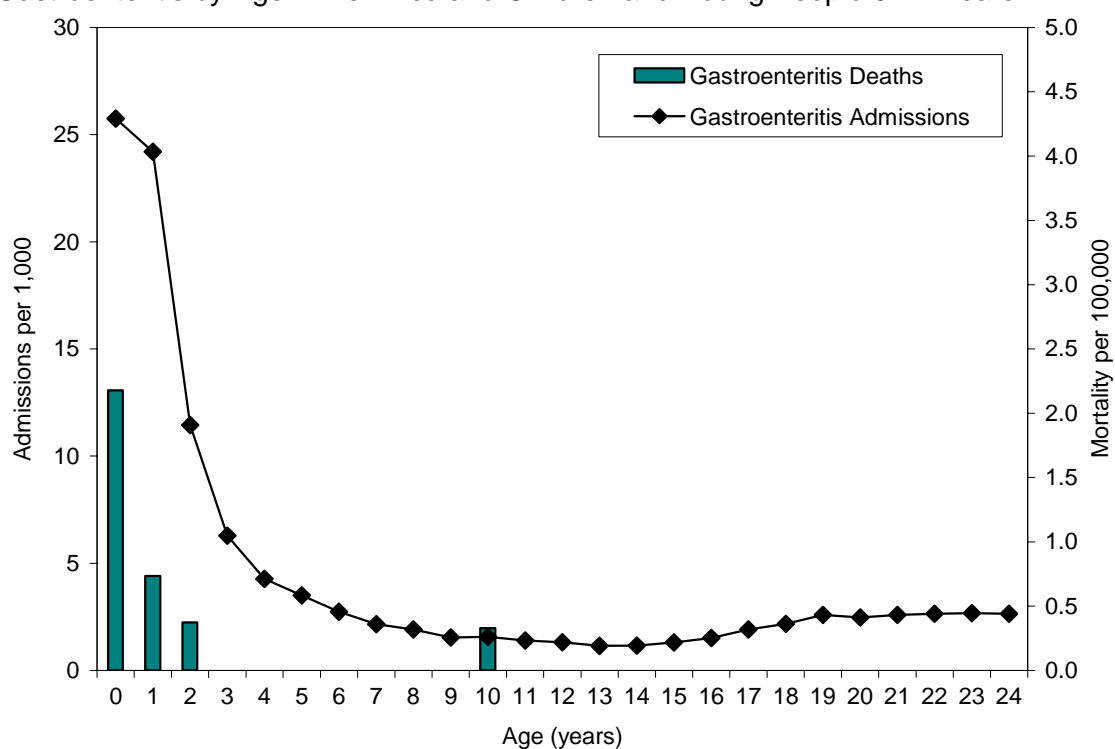
were highest amongst children during their first year of life and tapered off rapidly thereafter. Mortality during 2000-2004 followed a similar pattern (**Figure 134**).

Figure 133. Hospital Admissions (1990-2006) and Deaths (1990-2004) due to Gastroenteritis in New Zealand Children and Young People 0-24 Years



Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Census; *Mortality in 2004-05 is for 2004 year only

Figure 134. Hospital Admissions (2002-2006) and Deaths (2000-2004) due to Gastroenteritis by Age in New Zealand Children and Young People 0-24 Years



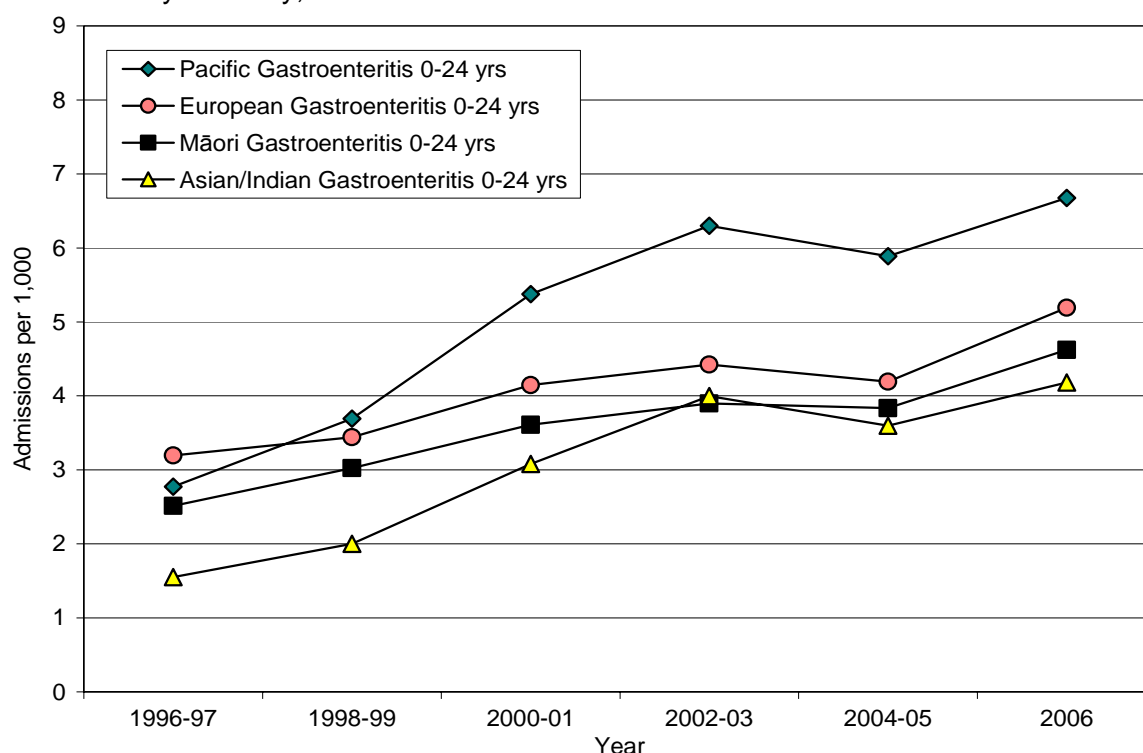
Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Census

Table 82. Risk Factors for Hospital Admissions due to Gastroenteritis in Children 0-14 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	3.71	1.00		1-2	3.72	1.00	
2	3.73	1.01	0.94-1.08	3-4	4.57	1.23	1.17-1.29
3	4.18	1.13	1.06-1.21	5-6	5.66	1.52	1.45-1.59
4	4.97	1.34	1.26-1.43	7-8	7.02	1.88	1.80-1.96
5	5.16	1.39	1.30-1.48	9-10	7.68	2.06	1.98-2.15
6	6.16	1.66	1.56-1.77	Prioritised Ethnicity			
7	6.12	1.65	1.55-1.76	Māori	5.06	0.88	0.85-0.91
8	7.88	2.12	2.00-2.25	Pacific	8.37	1.45	1.39-1.51
9	7.98	2.15	2.03-2.28	European	5.78	1.00	
10	7.44	2.00	1.89-2.12	Asian/Indian	6.37	1.10	1.05-1.15
Gender							
Female	5.67	1.00					
Male	6.01	1.06	1.03-1.09				

Source: Numerator-National Minimum Dataset; Denominator-Census; Rate per 1,000 per year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted.

Figure 135. Hospital Admissions due to Gastroenteritis in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity is Level 1 Prioritised

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

In New Zealand during 2002-2006, gastroenteritis admissions were *significantly higher* for Pacific > Asian / Indian > European > Māori children, males and those living in the more deprived areas (**Table 82**). Admissions were also generally higher for Pacific children and young people during 1998-2006 (**Figure 135**).

Gastroenteritis Admissions Amongst Pacific Groups in New Zealand

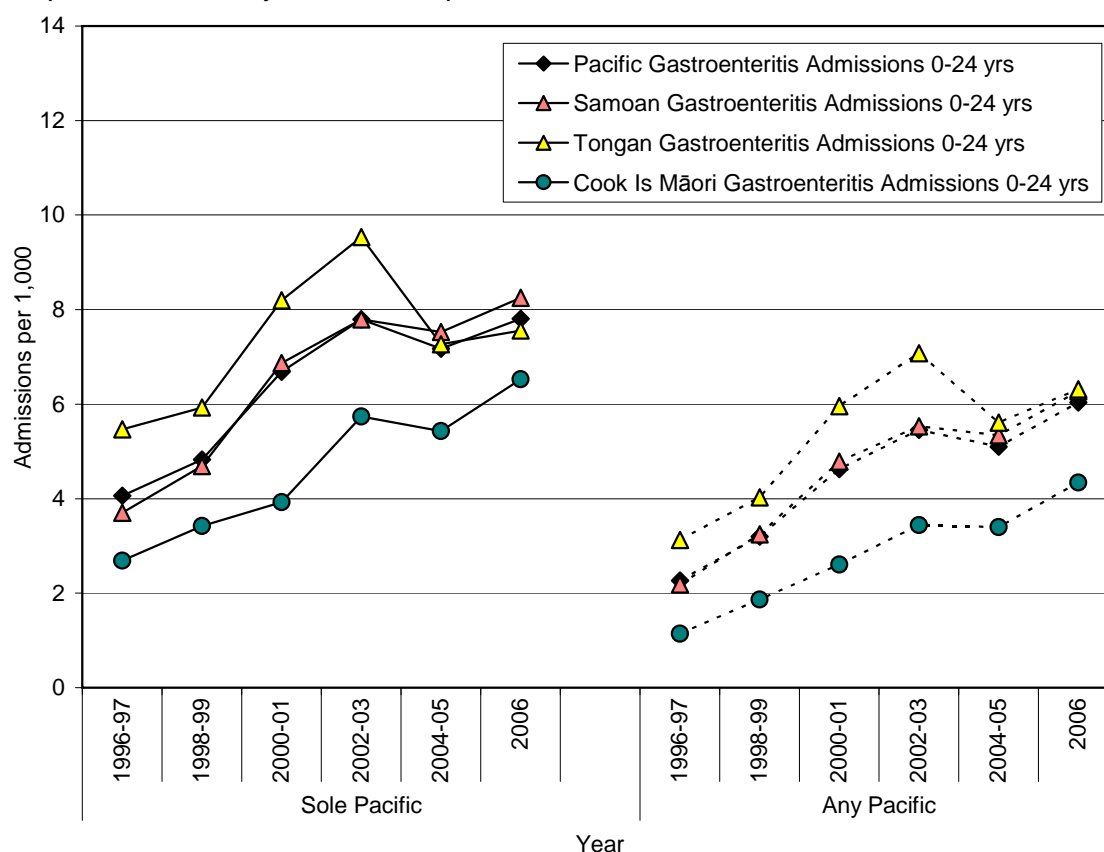
During 2002-2006, gastroenteritis admissions for all Pacific groups in the Sole Category (with the exception of Sole Tokelauan children), were *significantly higher* than for non-Māori non-Pacific children. In the (Any) Category, gastroenteritis admissions were *significantly higher* for Samoan, Tongan and Fijian children than for non-Māori non-Pacific children. In contrast, admission rates for (Any) Cook Island Māori, Niue and Tokelauan children were *significantly lower* (**Table 83**). During 1996-2006, hospital admissions for gastroenteritis were consistently higher for Tongan and Samoan children and young people than they were for Cook Island Māori children and young people in both the Sole and (Any) categories (**Figure 136**).

Table 83. Distribution of Hospital Admissions due to Gastroenteritis in Pacific Children 0-14 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR	95% CI
Any Samoan	1,752	350.4	7.31	1.26	1.20-1.32
Any Tongan	801	160.2	8.12	1.40	1.30-1.50
Any Cook Island Māori	532	106.4	4.60	0.79	0.72-0.86
Any Niue	155	31.0	3.59	0.62	0.53-0.73
Any Fijian	146	29.2	10.29	1.78	1.51-2.09
Any Tokelauan	51	10.2	3.68	0.63	0.48-0.83
Any Other Pacific	97	19.4	6.86	1.18	0.97-1.44
Any Pacific	3,397	679.4	7.06	1.22	1.18-1.27
Any Māori	5,025	1,005	5.06	0.87	0.84-0.90
Non-Māori Non-Pacific	17,033	3,406.6	5.79	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR	95% CI
Sole Samoan	1,353	270.6	10.88	1.88	1.78-1.99
Sole Tongan	635	127.0	10.90	1.88	1.74-2.03
Sole Cook Island Māori	346	69.2	8.15	1.41	1.27-1.57
Sole Niue	86	17.2	9.37	1.62	1.31-2.00
Sole Fijian	61	12.2	14.18	2.45	1.91-3.14
Sole Tokelauan	26	5.2	6.79	1.17	0.80-1.72
Sole Other Pacific	73	14.6	12.48	2.15	1.71-2.70
Sole Pacific	2,606	521.2	10.50	1.81	1.74-1.89
Sole Māori	3,714	742.8	8.56	1.48	1.43-1.53
Non-Māori Non-Pacific	17,033	3,406.6	5.79	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate ratios are compared to the Non-Māori Non-Pacific group and are unadjusted.

Figure 136. Hospital Admissions due to Gastroenteritis in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details)

Summary

Acute gastroenteritis is a clinical syndrome produced by a variety of viral, bacterial and parasitic organisms. Hospital admissions for gastroenteritis in New Zealand children and young people have been increasing in recent years, while deaths have remained static at 1-2 cases per year. Both hospital admissions and mortality for gastroenteritis are highest amongst children during their first year of life and taper off rapidly thereafter.

In New Zealand during 2002-2006 (using prioritised ethnicity), gastroenteritis admissions were *significantly higher* for Pacific > Asian / Indian > European > Māori children, males and those living in the more deprived areas. During the same period (using the Sole / (Any) classification), gastroenteritis admissions for all Pacific groups in the Sole Category (with the exception of Sole Tokelauan children), were *significantly higher* than for non-Māori non-Pacific children. In the (Any) Category, gastroenteritis admissions were *significantly higher* for Samoan, Tongan and Fijian children than for non-Māori non-Pacific children. In contrast, admission rates for (Any) Cook Island Māori, Niue and Tokelauan children were *significantly lower*.



Individual and
Whanau Health
and Wellbeing

Respiratory Disease

Lower Respiratory Tract Morbidity and Mortality in Children

Introduction

In New Zealand, a recent review has suggested that a large burden of avoidable morbidity and mortality in childhood can be attributed to respiratory diseases, with conditions such as whooping cough, pneumonia, bronchiolitis, tuberculosis and smoking related illnesses all being of major concern for New Zealand children and young people. In addition, the same review highlighted the significant contribution poor housing, poverty, poor nutrition, issues with access to primary, secondary and tertiary care, smoking and air pollution make to the burden of childhood respiratory disease in this country [242]. While a number of respiratory conditions of relevance to New Zealand children and young people are explored in more detail in the sections which follow, the current section considers the collective impact lower respiratory tract conditions (Asthma and Lower Respiratory Tract Infections) have on the health of children and young people in this country.

Data Sources and Methods

Definition

Hospital Admissions and Deaths from Asthma & Lower Respiratory Tract Infections in Children 0-14 Years

Data Sources

Admissions Numerator: National Minimum Dataset: Hospital admissions for children (0-14 years) with a primary diagnosis of Asthma (ICD-9 493, ICD-10 J45-46), Acute Unspecified Lower Respiratory Tract Infection (ICD-10 J22), Acute Bronchitis (ICD-9 466.0, ICD-10 J20), Bronchiolitis (ICD-9 466.1, ICD-10 J21), Pertussis (ICD-9 033, ICD-10 A37), Lung Abscesses and Pyothorax (ICD-9 510, 513, ICD-10 J85-86) or Pneumonia (ICD-9 480-486, 487.0, ICD-10 J12-18, J100, J110)

Deaths Numerator: National Mortality Collection: Deaths in children 0-14 years with any of the respiratory diagnoses listed above.

Denominator: NZ Census

Indicator Category Admissions: Proxy B-C; Mortality: Ideal B

Notes on Interpretation

The limitations of the National Minimum Dataset are discussed at length in Appendix 1. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data.

Statistical Significance Testing

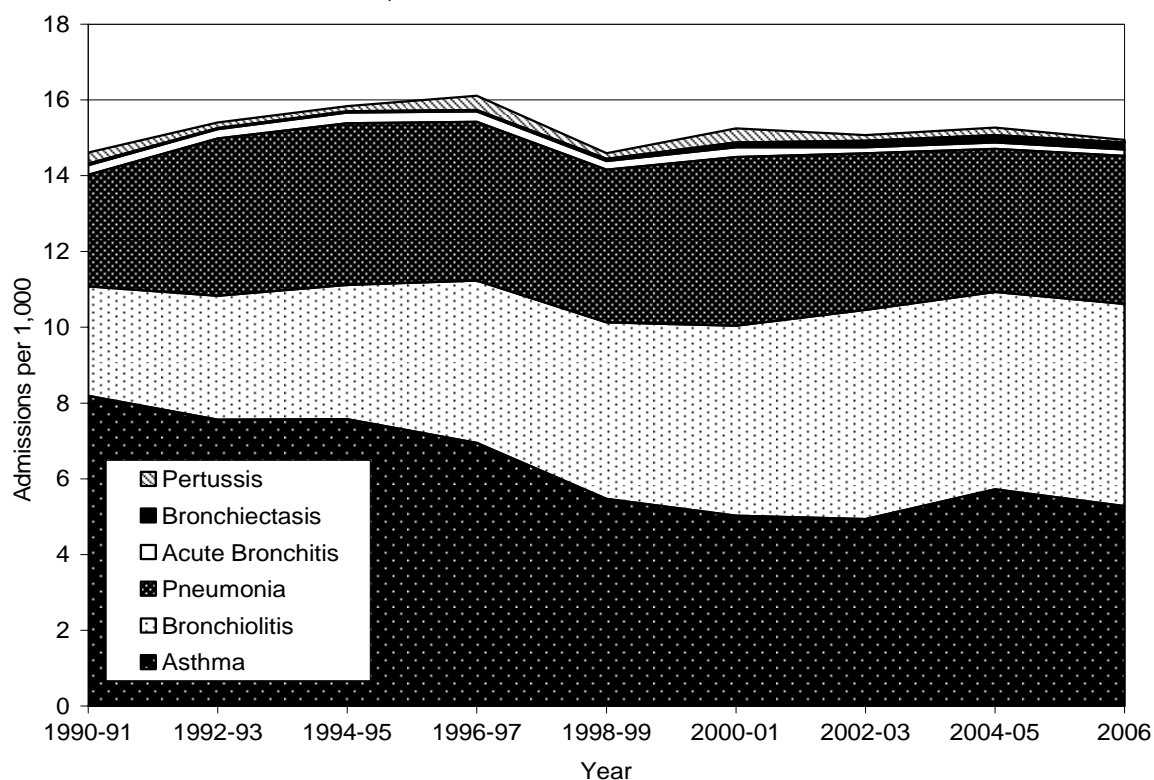
95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

New Zealand Distribution and Trends

New Zealand Distribution and Trends

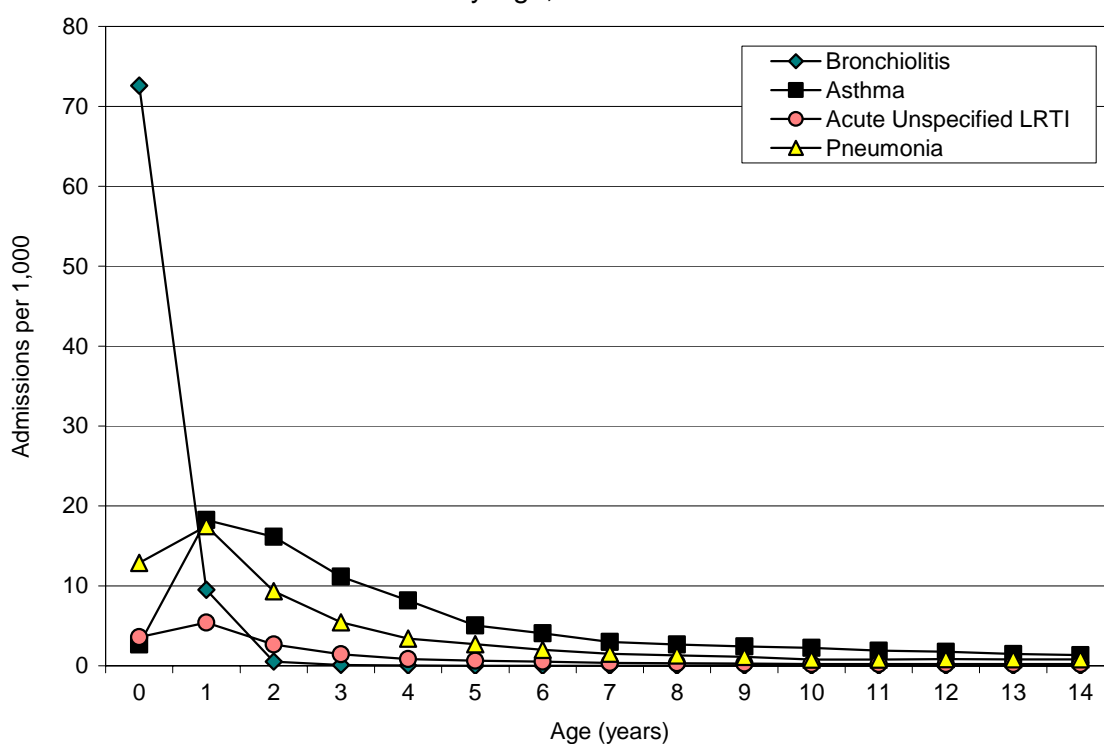
In New Zealand during 1990-2006, hospital admissions for children with lower respiratory tract conditions remained relatively static, with large declines in admissions for asthma being offset by correspondingly large increases in admissions for bronchiolitis (asthma and bronchiolitis admission rates combined, 11.1 per 1,000 in 1990-91 to 10.6 per 1,000 in 2006) (**Figure 137**). During 2002-2006, these two conditions accounted for 63.5% of lower respiratory admissions amongst (Any) Pacific children. In contrast, pneumonia accounted for 63.6% of all lower respiratory deaths nationally during 2000-2004 (**Table 84**).

Figure 137. Hospital Admissions for Selected Lower Respiratory Tract Infections and Asthma in Children 0-14 Years, New Zealand 1990-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; Note: Trend graphs and cross sectional tables differ slightly as trend graphs utilise ICD-9 coding and cross sectional tables utilise ICD-10 coding (which includes the category Acute Unspecified LRTI).

Figure 138. Hospital Admissions due to Selected Lower Respiratory Tract Infections and Asthma in Children 0-14 Years by Age, New Zealand 2002-2006



Source: Numerator-National Minimum Dataset; Denominator-Census

Table 84. Hospital Admissions (2002-2006) and Deaths (2000-2004) due to Lower Respiratory Infections and Asthma in New Zealand Children 0-14 Years by Diagnosis

Diagnosis	Number: 5-Year Total	Number: Annual Average	Rate per 1,000	% of Total
(Any) Pacific Admissions 2002-2006				
Bronchiolitis	6,423	1284.6	13.3	36.4
Pneumonia	4,979	995.8	10.3	28.2
Asthma	4,776	955.2	9.9	27.1
Acute Unspecified LRTI	896	179.2	1.9	5.1
Bronchiectasis	324	64.8	0.7	1.8
Pertussis	127	25.4	0.3	0.7
Acute Bronchitis	76	15.2	0.2	0.4
Lung Abscess / Pyothorax	31	6.2	0.1	0.2
Total	17,632	3526.4	36.6	100.0
New Zealand Admissions 2002-2006				
Bronchiolitis	23,052	4,610.4	5.4	33.0
Asthma	22,869	4,573.8	5.3	32.7
Pneumonia	16,967	3,393.4	3.9	24.3
Acute Unspecified LRTI	4,723	944.6	1.1	6.8
Bronchiectasis	791	158.2	0.2	1.1
Acute Bronchitis	733	146.6	0.2	1.0
Pertussis	651	130.2	0.2	0.9
Lung Abscess / Pyothorax	98	19.6	0.0	0.1
Total	69,884	13,976.8	16.3	100.0
New Zealand Deaths 2000-2004				
Pneumonia	42	8.4	1.0	63.6
Asthma	8	1.6	0.2	12.1
Bronchiolitis	7	1.4	0.2	10.6
Other LRTI*	9	1.8	0.2	13.6
Total	66	13.2	1.5	100.0

Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Census; (Any) Pacific includes children and young people who identify as Pacific in ANY of their three first ethnic groups;

*Other LRTI includes Pertussis, Acute Unspecified LRTI, Bronchiectasis, Lung Abscess & Pyothorax

Distribution by Age, Prioritised Ethnicity and NZ Deprivation Index Decile

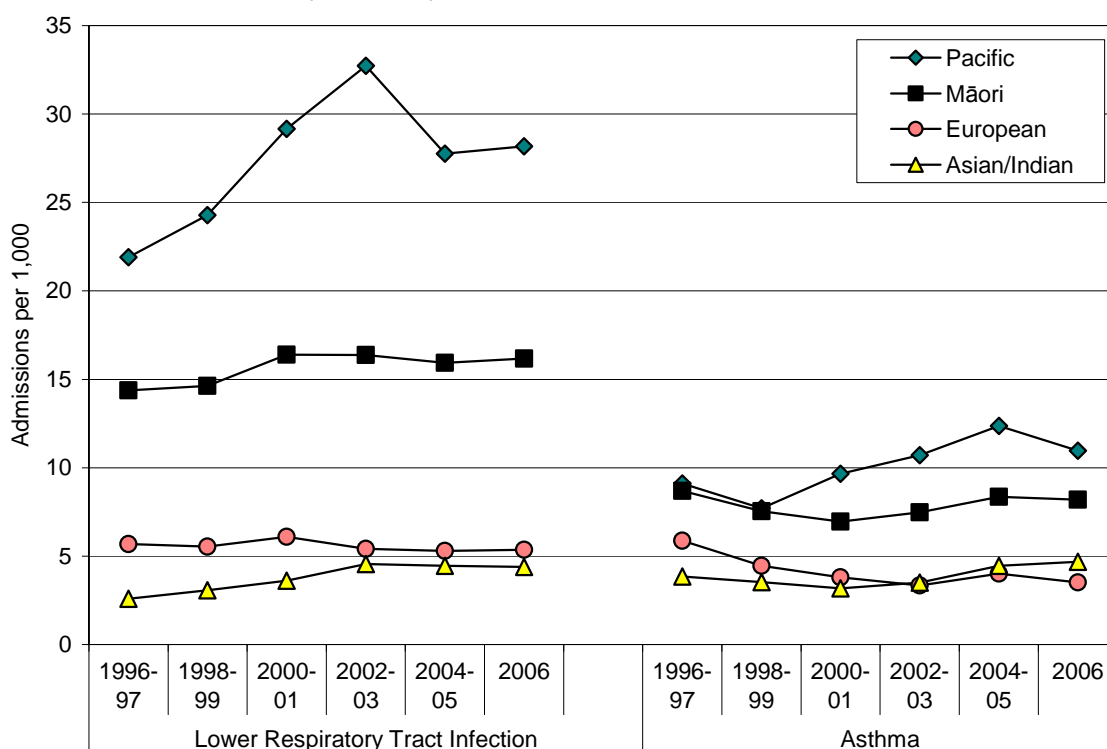
During 2002-2006, hospital admissions for lower respiratory tract conditions were highest amongst those under 5 years of age, with the greatest burden of morbidity being due to bronchiolitis admissions in those under 1 year (**Figure 138**). Admissions for lower respiratory tract infections were also *significantly higher* for Pacific > Māori > European > Asian / Indian children, males and those living in the most deprived areas (asthma risk factors are considered separately in the Asthma Section) (**Table 85**). Similar ethnic differences were seen during 1996-2006 (**Figure 139**).

Table 85. Risk Factors for Hospital Admission due to Lower Respiratory Tract Infections (excluding Asthma) in Children 0-14 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	3.93	1.00		1-2	4.28	1.00	
2	4.65	1.18	1.11-1.26	3-4	6.00	1.40	1.34-1.46
3	5.33	1.36	1.28-1.45	5-6	8.43	1.97	1.89-2.05
4	6.69	1.70	1.60-1.81	7-8	12.54	2.93	2.82-3.04
5	7.19	1.83	1.72-1.94	9-10	20.87	4.87	4.70-5.04
6	9.67	2.46	2.32-2.60	Prioritised Ethnicity			
7	10.36	2.64	2.50-2.79	Māori	17.67	2.85	2.79-2.91
8	14.63	3.73	3.54-3.93	Pacific	32.05	5.17	5.05-5.29
9	17.50	4.46	4.23-4.70	European	6.20	1.00	
10	23.65	6.02	5.73-6.33	Asian/Indian	5.19	0.84	0.80-0.88
Gender							
Female	9.54	1.00					
Male	12.27	1.29	1.27-1.31				

Source: Numerator-National Minimum Dataset; Denominator-Census; See Asthma section for Asthma rates; Rates are per 1,000 per year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted.

Figure 139. Hospital Admissions due to Lower Respiratory Tract Infections and Asthma in Children 0-14 Years by Ethnicity, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity is Level 1 Prioritised; Trend graphs and cross sectional tables differ slightly as trend graphs utilise ICD-9 coding and cross sectional tables utilise ICD-10 coding (which includes the category Acute Unspecified LRTI).

Lower Respiratory Infections Among Pacific Groups in New Zealand

During 2002-2006 (using the Sole / (Any) classification), hospital admissions for lower respiratory tract infections amongst Pacific children were *significantly higher* than for non-Māori non-Pacific children in each of the Sole and (Any) Groups. Within the (Any) Category, admissions were *significantly higher* for Tongan and Samoan children than for Cook Island Māori, Niue, Fijian and Tokelauan children. Within the Sole Category, admissions for Niue, Tongan and Samoan children were *significantly higher* than for Cook Island Māori, Fijian and Tokelauan children (**Table 86**).

Table 86. Distribution of Hospital Admissions due to Lower Respiratory Tract Infections in Pacific Children 0-14 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR	95% CI
Any Samoan	6,919	1,383.8	28.9	4.78	4.65-4.91
Any Tongan	3,110	622.0	31.5	5.22	5.03-5.42
Any Cook Island Māori	1,742	348.4	15.1	2.50	2.38-2.63
Any Niue	803	160.6	18.6	3.08	2.87-3.30
Any Fijian	203	40.6	14.3	2.37	2.07-2.72
Any Tokelauan	272	54.4	19.6	3.25	2.89-3.66
Any Other Pacific	360	72.0	25.5	4.22	3.81-4.68
Any Pacific	12,856	2571.2	26.7	4.42	4.33-4.53
Any Māori	17,546	3,509.2	17.7	2.93	2.87-2.99
Non-Māori Non-Pacific	17,744	3,548.8	6.0	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR	95% CI
Sole Samoan	5,683	1,136.6	45.7	7.57	7.35-7.80
Sole Tongan	2,543	508.6	43.7	7.23	6.94-7.53
Sole Cook Island Māori	1,127	225.4	26.6	4.40	4.15-4.67
Sole Niue	445	89.0	48.5	8.03	7.33-8.80
Sole Fijian	89	17.8	20.7	3.43	2.79-4.22
Sole Tokelauan	133	26.6	34.7	5.76	4.87-6.81
Sole Other Pacific	289	57.8	49.4	8.18	7.30-9.16
Sole Pacific	10,419	2,083.8	42.0	6.95	6.79-7.12
Sole Māori	14,360	2,872.0	33.1	5.48	5.36-5.60
Non-Māori Non-Pacific	17,744	3,548.8	6.0	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate ratios are compared to the Non-Māori Non-Pacific group and are unadjusted.

Summary

In New Zealand, a large burden of avoidable morbidity and mortality during childhood can be attributed to respiratory diseases, with poor housing, poverty, poor nutrition, issues with access to primary, secondary and tertiary care, smoking and air pollution all making a significant contribution. In New Zealand during 1990-2006, hospital admissions for lower respiratory conditions in children remained relatively static, with large declines in admissions for asthma being offset by correspondingly large increases in admissions for bronchiolitis. During 2002-2006, these two conditions accounted for 63.5% of lower respiratory admissions amongst (Any) Pacific children.

During 2002-2006 (using prioritised ethnicity), admissions for lower respiratory infections were *significantly higher* for Pacific > Māori > European > Asian / Indian children, males and those living in the most deprived areas. During the same period (using the Sole / (Any) classification), admissions for Pacific children were *significantly higher* than for non-Māori non-Pacific children in each of the Sole and (Any) Groups. Within the (Any) Category, admissions were *significantly higher* for Tongan and Samoan children than for Cook Island Māori, Niue, Fijian and Tokelauan children. Within the Sole Category, admissions for Niue, Tongan and Samoan children were *significantly higher* than for Cook Island Māori, Fijian and Tokelauan children.

Bronchiolitis

Introduction

Bronchiolitis is an acute viral infection of the lower respiratory tract commonly caused by the respiratory syncytial virus (RSV), although parainfluenza, influenza and other viruses have also been implicated. RSV is transmitted by contact with infected nasal secretions and less frequently, by aerosol spread. Its incubation period is 2-8 days, and following a prodromal phase, acute illness usually lasts 3-7 days, with gradual recovery over a 1-2 week period. Symptoms include runny nose, cough, low grade fever, expiratory wheeze and respiratory distress. Treatment is usually supportive, with severely affected infants being admitted to hospital for oxygen and fluid supplementation [243].

RSV is common, with overseas estimates suggesting >50% of infants are infected during the first year of life and >80% by the age of 2 years. Epidemics occur during winter months, and although there are only 2 major RSV strains (A and B), numerous genotypes, subtypes and frequent shifts in the dominant strain mean that infants may remain susceptible to reinfection from year to year, or even within the same season. Of those infected, 1-2% require hospital admission [243], with the case fatality rate of those admitted being around 2% [244]. Risk of hospital admission is increased by factors such as male sex, young age (<6 months), birth during the first 1/2 of the RSV season, overcrowding, the presence of siblings and attendance at day care [245]. In addition, socioeconomic disadvantage, lack of breastfeeding and maternal smoking have been implicated in a number of studies [244].

The following section explores hospital admissions for bronchiolitis amongst Pacific infants in New Zealand using information from the National Minimum Dataset.

Data Source and Methods

Definition

Hospital Admissions and Deaths due to Bronchiolitis in Infants < 1 Year of Age

Data Source

Admissions Numerator: National Minimum Dataset: Hospital admissions of infants < 1 year of age with a primary diagnosis of Bronchiolitis (ICD-9 466.1; ICD-10 J21)

Deaths Numerator: National Mortality Collection: Deaths in infants < 1 year of age with a clinical code (cause of death) attributed to Bronchiolitis (ICD-9 466.1; ICD-10 J21).

Denominator: Birth Registration Dataset

Indicator Category Admissions: Proxy B-C; Mortality: Ideal B

Notes on Interpretation

The limitations of the National Minimum Dataset are discussed at length in Appendix 1. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data.

Statistical Significance Testing

95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

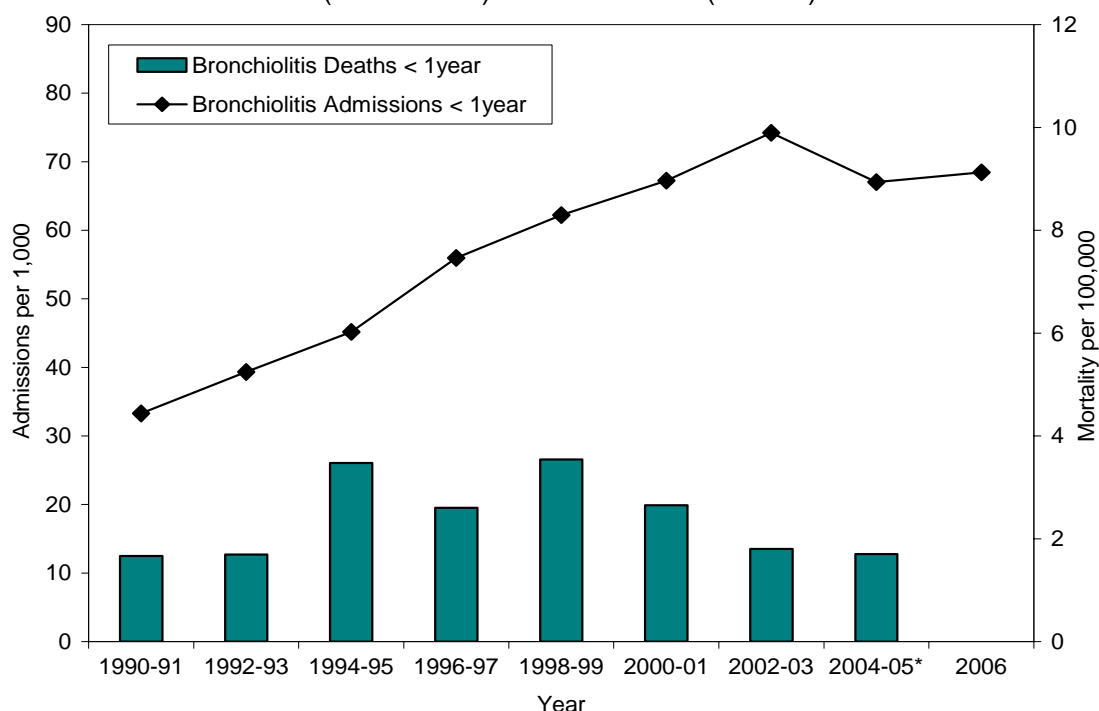
New Zealand Distribution and Trends

New Zealand Trends and Age Distribution

New Zealand's hospital admission rates for bronchiolitis in infants <1 year rose steadily during the 1990s and early 2000s, although data for 2004-2006 suggest that rates may be beginning to taper off. In contrast mortality, which initially decreased during the early

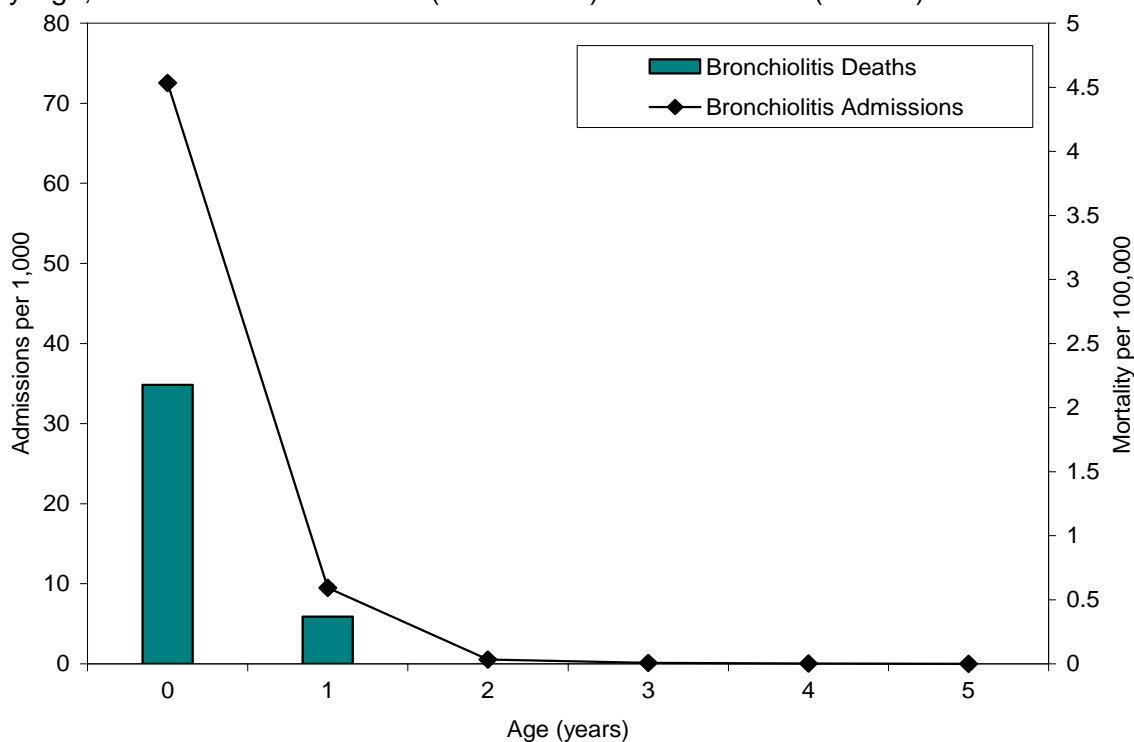
1990s, has remained relatively static at 1-2 deaths per year, during the last 12 years for which data was available (**Figure 140**).

Figure 140. Hospital Admissions and Deaths due to Bronchiolitis in Infants <1 Year, New Zealand 1990-2006 (Admissions) and 1990-2004 (Deaths)



Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Birth Registration Dataset; *Mortality in 2004-05 is for 2004 year only

Figure 141. Hospital Admissions and Deaths due to Bronchiolitis in Children 0-5 Years by Age, New Zealand 2002-2006 (Admissions) and 2000-2004 (Deaths)



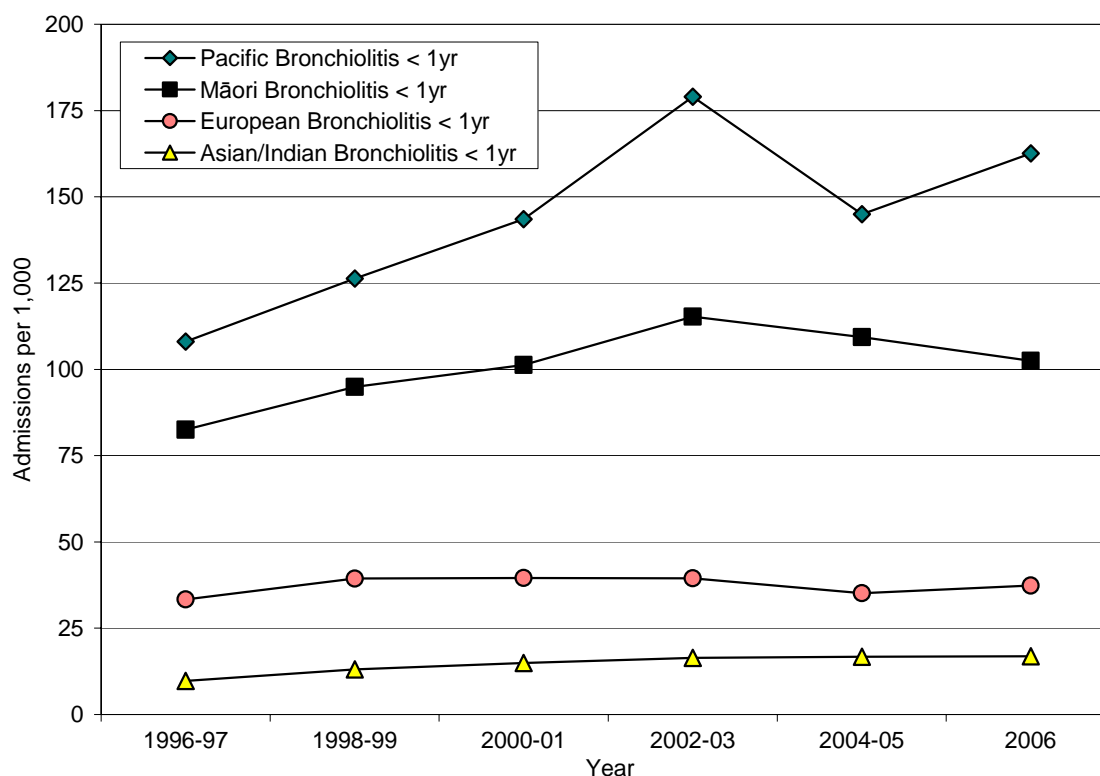
Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator- Birth Registration Dataset

Table 87. Risk Factors for Hospital Admissions due to Bronchiolitis in Infants <1 Year, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	24.60	1.00		1-2	26.90	1.00	
2	29.10	1.18	1.05-1.32	3-4	37.20	1.38	1.28-1.48
3	34.70	1.41	1.27-1.57	5-6	49.90	1.85	1.73-1.98
4	39.30	1.60	1.44-1.77	7-8	71.70	2.66	2.50-2.83
5	44.80	1.83	1.65-2.03	9-10	129.40	4.81	4.54-5.10
6	54.10	2.20	2.00-2.42	Prioritised Ethnicity			
7	66.00	2.69	2.45-2.96	Māori	110.00	2.95	2.86-3.05
8	76.20	3.10	2.83-3.40	Pacific	161.90	4.34	4.18-4.50
9	103.60	4.22	3.86-4.61	European	37.30	1.00	
10	151.70	6.18	5.67-6.74	Asian/Indian	16.60	0.45	0.41-0.50
Gender							
Female	55.00	1.00					
Male	84.50	1.54	1.50-1.58				

Source: Numerator-National Minimum Dataset; Denominator- Birth Registration Dataset; Rate per 1,000 per year, Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Figure 142. Hospital Admissions due to Bronchiolitis in Infants <1 Year by Ethnicity, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator- Birth Registration Dataset; Ethnicity is Level 1 Prioritised

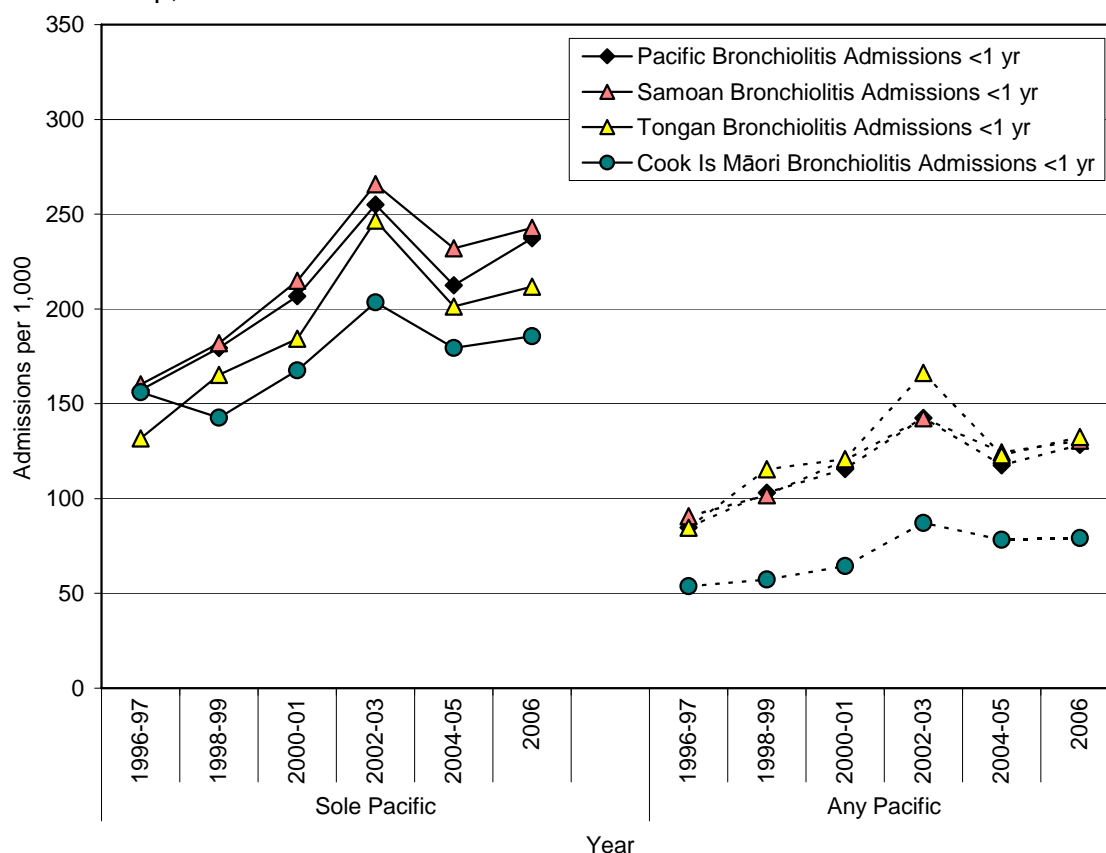
Distribution by Age, Prioritised Ethnicity and NZ Deprivation Index Decile

Bronchiolitis is predominantly a disease of infancy, with the majority of hospital admissions and deaths occurring in the first year of life, although a small number also occur between 1-2 years of age (**Figure 141**). During 2002-2006, hospital admissions for bronchiolitis were *significantly higher* for Pacific > Māori > European > Asian / Indian infants, males and those living in the most deprived areas (**Table 87**). While similar ethnic differences were evident during 1996-2006, the large increases in admissions for Māori and Pacific infants seen during the late 1990s have more recently begun to taper off (**Figure 142**).

Bronchiolitis Admissions Amongst Pacific Groups in New Zealand

During 2002-2006 (using the Sole / (Any) classification), bronchiolitis admissions for Pacific infants were *significantly higher* than for non-Māori non-Pacific infants in each of the Sole and (Any) Groups. Within the (Any) Category, admissions were *significantly higher* for Tongan and Samoan infants than they were for Cook Island Māori, Niue, Fijian, Tokelauan and 'Other' Pacific infants. Within the Sole Category, admissions were *significantly higher* for Niue, Samoan and Tongan infants than they were for Cook Island Māori and Fijian infants (**Table 88**). Similarly, during 1998-2006 bronchiolitis admissions for Samoan and Tongan infants were higher than for Cook Island Māori infants in both the Sole and (Any) categories (**Figure 143**).

Figure 143. Hospital Admissions due to Bronchiolitis in Pacific Infants <1 Year by Pacific Group, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator-Birth Registration Dataset; Ethnicity assigned using Any / Sole Classification (see page 11 for details)

Table 88. Distribution of Hospital Admissions due to Bronchiolitis in Pacific Infants <1 Year by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR	95% CI
Any Samoan	2,904	580.8	132.5	3.76	3.61-3.92
Any Tongan	1,368	273.6	141.4	4.02	3.81-4.25
Any Cook Island Māori	837	167.4	81.8	2.32	2.16-2.49
Any Niue	394	78.8	104.7	2.97	2.70-3.27
Any Fijian	65	13.0	47.3	1.34	1.06-1.70
Any Tokelauan	113	22.6	104.6	2.97	2.49-3.54
Any Other Pacific	150	30.0	105.7	3.00	2.57-3.50
Any Pacific	5,619	1,123.8	129.4	3.67	3.55-3.80
Any Māori	9,028	1,805.6	110.0	3.12	3.02-3.22
Non-Māori Non-Pacific	6,186	1,237.2	35.2	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR	95% CI
Sole Samoan	2,399	479.8	247.4	7.02	6.73-7.32
Sole Tongan	1,109	221.8	221.8	6.30	5.95-6.67
Sole Cook Island Māori	530	106.0	190.2	5.40	4.98-5.85
Sole Niue	217	43.4	383.4	10.89	9.78-12.12
Sole Fijian	23	4.6	99.1	2.82	1.91-4.16
Sole Tokelauan	58	11.6	217.2	6.17	4.91-7.76
Sole Other Pacific	121	24.2	173.9	4.94	4.19-5.82
Sole Pacific	4,514	902.8	234.4	6.66	6.43-6.90
Sole Māori	7,469	1,493.8	232.5	6.60	6.40-6.81
Non-Māori Non-Pacific	6,186	1,237.2	35.2	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Birth Registration Dataset; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate ratios are compared to the Non-Māori Non-Pacific group and are unadjusted

Summary

Bronchiolitis is an acute viral infection of the lower respiratory tract commonly caused by the respiratory syncytial virus (RSV). In New Zealand, hospital admissions for bronchiolitis in infants <1 year rose steadily during the 1990s and early 2000s, although data for 2004-2006 suggest that rates may be beginning to taper off. In contrast mortality, which initially decreased during the early 1990s, has remained relatively static at 1-2 deaths per year, during the last 12 years for which data was available.

During 2002-2006 (using prioritised ethnicity), hospital admissions for bronchiolitis were *significantly higher* for Pacific > Māori > European > Asian / Indian infants, males and those living in the most deprived areas. During 2002-2006 (using the Sole / (Any) classification), bronchiolitis admissions for Pacific infants were *significantly higher* than for non-Māori non-Pacific infants in each of the Sole and (Any) Groups. Within the (Any) Category, admissions were *significantly higher* for Tongan and Samoan infants than they were for Cook Island Māori, Niue, Fijian and Tokelauan infants. Similarly, within the Sole Category, admissions were *significantly higher* for Niue, Samoan and Tongan infants than they were for Cook Island Māori and Fijian infants.

Pertussis

Introduction

Pertussis is a highly contagious, bacterial respiratory infection caused by the organism *Bordetella Pertussis*. Infection is droplet spread and occurs most commonly in unimmunised infants and children <4 years of age. The incubation period of 7-14 days is followed by 6-8 weeks of illness divided into 3 distinct stages: a catarrhal stage (10-14 days) associated with runny nose, sneezing and dry cough; a paroxysmal stage (4-6 weeks) associated with a paroxysmal cough often ending in an inspiratory whoop; and a convalescent stage (1-2 weeks) [231]. Pertussis is of particular concern if acquired during the first year of life, when mortality rates are at their highest [246]. While in New Zealand mortality has been low in recent years (0-1 deaths per year), morbidity remains high, with hospitalised infants often requiring oxygen, suction, (+/-) intubation during the paroxysmal phase [247].

Routine pertussis vaccination began in New Zealand in 1960, with the current schedule recommending vaccination at 6 weeks, 3 months and 5 months of age. Booster doses are recommended at 15 months and 4 years [246]. Despite the widespread availability of vaccine, New Zealand's hospital admission rates for pertussis are 5-10 times higher than those of England / Wales and the USA [247] and epidemics occur at regular 4-5 year intervals, the most recent beginning in late 2004 [248]. In terms of reducing the burden of disease, evidence would suggest that improving on-time delivery of immunisation to children during the first year of life could be expected to significantly decrease hospital admission rates in New Zealand [247].

The following section explores hospital admissions for pertussis amongst Pacific infants <1 year using information from the National Minimum Dataset.

Data Source and Methods

Definition

Hospital Admissions and Deaths due to Pertussis in Infants < 1 Year of Age

Data Source

Admissions Numerator: National Minimum Dataset: Hospital admissions for infants < 1 year of age with a primary diagnosis of Pertussis (ICD-9 033; ICD-10 A37)

Deaths Numerator: National Mortality Collection: Deaths in infants < 1 year of age with a clinical code (cause of death) attributed to Pertussis (ICD-9 033; ICD-10 A37)

Denominator: Birth Registration Dataset

Indicator Category Admissions: Proxy B-C; Mortality: Ideal B

Notes on Interpretation

The limitations of the National Minimum Dataset are discussed at length in Appendix 1. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data.

Statistical Significance Testing

95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

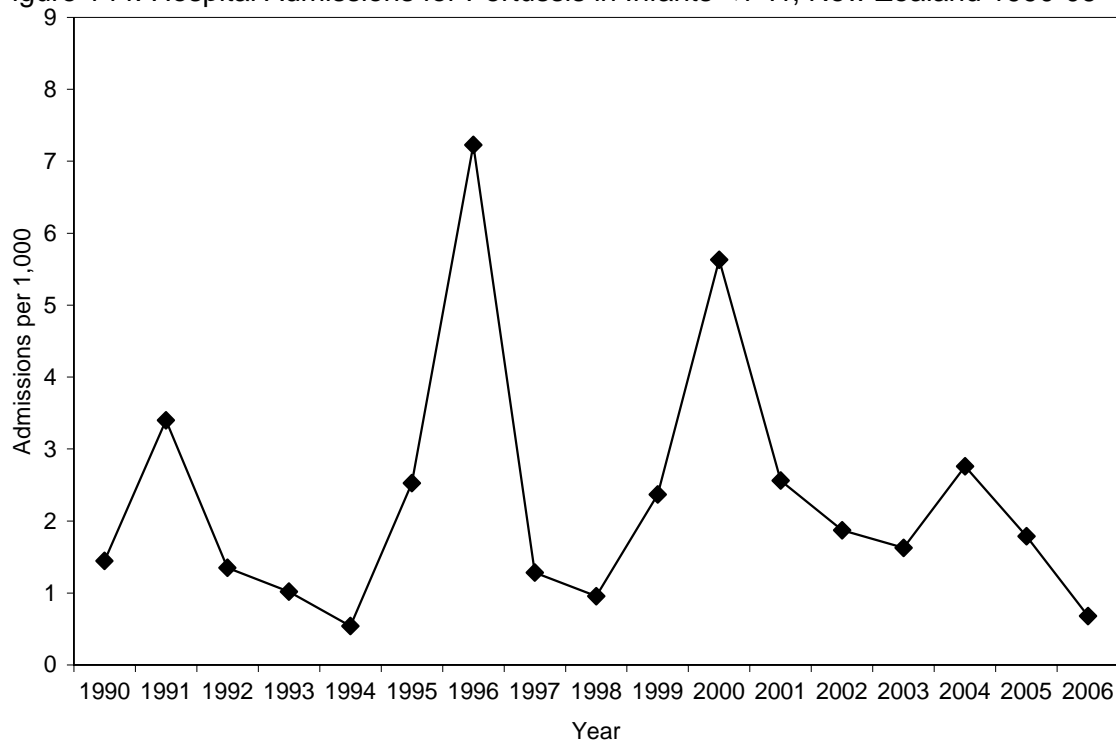
New Zealand Distribution and Trends

New Zealand Trends and Age Distribution

During 1990-2006, pertussis epidemics occurred in New Zealand at regular 4-5 year intervals, with hospital admissions for infants <1 year following a similar pattern (**Figure 144**). In addition, during 2000-2004, a total of 4 deaths were attributed to pertussis. While pertussis may affect any age group, it is amongst infants <1 year of age that the

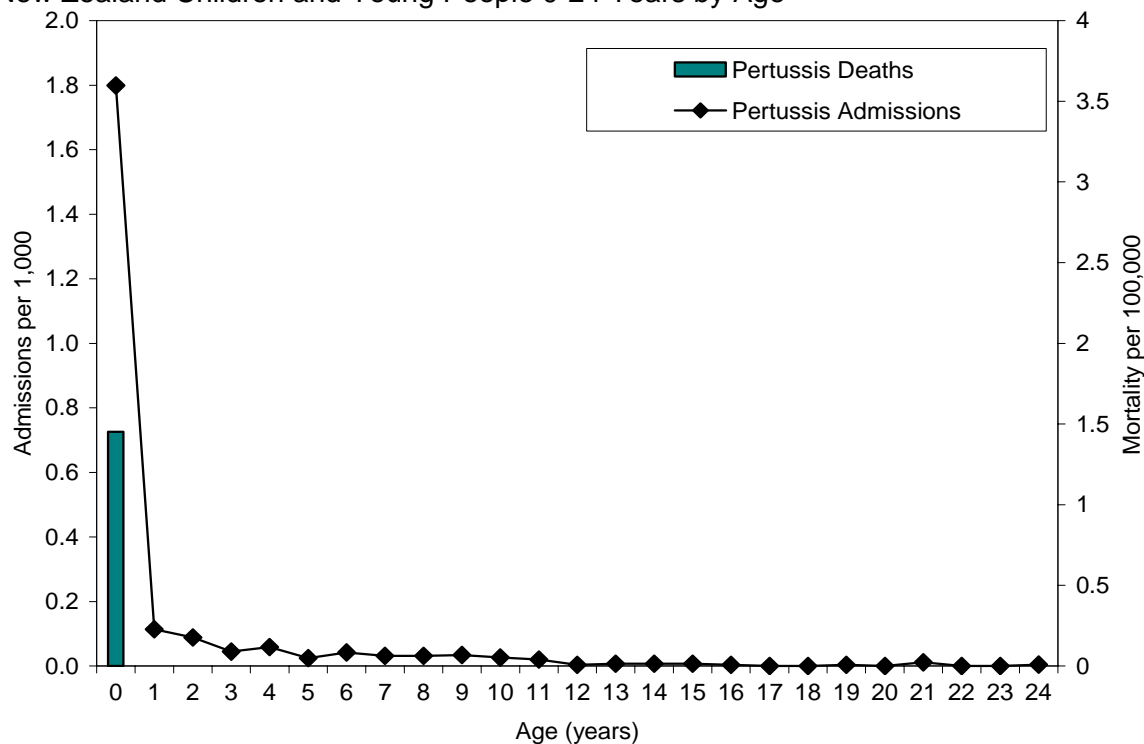
disease is most severe, with the majority of hospital admissions during 2002-2006, and all deaths during 2000-2004 occurring in this age group (**Figure 145**).

Figure 144. Hospital Admissions for Pertussis in Infants <1 Yr, New Zealand 1990-06



Source: Numerator-National Minimum Dataset; Denominator- Birth Registration Dataset

Figure 145. Hospital Admissions (2002-2006) and Deaths (2000-2004) for Pertussis in New Zealand Children and Young People 0-24 Years by Age



Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator- Birth Registration Dataset

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

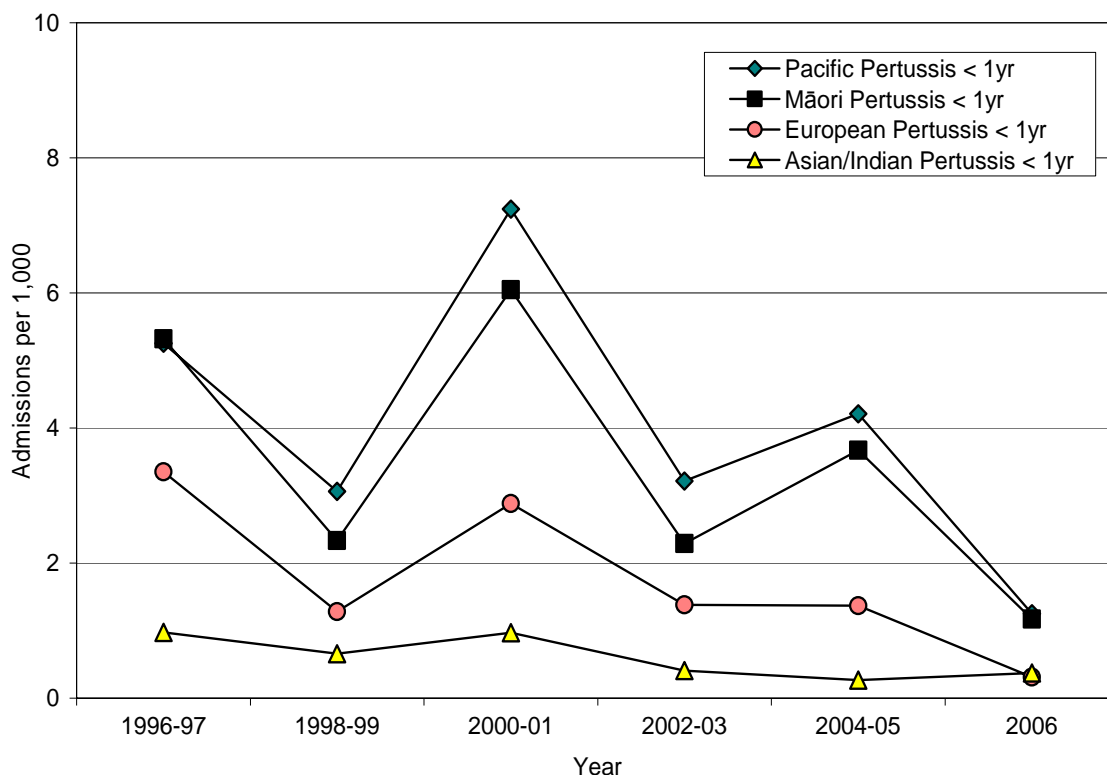
In New Zealand during 2002-2006, hospital admissions for pertussis were *significantly higher* for Pacific and Māori > European > Asian / Indian infants and those living in the more deprived (Decile 5-10) areas (**Table 89**). Similar ethnic differences were seen during 1996-2006 (**Figure 146**).

Table 89. Risk Factors for Hospital Admissions due to Pertussis in Infants <1 Year, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Quintile				Prioritised Ethnicity			
1-2	0.84	1.00		Māori	2.61	2.25	1.84-2.75
3-4	1.07	1.26	0.83-1.91	Pacific	3.21	2.77	2.16-3.55
5-6	1.41	1.67	1.13-2.47	European	1.16	1.00	
7-8	1.53	1.81	1.24-2.63	Asian/Indian	0.34	0.29	0.15-0.57
9-10	3.13	3.70	2.63-5.21				
Gender							
Female	1.83	1.00					
Male	1.65	0.90	0.76-1.07				

Source: Numerator-National Minimum Dataset; Denominator- Birth Registration Dataset; Rate per 1,000 per year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted.

Figure 146. Hospital Admissions due to Pertussis in Infants <1 Year by Ethnicity, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator- Birth Registration Dataset; Ethnicity is Level 1 Prioritised

Pertussis Admissions Amongst Pacific Groups in New Zealand

During 2002-2006 (using the Sole / (Any) classification), pertussis admissions for Pacific infants were *significantly higher* than for non-Māori non-Pacific infants in each of the Sole and (Any) Groups, with the exceptions of Fijian and Tokelauan infants, where small numbers prevented a valid comparison. Within the (Any) and Sole categories however, the majority of differences between individual Pacific groups did not reach statistical significance (**Table 90**).

Table 90. Distribution of Hospital Admissions due to Pertussis in Pacific Infants <1 Year by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR	95% CI
Any Samoan	45	9.0	2.05	1.92	1.39-2.66
Any Tongan	31	6.2	3.21	2.99	2.05-4.37
Any Cook Island Māori	21	4.2	2.05	1.92	1.22-3.01
Any Niue	9	1.8	2.39	2.24	1.15-4.37
Any Fijian	0	0			
Any Tokelauan	<5	s	s	s	s
Any Other Pacific	6	1.2	4.23	3.95	1.76-8.89
Any Pacific	109	21.8	2.51	2.34	1.85-2.96
Any Māori	214	42.8	2.61	2.44	2.01-2.97
Non-Māori Non-Pacific	188	37.6	1.07	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR	95% CI
Sole Samoan	33	6.6	3.40	3.18	2.20-4.60
Sole Tongan	27	5.4	5.40	5.05	3.38-7.55
Sole Cook Island Māori	13	2.6	4.67	4.36	2.49-7.64
Sole Niue	7	1.4	12.37	11.56	5.46-24.47
Sole Fijian	0	0			
Sole Tokelauan	0	0			
Sole Other Pacific	6	1.2	8.62	8.05	3.58-18.09
Sole Pacific	86	17.2	4.47	4.17	3.23-5.38
Sole Māori	176	35.2	5.48	5.12	4.17-6.28
Non-Māori Non-Pacific	188	37.6	1.07	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Birth Registration Dataset; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate Ratios compared to the non-Māori non-Pacific group and are unadjusted; s: Rates not calculated due to small numbers

Summary

During 1990-2006, pertussis epidemics occurred in New Zealand at regular 4-5 year intervals, with hospital admissions for infants <1 year following a similar pattern. In addition, during 2000-2004, a total of 4 deaths were attributed to pertussis. While pertussis may affect any age group, it is amongst infants <1 year of age that the disease is most severe, with the majority of hospital admissions during 2002-2006, and all deaths during 2000-2004 occurring in this age group.

In New Zealand during 2002-2006 (using prioritised ethnicity), hospital admissions for pertussis were *significantly higher* for Pacific and Māori > European > Asian / Indian infants and those living in the more deprived areas. During the same period (using the Sole / (Any) classification), pertussis admissions for Pacific infants were *significantly higher* than for non-Māori non-Pacific infants in each of the Sole and (Any) Groups (with the exceptions of Fijian and Tokelauan infants, where small numbers prevented a valid comparison). Within the (Any) and Sole categories however, the majority of differences between individual Pacific groups did not reach statistical significance.

Pneumonia

Introduction

The term pneumonia refers to a group of acute lower respiratory tract infections which lead to inflammation of the lung tissue. They are usually caused by inhaled micro-organisms from the upper respiratory tract, with the causative agent varying with the age of the child. In neonates, organisms from the mother's birth canal are the most common cause, while in infants > 4 months and preschool children viruses are a frequent cause, with the respiratory syncytial virus (RSV) being of particular importance. The most common bacterial cause after the neonatal period is *S. pneumoniae*, although *Chlamydia pneumoniae* and *Mycoplasma pneumoniae* have also been implicated, particularly in older children and adolescents [249]. Clinical manifestations include chills, fever, rapid pulse, high respiratory rates, cough, purulent sputum, chest pain and abdominal distension [231].

By international standards, New Zealand's pneumonia admission rates are high. New Zealand's rates also vary significantly by ethnicity, with Pacific and Māori children having both higher hospital admission rates [250] and more severe disease once admitted, than European children [165]. While risk factors for pneumonia overseas have included low socioeconomic status, poor nutrition, low birth weight, lack of breastfeeding, crowding and indoor smoke, it has been suggested that factors such as poor housing (cold, damp, mould, overcrowding), access to primary healthcare and poor nutrition (e.g. iron deficiency) are of particular importance in the New Zealand context [250].

The following section explores hospital admissions for pneumonia amongst Pacific children and young people in New Zealand using information from the National Minimum Dataset.

Data Source and Methods

Definition

Hospital Admissions and Deaths due to Pneumonia in those aged 0-24 years

Data Source

Admissions Numerator: National Minimum Dataset: Hospital admissions of children and young people (0-24 years) with a primary diagnosis of Pneumonia (ICD-9 480-486, 487.0; ICD-10 J12-J18, J10.0 J11.0)

Deaths Numerator: National Mortality Collection: Deaths in children and young people (0-24 years) with a clinical code (cause of death) attributed to Pneumonia (ICD-9 480-486, 487.0; ICD-10 J12-J18, J10.0 J11.0)

Denominator: NZ Census

Indicator Category Admissions: Proxy B-C; Mortality: Ideal B

Notes on Interpretation

The limitations of the National Minimum Dataset are discussed at length in Appendix 1. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data.

Statistical Significance Testing

95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

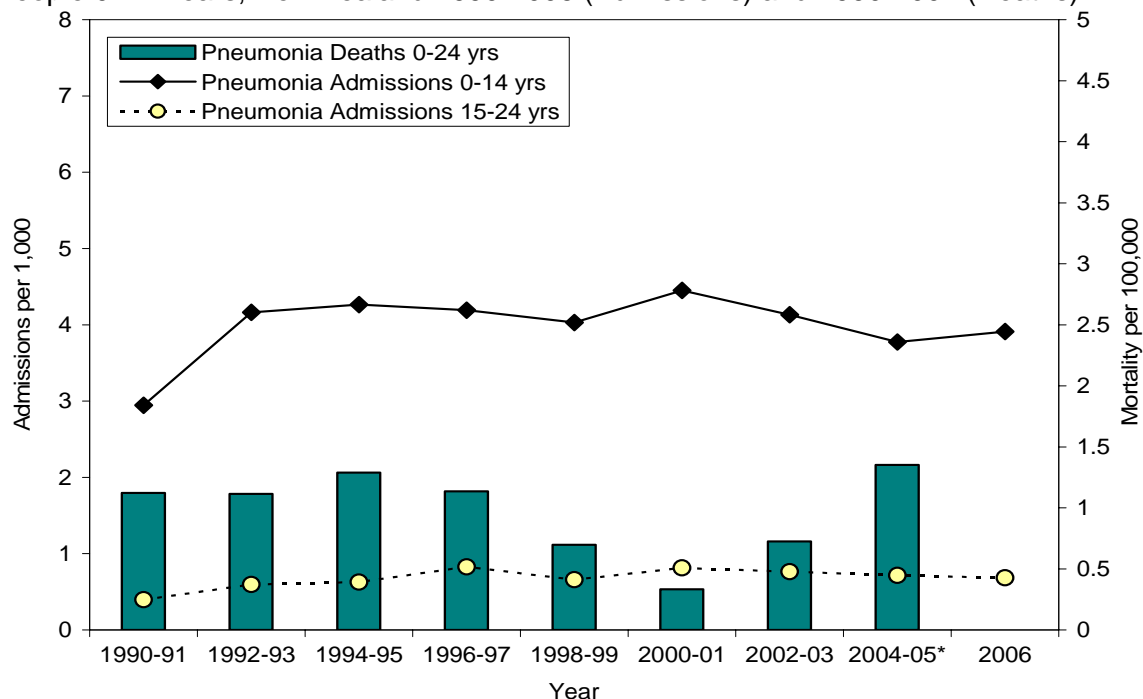
New Zealand Distribution and Trends

New Zealand Trends and Age Distribution

In New Zealand during 1992-2006, pneumonia admissions amongst children and young people remained relatively static, as did mortality during 1990-2004 (**Figure 147**). During 2002-2006, pneumonia admissions were highest amongst infants and

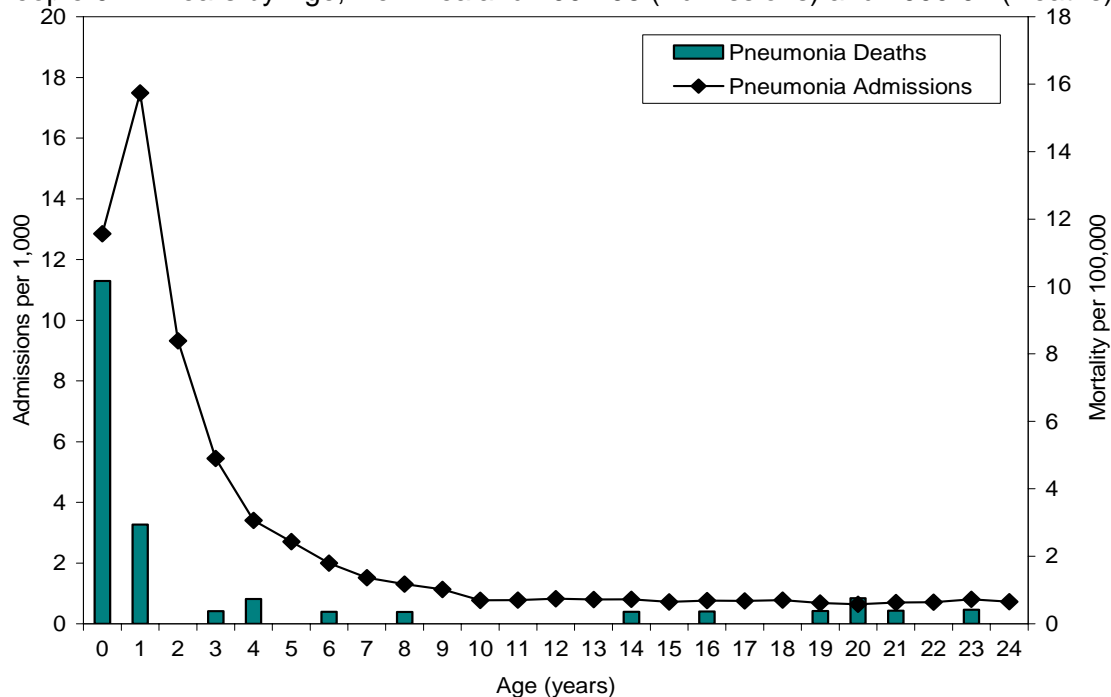
children 1-2 years of age, while mortality during 2000-2004 was highest for those under one year (**Figure 148**).

Figure 147. Hospital Admissions and Deaths due to Pneumonia in Children and Young People 0-24 Years, New Zealand 1990-2006 (Admissions) and 1990-2004 (Deaths)



Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Census; *Mortality for 2004-05 is for 2004 only

Figure 148. Hospital Admissions and Deaths from Pneumonia in Children and Young People 0-24 Years by Age, New Zealand 2002-06 (Admissions) and 2000-04 (Deaths)



Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Census

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

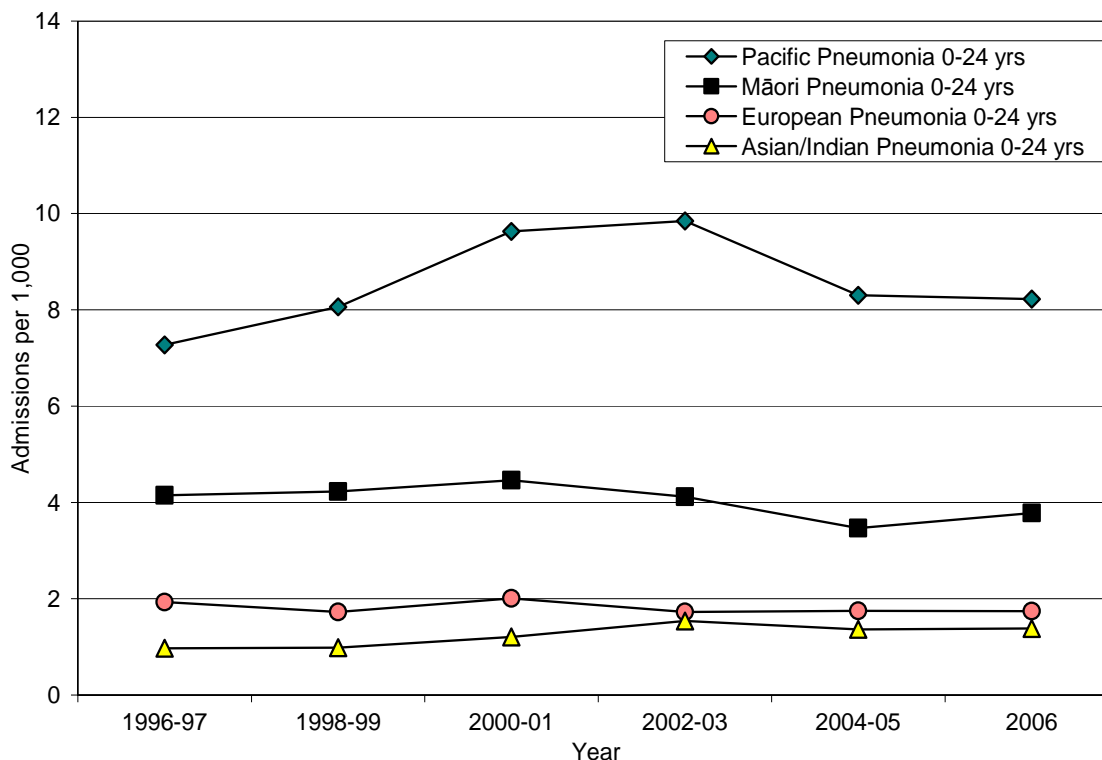
In New Zealand during 2002-2006, hospital admissions for pneumonia were *significantly higher* for Pacific > Māori > European and Asian / Indian children, males and those living in the more deprived areas (**Table 91**). Similar ethnic differences were seen for children and young people during 1996-2006 (**Figure 149**).

Table 91. Risk Factors for Hospital Admissions due to Pneumonia in Children 0-14 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	1.81	1.00		1-2	1.85	1.00	
2	1.88	1.04	0.94-1.15	3-4	2.48	1.34	1.25-1.43
3	2.28	1.26	1.15-1.38	5-6	3.09	1.67	1.57-1.78
4	2.68	1.48	1.35-1.62	7-8	4.32	2.34	2.21-2.48
5	2.76	1.52	1.39-1.67	9-10	7.12	3.85	3.65-4.06
6	3.42	1.89	1.73-2.06	Prioritised Ethnicity			
7	3.51	1.94	1.78-2.12	Māori	5.07	2.04	1.97-2.12
8	5.10	2.81	2.59-3.05	Pacific	12.62	5.07	4.88-5.27
9	5.94	3.28	3.03-3.55	European	2.49	1.00	
10	8.10	4.47	4.15-4.82	Asian/Indian	2.62	1.05	0.98-1.13
Gender							
Female	3.71	1.00					
Male	4.17	1.13	1.10-1.16				

Source: Numerator-National Minimum Dataset; Denominator-Census; Rate per 1,000 per year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted.

Figure 149. Hospital Admissions due to Pneumonia in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity is Level 1 Prioritised

Pneumonia Admissions Amongst Pacific Groups in New Zealand

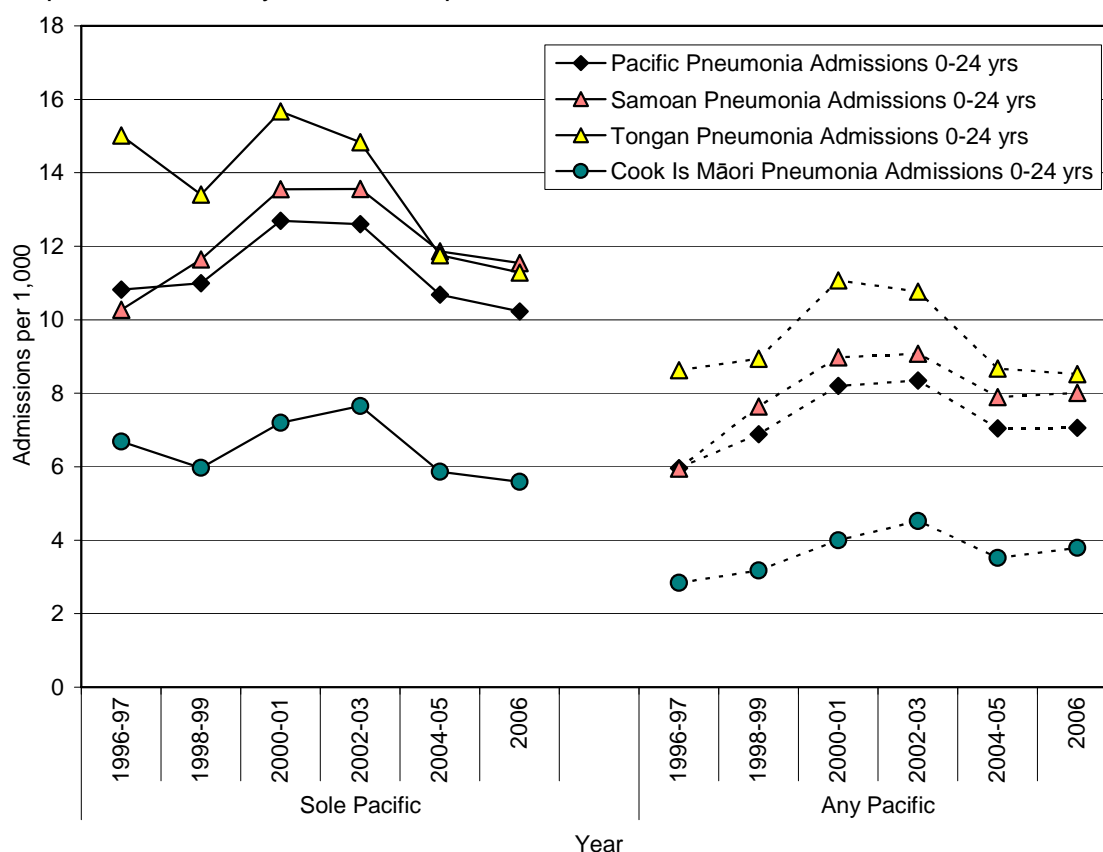
During 2002-2006 (using the Sole / (Any) classification), pneumonia admissions for Pacific children were *significantly higher* than for non-Māori non-Pacific children in each of the Sole and (Any) Groups. Within the (Any) Category, pneumonia admissions for Tongan and Samoan children were *significantly higher* than for Cook Island Māori, Niue, Fijian and Tokelauan children. Within the Sole Category, pneumonia admissions for Cook Island Māori children were *significantly lower* than for Tongan, Samoan or Niue children (**Table 92**). Similarly during 1996-2006, pneumonia admissions were consistently lower for Cook Island Māori children and young people than for Tongan and Samoan children and young people in both the Sole and (Any) categories (**Figure 150**)

Table 92. Distribution of Hospital Admissions for Pneumonia in Pacific Children 0-14 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR	95% CI
Any Samoan	2,780	556.0	11.6	4.67	4.47-4.88
Any Tongan	1,238	247.6	12.5	5.05	4.76-5.36
Any Cook Island Māori	580	116.0	5.0	2.02	1.86-2.20
Any Niue	269	53.8	6.2	2.51	2.22-2.83
Any Fijian	84	16.8	5.9	2.39	1.93-2.96
Any Tokelauan	110	22.0	7.9	3.19	2.64-3.85
Any Other Pacific	144	28.8	10.2	4.10	3.48-4.83
Any Pacific	4,974	994.8	10.3	4.16	4.01-4.31
Any Māori	5,036	1007.2	5.1	2.04	1.97-2.11
Non-Māori Non-Pacific	7,298	1459.6	2.5	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR	95% CI
Sole Samoan	2,303	460.6	18.5	7.46	7.12-7.82
Sole Tongan	1,032	206.4	17.7	7.14	6.69-7.62
Sole Cook Island Māori	383	76.6	9.0	3.63	3.28-4.02
Sole Niue	143	28.6	15.6	6.27	5.32-7.39
Sole Fijian	47	9.4	10.9	4.40	3.31-5.85
Sole Tokelauan	54	10.8	14.1	5.68	4.35-7.41
Sole Other Pacific	114	22.8	19.5	7.85	6.54-9.43
Sole Pacific	4,113	822.6	16.6	6.67	6.42-6.93
Sole Māori	4,037	807.4	9.30	3.75	3.61-3.89
Non-Māori Non-Pacific	7,298	1,459.6	2.5	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate ratios are compared to the Non-Māori Non-Pacific group and are unadjusted.

Figure 150. Hospital Admissions due to Pneumonia in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details)

Summary

The term pneumonia refers to a group of acute lower respiratory tract infections which lead to inflammation of the lung tissue. They are usually caused by inhaled micro-organisms from the upper respiratory tract, with the causative agent varying with the age of the child. In New Zealand, while pneumonia mortality in children and young people has declined, hospital admissions, after initially increasing during the early 1990s, have remained relatively static.

In New Zealand during 2002-2006 (using prioritised ethnicity), hospital admissions for pneumonia were *significantly higher* for Pacific > Māori > European and Asian / Indian children, males and those living in the most deprived areas. During the same period (using the Sole / (Any) classification), pneumonia admissions for Pacific children were *significantly higher* than for non-Māori non-Pacific children in each of the Sole and (Any) Groups. Within the (Any) Category, pneumonia admissions for Tongan and Samoan children were *significantly higher* than for Cook Island Māori, Niue, Fijian and Tokelauan children. Within the Sole Category, pneumonia admissions for Cook Island Māori children were *significantly lower* than for Tongan, Samoan or Niue children.

Bronchiectasis

Introduction

The term bronchiectasis originates from Greek, literally meaning 'stretching of the windpipe'. It is usually a progressive disease characterised by bronchial dilatation, with or without associated damage to the bronchial wall and lung parenchyma, and is usually accompanied by pus in the bronchial lumen. Clinically, bronchiectasis results in a persistent wet cough, with purulent sputum production in the older child and recurrent respiratory exacerbations. The symptoms result in significant morbidity, with lost schooldays and multiple absences from work for parents of affected children. Children with extensive bronchiectasis also have a reduced exercise capacity, may have slower growth [251], with finger clubbing and persistent coarse crackles on examination. Continued problems with untreated / extensive disease may progress to respiratory failure and premature death [252].

The estimated prevalence for New Zealand children is 7 times higher than the only country (Finland) for which comparable incidence figures are available [253]. By their 15th birthday, 1:1700 New Zealand children will be diagnosed with Bronchiectasis, with the incidence being 3 times higher for Māori and 12 times higher for Pacific children [253]. Bronchiectasis also demonstrates a marked socioeconomic gradient, with 67% of children in one study living in NZDep deciles 8-10 (the most deprived 30% of areas) and 58% living in households where one or more family members smoked [254]. Yet despite recent advances in the diagnosis of Bronchiectasis, its aetiology often remains unclear, with 50% of paediatric cases in one New Zealand study having an unknown aetiology (although 37% had a history of recurrent lower respiratory tract infection and a further 25% were presumed secondary to severe pneumonia [254]).

The following section explores hospital admissions for bronchiectasis amongst Pacific children and young people in New Zealand using information available from the National Minimum Dataset.

Data Source and Methods

Definition

Hospital Admissions & Mortality from Bronchiectasis where Cystic Fibrosis is not listed as a Co- Morbidity

Data Source

Admissions Numerator: National Minimum Dataset: Hospital admissions of children and young people (0-24 years) with a diagnosis of Bronchiectasis (ICD-9 494; ICD-10 J47) in any of the first 10 diagnostic codes. Cases where cystic fibrosis was mentioned in the first 10 diagnostic codes were excluded.

Deaths Numerator: National Mortality Collection: Deaths in children and young people (0-24 years) with a clinical code (cause of death) attributed to Bronchiectasis (ICD-9 494; ICD-10 J47) where Cystic fibrosis was not listed as a co-morbidity.

Denominator: NZ Census

Indicator Category Admissions: Proxy B-C; Mortality: Ideal B

Notes on Interpretation

Because children and young people with cystic fibrosis may also develop bronchiectasis over time, and because the epidemiology of cystic fibrosis and non-cystic fibrosis bronchiectasis are likely to differ considerably, cases where cystic fibrosis was mentioned as a co-morbidity have been removed from this analysis. In addition, care must be taken when interpreting trends in bronchiectasis admissions over time, as it remains unclear whether they represent an increase in the underlying burden of disease, an increase in access to hospitalisation, or an increase in the use of High Resolution CT to diagnose bronchiectasis in this population. Other limitations of the National Minimum Dataset are discussed at length in Appendix 1.

Statistical Significance Testing

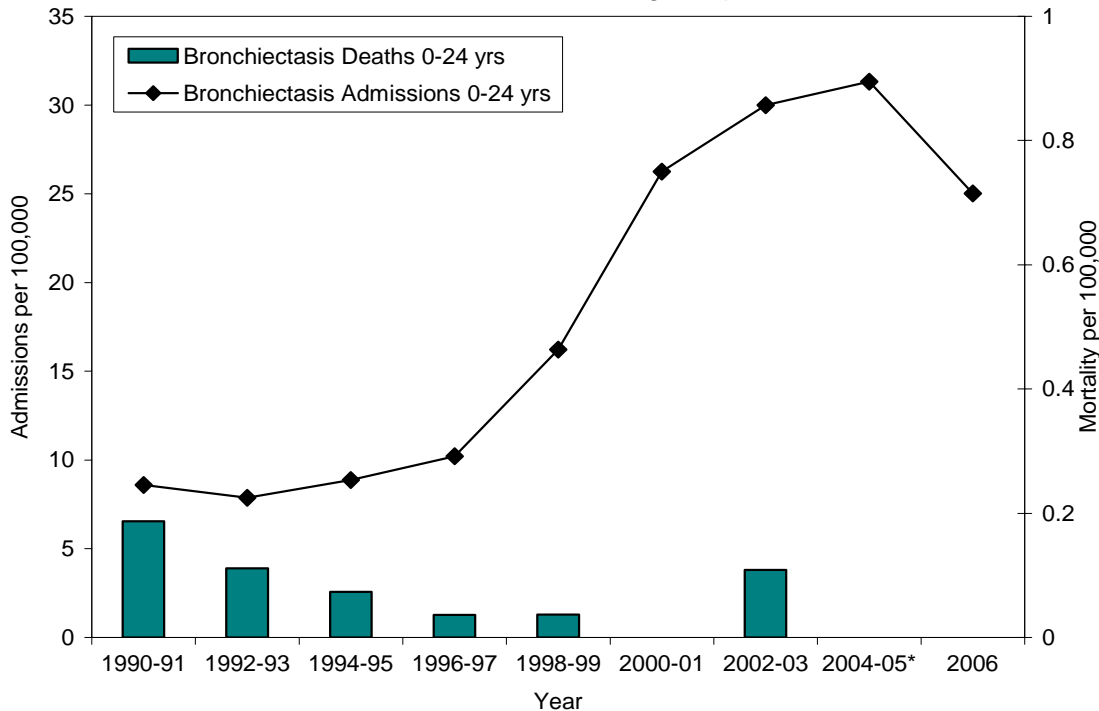
95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

New Zealand Distribution and Trends

New Zealand Trends

In New Zealand during 1990-2005, bronchiectasis admissions increased dramatically, although deaths remained more static during 1990-2004. Care must be taken when interpreting these trends, as it remains unclear whether they reflect an increase in the burden of disease, an increase in access to hospitalisation, or an increase in the use of High Resolution CT to diagnose bronchiectasis in this population (**Figure 151**).

Figure 151. Hospital Admissions (1990-2006) and Deaths (1990-2004) due to Bronchiectasis in New Zealand Children and Young People 0-24 Years



Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Census; *Deaths in 2004-05 are for 2004 only

Table 93. Risk Factors for Hospital Admission due to Bronchiectasis in Children and Young People 0-24 Years, New Zealand 2002-2006

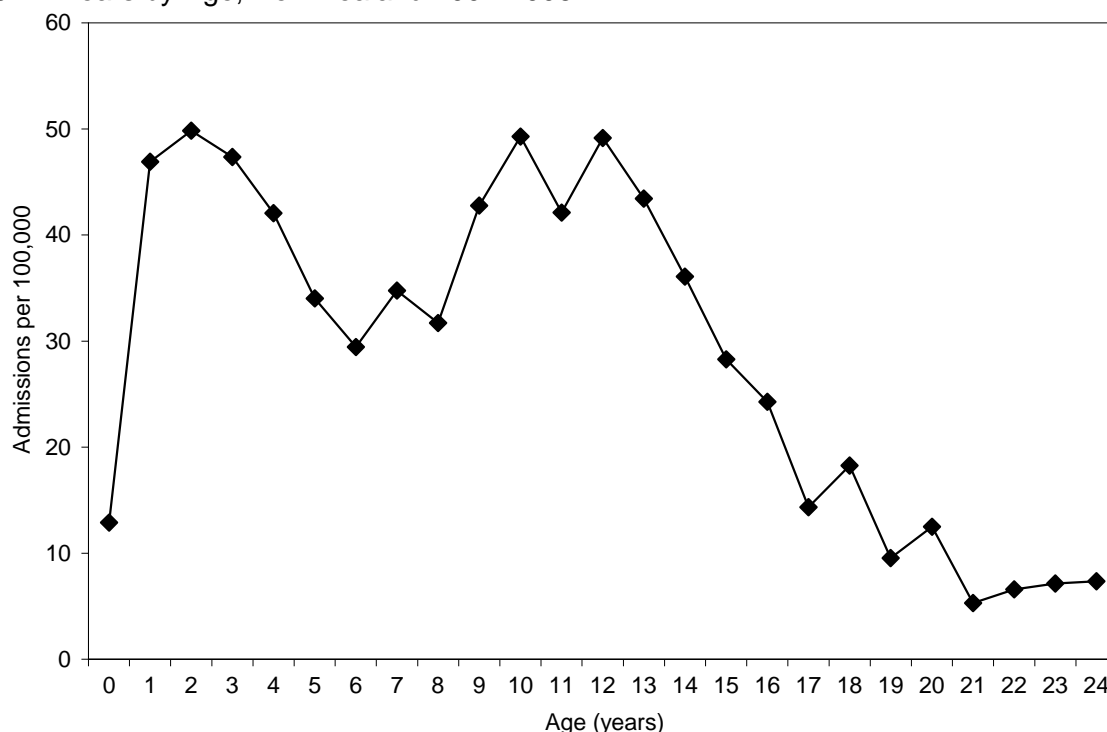
Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	5.07	1.00		1-2	6.83	1.00	
2	8.62	1.70	1.11-2.60	3-4	12.76	1.87	1.45-2.41
3	16.96	3.35	2.28-4.92	5-6	22.34	3.27	2.58-4.14
4	8.49	1.67	1.09-2.56	7-8	28.59	4.18	3.33-5.25
5	21.59	4.26	2.93-6.20	9-10	66.36	9.71	7.84-12.02
6	23.09	4.55	3.14-6.60	Prioritised Ethnicity			
7	18.71	3.69	2.53-5.39	Māori	49.73	4.03	3.60-4.52
8	37.98	7.49	5.24-10.70	Pacific	131.18	10.63	9.48-11.91
9	52.33	10.32	7.28-14.64	European	12.34	1.00	
10	79.00	15.58	11.04-21.98	Asian/Indian	8.64	0.70	0.53-0.92
Gender							
Female	30.14	1.00		Male	28.90	0.96	0.88-1.05

Source: Numerator-National Minimum Dataset; Denominator-Census; Rate per 100,000 per year; Ethnicity is Level 1 Prioritised; Rate Ratios are compared to the European group and are unadjusted

Distribution by Age

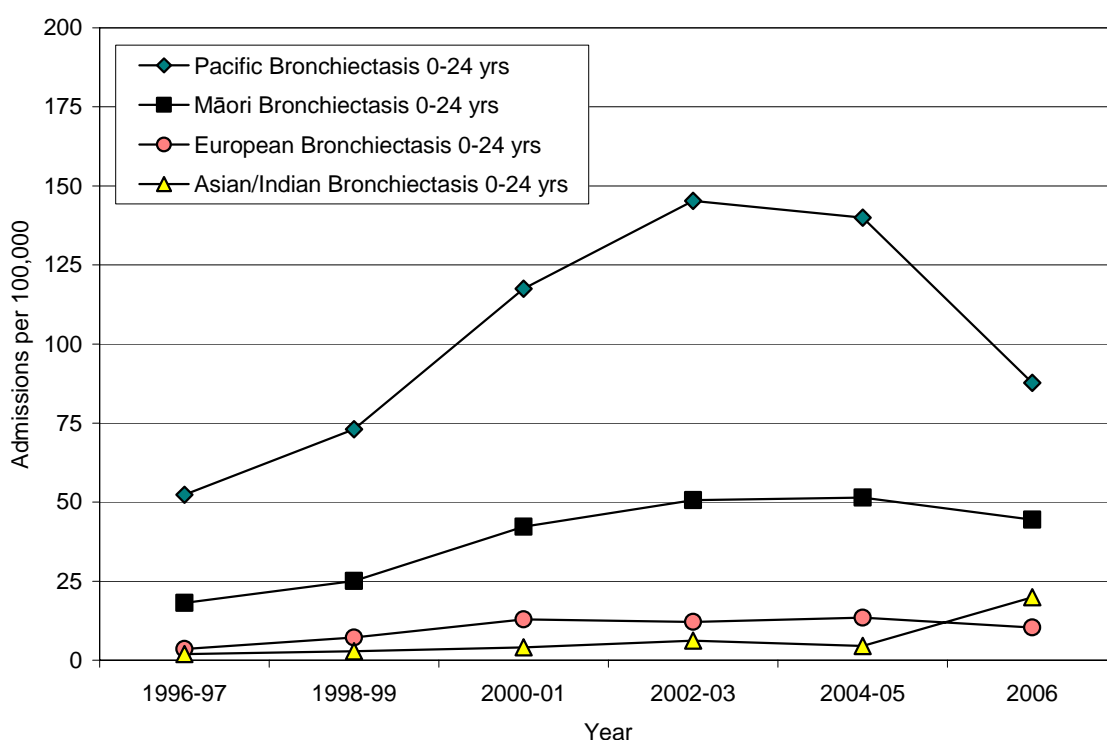
During 2002-2006, hospital admissions for bronchiectasis were highest amongst children 0-14 years (**Figure 152**).

Figure 152. Hospital Admissions due to Bronchiectasis in Children and Young People 0-24 Years by Age, New Zealand 2002-2006



Source: Numerator-National Minimum Dataset; Denominator-Census

Figure 153. Hospital Admissions due to Bronchiectasis in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity is Level 1 Prioritised

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

During 2002-2006, hospital admissions for bronchiectasis were *significantly higher* for Pacific > Māori > European > Asian / Indian children and young people, and those living in the most deprived areas (**Table 93**). While similar ethnic differences were seen during 1996-2006, in absolute terms Pacific children and young people experienced the largest increases in bronchiectasis admissions during this period, (although data for 2006 suggest that rates may be beginning to taper off) (**Figure 153**).

Bronchiectasis Admissions Amongst Pacific Groups in New Zealand

During 2002-2006 (using the Sole / (Any) classification), bronchiectasis admissions for Pacific children and young people were *significantly higher* than for non-Māori non-Pacific children and young people in each of the Sole and (Any) Groups. Within the (Any) Category, bronchiectasis admissions for Niue, Tongan and Samoan children and young people were *significantly higher* than for Cook Island Māori and Fijian children and young people. Within the Sole Category, bronchiectasis admissions for Niue children and young people were *significantly higher* than for the other Pacific groups (**Table 94**).

Table 94. Distribution of Hospital Admissions due to Bronchiectasis in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Any Samoan	430	86.0	122.2	10.1	8.93-11.43
Any Tongan	183	36.6	132.2	10.9	9.26-12.88
Any Cook Island Māori	114	22.8	68.1	5.6	4.60-6.87
Any Niue	85	17.0	133.9	11.1	8.81-13.88
Any Fijian	10	2.0	44.4	3.7	1.96-6.86
Any Tokelauan	13	2.6	65.2	5.4	3.11-9.34
Any Other Pacific	16	3.2	74.7	6.2	3.76-10.13
Any Pacific	828	165.6	116.8	9.7	8.69-10.72
Any Māori	736	147.2	49.7	4.1	3.69-4.58
Non-Māori Non-Pacific	603	120.6	12.1	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Sole Samoan	308	61.6	156.9	13.0	11.31-14.88
Sole Tongan	167	33.4	197.2	16.3	13.73-19.34
Sole Cook Island Māori	95	19.0	137.5	11.4	9.15-14.10
Sole Niue	67	13.4	408.2	33.7	26.22-43.39
Sole Fijian	8	1.6	103.2	8.5	4.25-17.13
Sole Tokelauan	7	1.4	108.6	9.0	4.26-18.89
Sole Other Pacific	16	3.2	169.3	14.0	8.52-22.97
Sole Pacific	671	134.2	171.9	14.2	12.73-15.86
Sole Māori	581	116.2	85.5	7.1	6.31-7.92
Non-Māori Non-Pacific	603	120.6	12.1	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate ratios are compared to the Non-Māori Non-Pacific group and are unadjusted.

Summary

Bronchiectasis is a progressive disease characterised by bronchial dilatation, with or without associated damage to the bronchial wall and lung parenchyma. In New Zealand, hospital admissions for bronchiectasis have increased dramatically during the past decade, while deaths due to bronchiectasis have declined. Care must be taken when interpreting these trends however, as it remains unclear whether they represent an increase in the underlying burden of disease, an increase in access to hospitalisation, or an increase in the use of High Resolution CT to diagnose bronchiectasis in this population.

During 2002-2006 (using prioritised ethnicity), hospital admissions for bronchiectasis were *significantly higher* for Pacific > Māori > European > Asian / Indian children and young people and those living in the most deprived areas. During the same period (using the Sole / (Any) classification), bronchiectasis admissions for Pacific children and young people were *significantly higher* than for non-Māori non-Pacific children and young people in each of the Sole and (Any) Groups. Within the (Any) Category, bronchiectasis admissions for Niue, Tongan and Samoan children and young people were *significantly higher* than for Cook Island Māori and Fijian children and young people. Within the Sole Category, bronchiectasis admissions for Niue children and young people were *significantly higher* than for the other Pacific groups.

Asthma

Introduction

Asthma is a chronic inflammatory disorder, which causes narrowing of the airways in the lower respiratory tract as a result of bronchial smooth muscle constriction, swelling, inflammation and mucus production. Episodic airflow obstruction leads to symptoms such as shortness of breath, wheezing, prolonged expiration and an irritative cough. Attacks in children are most commonly triggered by viral infections, but may also be associated with hypersensitivity to substances such as pollen, mould, house dust mite, foods, animal dander, cigarette smoke, chemicals or drugs. Asthma may also be triggered by exercise, exposure to cold air, or psychological stress [231].

New Zealand's asthma prevalence is one of the highest reported in the world [255], with 25% of children aged 6-7 years and 30% of adolescents 13-14 years reporting asthma symptoms in one recent survey [256]. While asthma prevalence is thought to be highest amongst Māori > European > Pacific children, symptom severity is highest amongst Māori and Pacific children [257]. Ethnic disparities have also been reported in hospital admission rates, with admissions for Māori children being higher than for non-Māori children, particularly in rural areas [258]. While from a public health perspective, addressing issues such as exposure to tobacco smoke, use of preventer medication and access to primary health care may assist in reducing disparities in the severity of asthma symptoms / hospital admission rates [257], it remains unclear what population level interventions will be of value in reducing the underlying prevalence of asthma in New Zealand's children and young people.

The following section explores hospital admissions for asthma in Pacific children and young people in New Zealand using information from the National Minimum Dataset.

Data Source and Methods

Definition

Hospital Admissions and Deaths due to Asthma in those aged 0-24 years

Data Source

Admissions Numerator: National Minimum Dataset: Hospital admissions of children and young people (0-24 years) with a primary diagnosis of Asthma (ICD-9 493; ICD-10 J45-46)

Deaths Numerator: National Mortality Collection: Deaths in children and young people (0-24 years) with a clinical code (cause of death) attributed to Asthma (ICD-9 493; ICD-10 J45-46)

Denominator: NZ Census

Indicator Category Admissions: Proxy B-C; Mortality: Ideal B

Notes on Interpretation

The limitations of the National Minimum Dataset are discussed at length in Appendix 1. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data.

Statistical Significance Testing

95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

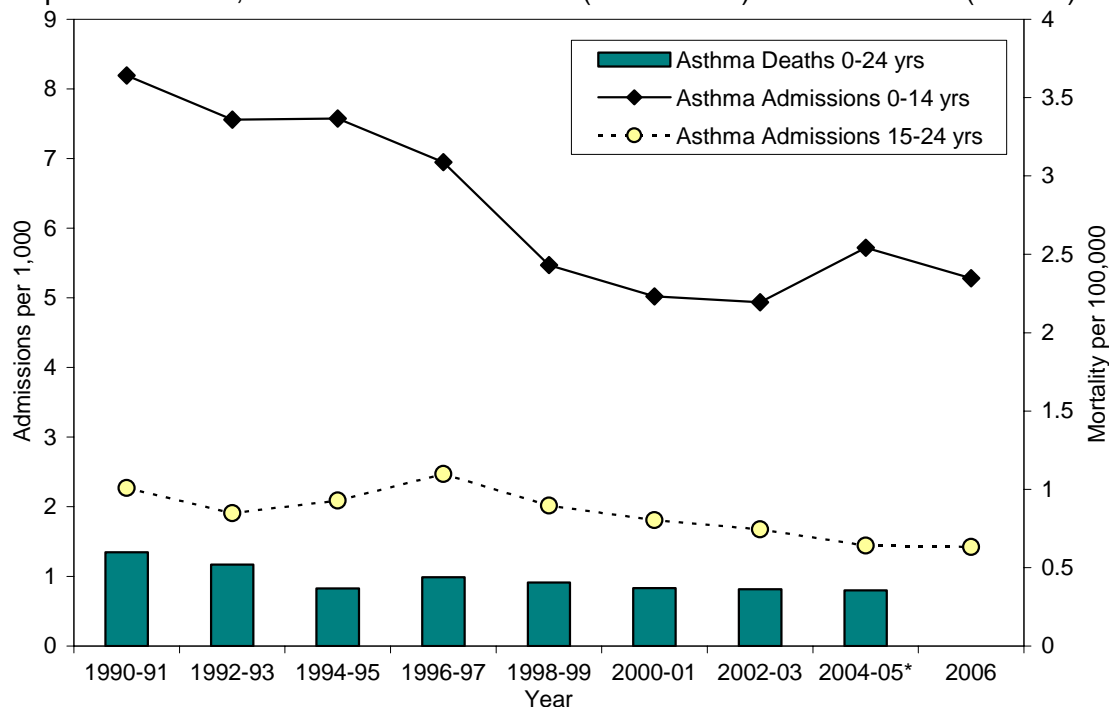
New Zealand Distribution and Trends

New Zealand Trends and Age Distribution

In New Zealand during 1990-2003 asthma admissions amongst children and young people gradually declined, although 2004-2006 saw an increase in admissions amongst children 0-14 years. In contrast, mortality remained relatively static during 1990-2004 (**Figure 154**). While hospital admissions during 2002-2006 were highest for

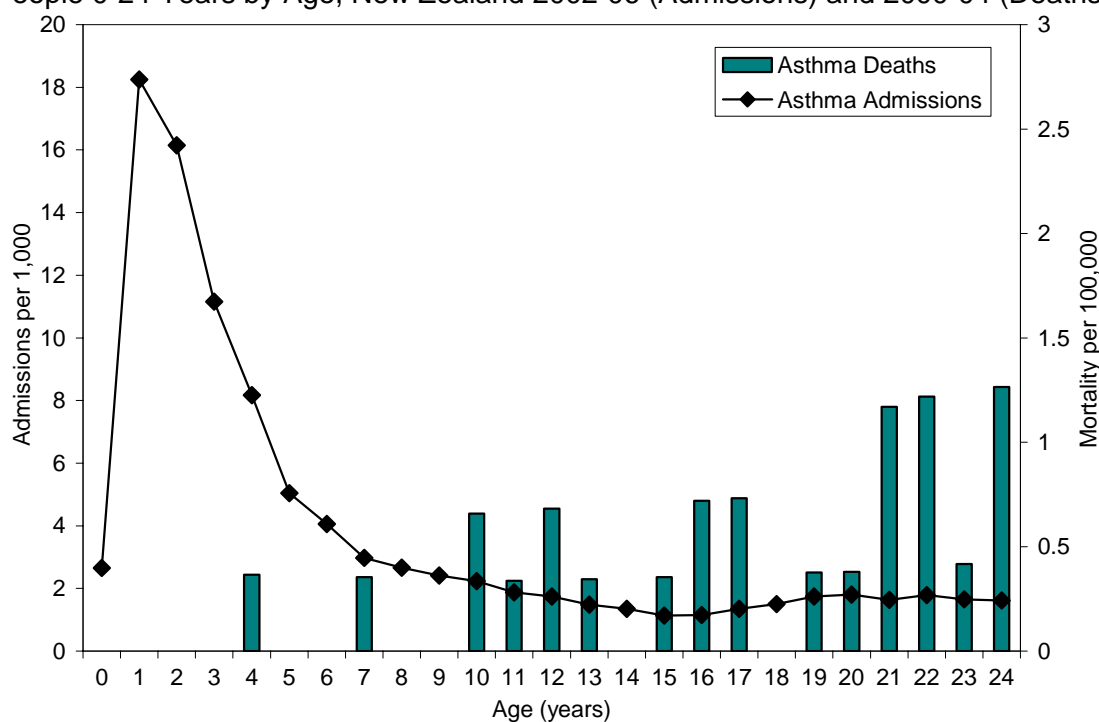
children <5 years of age, mortality during 2000-2004 was highest for adolescents and those in their early 20s (**Figure 155**).

Figure 154. Hospital Admissions and Deaths due to Asthma in Children and Young People 0-24 Years, New Zealand 1990-2006 (Admissions) and 1990-2004 (Deaths)



Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Census; *Mortality in 2004-05 is for 2004 year only

Figure 155. Hospital Admissions and Deaths due to Asthma in Children and Young People 0-24 Years by Age, New Zealand 2002-06 (Admissions) and 2000-04 (Deaths)



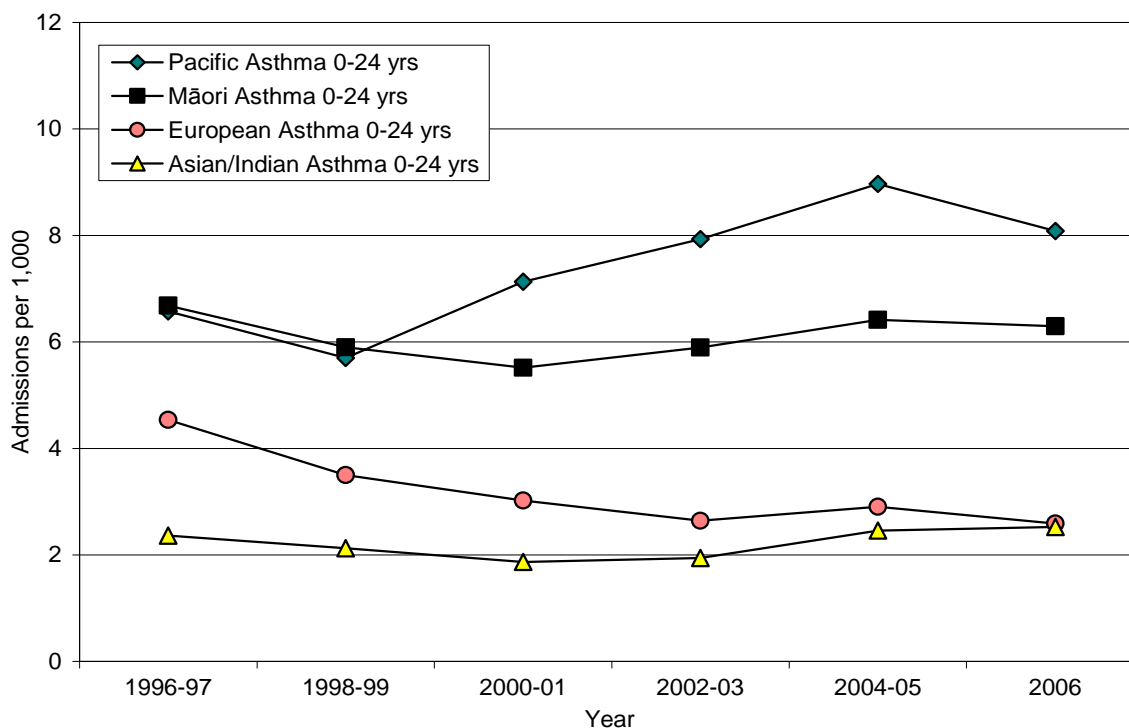
Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Census

Table 95. Risk Factors for Hospital Admissions due to Asthma in Children 0-14 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	2.52	1.00		1-2	2.59	1.00	
2	2.66	1.05	0.97-1.14	3-4	3.46	1.33	1.26-1.41
3	3.03	1.20	1.11-1.30	5-6	4.76	1.84	1.75-1.94
4	3.89	1.54	1.43-1.66	7-8	6.75	2.60	2.48-2.73
5	4.18	1.65	1.53-1.78	9-10	8.30	3.20	3.05-3.35
6	5.34	2.12	1.97-2.28	Prioritised Ethnicity			
7	5.95	2.36	2.20-2.53	Māori	7.97	2.19	2.12-2.26
8	7.52	2.98	2.78-3.19	Pacific	11.43	3.14	3.03-3.26
9	8.11	3.21	3.00-3.43	European	3.64	1.00	
10	8.45	3.35	3.14-3.58	Asian/Indian	4.16	1.14	1.08-1.21
Gender							
Female	4.48	1.00					
Male	6.12	1.37	1.33-1.41				

Source: Numerator-National Minimum Dataset; Denominator-Census; Rate per 1,000 per year. Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Figure 156. Hospital Admissions due to Asthma in Children and Young People 0-24 Years by Ethnicity, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity is Level 1 Prioritised.

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

In New Zealand during 2002-2006, hospital admissions for asthma were *significantly higher* for Pacific > Māori > European and Asian / Indian children, males and those in the most deprived areas (**Table 95**). Similar ethnic differences were seen during 2000-2006, with Pacific children and young people experiencing an upswing in rates during 1998/99 to 2004/05 (**Figure 156**).

Asthma Admissions Amongst Pacific Groups in New Zealand

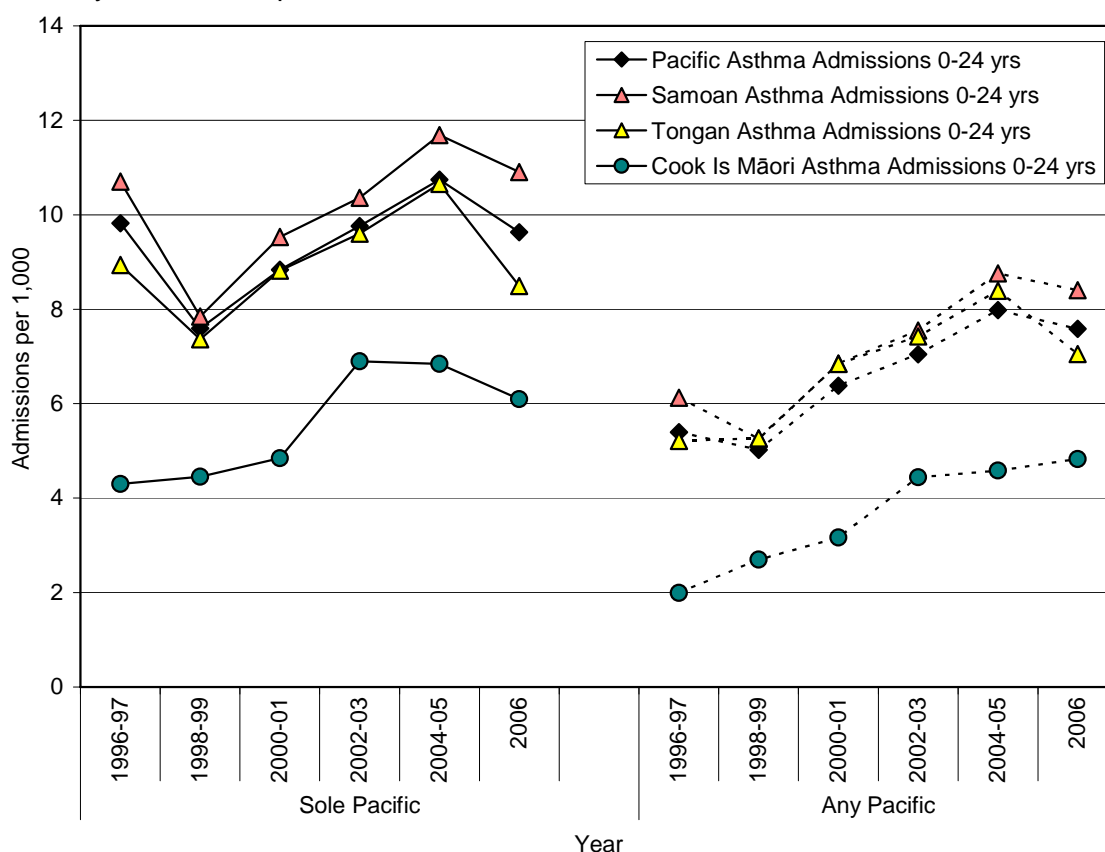
During 2002-2006 (using the Sole / (Any) classification), asthma admissions for Pacific children were *significantly higher* than for non-Māori non-Pacific children in each of the Sole and (Any) Groups. Within both the (Any) and Sole categories, asthma admissions for Cook Island Māori children were *significantly lower* than for Samoan, Tongan, Niue and Fijian children (**Table 96**). Similarly during 1996-2006, asthma admissions for Cook Island Māori children and young people were lower than for Samoan and Tongan children and young people in both the Sole and (Any) categories (**Figure 157**).

Table 96. Distribution of Hospital Admissions due to Asthma in Pacific Children 0-14 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR	95% CI
Any Samoan	2,634	526.8	11.0	3.00	2.88-3.13
Any Tongan	965	193.0	9.8	2.67	2.50-2.85
Any Cook Island Māori	658	131.6	5.7	1.55	1.43-1.68
Any Niue	374	74.8	8.7	2.37	2.14-2.63
Any Fijian	148	29.6	10.4	2.85	2.43-3.35
Any Tokelauan	101	20.2	7.3	1.99	1.64-2.42
Any Other Pacific	124	24.8	8.8	2.40	2.01-2.86
Any Pacific	4,773	954.6	9.9	2.71	2.62-2.80
Any Māori	7,914	1,582.8	8.0	2.18	2.12-2.24
Non-Māori Non-Pacific	10,765	2,153.0	3.7	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR	95% CI
Sole Samoan	1981	396.2	15.9	4.35	4.15-4.56
Sole Tongan	760	152	13.1	3.56	3.31-3.83
Sole Cook Island Māori	384	76.8	9.1	2.47	2.23-2.73
Sole Niue	203	40.6	22.1	6.04	5.26-6.93
Sole Fijian	69	13.8	16.0	4.38	3.46-5.54
Sole Tokelauan	55	11	14.4	3.92	3.01-5.10
Sole Other Pacific	79	15.8	13.5	3.69	2.96-4.60
Sole Pacific	3555	711	14.3	3.91	3.77-4.06
Sole Māori	5964	1192.8	13.7	3.75	3.64-3.87
Non-Māori Non-Pacific	10765	2153	3.7	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate Ratios are compared to the non-Māori non-Pacific group and are unadjusted.

Figure 157. Hospital Admissions for Asthma in Pacific Children and Young People 0-24 Years by Pacific Group, New Zealand 1996-2006



Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details)

Summary

Asthma is a chronic inflammatory disorder, which causes narrowing of the airways in the lower respiratory tract as a result of bronchial smooth muscle constriction, swelling, inflammation and mucus production. In New Zealand during 1990-2003 asthma admissions amongst children and young people gradually declined, although 2004-2006 saw an increase in admissions amongst children 0-14 years. In contrast, mortality remained relatively static during 1990-2004. While hospital admissions during 2002-2006 were highest for children <5 years of age, mortality during 2000-2004 was highest for adolescents and those in their early 20s.

In New Zealand during 2002-2006 (using prioritised ethnicity), hospital admissions for asthma were *significantly higher* for Pacific > Māori > European and Asian / Indian children, males and those in the most deprived areas. Similar ethnic differences were seen during 2000-2006, with Pacific children and young people experiencing an upswing in rates during 1998/99 to 2004/05. During 2002-2006 (using the Sole / (Any) classification), asthma admissions for Pacific children were *significantly higher* than for non-Māori non-Pacific children in each of the Sole and (Any) Groups. Within both the (Any) and Sole categories, asthma admissions for Cook Island Māori children were *significantly lower* than for Samoan, Tongan, Niue and Fijian children.



Individual and Whanau Health and Wellbeing

Chronic Conditions

Diabetes and Epilepsy

In New Zealand a range of chronic conditions affect the wellbeing of children and young people, but because many of these conditions are managed in primary care, or by specialist outpatient clinics, they are often not adequately captured in routine statistics. This lack of visibility should not preclude the needs of Pacific children and young people with chronic conditions being taken into consideration in prioritisation and strategy development. In an attempt to address this issue, the following sections bring together the available data on two conditions which have significant resource implications for the New Zealand health sector. These are:

1. Insulin Dependent (Type 1) Diabetes Mellitus
2. Epilepsy

Caution is urged when interpreting the information in the sections which follow (which by necessity are based on hospital inpatient and mortality data), as the majority of children and young people with these conditions are managed on an outpatient basis, with hospital admissions being reserved for those who require stabilisation immediately following diagnosis, who are experiencing complications, or who remain poorly controlled despite maximal outpatient management. It is thus likely that these figures are biased towards those at the more severe end of the spectrum, and thus reflect the “tip of the iceberg” in terms the burden of morbidity associated with these conditions. Nevertheless, it hoped that an analysis of hospital inpatient data will serve to highlight the needs of a group of children and young people who might otherwise not appear in routine health statistics.

Data Source and Methods

Definition

1. Hospital Admissions due to Insulin Dependent Diabetes Mellitus in children and young people 0-24 yrs
2. Hospital Admissions due to Epilepsy and Status Epilepticus in children and young people 0-24 yrs

Data Source

1. *Insulin Dependent Diabetes Mellitus*

Admissions Numerator: National Minimum Dataset: Hospital admissions of children and young people (0-24 years) with a primary diagnosis of Insulin Dependent Diabetes Mellitus (ICD-10 E10)

Deaths Numerator: National Mortality Collection: Deaths in children and young people (0-24 years) with a clinical code (cause of death) attributed to Insulin Dependent Diabetes Mellitus (ICD-10 E10)

Denominator: NZ Census

2. *Epilepsy and Status Epilepticus*

Admissions Numerator: National Minimum Dataset: Hospital admissions of children and young people (0-24 years) with a primary diagnosis of Epilepsy (ICD-10 G40) or Status Epilepticus (ICD-10 G41). Epilepsy types were coded using ICD-9 subcategories

Deaths Numerator: National Mortality Collection: Deaths in children and young people (0-24 years) with a clinical code (cause of death) attributed to Epilepsy (ICD-10 G40) or Status Epilepticus (ICD-10 G41)

Denominator: NZ Census

Indicator Category

Bookmark C

Notes on Interpretation

The limitations of the National Minimum Dataset are discussed at length in Appendix 1. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data.

Statistical Significance Testing

95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

Type 1 Diabetes

Overseas research suggests that the incidence of Type 1 diabetes is increasing in the under 15 age group [259]. National and regional incidence studies during the past three decades also indicate that similar trends may be occurring in New Zealand. During 1968-1972, a review of hospital admission data suggested an annual incidence (new cases per year) of 8.9 per 100,000 for those 0-15 years [260]. In Auckland during 1977-1984, registry data suggested rates of 9.3 per 100,000 [261], while a Canterbury audit during 1982-1990 suggested rates of 12.8 per 100,000 [262]. In contrast, active national surveillance over a two year period during 1999-2000 found an annual incidence of 17.9 per 100,000, with rates being 4.5 times higher amongst European children. The same review also noted that while the incidence of Type 1 diabetes had doubled in New Zealand during the past three decades, the geographical (South Island > North Island) and ethnic (European > Māori) differences highlighted in previous reports had persisted [259]. In contrast, prevalence estimates (existing cases at a single point in time) based on a recent Christchurch review suggested that 227 per 100,000 of those aged 0-24 years had Type 1 diabetes, with rates being 274 per 100,000 Europeans and 81 per 100,000 for Māori. The same report also noted a two to threefold rise in the prevalence of Type 1 diabetes since similar estimates were made in 1988 [263].

Active surveillance during 1999-00 also suggested a number of risk factors for Type 1 Diabetes including [259]:

1. Age: 21% of new Type 1 diabetics were <5 years of age, with a median age of diagnosis of 9.5 years for males and 9.0 years for females and the peak incidence being between 9-11 years.
2. Ethnicity: Māori, Pacific and Asian children all had significantly lower rates of Type 1 diabetes than European children, with the incidence for Māori being 5.6 per 100,000, as compared to 21.7% for non-Māori children.
3. Family History: While there were no significant differences in diabetes incidence by gender, 8.8% of cases had a first degree relative with Type 1 diabetes.

At a population level, increases in the number of children and young people with Type 1 diabetes have significant implications for service delivery, with optimal long term outcomes requiring intensive management by the patient, their family and their health professional team[263]. It has been suggested that if the increases highlighted above continue at this pace, new models of service delivery may be required in both paediatric and adult secondary care services [263]. In addition, with estimates of 1:500 school children having Type 1 diabetes, this has implications for health policy planning in schools as well, with most secondary schools likely to have at least one child with diabetes[263]. In the longer term, such increases may also signal increases in microvascular (e.g. retinopathy and nephropathy) and macrovascular disease (e.g. coronary heart disease, stroke and peripheral vascular disease) as the current generation of children and young people with Type 1 diabetes reach adulthood [264].

Hospital Admissions for Type 1 Diabetes

Diabetes Admissions in (Any) Pacific Children and Young People

While changes in the way in which diabetes was coded over time precluded an accurate time series analysis, a cross sectional analysis of hospital admissions was possible for 2002-2006. During this period, while Type 1 Diabetes was the most common reason for a diabetes admission amongst both (Any) Pacific and New Zealand children and young people, admission rates for insulin dependant diabetes in Pacific children and young people were lower than the New Zealand average, while admissions for non-insulin dependant diabetes were generally higher (**Table 97**).

Distribution by Age, Prioritised Ethnicity and NZ Deprivation Index Decile

During 2002-2006, hospital admissions for Type 1 diabetes were *significantly higher* for European > Māori and Pacific > Asian / Indian children and young people. In addition, admissions for Type 1 diabetes were *significantly lower* for those living in the more affluent (Decile 1-3) areas, when compared to those living in the mid-ranges (Deciles 5-9) of the NZDep distribution (**Table 98**). Hospital admissions increased progressively with age, reaching a peak in adolescence and thereafter declining (**Figure 158**). There were five deaths attributed to Type 1 diabetes amongst New Zealand children and young people 0-24 years during 2000-2004.

Table 97. Hospital Admissions for Diabetes in Children and Young People 0-24 Years by Diagnosis, New Zealand 2002-2006

Diagnosis	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	% of Total
(Any) Pacific				
Insulin Dependant Diabetes	262	52.4	36.9	83.7
Non Insulin Dependant	43	8.6	6.1	13.7
Other & Unspecified Diabetes	8	1.6	1.1	2.6
Total	313	62.6	44.1	100.0
New Zealand				
Insulin Dependant Diabetes	4,642	928.4	66.1	95.4
Non Insulin Dependant	162	32.4	2.3	3.3
Other & Unspecified Diabetes	61	12.2	0.9	1.3
Total	4,865	973.0	69.3	100.0

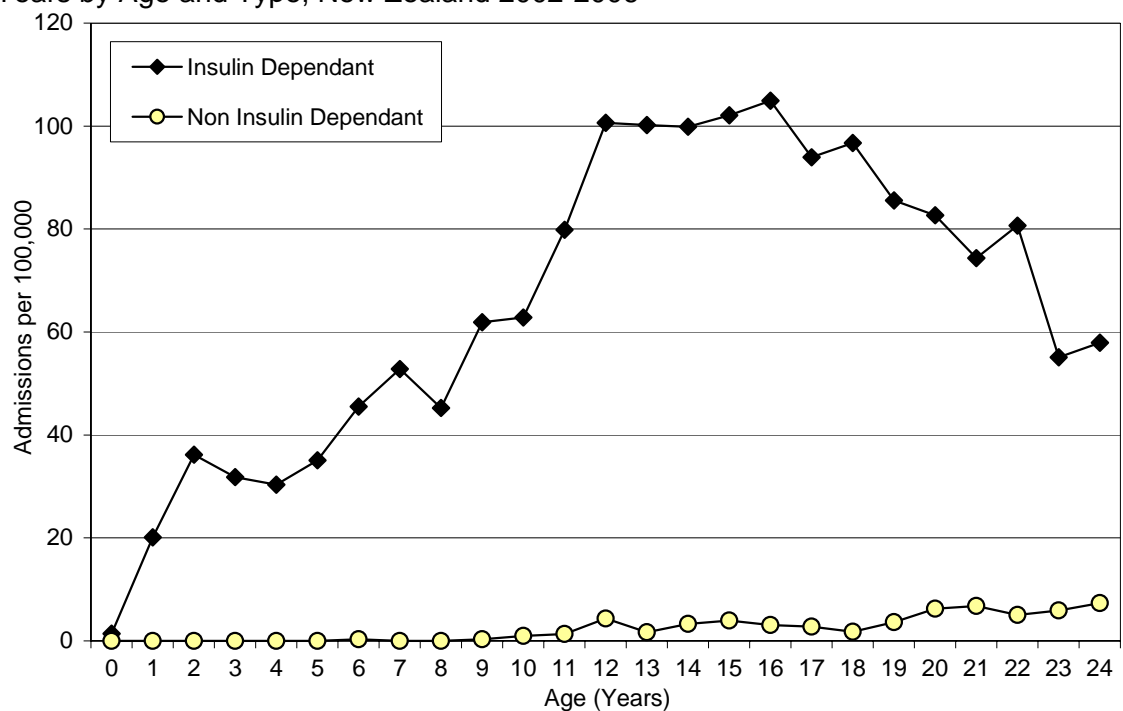
Source: Numerator-National Minimum Dataset; Denominator-Census; (Any) Pacific includes children and young people who identify as Pacific in ANY of their three first ethnic groups

Table 98. Risk Factors for Hospital Admission for Insulin Dependant Diabetes in Children and Young People 0-24 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	50.39	1.00		1-2	47.38	1.00	
2	44.32	0.88	0.75-1.03	3-4	56.71	1.20	1.08-1.33
3	53.15	1.05	0.90-1.22	5-6	73.82	1.56	1.41-1.72
4	60.34	1.20	1.04-1.39	7-8	84.03	1.77	1.61-1.95
5	76.17	1.51	1.31-1.73	9-10	66.71	1.41	1.28-1.55
6	71.52	1.42	1.24-1.63	Prioritised Ethnicity			
7	84.93	1.69	1.48-1.93	Māori	42.03	0.48	0.44-0.52
8	83.17	1.65	1.44-1.89	Pacific	41.70	0.47	0.41-0.54
9	74.74	1.48	1.30-1.69	European	87.85	1.00	
10	59.47	1.18	1.03-1.35	Asian/Indian	11.78	0.13	0.10-0.16
Gender							
Female	74.63	1.00					
Male	57.87	0.78	0.74-0.83				

Source: Numerator-National Minimum Dataset; Denominator-Census; Rate per 100,000 per year. Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted.

Figure 158. Hospital Admissions for Diabetes in Children and Young People 0-24 Years by Age and Type, New Zealand 2002-2006



Source: Numerator-National Minimum Dataset; Denominator-Census;

Epilepsy and Status Epilepticus

Epilepsy is the most common serious neurological illness in children and young people [265]. It is a cause of significant morbidity for those affected and has significant resource implications for the health care system. In developed countries, it is generally accepted that the incidence (number of new cases) of epilepsy is 50 per 100,000 per year, while the prevalence (existing cases at any point in time) is 5-10 per 1,000 [265]. In the year ending June 2006, PHARMAC estimated that the New Zealand health sector spent \$24.6 million on anti-epilepsy medications [266].

Despite its significant impact, epilepsy is not an entity in itself, but rather a symptom complex arising from a variety of different processes. Causes vary with age, with congenital, developmental and genetic conditions being most commonly associated with the development of epilepsy in childhood, while head trauma, central nervous system infections and tumours may lead to epilepsy at any age [265]. In addition, in a proportion of cases, the underlying cause for the epilepsy is unknown [267]. In developed countries, it had been consistently shown that despite an overall good prognosis for seizure control, those with epilepsy have a 2-3 fold increase in risk of mortality compared to those without epilepsy, with most deaths being directly related to the epilepsy itself [268]. In addition, a recent audit of epilepsy related deaths in the UK found that 59% of deaths during childhood could have potentially, or probably, been avoided given sufficient attention to appropriate drug management, access to specialist care or adequate investigations [268].

Hospital Admissions for Epilepsy

Epilepsy in (Any) Pacific Children and Young People

During 2002-2006, the most common reason for a hospital admission with epilepsy for both (Any) Pacific and New Zealand children and young people was for generalized

idiopathic epilepsy, followed by those for whom the type of epilepsy was not specified. During this period, epilepsy admissions for (Any) Pacific children and young people were similar to the New Zealand average (**Table 99**).

Distribution by Age, Prioritised Ethnicity and NZ Deprivation Index Decile

During 2002-2006, while there were *no significant differences* in hospital admission rates for epilepsy and status epilepticus between Pacific, Māori and European children and young people, a modest socioeconomic gradient existed, with admission rates being *significantly lower* for those living in the most affluent (Decile 1-2) areas, when compared to those living in more deprived (Decile 7-10) areas (**Table 100**). During the same period, hospital admissions for epilepsy and status epilepticus were highest for those under 5 years, with epilepsy admissions decreasing through childhood, before increasing slightly again amongst young people in their early 20s (**Figure 159**). During 2000-2004 there were 59 deaths attributed to epilepsy or status epilepticus amongst New Zealand children and young people.

Table 99. Hospital Admissions for Epilepsy in Children and Young People 0-24 Years by Diagnosis, New Zealand 2002-2006

Diagnosis	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	% of Total
(Any) Pacific				
Generalized: Idiopathic	194	38.8	27.4	32.8
Grand Mal Seizures NOS	34	6.8	4.8	5.8
Generalized: Other	23	4.6	3.2	3.9
Status Epilepticus	61	12.2	8.6	10.3
Partial Seizures: Complex	49	9.8	6.9	8.3
Partial Seizures: Simple	28	5.6	3.9	4.7
Unspecified Epilepsy	191	38.2	26.9	32.3
Other Epilepsy	11	2.2	1.6	1.9
Total	591	118.2	83.3	100.0
New Zealand				
Generalized: Idiopathic	1,826	365.2	26.0	29.7
Grand Mal Seizures NOS	443	88.6	6.3	7.2
Generalized: Other	281	56.2	4.0	4.6
Status Epilepticus	681	136.2	9.7	11.1
Partial Seizures: Complex	499	99.8	7.1	8.1
Partial Seizures: Simple	320	64.0	4.6	5.2
Partial Seizures: Localized	32	6.4	0.5	0.5
Petit Mal NOS	15	3.0	0.2	0.2
Special Epileptic Syndromes	9	1.8	0.1	0.1
Unspecified Epilepsy	1,881	376.2	26.8	30.6
Other Epilepsy	153	30.6	2.2	2.5
Total	6,140	1,228.0	87.4	100.0

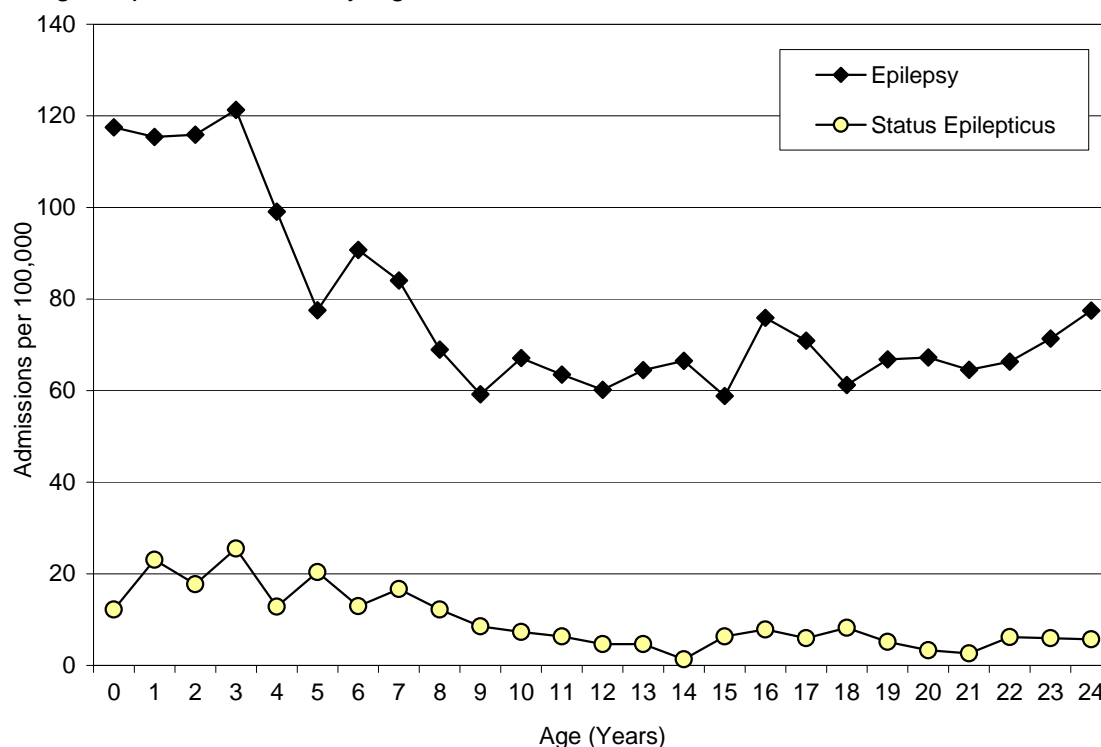
Source: Numerator-National Minimum Dataset; Denominator-Census; (Any) Pacific includes children & young people identifying as Pacific in ANY of their 3 first ethnic groups

Table 100. Risk Factors for Hospital Admission for Epilepsy and Status Epilepticus in Children and Young People 0-24 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	53.52	1.00		1-2	55.71	1.00	
2	57.94	1.08	0.94-1.25	3-4	79.41	1.43	1.30-1.57
3	74.50	1.39	1.21-1.59	5-6	67.95	1.22	1.11-1.34
4	84.42	1.58	1.38-1.80	7-8	111.17	2.00	1.83-2.18
5	59.05	1.10	0.95-1.27	9-10	112.59	2.02	1.86-2.20
6	76.65	1.43	1.25-1.64	Prioritised Ethnicity			
7	107.35	2.01	1.77-2.28	Māori	97.85	1.04	0.98-1.10
8	114.80	2.14	1.89-2.42	Pacific	95.74	1.01	0.92-1.11
9	121.94	2.28	2.02-2.57	European	94.50	1.00	
10	104.16	1.95	1.73-2.20	Asian/Indian	29.22	0.31	0.27-0.36
Gender							
Female	82.66	1.00					
Male	92.06	1.11	1.06-1.17				

Source: Numerator-National Minimum Dataset; Denominator-Census; Rate per 100,000. Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted.

Figure 159. Hospital Admissions for Epilepsy and Status Epilepticus in Children and Young People 0-24 Years by Age, New Zealand 2002-2006



Source: Numerator-National Minimum Dataset; Denominator-Census

Summary

Type 1 diabetes and epilepsy are two conditions which impact significantly on the health and wellbeing of New Zealand children and young people. They also have significant implications for health care resourcing. In New Zealand, the available evidence would suggest that the incidence of Type 1 diabetes is increasing, and while less time series information is available for epilepsy, analysis of mortality data during 2000-2004 suggests that it is a significant cause of mortality in this age group. During 2002-2006, while Type 1 Diabetes was the most common reason for a diabetes admission in both (Any) Pacific and New Zealand children and young people, admission rates for insulin dependant diabetes in (Any) Pacific children and young people were lower than the New Zealand average, while admissions for non-insulin dependant diabetes were higher. Ethnic differences in epilepsy admissions however were much less marked, with *no significant differences* in admission rates being evident between (Prioritised) Pacific, Māori and European children and young people.



Cancer

Introduction

Cancer in New Zealand children is relatively rare, with just over 1/3 of cases being attributed to leukaemia. Other types, in descending order of frequency are brain, bone and connective tissue, non-Hodgkin's lymphoma and kidney. These 5 sites account for >80% of childhood cancer registrations and >70% of childhood cancer deaths [269]. Since 1956, the incidence of childhood cancer in New Zealand has increased (for males, from 13 per 100,000 in 1956 to 17 per 100,000 in the early 1980s and thereafter has remained stable; for females, from 10 per 100,000 in 1956 to 15 per 100,000 in 1996, although the rate of increase has slowed during the past 15 years). In contrast, cancer mortality has declined steadily, from 8 (males) / 7 (females) per 100,000 in 1956 to 5 (males) / 4 (females) per 100,000 in 1997. Projections suggest that these opposing trends in incidence and mortality will continue into the near future [269].

In terms of known risk factors, a wide range of familial and genetic syndromes have been associated with childhood cancer overseas. Studies on the links between genetic factors and the environment however have been more inconsistent. In addition, few solely environmental risk factors have been established, although ionising radiation and infective agents have been implicated in a number of specific situations [270]. Thus, from a population health point of view, further research is necessary before sound evidence based primary prevention strategies can be developed which address the incidence of childhood cancer in this country. In terms of reducing the impact of childhood cancer once it has developed however, while treatment is very successful in preventing death in the majority of cases, families of children newly diagnosed with cancer can still expect multiple hospital admissions, treatments with severe side effects, and a great disruption to many aspects of their everyday life [271]. Thus ensuring equitable access to specialist health services, family support and the reimbursement of travel / associated costs remains important in reducing the burden cancer places on the families of children and young people in this country.

The following section explores cancer notifications and mortality for Pacific children and young people in New Zealand using two different data sources: Notifications to the New Zealand Cancer Registry and the National Mortality Collection.

Data Source and Methods

Definition

1. Notifications to the New Zealand Cancer Registry for Children and Young People 0-24 Years
2. Deaths due to Cancer in Children and Young People 0-24 Years

Data Sources

1. Cancer Notifications

Numerator: The New Zealand Cancer Registry: Notifications for children and young people 0-24 years. Cancer site was assigned using the following ICD-10 Codes: myeloid leukaemia C29; lymphoid leukaemia C91; Hodgkin's lymphoma C81; other lymphomas C82-C85; brain C71; testis C62; melanoma C43; bone and cartilage C40-41; kidney C64; adrenal C74; ovary C56; thyroid C73; cervix 53; and carcinoma in situ of cervix D06.

2. Cancer Deaths

Numerator: National Mortality Collection: Deaths in children and young people (0-24 years) attributed to cancer with the site assigned according to the ICD-10 codes above

Denominators: NZ Census

Indicator Category Ideal B

Notes on Interpretation

Because of differences in the coding between ICD-9 and ICD-10, only information for 2000-04 was utilised.

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

Children Aged 0-14 Years

In New Zealand during 2000-2004, the cancer most frequently notified to the NZ Cancer Registry for children was lymphoid leukaemia, followed by tumours of the brain. The most frequent causes of cancer death were cancers of the brain, followed by lymphoid leukaemia. Similarly for (Any) Pacific children, the most frequent reasons for cancer notification were for lymphoid leukaemia, followed by cancers of the brain, while the leading cause of cancer mortality was cancers of the brain (**Table 101, Table 103**).

Young People Aged 15-24 Years

In New Zealand during 2000-2004, cervical carcinoma in situ was the leading cause of notification to the NZ Cancer Registry for young people, although melanoma was the leading form of invasive disease. The most frequent causes of death were cancers of the bone and cartilage, followed tumours of the brain and lymphoid leukaemia. For (Any) Pacific young people, while cervical carcinoma in situ was the leading reason for notification to the NZ Cancer Registry, leukaemias, lymphomas and thyroid cancers were the most frequent forms of invasive disease. Leukaemias were the leading cause of cancer mortality for (Any) Pacific young people in this period (**Table 102, Table 104**).

Table 101. Cancer Registrations in Children 0-14 Years, New Zealand 2000-2004

Site of Cancer	Number: Total 2000-2004	Number: Annual Average	Rate per 100,000	% of Total
New Zealand Children 0-14 Years				
Leukaemia: Lymphoid	184	36.8	4.3	26.9
Leukaemia: Myeloid	37	7.4	0.9	5.4
Lymphoma: Hodgkins	16	3.2	0.4	2.3
Lymphoma: Other	32	6.4	0.8	4.7
Brain	106	21.2	2.5	15.5
Kidney	45	9.0	1.1	6.6
Bone and Cartilage	38	7.6	0.9	5.5
Adrenal	26	5.2	0.6	3.8
Testis	12	2.4	0.5	1.8
Ovary	9	1.8	0.4	1.3
Melanoma: In Situ	11	2.2	0.3	1.6
Melanoma: Malignant (Skin)	5	1.0	0.1	0.7
Thyroid	5	1.0	0.1	0.7
Neoplasm of Uncertain Behaviour	7	1.4	0.2	1.0
Other Malignancies	152	30.4	3.6	22.2
Total	685	137.0	16.1	100.0
(Any) Pacific Children 0-14 Years				
Leukaemia: Lymphoid	25	5	5.4	34.7
Leukaemia: Myeloid	4	0.8	s	5.6
Brain	11	2.2	2.4	15.3
Bone and Cartilage	5	1.0	1.1	6.9
Kidney	4	0.8	s	5.6
Lymphomas	4	0.8	s	5.6
Other Cancers	19	3.8	4.1	26.4
Total	72	14.4	15.6	100.0

Source: Numerator-NZ Cancer Registry; Denominator-Census; (Any) Pacific includes children identifying as Pacific in ANY of their first three ethnic groups. s=numbers too small to calculate rate

Table 102. Cancer Registrations in Young People 15-24 Years, New Zealand 2000-2004

Site of Cancer	Number: Total 2000-2004	Number: Annual Average	Rate per 100,000	% of Total
New Zealand Young People 15-24 Years				
Cervix: Carcinoma in Situ	2,600	520.0	200.2	74.4
Cervix: Malignant	16	3.2	1.2	0.5
Melanoma: Malignant (Skin)	169	33.8	6.5	4.8
Melanoma: In Situ	64	12.8	2.5	1.8
Testis	84	16.8	6.4	2.4
Ovary	33	6.6	2.5	0.9
Lymphoma: Hodgkins	66	13.2	2.5	1.9
Lymphoma: Other	35	7.0	1.3	1.0
Leukaemia: Lymphoid	41	8.2	1.6	1.2
Leukaemia: Myeloid	34	6.8	1.3	1.0
Bone and Cartilage	49	9.8	1.9	1.4
Thyroid	48	9.6	1.8	1.4
Brain	46	9.2	1.8	1.3
Kidney	7	1.4	0.3	0.2
Other In Situ Neoplasm	28	5.6	1.1	0.8
Neoplasm of Uncertain Behaviour	10	2.0	0.4	0.3
Other Malignancies	166	33.2	6.4	4.7
Total	3,496	699.2		100.0
(Any) Pacific Young People 15-24 Years				
Cervix: Carcinoma in Situ	49	9.8	45.7	48.5
Leukaemia: Myeloid	5	1.0	2.3	5.0
Leukaemia: Lymphoid	3	0.6	s	3.0
Lymphomas	5	1.0	2.3	5.0
Thyroid	5	1.0	2.3	5.0
Bone and Cartilage	4	0.8	s	4.0
Ovary	4	0.8	s	4.0
Other Cancers	26	5.2	12.1	25.7
Total	101	20.2		100.0

Source: Numerator-NZ Cancer Registry; Denominator-Census; Note: Rates for cancers of reproductive organs are gender specific. (Any) Pacific includes young people identifying as Pacific in ANY of their first three ethnic groups; s=numbers too small to calculate rate.

Table 103. Cancer Deaths in Children 0-14 Years, New Zealand 2000-2004

Site of Cancer	Number: Total 2000-2004	Number: Annual Average	Rate per 100,000	% of Total
New Zealand Children 0-14 Years				
Brain	53	10.6	1.2	34.9
Leukaemia: Lymphoid	26	5.2	0.6	17.1
Leukaemia: Myeloid	10	2.0	0.2	6.6
Bone and Cartilage	12	2.4	0.3	7.9
Adrenal	10	2.0	0.2	6.6
Other Malignancies	41	8.2	1.0	27.0
Total	152	30.4	3.6	100.0
(Any) Pacific Children 0-14 Years				
Brain	5	1.0	1.1	29.4
Leukaemia	3	0.6	s	17.6
Other Cancers	9	1.8	2.0	52.9
Total	17	3.4	3.7	100.0

Source: Numerator-National Mortality Collection; Denominator-Census; (Any) Pacific includes children identifying as Pacific in ANY of their first three ethnic groups; s=numbers too small to calculate rates

Table 104. Cancer Deaths in Young People 15-24 Years, New Zealand 2000-2004

Site of Cancer	Number: Total 2000-2004	Number: Annual Average	Rate per 100,000	% of Total
New Zealand Young People 15-24 Years				
Bone and Cartilage	24	4.8	0.9	15.6
Brain	22	4.4	0.8	14.3
Leukaemia: Lymphoid	19	3.8	0.7	12.3
Leukaemia: Myeloid	8	1.6	0.3	5.2
Lymphoma	13	2.6	0.5	8.4
Melanoma: Malignant (Skin)	9	1.8	0.3	5.8
Testis	6	1.2	0.5	3.9
Other Malignancies	53	10.6	2.0	34.4
Total	154	30.8		100.0
(Any) Pacific Young People 15-24 Years				
Leukaemias	5	1.0	2.3	27.8
Brain	4	0.8	s	22.2
Other Cancers	9	1.8	4.2	50.0
Total	18	3.6		100.0

Source: Numerator-National Mortality Collection; Denominator-Census; Note: Rates for cancers of reproductive organs are gender specific; (Any) Pacific includes young people identifying as Pacific in ANY of their first three ethnic groups; s= numbers too small to calculate rate.

Summary

In New Zealand during 2000-2004, the cancer most frequently notified to the NZ Cancer Registry for (Any) Pacific children 0-14 years was lymphoid leukaemia, followed by tumours of the brain, while the leading cause of cancer mortality was cancer of the brain. In the 15-24 year age group, cervical carcinoma in situ was the leading cause of notification to the NZ Cancer Registry for (Any) Pacific young people, while leukaemias, lymphomas and thyroid cancers were the most frequent forms of invasive disease. Leukaemias were the leading causes of cancer mortality for (Any) Pacific young people during 2000-2004.



Individual and Whanau Health and Wellbeing

Disability

Disability: An Introduction

In 1995, a report on the Health of Infants and Children in the Midland Region noted:

“There is a dearth of information on people who have disabilities living in Midland, as well as NZ” and that “the dearth of useful information on disabilities and people with disabilities, is a serious impediment to rational and effective service planning and delivery” [272].

Since the time of this report, little has changed and it remains very difficult to access useful information on the nature and prevalence of disabilities amongst New Zealand children and young people. Nevertheless, the provision of health and disability support services remains a key role of those working with Pacific children and young people and it is undesirable that a lack of ethnic specific data should preclude the coverage of disability issues in this report. The following sections thus bring together the available information on children and young people with disabilities in New Zealand. Where local data was readily available, this has been included in the sections which follow. Where local data was not available, but where an issue was deemed to be important, prevalence estimates have been provided which are based on overseas figures.

The same paucity of data also meant that ethnic specific rates were unable to be provided for a number of conditions in the sections which follow. The 2001 NZ Household Disability Survey however, suggested that rates of disability amongst Pacific children (0-14 years) in New Zealand are only slightly lower than for non-Pacific children (10% of Pacific boys vs. 13% of non-Pacific boys and 6% of Pacific girls vs. 9% of non-Pacific girls reported having a disability in 2001). The same survey also suggested that the types of disability experienced by Pacific children may differ somewhat from those experienced by non-Pacific children, with Pacific children reporting higher rates of hearing problems and severe asthma and non-Pacific children reporting higher rates of all other disability types [273]. The reader is thus urged to take these differences into account, when interpreting the information in the sections which follow (which in many cases are only able to provide information on the absolute number of Pacific children and young people with a particular disability).

The following section begins by reviewing a number of issues common to many children and young people with disabilities, irrespective of the nature of their disability, or the ethnic group to which they belong. Later sections provide prevalence estimates for a number of conditions for which no other data sources are available (Intellectual Disability, Autism, Cerebral Palsy), as well as limited local data in the following areas:

1. Congenital Anomalies Evident at Birth: Down Syndrome and Neural Tube Defects.
2. Permanent Hearing Loss: Notifications to the NZ Deafness Database.
3. Visual Impairment: Children Referred to BLENNZ Services.

In addition, for a review of the numbers of Pacific young people (16-24 yrs) on Sickness and Invalid's Benefits, the reader is referred to the section on *Young People Reliant on Benefits* in the earlier part of this report.

Issues Common to Many Children with Disabilities

In 2001, the Household Disability Survey estimated that 11% of New Zealand children (0-14 yrs) had a disability. While little information was available on the precise nature of these disabilities, in general terms they included chronic health problems, sensory impairments, psychiatric or psychological problems, intellectual disabilities, speech, learning and developmental problems and the need for special education or technical



equipment. Of those with a disability, 41% had existed from birth, 33% were caused by a disease / illness and 3% resulted from an injury [273].

In order to assist families in caring for children and young people with disabilities, the Ministry of Health funds a number of disability support services. Access to almost all of these services is via Needs Assessment and Service Co-ordination (NASC) Agencies, who accept children with significant intellectual, physical or sensory disabilities, or with autism spectrum disorders. NASC Agencies work on the basis of assessed need and the equitable sharing of available resources, with needs assessments being designed to identify the disability support needs of children and young people and their caregivers. The need for support services is usually reviewed annually (or more often at parental request) and if there is a significant change in needs (e.g. school entry) a new needs assessment is carried out. Some of the services available via NASC include in-home support, respite care in specialist facilities, special equipment and housing alterations. Unfortunately not all types of support service are available in all regions and entitlements may vary with the age of the child [274]. Additionally, not all children with a disability will qualify for a NASC assessment.

Access to appropriate support services is crucial however, if those caring for children and young people with disabilities are to be able to cope with the demands placed on them in their care giving roles. In New Zealand as in many other developed countries, there has been a move away from institutional care during the past 2-3 decades, with the majority of disabled children now living in households and care becoming increasingly the domain of family members [275]. Such shifts have significant resource implications however, if the transition to home based care is to be sustainable for families caring for disabled children and young people. In this context it is perhaps concerning that a recent Australian review of the area noted that [275]:

1. **Family Structure:** Higher proportions of disabled children and young people live in single parent families. While the reasons for this remain unclear, some have attributed this to the stresses associated with the raising of a disabled child, although others have suggested that once socioeconomic factors are taken into account, rates of divorce are not significantly different between couples with and without disabled children.
2. **Family Socioeconomic Position:** Higher proportions of disabled children live in low income families. While some suggest that families living in financial hardship have a higher number of risk factors for childhood disability, other research indicates that families with disabled children have significant out-of-pocket costs which are directly related to their children's special needs, as well as the more indirect time costs associated with caring for their children. Such costs are particularly significant for families with medium to low incomes and for single parents, whose care commitments may prevent them from taking up or staying in employment.
3. **Effects on Parents:** For many parents, caring for a child with a disability can be stressful, with a number of studies noting that mothers caring for children with conditions such as autism, physical and learning disabilities and Asperger's syndrome, had higher rates of stress and depression. Sole parents may be particularly vulnerable to stress, as a result of their dual role as primary caregiver and primary bread-winner.
4. **Role of Social and Material Support:** In explaining why some parents experience less stress than others when caring for children and young people with disabilities, it has been suggested that the availability of socioeconomic resources plays a crucial role. In addition, the presence of social and material support (e.g. emotional support, access to services, early interventions, respite care, equipment services

and family support programmes) are thought to be crucial in ensuring parental wellbeing.

5. **Effects on Siblings:** Evidence of the effects that childhood disability has on siblings is mixed. At the positive end of the spectrum, some siblings report enhanced self-esteem, empathy, maturity and a sense of responsibility. At the more negative end of the spectrum, some view having to take on higher levels of caregiver and household responsibility (particularly if financial resources or family size are limited), less attention from parents and the restrictions a disabled family member places on their social life, in less positive terms.
6. **Positive Effects:** In contrast, there has been much less research into the more positive effects caring for a disabled child has on families e.g. strengthening family relationships and the positive emotional bonds parents develop with their children.

While the majority of these findings were based on research in Australia or other developed countries, a New Zealand report on the reasons why families with children with high disability support needs sought permanent 'out of family' care [276] suggests that many of the issues highlighted by the Australian review, are also of relevance in the New Zealand context. As a consequence, a range of disability support services, including access to in-home support, out of home respite care and multidisciplinary early intervention services are required by the families of children and young people with disabilities, irrespective of the precise origins of their disability and ensuring families have adequate access to such services is likely to significantly enhance their health and wellbeing.



Prevalence Estimates for Selected Causes of Disability

Indicator Category Bookmark C

While many conditions leading to disability are evident at the time of birth a number of others (while still having their origins in utero or the first weeks of life), may not become evident until children fail to reach developmental milestones in later life. In many cases, children with these disabilities are managed predominantly in the primary care / outpatient setting, with little information on them being captured in New Zealand's national datasets. As a consequence, while children with autism, intellectual disabilities, developmental delay, cerebral palsy and behavioural problems make up a large part of the workload of developmental paediatricians, little data are available with which to estimate the prevalence of these conditions, or their trends over time. The lack of available data should not preclude consideration of the needs of these children in national strategy development and thus the following section briefly reviews 3 conditions commonly seen in children's outpatient clinics. These are:

1. Autism and Autism Spectrum Disorders
2. Cerebral Palsy
3. Intellectual Disabilities

For each condition, a brief overview is presented, followed by a summary of the types of health and disability support services likely to be required at the regional level. The number of Pacific children and young people likely to be affected is then estimated, based on the findings of overseas research.

Data Source and Methods

Definition

Prevalence Estimates for Autism, Cerebral Palsy and Intellectual Disabilities in Children and Young People 0-24 Years

Data Sources

Prevalence estimates were obtained from the current literature, with preference being given to New Zealand and Australian research (both published and unpublished). A range of estimates have been presented, with the upper and lower ranges being used to estimate the number of children and young people affected in New Zealand (by multiplying NZ / overseas prevalence estimates by the number of children and young people aged 0-24 years in New Zealand at the 2006 Census)

Indicator Category Bookmark C

Notes on Interpretation

There is very little data available on the prevalence of common conditions leading to disability amongst New Zealand children and young people. While overseas rates may provide estimates in very broad terms, care must be taken when interpreting these figures as the composition of the New Zealand population (e.g. by ethnicity) is likely to differ from many of the countries contributing prevalence data. In addition the disability support and healthcare needs of children and young people with these conditions will vary depending on their stage in the lifecourse.

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance.

Autism and Autism Spectrum Disorders

Autism Spectrum Disorders comprise a group of developmental disorders characterised by impairments in the ability to understand and use verbal and non-verbal communication, to understand social behaviour and to think and behave flexibly. The spectrum includes Autism, Asperger's Syndrome and Pervasive Developmental Disorder NOS [277]. Of these, Autism is most studied and is characterised by severe

difficulties with social interaction and communication and with behaviours and interests that are restricted or stereotyped. Onset is usually <3 years, with delayed language development being a common reason for presentation. Many children with autism never speak, or if they do so their language often has unusual intonation, echolalia (a repetition of what is said) or pronoun reversal. Other features include impaired eye gaze, a lack of social reciprocity, limited or absent peer relationships and difficulties in developing imaginative play. Children are often pre-occupied with non-functional features of objects, such as taste or smell and stereotyped movements are often present (e.g. hand flapping or finger flicking) [278].

Early intervention improves outcomes for children with autism. Management is primarily educational. While programmes vary in nature, the overall aims of treatment are usually to foster growth in areas of communication, cognition and self help skills, as well as to reduce problem behaviours which interfere with learning. Programmes often draw on procedures from special education and behavioural psychology. Occasionally pharmacological treatments are used to manage problem behaviours and to enhance children's participation in educational programmes. Over time a large number of alternative treatments have also been put forward, although evidence for the efficacy of many is often limited or non-existent [278].

At present the cause of autism remains unknown, although higher rates of seizures, persistent primitive reflexes and cognitive disability suggest central nervous system involvement. A genetic basis is also likely, as recurrence rates in families are high, but the mode of transmission remains unknown [278]. While there have been reports of large increases in Autism Spectrum Disorders over the past 40 years (estimates in the 1960s of around 4 per 10,000 contrast with more recent estimates of 30-60 per 10,000), some of these differences are likely due to increased ascertainment and a broadening of the diagnostic concept to include a greater number of children with normal IQs [279].

At present there is no routine information on the prevalence of Autism or Asperger's Syndrome in New Zealand, although a recent estimate from the Statistics NZ Household Disability survey suggested that 2,100 New Zealand children may have Autism or Asperger's Syndrome (personal communication Phillipa Clark 2006) giving a prevalence of 24.8 per 10,000. Similarly, a recent estimate from the Nelson Marlborough Region suggested a prevalence of 46 per 10,000, with 56% having Autism, 30% having Asperger's Syndrome and 14% having a non specified Pervasive Developmental Disorder [280]. Using these estimates, as well as those from overseas research **Table 105** estimates the number of New Zealand Pacific children and young people likely to be affected at the time of the 2006 Census.

Table 105. Estimated Number of Pacific Children and Young People 0-24 Years with Autism in New Zealand During 2006

Disorder	Overseas Estimates per 10, 000	NZ Estimate (No. Aged 0-24 yrs)	NZ Pacific* Estimate (No. Aged 0-24 yrs)
Autism	7.1 [281] 7.2 [282]	Range 1,022-1,036	Range 106-107
Autism Spectrum Disorders	24.8* 46 [280] 30-60 [279]	Range 3,568-8,632	Range 369-893

Note: NZ estimates were calculated by applying overseas rates to the NZ child and youth population at the time of the 2006 Census. *Pacific estimates based on 2006 Census data for those identifying as Pacific in ANY of their first three ethnic groups; *Personal communication Phillipa Clarke based on Statistics New Zealand Household Survey

Cerebral Palsy

Cerebral palsy refers to a group of disorders of movement or posture arising from a non-progressive insult to the central nervous system during early development. The insult may occur prior to, during or shortly after birth and while being non-progressive, its physical consequences can evolve over time [283]. The clinical presentation may also vary, with one recent Australian study [283] noting that of children with cerebral palsy in one cohort, 84% had predominantly spastic cerebral palsy (characterised by weakness, increased muscle tone, overactive reflexes and a tendency to contractures), 8.3% had predominantly dyskinetic cerebral palsy (characterised by involuntary movements which disappear during sleep) and 6.6% had predominantly ataxic cerebral palsy (characterised by problems with coordination, gait and rapid movements of the distal extremities) [284]. In addition, while cerebral palsy refers solely to the motor impairment, features such as seizures, intellectual impairment and learning disabilities are also common [284].

Depending on their degree of motor impairment, children and young people with cerebral palsy require a variety of personal health care and disability support services, with the overall aim being to ensure the highest possible functioning within the family and community contexts. Physical and occupational therapy are beneficial in the management of motor impairments, with proper positioning and handling being necessary to minimise the difficulties associated with posture, trunk control and feeding. Passive and active exercises to stretch tight tendons may also be necessary to maintain normal alignment of bone, joint and soft tissue and to prevent contractures. Medical and surgical procedures may be necessary to correct contractures that do not respond to physiotherapy and to re-establish motor balance between opposing muscle groups, with innovations in this area evolving rapidly. In addition, a variety of equipment (e.g. walkers and standing frames, motorised wheel chairs, feeding tubes, computers to augment communication) and additional supports (e.g. speech therapy, medications, ophthalmology referrals, tailored educational programmes, respite care) may be required to meet the needs of children and their caregivers [284].

While maturity at birth is the strongest single predictor of cerebral palsy, advances in neonatal care and the enhanced survival of very premature infants have not led to a large increase in prevalence, with research suggesting that after initial increases following the introduction of neonatal intensive care, rates fell away again as experience in neonatal care grew [283]. In addition, with 1/2 of all cerebral palsy cases occurring in infants of normal birth weight and with asphyxiation at birth accounting for only a small percentage of cases, research has now turned to other exposures during pregnancy and immediately after birth (e.g. intrauterine infection / inflammation and perinatal coagulation disorders) as possible causes [285]. While there is no routinely collected data on the prevalence of cerebral palsy in New Zealand, numerous overseas studies have estimated the prevalence to be 2-3 per 1,000 live births, with very little change since the mid-50s, despite marked improvements in obstetric and perinatal care. uses prevalence estimates from 2 overseas studies to estimate the number of Pacific children and young people in New Zealand with cerebral palsy during 2006.

Table 106. Estimated Number of Pacific Children and Young People 0-24 Years with Cerebral Palsy in New Zealand During 2006

Condition	Overseas Estimates (per 10, 000 live births)	NZ Estimate (No. Aged 0-24 yrs)	NZ Pacific Estimate (No. Aged 0-24 yrs)
Cerebral Palsy	10-30 [283] 20 [284]	Range 1,439-4,316	Range 149-446

Note: NZ estimates were calculated by applying overseas rates to the NZ child and youth population at the time of the 2006 Census. *Pacific estimates based on 2006 Census data for those identifying as Pacific in ANY of their first three ethnic groups

Intellectual Disabilities

Intellectual disabilities in children have a variety of causes including genetic conditions (e.g. inborn errors of metabolism), chromosomal anomalies (e.g. Down Syndrome) congenital anomalies (e.g. neural tube defects), conditions arising before, during or shortly after birth (e.g. intrauterine infections, hypoxia, extreme prematurity) or during childhood and adolescence (e.g. meningitis, head injury). Over time a number of different classification systems have been used to gauge the severity of intellectual disability. While earlier systems used cognitive ability, as measured by IQ (**Table 107**) as the only diagnostic criteria, more recent classification systems have also included an assessment of children's adaptive behaviour, as well as the level of support they require to function on their everyday environment. The American Association of Mental Retardation (AAMR) revised its official classification system in 1992 to reflect this transition, with their definition of intellectual disability now including those with:

“significant subaverage intellectual functioning (defined as an IQ score of below 70 to 75) existing concurrently with related limitations in two or more of the following applicable adaptive skill areas: communication, self care, home living, social skills, community use, self direction, health and safety, functional academics, leisure and work” [286].

At a regional level, children and young people with intellectual disabilities require a variety of personal health and disability support services. Personal health needs include routine Well Child care (e.g. immunisation, monitoring of growth and development), as well as the management of conditions more common in children with intellectual disabilities (e.g. seizure disorders, orthopaedic problems and vision and hearing problems). Early intervention programmes for infants and toddlers assist in nurturing children's development, while tailored educational programmes during the preschool and school years may facilitate learning, positive self-esteem, social competence and adaptive living skills [284]. During adolescence, issues related to sexuality, vocational training and community living become more prominent [287].

While there is no data routinely collected on the prevalence on intellectual disability in New Zealand, a range of overseas estimates are available. While estimates vary widely depending on the definition used and the population surveyed, it is usually assumed that approximately 3% of the population have an IQ of <68, with 80-90% of these being classified as having mild mental retardation and 5% being severely or profoundly impaired [287]. Other estimates suggest that 3-4 per 1,000 have an IQ in the <50 range [288] (**Table 107**).

Table 107. Classification of Intellectual Disability Based on Severity and IQ Score

Level of Severity	IQ Levels		Level of Functional Impairment [287]	Prevalence Estimates Overseas Studies & NZ at the time of the 2006 Census
	ICD-9 CM	DSM-IV		
Any	IQ <70		See Below	
Mild	50-70	50-55 to 70	Includes approximately 90% of children with intellectual disability. Most need at least some special class placement and some can achieve primary school reading levels. Those with well developed adaptive skills may be able to function independently as adults.	Overseas Rate 3 per 100 [289] NZ Estimate (No. 0-24 yrs) 43,162 NZ Pacific* Estimate (No. 0-24 yrs) 4,463
Moderate	35-49	35-40 to 50-55	Educational goals focus on gaining maximal self care +/- some academic skills. Those with good adaptive skills may function semi-independently in supervised living and sheltered workshop settings.	Overseas Rate 3.8 per 1,000 [288] NZ Estimate (No. 0-24 yrs) 5,467 NZ Pacific* Estimate (No. 0-24 yrs) 565
Severe	20-34	20-25 to 35-40	Children can learn minimal self-care and simple conversational skills. Much supervision is needed throughout their lives.	
Profound	<20	<20 or 25	Children require total supervision. Very minimal self care skills possible and few are toilet trained. Language development generally minimal.	

Source: Murphy et al [289]; Note: NZ estimates were calculated by applying overseas rates to the NZ child and youth population at the time of the 2006 Census. *Pacific estimates based on 2006 Census data for those identifying as Pacific in ANY of their first three ethnic groups

Summary

While many conditions leading to disability are evident at the time of birth, others may not become evident until children fail to reach developmental milestones in later life. In many cases, children with such disabilities are managed predominantly in the primary care / outpatient setting, with little information on them being captured in New Zealand's national datasets. As a consequence, while children with autism, intellectual disabilities and cerebral palsy make up a large part of the workload of paediatric outpatient services, little data are available with which to estimate the prevalence of these conditions, or their trends over time. Despite this, it is vital that the needs of these children and young people are considered in future planning and resource allocation decisions.

Congenital Anomalies Evident at Birth

The 2001 Household Disability Survey estimated that of the 11% of children (0-14 yrs) with a disability, 41% had existed from the time of birth [273]. Of these, a significant proportion are likely to be congenital anomalies, with overseas estimates suggesting that approximately 2-3% of births are associated with a major congenital anomaly [290]. While in New Zealand minor congenital anomalies of the musculoskeletal, genitourinary and cardiovascular systems are frequently mentioned in hospital discharge data, it is likely that many of these are either of little functional significance, or readily corrected during the first years of life (e.g. cleft palate, undescended testis). In contrast, a number of less common but more serious anomalies can lead to a significant degree of disability and a variable requirement for disability support services (although some may not become evident until children fail to reach developmental milestones in later childhood). Two conditions which are usually readily identifiable at the time of birth and which can lead to a significant degree of disability, however, are Down Syndrome and Neural Tube Defects, which will be reviewed in the section that follows.

Down Syndrome

Down Syndrome is the most common (non sex-linked) chromosomal anomaly in live born babies and diagnosis is usually made in-utero or at the time of birth. Children with Down Syndrome have a range of clinical features including reduced growth (height around the 3rd percentile), slow cognitive development, low muscle tone and joint laxity and an increased risk of a number of medical conditions (e.g. congenital heart disease, thyroid dysfunction, otitis media, cataracts, hearing problems), which may affect their quality of life [274]. Approximately 95% of children with Down Syndrome have an extra chromosome 21 (trisomy 21), with the remaining 5% having either translocations (3%) or mosaicism (2%). In mosaicism, some cells have 46 chromosomes and some have 47, leading to a milder clinical presentation and intelligence often approaching the normal range [291].

On average, 50 babies in New Zealand each year are born with Down Syndrome and at a regional level it is necessary to ensure that the health, developmental, educational and psychosocial needs of these children and their families are identified and met. The Ministry of Health Guidelines on the clinical assessment and management of children and young people with Down Syndrome [274] outline a range of clinical and support services children and young people require at different stages of their development. These include:

1. Parental counselling at the time of birth and ongoing support thereafter.
2. Lactation consultant / speech-language therapist support with the establishment of breastfeeding, as well as the ongoing monitoring of feeding, nutrition and growth.
3. Identification and management of other congenital anomalies and related medical conditions (e.g. cardiovascular defects, cataracts, hearing problems, obesity), with ongoing coordination of care and anticipatory monitoring (e.g. thyroid function, ongoing hearing and vision screening).
4. Access to early intervention and disability support services (e.g. physiotherapists, speech-language, occupational and neurodevelopmental therapists, Child Disability Allowance) and Specialist Education Services.



Neural Tube Defects (Anencephaly, Encephalocele, Spina Bifida)

Neural Tube Defects (NTDs) are congenital malformations which result from abnormal closure of the neural tube between the 3rd and 4th week of gestation. They can result in structural defects anywhere along the neuroaxis, from the developing brain to the sacrum. NTDs are generally divided into two groups:

1. Those affecting cranial structures (i.e. anencephaly and encephalocele).
2. Those affecting spinal structures (i.e. spina bifida).

Cranial malformations are generally the most clinically obvious and are often incompatible with life. In contrast, spina bifida can range from a severe open defect leading to muscle weakness, loss of skin sensation and problems with bowel and bladder control, to defects that are less easily detected [292]. Associated central nervous system anomalies and hydrocephalus, as well as later scoliosis or kyphosis may further complicate the clinical presentation. While advances in neurosurgical, urologic and medical care have allowed many children with spina bifida to survive with virtually intact cognitive skills, specialised medical and surgical care is necessary to ensure that children achieve independent mobility. For younger children, the ability to walk is usually influenced by the degree of paralysis arising from the spinal cord lesion, although as children get older, the amount of energy required for walking and the slow speeds achieved may lead to an increasing reliance on a wheelchair for day to day mobility [284].

The aetiology of NTDs is complex and generally thought to be a combination of genetic and environmental factors. While a number of chromosomal / genetic disorders have been associated with NTDs, many result in in-utero death, making their overall contribution to defects evident at the time of birth less than might otherwise be expected. In contrast to Down Syndrome, the effect of maternal age on NTDs is thought to be small, although a number of studies have suggested that folic acid supplementation prior to / at conception may reduce the risk of NTDs and their associated costs at a regional level. As a consequence a number of groups have recently advocated for the mandatory supplementation of New Zealand's food supply with folic acid [293].

Data Source and Methods

Definition

Babies identified as having Down Syndrome or a Neural Tube defect at the time of Birth

Data Source

National Minimum Dataset

Numerator: All admissions identified as a birth event (Admission Type BT), with a diagnosis of Down Syndrome (ICD-10 Q90) or Neural Tube Defects (Anencephaly ICD-10 Q00, Encephalocele ICD-10 Q01, Spina Bifida ICD-10 Q05) in the first 15 diagnostic codes. Total congenital anomaly counts were calculated by summing the number of congenital anomalies (ICD-10 Q00-Q99) mentioned in the first 15 diagnostic codes of the births dataset, while the number with cardiovascular anomalies was assessed by summing the number of births with a cardiovascular anomaly (Q20-28) mentioned in the first 15 diagnostic codes.

Denominator: All admissions identified as a birth event.

Indicator Category

Proxy B-C

Notes on Interpretation

See text for guidance on interpreting the information contained in this section

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

New Zealand Distribution and Trends

Down Syndrome

New Zealand Trends

In New Zealand the prevalence of Down Syndrome at the time of birth has been static in recent years, with earlier estimates of 0.82 per 1,000 in 1980-82 and 0.94 per 1,000 in 1989-91 [294] being very similar to the estimates of 0.92 per 1,000 in 2004-05 derived from the birth admission dataset (**Figure 160**). Static rates may well mask large underlying shifts in the true incidence however, as one of the key risk factors for Down Syndrome is higher maternal age (particularly >35 years), with the number of women giving birth in this age group increasing significantly in New Zealand in recent years [107]. It is likely that such changes have been offset however, by increases in prenatal diagnosis and the selective termination of pregnancy, which overseas have resulted in large reductions in the number of babies being born with congenital anomalies [295].

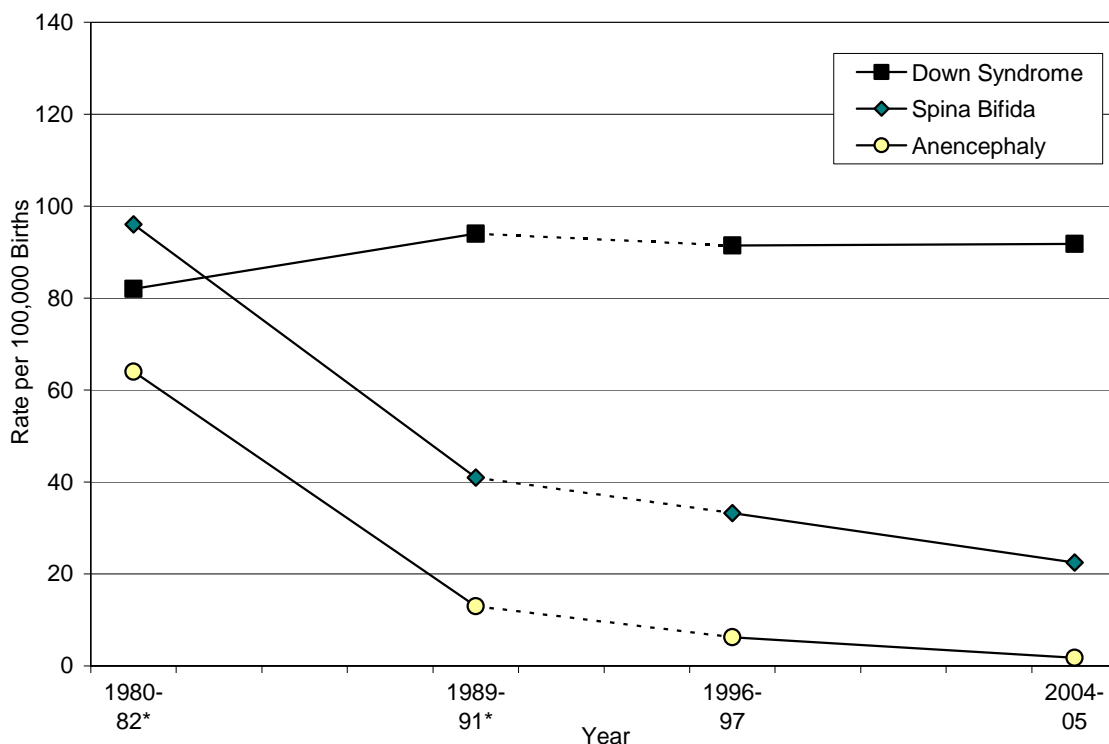
Down Syndrome in Pacific Babies

In New Zealand during 1996-2006, approximately 52 babies per year were identified as having Down Syndrome at the time of birth, with approximately 5 of these babies being identified as (Any) Pacific. While small numbers make precise comparisons difficult, in general rates for (Any) Pacific babies were similar to the New Zealand average (**Figure 161**).

Other Congenital Anomalies in Babies with Down Syndrome

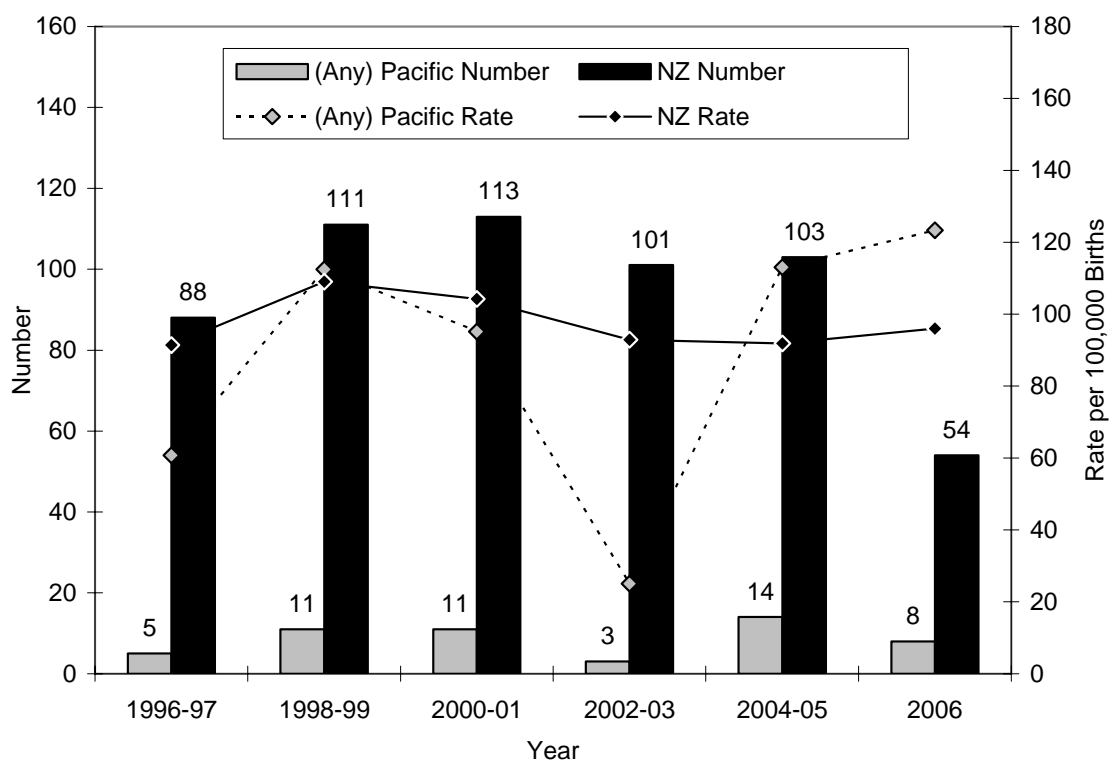
During 2002-2006, 56.6% of babies born with Down Syndrome had one or more additional congenital anomalies listed at the time of birth, with 48.8% of babies having at least one anomaly of the cardiovascular system (**Table 108**).

Figure 160. Infants with Down Syndrome or Neural Tube Defects Identified at Birth, New Zealand 1980-2005



Note: Estimates for 1980-82 and 1989-91 are from the NZ Birth Defects Monitoring Programme [294] while estimates for 1996-97 and 2004-05 are from the National Minimum Dataset

Figure 161. Infants Identified with Down Syndrome at Birth, New Zealand 1996-2006



Source: Numerator and Denominator-National Minimum Dataset; Note: With the exception of 2006, numbers are per 2 year period; (Any) Pacific includes children and young people who identify as Pacific in ANY of their three first ethnic groups

Table 108. Number of Other Congenital Anomalies Listed at the Time of Birth in Infants with Down Syndrome, New Zealand 2002-2006

Number of Other Anomalies Evident at Birth	Number of Infants: 2002-2006	% of Infants with Down Syndrome
All Congenital Anomalies		
Nil	112	43.4
1	60	23.3
2	43	16.7
3	28	10.9
4	10	3.9
>4	5	1.9
Total	258	100.0
Cardiovascular Anomalies		
No CVS Anomaly Present	132	51.2
CVS Anomaly Present	126	48.8
Total	258	100.0

Source: National Minimum Dataset

Spina Bifida

New Zealand Trends

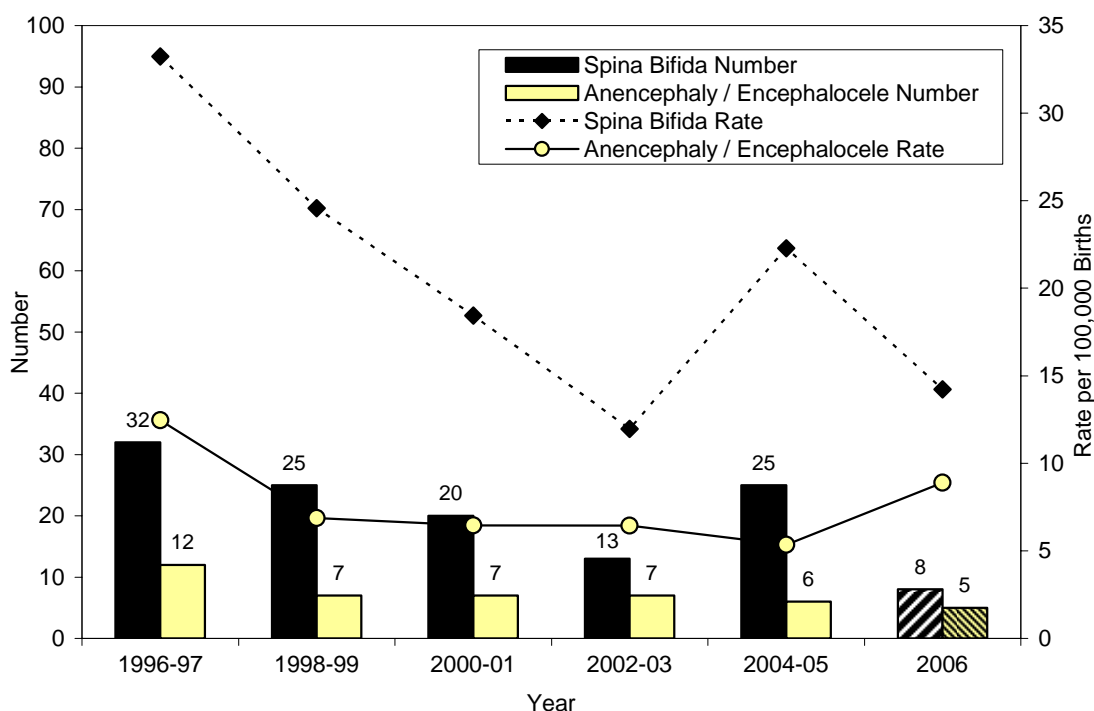
In contrast to Down Syndrome, NTDs are generally thought to be unrelated to maternal age, meaning that any increases in obstetric surveillance may not have been offset by opposing changes in maternal age. As a consequence, the time series information presented in **Figure 160**, which suggests a dramatic decline in the rates of NTDs but

static rates for Down Syndrome, likely reflects the complex interplay between opposing factors including access to prenatal diagnosis, the personal choices of parents and population level shifts in known (e.g. maternal age) and unknown risk factors [294].

Neural Tube Defects in (Total) New Zealand and (Any) Pacific Babies

In New Zealand during 1996-2006, approximately 12 babies each year were identified as having spina bifida and 4 as having either anencephaly or an encephalocele at the time of birth, although the general downward trend meant that the numbers in the latter part of this period may have been slightly lower (**Figure 162**). During the same period a total of 14 (Any) Pacific babies (average 1.3 per year) were identified as having spina bifida, while 3 were identified as having either anencephaly or an encephalocele.

Figure 162. Infants Identified with Neural Tube Defects at Birth, New Zealand 1996-2006



Source: Numerator and Denominator-National Minimum Dataset; Note: With the exception of 2006, numbers are per 2 year period

Summary

It has been estimated that of the 11% of New Zealand children <15 years with a disability, 41% were present from the time of birth. Of these a significant proportion are likely to be congenital anomalies, with overseas estimates suggesting that approximately 2-3% of births are associated with a major congenital anomaly. In New Zealand the number of children born with Down Syndrome has remained relatively static during the past 25 years, while the number with Neural Tube Defects has declined dramatically. In reality, both trends reflect the complex interplay between opposing factors including access to prenatal diagnosis and the selective termination of pregnancy, the personal choices of parents and population level shifts in known (e.g. maternal age) and unknown risk factors. While it is likely that prenatal diagnosis has also reduced the number of children being born with other major congenital anomalies, nationally a small number of Pacific children are still born each year with these anomalies, and these children require an integrated approach to their health and disability support needs, if they are to reach their full potential.

Blindness and Low Vision

Introduction

It is difficult to precisely estimate the number of children and young people who have visual impairments in New Zealand, although a recent review of the available evidence for adults noted that the figure varied significantly depending on the data source used, with figures ranging from as low as 11,293 if estimates were based on membership of the Royal New Zealand Foundation of the Blind, to as high as 98,400 if the New Zealand Disability Survey is used [296]. Similarly for children, extrapolations from the 2001 Disability Survey suggest that in 2004 there were 460 blind and 1,380 visually impaired children (0-15 yrs) in New Zealand. In contrast the Vision Education Agency, which records information on blind and low vision children receiving educational supports, noted that of the 1,323 children who were enrolled with the Blind and Low Vision Education Network NZ (BLENNZ) during 2006, 147 were blind, 27 were deafblind (dual sensory loss), 870 were low vision, 54 had cortical visual impairments, and 225 had an unspecified level of visual impairment. Of the 87% for whom this information was available, 8.2% (n=95) were identified as belonging to a Pacific ethnic group.

While in New Zealand there is no routinely available information on the reasons for blindness and low vision amongst children and young people, information from overseas registers would suggest that in developed countries the most common causes are retinal disorders, optic atrophy and lesions of the higher visual pathways. Retinal causes frequently include hereditary retinal dystrophies and retinopathy of prematurity, while lesions of the higher visual pathways are often associated with other disabilities, arising from problems in the central nervous system. In about a third of cases, the underlying cause of the eye malformation or anomaly is unknown [297]. Irrespective of the underlying cause however, children who are blind or have low vision require a range of education, health and disability support services, in order to ensure that they reach their full developmental potential.

In New Zealand the Blind and Low Vision Education Network (BLENNZ) offers a range of services to blind and low vision children. Children are eligible for BLENNZ services if they have a visual impairment and meet a number of criteria. A visual impairment is defined as *"a disorder of the structure or function of the eye, the visual pathways or the cortex, that even with the best correction and treatment, interferes with learning"*. Eligibility criteria include:

Medical: A written report from an ophthalmologist, optometrist or other medical specialist identifying vision impairment manifest by at least one of the following:

1. A visual acuity of 6/18 or less in the better eye after correction.
2. A visual field so restricted that it affects functional ability in an educational setting.
3. A progressive loss of vision which affects functional ability in an educational setting.
4. For children 0-5 years, bilateral lack of central vision with an estimated visual acuity of 6/18 or less after correction, or a documented eye condition as above.
5. A cerebral vision impairment which affects functional ability in an educational setting.

Educational: A functional vision assessment conducted by an educational professional with expertise in blindness education identifies impaired processing of information via visual pathways and this impairment reduces the child's ability to use regular print resources, black / white boards / other educational resources and necessitates the use of ≥1 of the following:

1. Adaptation of the environment or of teaching and learning approaches.
2. Access to assistive technology or materials in other formats e.g. collage, Braille.
3. Access to the Expanded Core Curriculum or adaptation of the regular curriculum.

Eligible children are offered a range of teaching and assessment services based at the Homai Campus and regionally located Visual Resource Centres including:

1. The Homai Campus School, Immersion and Residential Services
2. A National Assessment Team based at the Homai Campus
3. Regional Visual Resource Centres in Auckland (including the Homai Campus in South Auckland, the Marlborough Resource Unit on the North Shore, the Northland Resource Centre in Whangarei), Hamilton, Tauranga, Gisborne, Napier, New Plymouth (Welbourn), Palmerston North, Wellington (Kelburn), Nelson, Christchurch (Elmwood), South Canterbury (Timaru), Otago (Dunedin) and Southland (Invercargill).

Services offered include assessment and evaluation, early childhood services (centre or home based programmes to assist young children acquire essential skills), teaching and learning programmes in the Expanded Core Curriculum, professional development for teachers, teacher aids and education support workers and the provision of accessible format materials, resources and equipment.

The following section uses information on the number of children enrolled with BLENNZ to estimate the number of Pacific children with significant visual impairments in New Zealand during 2006. While enrolment data is provided for all children, more detailed information on the child's ethnicity, the nature of their visual impairments and the communication modalities used is only provided for the 87% of children on the Visual Education Agency's Database as at June 2006.

Data Source and Methods

Definition

Number of children and young people enrolled with BLENNZ

Data Source

Numerator: Number of Children Enrolled with BLENNZ

Denominator: Not applicable

Indicator Category Ideal B-C

Notes on Interpretation

The Vision Education Agency collects information about the educational needs of blind and vision impaired students. It collects basic enrolment data on all students who receive services from BLENNZ and more detailed information on demographic, communication and resourcing for each student. An opt off system means that while basic enrolment information is available on all students (i.e. the number enrolled with the various Visual Resource Centres around the country), more detailed information was only available for the 87% of learners during 2006 who did not opt out of having their information recorded in the National Database for Learners.

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance.

New Zealand Distribution and Trends

Enrolments at BLENNZ Visual Resource Centres in New Zealand

New Zealand Distribution

During June 2006, a total of 1,323 children and young people were enrolled with BLENNZ, with enrolments being spread across the educational spectrum from early childhood to secondary school level (**Table 109**).

Table 109. Number of Blind and Low Vision Learners Receiving Education Services by Region, New Zealand June 2006

Region	Visual Resource Centre Enrolments	Educational Level	Roll No.	2006 Referrals
Auckland / Northland	Auckland VRC 403 Manurewa High 17	Early Childhood	88	41
		Primary	217	
		Secondary	98	
		Manurewa High	17	
Homai Campus School	Homai CS 39	Primary	18	N/A
		Secondary	21	
Waikato / Thames / Coromandel / King Country	Hamilton VRC 108	Early Childhood	24	20
		Primary	61	
		Secondary	23	
Bay of Plenty	Tauranga VRC 40	Early Childhood	7	3
		Primary	23	
		Secondary	10	
Gisborne / East Cape	Gisborne VRC 40	Early Childhood	6	23
		Primary	23	
		Secondary	11	
Hawke's Bay	Napier VRC 48	Early Childhood	5	4
		Primary	26	
		Secondary	17	
Taranaki	Welbourn VRC 45	Early Childhood	7	1
		Primary	29	
		Secondary	9	
Horewhenua Manawatu	Palmerston North SRC 76	Early Childhood	20	11
		Primary	40	
		Secondary	16	
Wellington	Kelburn VRC 142	Early Childhood	26	27
		Primary	69	
		Secondary	47	
Nelson / Buller / Marlborough	Nelson VRC 47	Early Childhood	11	2
		Primary	21	
		Secondary	15	
Canterbury / West Coast	Elmwood VRC 240	Early Childhood	20	21
		Primary	146	
		Secondary	74	
Otago	Otago VRC 43	Early Childhood	4	5
		Primary	21	
		Secondary	18	
Southland	Southland VRC 35	Early Childhood	8	7
		Primary	18	
		Secondary	9	
Total			1323	165

Source: BLENNZ

Distribution by Ethnicity

Of the 1,153 (87%) students for whom this information was available, 63.7% identified as being European, 21.2% as Māori and 8.2% (n=95) as belonging to a Pacific ethnic group, with 45 children identifying as Samoan, 16 as Tongan, 14 as Cook Island Māori, 11 as Niue and 9 as from Other Pacific groups (**Table 110**).

Table 110. Ethnicity of Blind and Low Vision Learners Receiving Education Services and Enrolled on the National Database, New Zealand June 2006

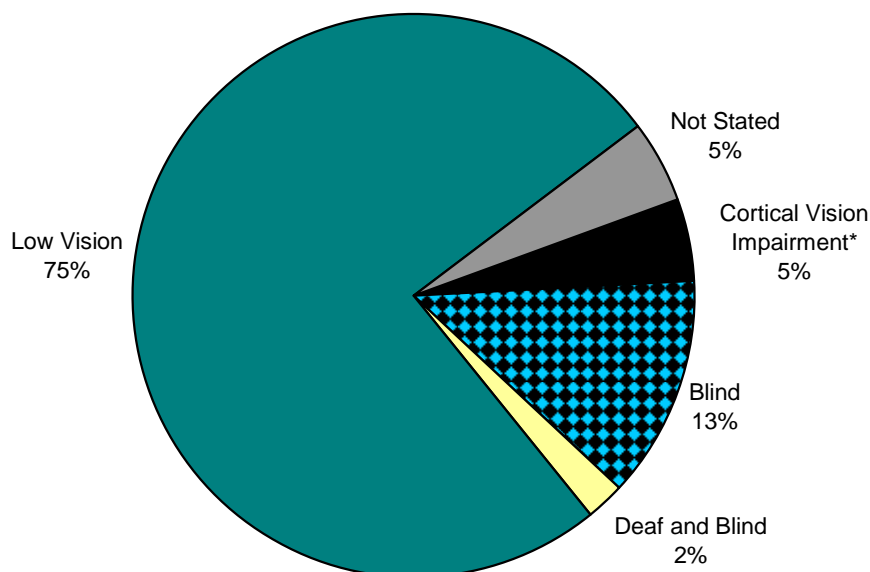
Ethnicity	Number	% on Database
European	735	63.7
NZ Māori	244	21.2
Samoan	45	3.9
Tongan	16	1.4
Cook Is Māori	14	1.2
Niue	11	1.0
Other Pacific	9	0.8
Asian / Indian	59	5.1
Other	20	1.7
Total on Database	1,153	100.0
Total on Roll	1,323	

Source: BLENNZ

Nature of Impairment

Of the 1,153 (87%) students who had their information recorded on the national database, 75% had low vision, 13% were blind, 2% were deaf-blind and 5% were noted as having cortical visual impairment (although the latter category was inconsistently reported by different Resource Centres across the country) (**Figure 163**). In addition, 60.4% of those on the national database were listed as having other disabilities, the consequences of which ranged from minor to major impacts on their functioning.

Figure 163. Visual Status of Blind and Low Vision Learners Receiving Education Services and Enrolled on the National Database, New Zealand June 2006 (n=1,153)



Source: BLENNZ; Note: Reporting of Cortical Vision Impairment is inconsistent across the country.

Communication Modalities

Of the 1,153 (87%) students who had their information recorded on the national database in June 2006, 101 were Braille users, with a further 33 identified as potential Braille users. Of the print users identified, 542 used large print and 298 used regular print, although a large proportion of these children also used visual aids, making numbers in **Table 111** sum to >100%. In addition, children also used a range of other communication modalities including augmentative communication and signing systems.

Table 111. Communication Modes of Blind and Low Vision Learners Receiving Education Services and Enrolled on the National Database, New Zealand June 2006

Mode	Number	% of Those on National Database (n=1153)
Braille User	75	6.5
Dual Mode Braille & Print	26	2.3
Potential Braille User	33	2.9
Braille Not Yet Determined	78	6.8
Tactile User	252	21.9
Large Print	542	47.0
Regular Print	298	25.8
Visual Aids	245	21.2
Signing System	105	9.1
Augmentative	143	12.4

Source: BLENNZ; Note: 112 of learners identified as using regular print also used visual aids and 255 of learners identified as using large print also used visual aids, so totals add up to >100% of sample size

Summary

While it is difficult to precisely estimate the number of Pacific children and young people who are blind or have low vision, the Vision Education Agency suggested that in 2006, 95 Pacific children and young people in New Zealand required educational support as a result of a visual impairment. Students enrolled with the Agency nationally had a variety of visual impairments, ranging from low vision, through blindness and deaf-blindness, to cortical visual impairments and used a variety of communication modalities including large print, visual aids, Braille and signing systems. In addition, 60.4% had other disabilities which had minor to major impacts on their functional ability. Irrespective of the underlying cause of their visual impairment however, Pacific children and young people with visual impairments require a range of education, health and disability support services, the coordination of which is vital to ensuring they reach their full developmental potential.

Permanent Hearing Loss

Introduction

Sensorineural hearing loss is a permanent condition which occurs when the functioning of the inner ear, the auditory nerve and / or its connections to the brain are impaired. Between 135-170 babies (2-3 /1000) in New Zealand each year are identified as having a permanent congenital hearing loss [298] and until recently, New Zealand has relied on a “risk factor” approach to identification, with children with any of the factors listed below being referred to an Audiologist for further assessment:

1. A Family History of Hearing Loss
2. Jaundice Requiring Exchange Transfusion
3. Craniofacial Abnormalities
4. Ototoxic Drugs
5. Mechanical Ventilation Lasting 5+ Days
6. Low APGAR Scores (0-4 at 1 Minute, 0-6 at 5 Minutes)
7. Birth Weight <1500g
8. Bacterial Meningitis
9. Infections (e.g. Rubella, Herpes, Toxoplasmosis) Associated with Hearing Loss.

Unfortunately, such “high risk” approaches have not led to an earlier age of diagnosis, with the average age of confirmation for moderate / higher degrees of hearing loss being approximately 45 months in 2004 [299]. Such delays are of concern, as hearing impairment during the early years of life may prevent / delay speech and language development and in the longer term, impact negatively on cognitive development, academic performance, social wellbeing and subsequent career choice [300]. In mediating these impacts, 4 key variables are thought to play a role:

1. **Age of Onset:** Children born with permanent hearing loss often have limited exposure to sound during a critical period of brain development, leading to poorer development of the central auditory system and a reduced ability to acquire language. As a result, the greatest benefits from auditory interventions are achieved within the first 3 years of life.
2. **Severity of the Loss:** There are varying degrees of hearing loss and associated functional impairment (**Table 114**). Lower degrees of hearing loss can still have negative impacts, as they are often detected later, allowing time for deficits in speech and language to develop.
3. **Intervention Delay:** The internationally recommended age for identification of hearing loss is 3 months, with intervention commencing by 6 months of age [301]. These recommendations are based on evidence suggesting that infants whose hearing loss is detected early and who receive appropriate assistance, have significantly better spoken language and subsequent educational outcomes than later detected peers [300]. Available interventions include hearing aids, speech language therapy, the teaching of sign language, other educational supports and cochlear implants.
4. **Presence of Other Disabilities:** Analysis of New Zealand Deafness Notification Data suggests that approximately ¼ of hearing impaired children have other disabilities, including Downs Syndrome, brain injury, developmental delay and metabolic disorders, which may themselves impact on children's learning and cognitive development [299].



In response to concerns regarding the late age of detection of congenital hearing loss, the Government in its May 2006 Budget, announced a funding package of \$16 million over the next four years to establish a Universal Newborn Hearing Screening Programme for New Zealand. Since this announcement, work has focused on programme design and models for a national information system. In addition, the Universal Newborn Hearing Screening Advisory Group has highlighted a number of areas where further work is necessary if the programme is to be implemented effectively (e.g. national workforce development; creation of a national lead agency, funding agreements and data systems; quality improvement, monitoring and evaluation) [298]. It is likely that significant further policy work will be required before the final roll out of the national programme, and in the meantime the majority of DHBs will still need to rely on the “at risk” identification system.

While awaiting the roll out of a universal screening programme, two data sources provide information on the number of Pacific children and young people with permanent hearing loss in New Zealand. These are the New Zealand Deafness Database, which collects information on children diagnosed with a permanent hearing loss who meet a number of specific criteria and the National Minimum Dataset, which collects information on the number of children admitted to hospital for cochlear implant surgery each year. The following sections review each of these in turn.

Data Source and Methods

Definition

1. Children notified to the New Zealand Deafness Database
2. Hospital Admission for Cochlear Implant in Children and Young People (0-24 yrs)

Data Source and Interpretation

1. *Children notified to the New Zealand Deafness Database*

NZ Deafness Notification Data Reports produced by the National Audiology Centre

Numerator: Children notified to the New Zealand Deafness Notification Database who meet the appropriate criteria (see below).

Denominator: Not applicable

Interpretation: The data is presented by year of notification, rather than year at first identification, with the degree of hearing loss assessed using the dBHL ranges outlined in Table 114. As notification is not mandatory, these statistics may undercount the number of children with permanent hearing loss. A recent data matching exercise with the Children’s Hearing Aid Fund, which has mandatory form completion, revealed 157 children over an 11 year period who had not been reported to the Deafness Database, but who had been fitted with hearing aids. Similar processes have been carried out at intervals in the past (44 retrospective cases were added during 2001). In addition, because of the generally late age at first diagnosis, it is not possible to be certain of the aetiology or time of onset of the reported hearing loss. Thus although most cases are likely to be congenital, it is still not possible to rule out the possibility that the hearing loss was acquired, or that the degree of loss had changed between birth and identification.

2. *Hospital Admission for Cochlear Implant in Children and Young People (0-24 yrs)*

National Minimum Dataset

Numerator: Children and young people admitted to hospital with Implantation or Replacement of Cochlear Prosthetic Device (ICD-09 20.96-20.98) as primary or secondary procedure.

Denominator: Not Applicable

Interpretation: Because ICD-9 coding does not differentiate between implantation and replacement of a cochlear implant, it is possible that some of the cases listed in this section represent the replacement of a cochlear implant in a previously implanted individual.

Indicator Category

Ideal C

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance (see Appendix 10 for rationale).

New Zealand Distribution and Trends

Notifications to the New Zealand Deafness Database

Notification Criteria

The New Zealand Deafness Notification database is managed by the National Audiology Centre and collects information on children meeting the following criteria [299]:

1. Children must be <18 years of age, with congenital hearing losses or any hearing loss not remediable by medical or surgical means which requires hearing aids and / or surgical intervention.
2. Children must have an average bilateral hearing loss (over 4 audiometric frequencies 500-4000 Hz) of >26 dBHL in the better ear.
3. Children are excluded if their hearing loss is <26 dBHL, unilateral, acquired or they were born overseas.

Trends and Distribution by Ethnicity

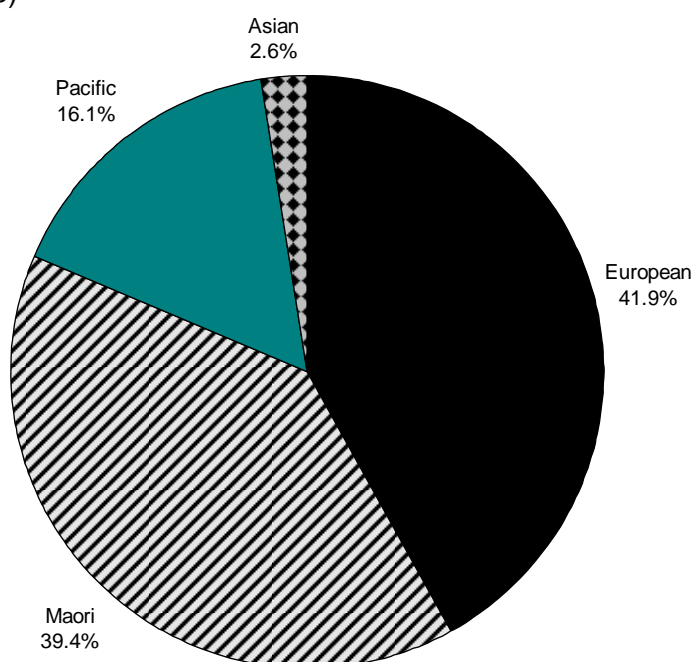
In New Zealand during 1998-2004, an average of 123 children per year met the inclusion criteria for the Deafness Notification Database. The large number of notifications in 2001 and 2004 reflect a number of retrospective notifications which were overlooked in previous years (**Table 112**). During 2004, 16.1% of the 155 notifications to the Deafness database were for Pacific children and 39.4% were for Māori children, although the lack of a clear denominator precluded the calculation of rates (**Figure 164**).

Table 112. Number of Notifications Meeting the Criteria for Inclusion in Deafness Notification Database by Region of Residence, New Zealand 1998-2004

Region of Residence	Notification Year						
	1998	1999	2000	2001*	2002	2003	2004*
Northland	10	8	11	10	5	7	10
Auckland Region	21	35	40	74	36	52	37
Waikato	7	13	9	19	10	9	15
Lakeland	3	2	0	3	3	3	6
Bay of Plenty	10	6	4	21	6	12	9
Tairāwhiti	3	0	1	3	2	1	5
Taranaki	2	2	1	1	3	3	8
Hawke's Bay	1	2	2	31	5	4	5
Manawatu	3	3	0	12	7	12	24
Wellington	3	10	5	8	12	17	5
Nelson Marlborough	2	3	2	1	3	4	4
West Coast	0	0	0	0	1	1	1
Canterbury	0	3	7	10	12	9	10
South Canterbury	0	1	1	4	1	3	3
Otago	0	1	8	5	5	3	7
Southland	1	3	2	0	3	4	6
New Zealand Total	65	90	92	202	113	144	155

Source: National Audiology Centre; Note: 2001 figures include 44 retrospective notifications; During 2004 an additional 157 retrospective cases which had not been notified over an 11-year period were added to the database, but are not included in this total

Figure 164. Distribution of Notifications to the Deafness Database by Ethnicity, New Zealand 2004 (n=155)



Source: National Audiology Centre

Age at Identification of Hearing Loss

The average age at confirmation of hearing loss is calculated for children with at least a moderate loss (>40 dBHL). The age at detection for mild losses is often much later and until recently the effects on educational performance were thought to be less marked. During 2001-2004 there was considerable year to year variation in the average age at identification of at least a moderate loss (**Table 113**). In addition, significant delays between the time of first suspicion and final confirmation (range 6.5-13.5 months) may have further delayed the age at which effective interventions began. It is hoped that with the roll out of a Universal Newborn Hearing Programme in New Zealand over the next few years, the age of confirmation will decline significantly.

Table 113. Age at Suspicion and Confirmation of Moderate or Greater Hearing Loss, New Zealand 2001-2004

Year	Mean Age Suspected (months)	Mean Age Confirmed (months)	Time Taken (months)
2001	28.1	33.7	6.5
2002	24.4	35.1	10.7
2003	35.3	46.1	10.8
2004	31.8	45.3	13.5

Source: National Audiology Centre

Other Disabilities

During 2004, a number of children who met the criteria for inclusion in the NZ Deafness Database also had other disabilities. These included (n=155):

- | | | | |
|-------------------------|-------|----------------------|------|
| • No Other Disability | 77.4% | • IHC | 1.9% |
| • Multiple Disabilities | 8.4% | • Down Syndrome | 0.6% |
| • Other Syndromes | 3.9% | • Other Disabilities | 4.5% |
| • Asthma | 1.9% | • Unknown | 1.3% |

Degree of Hearing Loss

The New Zealand Deafness Database classifies the degree of hearing loss in the better hearing ear using the dBHL ranges outlined in **Table 114**, which also summarises the degree of deafness of the 155 children notified to the database in 2004. As with the total population figures, a breakdown by ethnicity suggested that the majority of notifications for Pacific children were in the mild-moderate range, with 92% of Pacific children notified during 2004 being in this category (**Table 115**).

Table 114. Degrees of Hearing Loss and Associated Functional Impairment in Children Notified to a New Zealand Database, New Zealand 2004

Degree of Loss	Functional Impairment Likely at this Level of Loss [300]	% of 2004 notifications
Mild 26-40 dBHL	Some difficulties in hearing soft speech and conversations (persons sound as if they are mumbling) but can often manage in quiet situations with clear voices. Speech and language usually develop normally if child is fitted early with hearing aids.	59%
Moderate 41-65 dBHL	Difficulty understanding conversational speech, particularly in the presence of background noise. Volume of TV and Radio needs to be turned up to be heard. Speech and language generally affected if hearing aid is not provided early. A hearing aid will assist most hearing difficulties if speech discrimination is good and listening environment is not too noisy.	29%
Severe 66-95 dBHL	Normal conversational speech is inaudible and only raised voices at close distance can be understood. Speech and language will not develop spontaneously in children with severe hearing loss. Hearing aids will amplify many speech sounds and will greatly assist children in developing speech, although speech quality is likely to be affected. Some children may benefit from a cochlear implant.	7%
Profound 96+ dBHL	Learning to speak without significant support is very difficult, although there is individual variation. Greater inconsistency in the benefit derived from hearing aids: some can understand clear speech in quiet conditions when wearing a hearing aid, while others derive little benefit. This group should be considered for cochlear implants, with benefits being evident, especially if implanted at a young age.	5%

Source: National Audiology Centre

Table 115. Degrees of Hearing Loss by Ethnicity in Children Notified to the Deafness Database, New Zealand 2004 (n=155)

Degree of Hearing Loss	European		Māori		Pacific		Asian	
	No.	%	No.	%	No.	%	No.	%
Mild (26-40 dBHL)	37	56.9	40	65.6	12	48.0	3	75.0
Moderate (41-65 dBHL)	16	24.6	18	29.5	11	44.0	0	
Severe (66-95 dBHL)	6	9.2	3	4.9	1	4.0	1	25.0
Profound (>95 dBHL)	6	9.2	0	0.0	1	4.0	0	
Total	65	100.0	61	100.0	25	100.0	4	100.0

Source: National Audiology Centre

Cause of Hearing Loss

During 2004, in half of cases the cause of the hearing loss was unknown. While a family history is quoted in 32% of cases, this is higher than for Australian figures and very few children undergo genetic testing for hearing loss. Causes during 2004 included (n=155):

- | | | | |
|-------------------|-----|-----------------------|----|
| • Unknown | 50% | • Low Birth Weight | 2% |
| • Family History | 32% | • Facial Malformation | 1% |
| • Multiple Causes | 6% | • Other Causes | 6% |
| • Asphyxia | 3% | | |

Hospital Admissions for a Cochlear Implant

Cochlear implants are devices which provide hearing sensations for severely and profoundly deaf individuals. They consist of two parts, an electrode array which is implanted into the cochlear and a speech processor which is worn externally (either behind the ear or on the body). Once it has been established that no significant benefit is being obtained from a hearing aid, a cochlear implant should be considered as soon as possible, although congenitally deaf children who are 3+ years of age need to have been fitted with hearing aids and started to develop speech and language, in order to benefit from an implant. Following successful implantation, the degree of benefit varies depending on the age of onset of the deafness, the child's previous experience with hearing and the duration of the loss [302].

Cochlear Implants in New Zealand and (Any) Pacific Children

In New Zealand during 1988-2005, there were a total of 238 hospital admissions for cochlear implant surgery in the 0-24 age group, involving a total of 222 children. While it is likely that the majority of admission were for the implantation of a cochlear prosthetic device, a small number may have been admitted for repair / replacement surgery (differentiation between the two is difficult using current ICD coding). Between 1990 and 2005 the number of children receiving cochlear implant surgery gradually increased, from approximately 4 cases per year during the first 4 years, to approximately 21 cases per year during the last 4 years for which data was available (**Table 116**). During the same period, a total of 3 (Any) Pacific children received a cochlear implant, with all of these implants occurring after 1999.

Table 116. Number of Admissions for Cochlear Implant Surgery in Children and Young People 0-24 Years, New Zealand 1990-2005

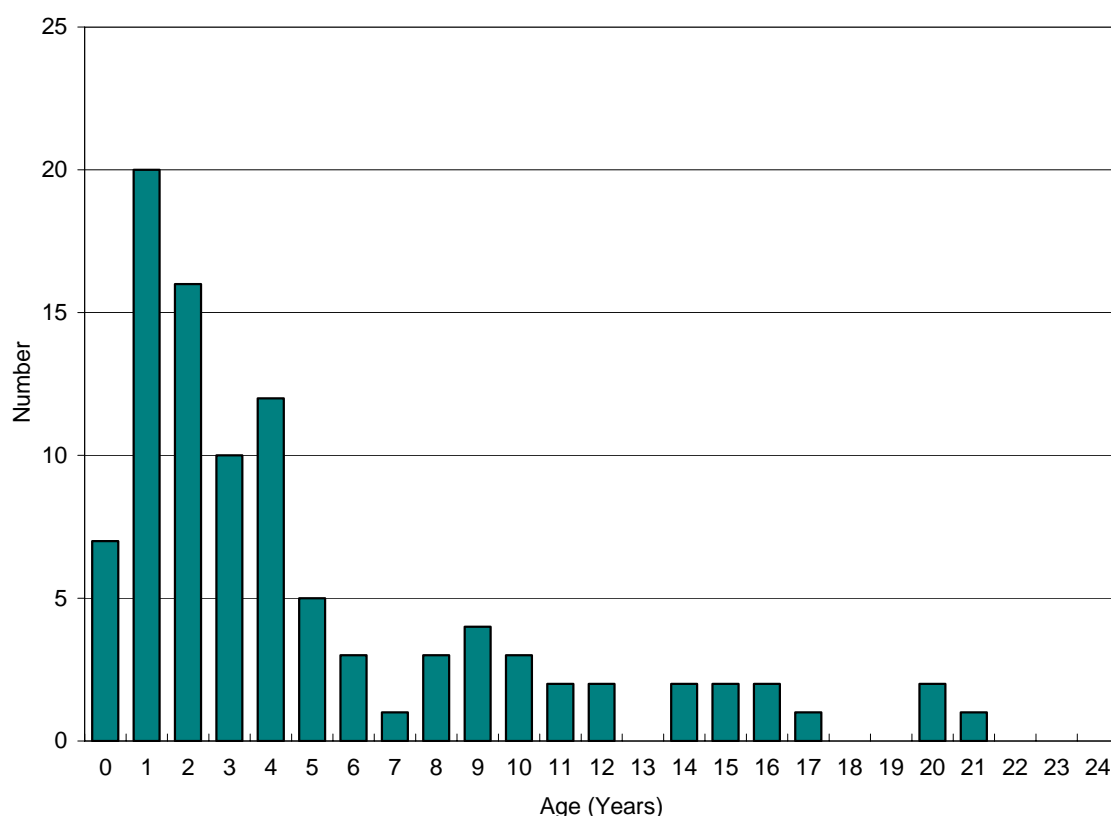
New Zealand	1990-91	1992-93	1994-95	1996-97	1998-99	2000-01	2002-03	2004-05
Total	3	13	18	28	40	48	46	37

Source: National Minimum Dataset; Note: Numbers are per 2 year period and may include those undergoing repair / replacement of a cochlear implant

Cochlear Implants by Age

In New Zealand during 2001-2005, 43.9% of cochlear implant surgery in the 0-24 age group occurred before the age of 3 years and 66.3% occurred before the 5 years of age. A small number of implants occurred after the age of 5 years, although the possibility of repair / replacement surgery could not be ruled out in these cases (**Figure 165**).

Figure 165. Hospital Admissions for Cochlear Implant Surgery in Children and Young People 0-24 Years by Age, New Zealand 2001-2005



Source: National Minimum Dataset

Summary

Hearing loss during the early years of life is of significant concern, as delays in intervention may lead to impaired language development and long term, may impact negatively on cognitive development, academic performance and subsequent career choice. In New Zealand each year, approximately 120 children meet the inclusion criteria for the Deafness Notification Database, with 16% of notifications during 2004 being for Pacific children, the majority of whom had mild-moderate hearing losses. Despite these notifications, evidence would suggest that New Zealand's recent high risk approach to detection has resulted in significant delays, with the average age of detection of moderate or greater loss in 2004 being 45.3 months. It is hoped that the roll out of a Universal Newborn Hearing Programme over the next few years, will lead to a reduction in the age at first detection of hearing loss, and as a consequence to significantly earlier intervention for these children.



Self Portrait by Sione Tukuafu
*"Identifying myself as an individual supported by
friends and culture"*

Viewpoint: Pacific Youth: Key Messages

by Karlo Mila-Schaaf

Introduction

There is a paucity of information about Pacific young people. Evidentially, we are used to working from a few isolated cross-sectional snapshots in time. These are often few and far between and tend to be limited in their focus, design, scope, usefulness and science. The wealth of information provided here is a huge gift to Pacific young people and people working towards their advancement and wellbeing. To have data that can track movement over a five year period is particularly exciting.

This “opinion piece” highlights and briefly summarises the key findings relevant to Pacific youth in this report. This begins with a focus on some of the main health issues identified. It then examines in more detail, the patterns of ethnic disparity found in the report. It then considers the broad trend of improvement in outcomes demonstrated over a five year period in a number of youth health areas. These improvements in outcome are generally experienced by all ethnic groups, including Pacific young people. Notably, despite these improvements, ethnic disparities for Pacific young people remain. A few metaphorical “red flags” are then identified, whereby specific results highlight areas of concern - or questions - that warrant further study.

The opinion piece concludes with a discussion of the implications of the findings and recommendations in three key health areas: sexual health, mental health and the relationship between education and health outcomes for Pacific young people. It is generally concluded that *The Health of Pacific Children and Young People in New Zealand* is a substantial piece of research that can be used as a solid platform for advancing equitable and optimal health and wellbeing for Pacific young people.

Major Health and Wellbeing Issues for Pacific Young People

This report provides some clear answers to some very fundamental and basic questions. First, what are our Pacific young people, aged 15-24, dying of? The report tells us that the leading cause of mortality (63.2%) between the ages of 15-24 is injury (including suicide). And from all types of injury mortality, suicide (19.1 per 100,000 per year) is the leading cause of death, followed closely by being the vehicle occupant of a transport accident (18.2 per 100,000 per year).

Another fundamental question: What are our Pacific young people most likely to be going to hospital for? We learn from this report that our Pacific young people (aged 15-24) are mostly going to the hospital for pregnancy related issues (45.5%) and for the most part, to give birth (39.6%). This is followed by approximately ten percent of admissions being due to injury. We also learn that amongst young people during 2002-2006, hospital admissions for injuries sustained as a result of an assault were higher than the non-Maori non-Pacific average for all of New Zealand's largest Pacific groups, with the exception of Tokelauan young people.

Mental health, violence, sexual health and access (e.g. to health care, societal institutions) are critical areas that have been identified as crucial to the health and wellbeing of Pacific young people [303]. This report reaffirms all of these areas as important health issues for Pacific young people.

Ethnic Disparities

This report also reinforces the fact that there are significant differences in health outcomes between Pacific young people and young people of other ethnic groups. Such inequalities between Pacific peoples and the New Zealand European population have been replicated in numerous data-sets and appear to be revalidated with every new study [304], [74]. Poorer outcomes for young Pacific people are evident in the



relatively high rates of teen pregnancies, schizophrenia admissions and injuries arising from assault.

The ethnic disparities are also evident in various determinants of health such as education, employment and living standards. This report shows Pacific young people have proportionally higher rates of leaving school with little or no formal attainment (12.2% in 2006), relatively low rates of leaving school with university entrance qualifications (16.8% in 2006), and markedly high rates of school stand-downs and suspensions (with the highest rate of expulsions). Similarly, the report shows Pacific young people have proportionally higher numbers of people on unemployment benefits, who report lower than average living standards, and who live in significantly more crowded households than other New Zealanders.

There is also a recurring pattern within ethnic differences which is reaffirmed in this report. This pattern dictates that either Pacific or Māori have the poorest health outcomes of all ethnic groups in New Zealand. In this report, the youth findings show that Pacific young people tend to have an 'intermediary' profile and that young tangata whenua have, fairly consistently, the poorest youth health profile. NZ European young people, for the most part, enjoy the best health profile and, in some cases, young New Zealanders of Asian and other ethnicities appear to fare better than NZ Europeans; although this is not always the case. The pattern whereby Pacific young people have an 'intermediary' profile (between Māori and NZ European) is evident in, for example: daily smoking rates, suspensions and stand-downs, educational attainment at school leaving, injury mortality, teenage pregnancies and benefit recipients.

Improvements in Outcomes

In this report, balanced against a fairly negative statistical picture, there are some clear positive gains. The ability to track data over a five year period shows some consistently positive movement. There are upward trajectories for all ethnic groups over the past five years in a variety of areas. This strong gradient of improvement is evident in the following areas:

- Reduction of numbers of young people reliant on benefits
- Higher levels of educational attainment (noticeably since the introduction of NCEA)
- Improved or sustained school retention rates
- A significant decline in daily smoking
- A decline in injury mortality
- A decline in suicide rates

One could also posit that the approach of the "Primary Health Care Strategy" [73] has worked well. Pacific peoples have a high rate (96%) of registration with Primary Health Organisations [74]. Research has shown that there is a predominance of Pacific patients at community governed clinics and that they receive a higher level of service there [83].

Increasingly health promotion, injury prevention, smoking cessation and other important well-being promoting social marketing campaigns and interventions have also been targeted directly at Pacific youth. Understanding the extent to which this makes a difference is a reasonable area for inquiry, particularly given that the pretext was marginalisation, lack of visibility and the same (i.e. mono-cultural) solutions and interventions for all young people.

A Few Red Flags

Aside from the major trends and big questions, there were many smaller but significant areas that waved metaphorical red flags within the Report. One of particular concern was the disproportionate proportion of mental health admissions for schizophrenia (48.2%) among Pacific young people. This was followed by schizotypal and delusional disorders (15.1%), which amounted to well over half of all admissions. It is recognised

that there are limitations in focusing on hospital admission data, as opposed to outpatient data, as most mental health care occurs in outpatient settings. Fairly obviously, admission data is information about admission, as opposed to actual burden of illness which provides further limits. There have been concerns about the low rates of visits to mental health services by Pacific peoples, with research showing only one quarter of Pacific peoples with a serious mental disorder accessing mental health care [305]. With all of this taken into account, however, the disproportionate rate of young Pacific peoples presenting with schizophrenia or schizotypal disorders is still an area meriting further focus and better understanding.

Another hotspot is in the area of expulsions from school. When Pacific young people have lower rates of stand-downs, suspensions, why are they over-represented in expulsions?

The most difficult questions are about what lies beneath the admission rates and statistics in the areas of violence, sexual health, mental health and access? This is the challenge that presents itself. Notably, to some extent these areas are all likely to be associated with cultural determinants of health and wellbeing. It is not surprising that a report of this kind leads directly to more questions. And somewhat oxymoronically, when more becomes 'known', one becomes more aware of how 'little' is known.

Another red flag - although not derived from the data - is the fact that the information collected in this Report does not reflect the burden of chronic diseases likely to face the next generation of Pacific peoples. Lifestyle diseases such as diabetes and coronary heart disease, which affect Pacific peoples disproportionately, for the most part do not appear on the radar in the information collected here [74]. However, lifestyle choices and patterns established in adolescence clearly have implications for chronic diseases in later life [306]. Although this is not captured in young people's hospital admission data, the extreme burden of chronic diseases among Pacific adults requires that we engage with lifestyle risk factors in the youth population.

Implications of the Findings

Despite the good news of strong, consistent and positive improvements in outcomes, what is also clear from the data is that ethnic disparities have not disappeared. Ethnic differences appear to be deeply embedded within New Zealand society. To use outdated terminology – despite overall improvements in outcomes - the “gaps” between ethnic groups have not closed. Ethnic differences remain entrenched even in the improvements.

What does this mean for us? What kinds of initiatives would lead to equitable gains, what would address/ challenge/ change such well-established patterns of inequalities? Will there be support for concerted, directed, targeted efforts to propel and accelerate Pacific and Māori young peoples' outcomes to tip the balance of this inequity?

There has been a political agenda to minimise ethnic differences and swing our focus, instead, to socio-economic determinants. While the data in this report has not been adjusted for NZDep, the relationship between ethnicity and socio-economic status has been carefully examined. In many other analyses, Pacific data has been re-examined and after modelling, controlling, checking for effects and confounding, it is clear that ethnic inequalities for young people exist independently of socio-economic status (e.g. the recently released Youth2000 Pacific Youth Health Report [307]).

What do we do with this kind of information - which is both empowering and disempowering at the same time? In light of the evidence provided here (and elsewhere), political attacks on 'race-based' funding appear inconsistent with the best information we have at hand.

What is clear is that we can have renewed confidence in the advice and instruction that diligent attention and due care of the health of young people in New Zealand requires



engaging with ethnicity. In light of the political climate we have been operating within, this evidence-based certainty is a gift. The task at hand is to ensure this gift reaches the hands of Pacific young people.

Recommendations

This opinion piece concludes with three recommendations in key health-related areas.

1. The findings show that Pacific young people were most likely to be going to hospital for reproductive and pregnancy related issues. The report also shows higher rates of teen pregnancy among Pacific young people, when compared to NZ-European young people (intermediary compared with Māori). This clearly identifies sexual and reproductive health among Pacific young people as a priority area. It makes sense that efforts are made (and investment is targeted) to promote sexual health and safe sex upstream of pregnancy. Any services developed for young people in this area need to be cognisant of Pacific cultures, as well as of youth culture, recognising young Pacific people straddle (often the contradictions of) both worlds. In addition, the paucity of research about any aspect of sexual health and Pacific young people needs to be immediately addressed.
2. The leading cause of mortality among Pacific young people was injury, with a large proportion of injury mortality being attributable to suicide. The high incidence of suicide, in combination with the finding that almost half of mental health admissions were attributed to schizophrenia, (followed by schizotypal or delusional disorders) strongly indicates that mental health is a priority Pacific youth health area. Once again, a case can be made for earlier interventions and mental health promoting activities to reduce the prevalence of serious disorders and suicide. As stated above, any service or initiative targeting Pacific young people must be cognisant of Pacific cultures, as well as of youth culture, if it is to be responsive to the complexity of young Pacific peoples' realities.
3. Finally, it is recognised that between 2000 and 2005, educational retention rates and educational attainment rates improved in combination with a reduction in the number of Pacific young people on benefits. This increased participation in education and employment (and corresponding socio-economic benefit) are trends that occurred in conjunction with a decline in suicide rates, injury mortality and smoking. The Youth Development Strategy Aotearoa [308] identifies the importance of meaningful participation, the sense of contributing something to society and young peoples' belief that they have choices about their future as fundamental to youth development and wellbeing. In broad terms, the findings from this report reinforce that for Pacific young people, positive participation in education and employment is connected to health and wellbeing. The findings suggest that strengthening educational and employment outcomes for Pacific young people may be valid pathways (or viable medium to long-term strategies) towards improving health outcomes. This potentially lends support to unconventionally holistic and radically intersectoral approaches to improving health outcomes for Pacific young people. Exploration of intersectoral relationships (and solutions) is particularly compelling in a context whereby Pacific health disparities parallel considerable socio-economic, educational and employment inequities.

To conclude, this report shows that Pacific young people have specific health needs, and a profile of risk and protective factors, different from other ethnic groups. For a long time we've recognised that the determinants of health of Pacific young people involves a complex interaction of risk and protective factors. The report provides new insights and more advanced understandings of the dynamics for Pacific young people. It imperative that the next steps are taken: first, that this knowledge is translated meaningfully into responsive targeted action; second, that the knowledge in this report is advanced and extended via further research.



Individual and Whanau Health and Wellbeing Mental Health

Issues Experienced by Callers to Telephone Counselling Services

Introduction

Good empirical evidence suggests that investment in early intervention and prevention programmes in child and youth mental health can be effective [309]. The potential for mental health problems to have long term disabling effects on the normal development and well-being of children and young people suggests that the costs of early intervention and prevention can be easily offset by longitudinal savings from reduced treatment costs and improved occupational achievements.

In New Zealand, the need for child and youth mental health services can be seen as spanning a continuum, with the types of issues being dealt with by child and youth telephone counselling services, at one end of this continuum potentially reflecting the everyday issues and concerns being experienced by many New Zealand children and young people. Analysis of calls received by both the What's Up telephone counselling service and Youthline's Youth Help Line Service in recent years suggest that many of these concerns relate to issues such as peer relationships and bullying, although relationships with family and partners (girlfriends and boyfriends) also feature prominently [310].

Supporting children and young people in dealing with these issues is vital, as it has been suggested that peer relationships contribute substantially to social and cognitive development, and to the effectiveness with which we function as adults, with some authors suggesting that the single best childhood predictor of adult adaptation is the adequacy with which a child gets along with their peers. In this context, children who are generally disliked, who are aggressive or disruptive, who are unable to sustain close relationships with other children, or who cannot establish a place for themselves in their peer culture, are seen as being seriously at risk [311].

A number of studies also suggest that being victimised by peers is significantly related to low levels of psychological wellbeing and social adjustment, and to high levels of psychological distress and adverse physical health symptoms. Evidence from longitudinal studies suggests that these associations may be causal [312]. Conversely, it has been suggested that young people with high self esteem, a sense of purpose, resilience, interpersonal skills, support from parents, family and community, and a connectedness with their peers are at a much lower risk of adverse outcomes, such as suicide [313].

In attempting to assess some of the more common issues affecting the mental wellbeing of New Zealand children and young people, the following section explores the most frequent reasons for calling the 0800WHATSUP telephone counselling service and Youthline's Youth Help Line Service during 2006. While limits on the number of calls which can be answered, as well as the inability to identify individual callers by ethnicity preclude the calculation of ethnic specific rates, these figures nevertheless highlight a range of issues which New Zealand children and young people identify as their main concerns. In addition, the large number calls which are unable to be answered (73% of calls to 0800WHATSUP were unable to be answered during 2006) potentially suggest that there is a large amount of unmet need in this area.



Data Source and Methods

Definition

1. Telephone calls made by children and young people to 0800WHATSUP
2. Telephone calls made by children and young people to Youthline

Data Sources and Interpretation

1. *The 0800WHATSUP Telephone-Based Counselling Service*

0800WHATSUP is a free, professional telephone counselling service that is available from noon to midnight every day of the year to New Zealand children and young people aged between 5 and 18 years. 0800WHATSUP is provided by The Kids Help Foundation Trust, an incorporated charity. It became available to children and young people in September 2001.

2. *Youthline's Youth Help Line Service*

Youthline is a charitable organisation, established in 1970 to provide a first point of contact for young people requiring confidential support and counselling. It provides a number of clinical services including family therapy, email counselling, pregnancy counselling and crisis support, as well as an on-site school, youth information including the inter-departmental on-line initiative Urge/Whakamanawa, (www.urge.co.nz), community facilities and youth development programmes. While the range of face to face services varies from region to region, its Youth Help Line counselling service is available nationwide, with approximately 24,000 calls annually being received by its 0800 free-call number. The information presented in this section was collected by Youthline telephone counsellors at the time of client contact. The anonymous nature of the service means that while it is usually possible to obtain relatively complete information on the nature of the presenting issue, it is not always appropriate to collect additional information (e.g. age, ethnicity, area of residence) and thus in many cases information of this nature is incomplete. Thus further analysis by age, ethnicity and NZDep Index decile is not possible using Youthline Helpline data.

Indicator Category

Bookmark / Proxy C

Statistical Significance Testing

Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance.

Calls to 0800WHATSUP Telephone Counselling Service

During 2006, on average 1,721 calls were made to 0800WHATSUP each day. 0800WHATSUP counsellors answered 27% of these calls, averaging 429 calls daily. Males made up 49% of callers and females 51%, with the average age being 13 years (38% of callers were <13 years and 85% were <16 years, with callers >18 years being referred to more age-appropriate services where possible). Approximately 10% of calls were from children and young people seeking help with a particular problem. 0800WHATSUP counsellor's record non-identifying details on all calls answered, providing a pool of valuable information on the issues of concern to the young people who phone the service.

Calls from children and young people during 2006 were categorised into one of eleven problem categories as outlined in **Table 117**. These categories were further divided into 35 sub-problems, with the ten main problems for which children and young people phoned What's Up in 2006 being outlined in (**Figure 166**). Within these categories, the top 5 reasons for calling were issues relating to peer relationships, bullying, relationships with family, relationships with partners, and pregnancy.

Relationships

By far the most common reason for calling 0800WHATSUP during 2006 was to discuss relationship issues, with almost half of all counselling calls involving concerns about relationships with others. Thirty five percent of those calling about peer relationship issues reported ongoing problems in peer relationships, including difficulties in maintaining relationships. Of those calling about family relationships, 49% reported experiencing frequent family conflict, or family breakdown such as separation or divorce. Finally, relationships with partners (girlfriends / boyfriends) were the main concern for teenage callers, with 37% of calls about partner relationships reporting

significant difficulties, or relationship breakdown. In addition, thirty-three percent said they wanted to establish a relationship.

School Related Problems and Bullying

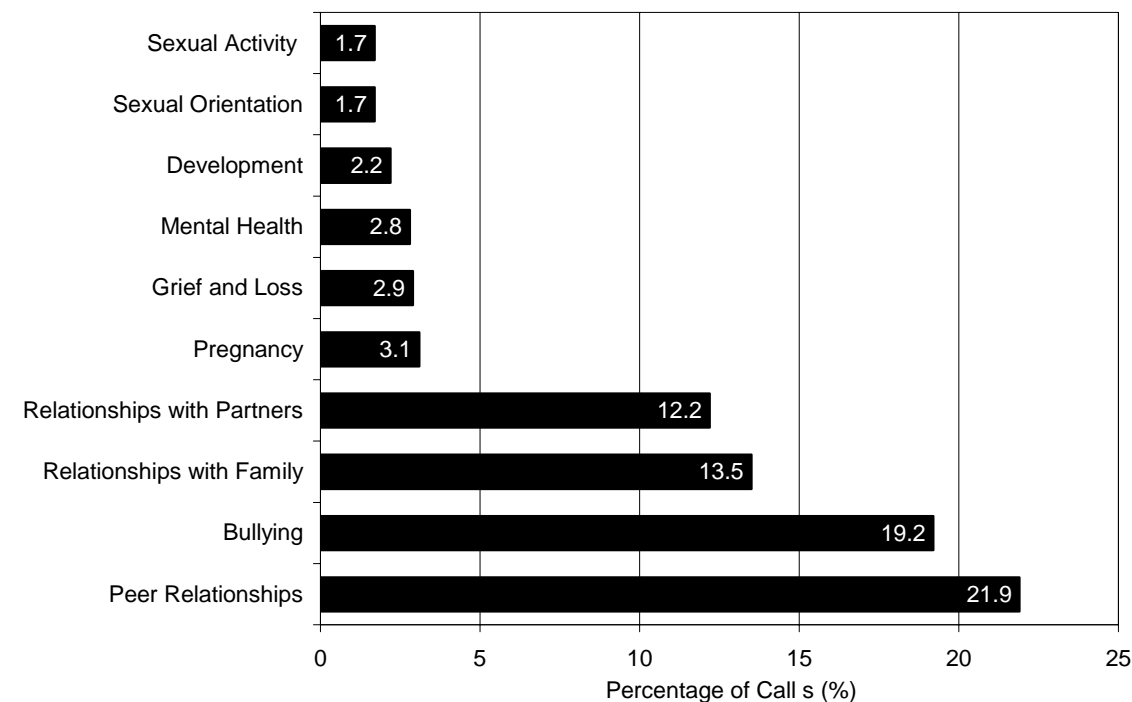
Bullying was the second most frequent reason for children and young people calling 0800WHATSUP, although its significance diminished with age. Nearly 40% of calls about bullying concerned frequent incidents or continual harassment, with the proportion of calls relating to bullying increasing since 2003 (14.9% of calls in 2003 vs. 19.2% of calls in 2006).

Table 117. Number and Percentage of Calls to the 0800WHATSUP Telephone Counselling Service by Category, New Zealand 2006

Problem Category	Number of Calls	% of Calls
Relationships	7,373	48.6
School Related	3,228	21.3
Sex	895	5.9
Emotional	838	5.5
Health	802	5.3
Self Concept	689	4.5
Practical	496	3.3
Drug and Alcohol	381	2.5
Child Abuse	259	1.7
Violence	212	1.4
Cults/Sects	5	0.0
Total	15,178	100.0

Source: The Kids Help Foundation Trust

Figure 166. Ten Most Frequent Reasons for Calling the 0800WHATSUP Telephone Counselling Service, New Zealand 2006



Source: The Kids Help Foundation Trust

Gender and Age Differences

During 2006, while both males and females were principally concerned with relationship problems, the relative importance of different types of relationships varied, with peer relationships followed by bullying being the main reasons for calling 0800WHATSUP for females, while this order was reversed for males. In addition, while relationships with peers followed by bullying were the main reasons for calling for those aged 5-12 years, relationships with partners, followed by relationships with family were the top reasons for calling for those aged 13-18 years (**Table 118**).

Table 118. The Top 5 Reasons for Calling the 0800WHATSUP Telephone Counselling Service by Gender and Age, New Zealand 2006

Females	Males	Aged 5-12 Years	Aged 13-18 Years
Peer Relationships	Bullying	Peer Relationships	Partner Relationships
Bullying	Peer Relationships	Bullying	Family Relationships
Family Relationships	Partner Relationships	Family Relationships	Peer Relationships
Partner Relationships	Family Relationships	Partner Relationships	Bullying
Pregnancy	Sexual Orientation	Development	Pregnancy

Source: The Kids Help Foundation Trust

Calls to the Youthline's Youth Help Line Service

During the year ending September 2006, a total of 34,981 calls were taken by Youthline's Youth Help Line Service. While differences in the way in which What's Up and Youthline categorise the reasons for calling meant that comparisons cannot be made across these two services, in general terms the types of issues young people called for were similar, with relationships being a major area of concern. Issues of isolation and loneliness also played a major role for a large proportion of young people calling Youthline, with depression and anger also making a significant contribution (**Table 119**).

Summary

Good empirical evidence suggests that investment in early intervention and prevention programmes in child and youth mental health can be effective. In New Zealand, the need for child and youth mental health services can be seen as spanning a continuum, with the types of issues being dealt with by child and youth telephone counselling services, at one end of this continuum potentially reflecting the everyday issues and concerns experienced by many New Zealand children and young people. Analysis of the calls received by both the 0800WHATSUP telephone counselling service and Youthline's Youth Help Line Service during 2006 suggests that many of these concerns relate to issues with peer relationships and bullying, although relationships with family and partners (girlfriends and boyfriends) also feature prominently. Supporting children and young people in dealing with these issues is vital, as it has been suggested that peer relationships contribute substantially to social and cognitive development. The large number of calls which are unable to be answered by these telephone counselling services also potentially suggest that there may be a large amount of unmet need in this area.

Table 119. Calls to Youthline's Youth Help Line by Reason, New Zealand Sept. 2005 - 2006

Main Issue Related to Call	Number	Percent of Calls
Contact / Isolation	10,157	29.0
Relationships	3,727	10.7
Emotional Support	2,788	8.0
Depression	2,688	7.7
Anger	1,443	4.1
Family / Children	1,186	3.4
Family / Parents	1,073	3.1
Loneliness	1,053	3.0
Health / Sexual Issues	1,038	3.0
Abusive Caller	1,008	2.9
Anxiety	991	2.8
Referral	876	2.5
Suicide	804	2.3
Grief	644	1.8
Mental Illness	574	1.6
Stress	542	1.5
Pregnancy	499	1.4
Sexual Abuse (Rape)	417	1.2
Substance Abuse / Addiction	404	1.2
Bullying	362	1.0
Self Harm	349	1.0
Couple Issues	275	0.8
Accommodation	267	0.8
Sexual Orientation	255	0.7
Financial Stress / Unemployment	215	0.6
Miscarriage Support	212	0.6
Violence / Physical Abuse	192	0.5
Family Violence	180	0.5
Employment Relations / Issues	165	0.5
Eating Disorder	155	0.4
School	127	0.4
Custody / Access issues	97	0.3
Emotional Abuse	92	0.3
Psychological Abuse	42	0.1
Gambling	27	0.1
Incest	27	0.1
Supervision	22	0.1
Child Prostitution	8	0.0
Total	34,981	100.0

Source: Youthline

Mental Health Inpatient Admissions

Introduction

Mental health problems become more common as young people move through adolescence, with the Dunedin Multidisciplinary Health and Development Study suggesting the prevalence of mental health problems increases from about 17.6% at age 11, through 22% at age 15, to 36.6% at 18 years of age [314]. Mental health conditions commonly diagnosed in this age group include anxiety disorders, depression, conduct disorders and alcohol and substance use disorders. In addition, suicide rates amongst NZ young people remain high by international standards [214].

The type of mental health problem diagnosed varies by age and gender, with males tending to have higher rates of conduct disorder and alcohol and substance use and females higher rates of anxiety and depression. More limited information also suggests that mental health problems vary with ethnicity, with higher rates of admission and readmission to psychiatric facilities amongst Māori males 15-19 years [214]. In terms of risk factors for mental health problems, multiple disadvantages during childhood appear to place young people at higher risk of poorer mental health outcomes. Known resiliency / protective factors include intelligence and problem solving abilities; interests outside the home; a caring relationship with an adult outside the family; warm, nurturing and supportive relationships with a parent; easy temperament; positive peer relationships; and low levels of novelty seeking [214].

In New Zealand, while the vast majority of child and youth mental health issues are dealt with on an outpatient basis, data constraints (e.g. the recording of diagnoses for mental health outpatient contacts has only recently been introduced) mean that much of the workload of child and youth mental health services is only now beginning to be captured at a national level. More complete information however, is available on mental health inpatient admissions for Pacific young people, and it is these admissions which are the subject of the section which follows. The reader is urged to bear in mind however, that these admissions represent the tip of the iceberg in terms of the mental health issues experienced by Pacific young people in New Zealand, and that the type of mental health issue dealt with on an inpatient basis will not be representative of the issues dealt with in the outpatient setting.

Data Source and Methods

Definition

Hospital Admissions for Mental Health Issues in Young People Aged 15-24 Years

Data Source

Numerator: National Minimum Dataset: Hospital admissions for young people 15-24 years with a primary diagnosis of a Mental or Behavioural Disorder (ICD-10 F00-F99). Risk factors for schizophrenia (ICD-10 F20), depression (ICD-10 F32-F33), bipolar affective disorder (F31) and eating disorders (F50) were explored in more detail. Inpatient admissions with an Emergency Medicine specialty code in the range M05-M08 on discharge were excluded in order to ensure consistency over time (see Appendix 1).

Denominator: NZ Census

Indicator Category Bookmark / Proxy C

Notes on Interpretation

The limitations of the National Minimum Dataset are discussed at length in Appendix 1. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data. In addition, the change over from ICD-9 to ICD-10 coding during 1999 made comparisons with earlier years difficult.

Statistical Significance Testing

95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

New Zealand Distribution and Trends

Most Frequent Reasons for Mental Health Inpatient Admissions

In New Zealand during 2002-2006, the most common reasons for inpatient mental health admissions in young people were for schizophrenia, followed by depression and the mental health effects of drugs and alcohol. Composite categories including schizotypal & delusional disorders also made a significant contribution. For (Any) Pacific young people during this period, schizophrenia and schizotypal and delusional disorders made the largest contribution and while overall, rates for mental health inpatient admissions appeared to be lower than the New Zealand average, these differences need to be seen in the context of the other services available to Pacific young people in the ambulatory care setting. Thus these figures should not be used to estimate population prevalence for the Pacific population, as access to inpatient facilities may fail to accurately reflect the true burden of illness, or access to mental health services on an outpatient basis (**Table 120**).

Table 120. The Most Frequent Reasons for a Hospital Admission with a Mental Health Issue in Young People 15-24 Years, New Zealand 2002-2006

Diagnosis	New Zealand		(Any) Pacific		
	Rate	%	No.*	Rate	%
Schizophrenia	137.8	26.8	415	182.2	48.2
Schizotypal & Delusional Disorders	56.0	10.9	130	57.1	15.1
Bipolar Affective Disorder	45.1	8.8	61	26.8	7.1
Depression	70.9	13.8	63	27.7	7.3
Alcohol & Drug Mental Health Effects	59.0	11.5	50	22.0	5.8
Stress Reaction / Adjustment Disorders	41.6	8.1	44	19.3	5.1
Personality Disorders	32.0	6.2	26	11.4	3.0
Other Mental Health Issues	72.4	14.1	72	31.6	8.4
Total	514.8	100.0	861	378.0	100.0

Source: Numerator-National Minimum Dataset; Denominator-Census; Rate per 100,000 per year, Numbers are per 5 year period; (Any) Pacific includes children and young people who identify as Pacific in ANY of their three first ethnic groups

Distribution by Age, Gender, Prioritised Ethnicity and Deprivation Index Decile

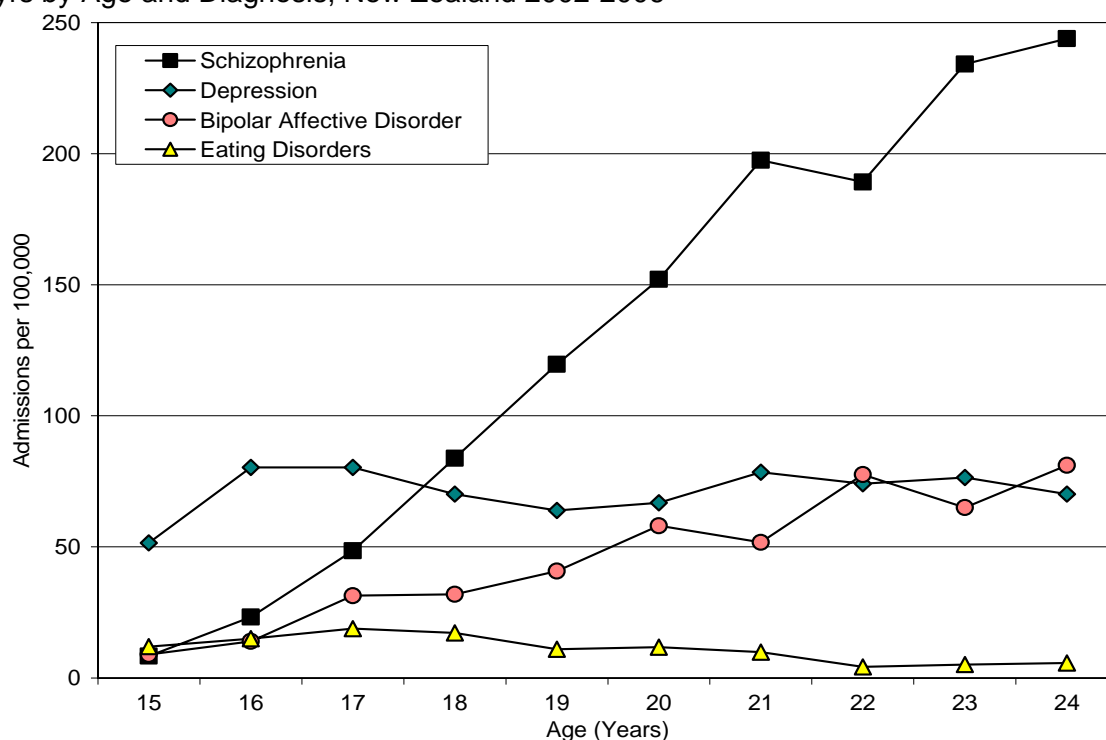
Age and Gender: During 2002-2006, while admissions for schizophrenia and bipolar affective disorder increased with age, admissions for eating disorders were more frequent amongst those in their teenage years (**Figure 167**). During the same period, admissions for schizophrenia were *significantly higher* for young men, while admission for depression and eating disorders were *significantly higher* for young women. No gender differences were seen for bipolar affective disorder (**Table 121** to **Table 124**).

Prioritised Ethnicity: During 2002-2006, schizophrenia admissions for Pacific young people were *significantly higher* than for European and Asian / Indian young people but *significantly lower* than for Māori young people (**Table 121**). In contrast, depression admissions for Pacific young people were *significantly lower* than for European and Māori young people, but *significantly higher* than for Asian / Indian young people (**Table 122**). Bipolar affective disorder admissions for Pacific young people were also *significantly lower* than for European and Māori young people, but similar to those of Asian / Indian young people (**Table 123**). Finally hospital admissions for eating disorders in Pacific young people were *significantly lower* than for European young people, but similar to those for Māori and Asian / Indian young people (**Table 124**).

NZDep Index Decile: During 2002-2006, hospital admissions for schizophrenia were *significantly higher* for those in the more deprived (Deciles 4-10) areas, with the highest rates being seen amongst those in the most deprived (Decile 10) areas (**Table 121**). In

contrast, hospital admissions for depression were *significantly higher* in the mid-ranges of the NZDep distribution (Deciles 4-9) (**Table 122**), while hospital admissions for eating disorders were significantly higher amongst those in the most affluent (Decile 1-2) areas (when compared to those in Decile 9-10 areas (**Table 124**)). NZDep differences for bipolar affective disorder were more mixed (**Table 123**).

Figure 167. Hospital Admission Rates for Mental Health Issues in Young People 15-24 yrs by Age and Diagnosis, New Zealand 2002-2006



Source: Numerator-National Minimum Dataset; Denominator-Census

Table 121. Risk of Hospital Admission for Schizophrenia in Young People 15-24 Years by Ethnicity, Gender and NZ Deprivation Index Decile, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	41.41	1.00		1-2	43.08	1.00	
2	44.71	1.08	0.82-1.42	3-4	57.34	1.33	1.11-1.59
3	38.83	0.94	0.71-1.25	5-6	90.36	2.10	1.78-2.48
4	76.06	1.84	1.44-2.35	7-8	158.51	3.68	3.16-4.28
5	87.65	2.12	1.67-2.69	9-10	227.03	5.27	4.55-6.10
6	92.92	2.24	1.77-2.83	Prioritised Ethnicity			
7	111.19	2.69	2.14-3.38	Māori	381.20	5.78	5.36-6.24
8	203.18	4.91	3.96-6.09	Pacific	145.11	2.20	1.93-2.51
9	178.71	4.32	3.48-5.36	European	65.93	1.00	
10	276.89	6.69	5.42-8.26	Asian/Indian	29.08	0.44	0.36-0.54
Gender							
Female	54.15	1.00					
Male	195.10	3.60	3.32-3.91				

Source: Numerator-National Minimum Dataset; Denominator-Census; Note: Rate per 100,000 per year, Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Table 122. Risk of Hospital Admission for Depression in Young People 15-24 Years by Ethnicity, Gender and NZ Deprivation Index Decile, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	45.29	1.00		1-2	49.03	1.00	
2	52.65	1.16	0.90-1.50	3-4	66.70	1.36	1.15-1.61
3	56.22	1.24	0.96-1.60	5-6	73.93	1.51	1.28-1.78
4	77.28	1.71	1.35-2.17	7-8	89.18	1.82	1.56-2.13
5	73.90	1.63	1.28-2.07	9-10	70.64	1.44	1.23-1.69
6	73.97	1.63	1.29-2.06	Prioritised Ethnicity			
7	82.86	1.83	1.45-2.30	Māori	59.74	0.65	0.57-0.74
8	95.15	2.10	1.68-2.63	Pacific	27.47	0.30	0.23-0.39
9	85.48	1.89	1.51-2.36	European	91.61	1.00	
10	55.32	1.22	0.96-1.55	Asian/Indian	13.92	0.15	0.11-0.20
Gender							
Female	90.35	1.00					
Male	52.04	0.58	0.53-0.64				

Source: Numerator-National Minimum Dataset; Denominator-Census; Note: Rate per 100,000 per year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Table 123. Risk of Hospital Admission for Bipolar Affective Disorder in Young People 15-24 Years by Ethnicity, Gender and NZ Deprivation Index Decile, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	28.47	1.00		1-2	28.86	1.00	
2	29.25	1.03	0.74-1.44	3-4	35.99	1.25	1.00-1.56
3	27.50	0.97	0.69-1.36	5-6	36.87	1.28	1.03-1.59
4	44.57	1.57	1.16-2.13	7-8	52.26	1.81	1.48-2.22
5	38.91	1.37	1.00-1.87	9-10	60.65	2.10	1.73-2.55
6	34.94	1.23	0.90-1.68	Prioritised Ethnicity			
7	44.12	1.55	1.15-2.09	Māori	72.26	1.68	1.48-1.91
8	59.94	2.11	1.59-2.80	Pacific	27.99	0.65	0.49-0.86
9	77.74	2.73	2.08-3.58	European	42.91	1.00	
10	43.02	1.51	1.13-2.02	Asian/Indian	17.33	0.40	0.30-0.53
Gender							
Female	44.84	1.00					
Male	44.45	0.99	0.88-1.11				

Source: Numerator-National Minimum Dataset; Denominator-Census; Note: Rate per 100,000 per year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Table 124. Risk of Hospital Admission for Eating Disorders in Young People 15-24 Years by Ethnicity, Gender and NZ Deprivation Index Quintile, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Quintile				Prioritised Ethnicity			
1-2	15.49	1.00		Māori	1.03	0.06	0.02-0.15
3-4	12.81	0.83	0.59-1.16	Pacific	0.52	0.03	0.00-0.21
5-6	9.93	0.64	0.45-0.91	European	18.31	1.00	
7-8	11.50	0.74	0.53-1.03	Asian/Indian	1.86	0.10	0.04-0.22
9-10	8.02	0.52	0.37-0.74				
Gender							
Female	22.31	1.00					
Male	0.44	0.02	0.01-0.04				

Source: Numerator-National Minimum Dataset; Denominator-Census; Note: Rate per 100,000 per year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Summary

In New Zealand during 2002-2006, the most common reasons for inpatient mental health admissions in young people were for schizophrenia, followed by depression and the mental health effects of drugs and alcohol. For (Any) Pacific young people during this period, schizophrenia and schizotypal and delusional disorders made the largest contribution and while overall, rates for mental health admissions were lower than the New Zealand average, these differences need to be seen in the context of the other services available to Pacific young people in the ambulatory care setting.

During 2002-2006 (using prioritised ethnicity), schizophrenia admissions for Pacific young people were *significantly higher* than for European and Asian / Indian young people but *significantly lower* than for Māori young people. In contrast, depression admissions were *significantly lower* than for European and Māori young people, but *significantly higher* than for Asian / Indian young people. Bipolar affective disorder admissions for Pacific young people were also *significantly lower* than for European and Māori young people, but similar to those of Asian / Indian young people. Finally hospital admissions for eating disorders in Pacific young people were *significantly lower* than for European young people, but similar to those for Māori and Asian / Indian young people. These figures should not be used to estimate population prevalence for Pacific young people however, as access to inpatient facilities may fail to accurately reflect the true burden of illness, or access to mental health services on an outpatient basis.

Self-Harm and Suicide

Introduction

While New Zealand's youth suicide rates had been increasing steadily since the early 1970s, it was not until the late 1980s / early 1990s that the most dramatic increases began to occur. Youth suicide rates reached a peak in 1996 and since then have begun to decline. Risk factors for suicide include male gender, ethnicity (Māori males > non-Māori males > Māori females > non-Māori females) and age. While much recent interest has focused on teenage suicides, recent data would suggest that the majority of youth deaths actually occur amongst those aged 19-24 years [315]. In 1998, the New Zealand Government launched a Youth Suicide Prevention Strategy, to provide a framework for understanding suicide prevention and to highlight some steps government agencies, communities, services, hapu and iwi could take to reduce suicide rates in the 15-24 year age group [316].

The following section explores hospital admissions for self inflicted injuries and deaths from suicide amongst Pacific young people in New Zealand using two data sources: the National Minimum (Hospital Admission) Dataset & the National Mortality Collection.

Data Source and Methods

Definition

Hospital Admissions for Self-Inflicted Injuries and Deaths from Suicide in Young People Aged 15-24 Years

Data Source

Admissions Numerator: National Minimum Dataset: Hospital admissions for young people 15-24 years with a primary diagnosis of injury (ICD-9 800-995: ICD-10 S00-T79) and an external cause code (E code) of intentional self harm (ICD-9 E950-E958 or ICD-10 X60-X84); the following were excluded: 1) Inpatient admissions with an Emergency Medicine Specialty code (M05-M08) on discharge (see Appendix 1);

Deaths Numerator: National Mortality Collection: Deaths of young people aged 15-24 years with a clinical code (cause of death) attributed to intentional self harm (ICD-9 E950-E958 or ICD-10 X60-X84)

Denominator: NZ Census

Indicator Category

Admissions: Proxy B-C; Mortality: Ideal B

Notes on Interpretation

The limitations of the National Minimum Dataset are discussed at length in Appendix 1. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data, particularly those which relate to injuries.

Statistical Significance Testing

95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

New Zealand Distribution and Trends

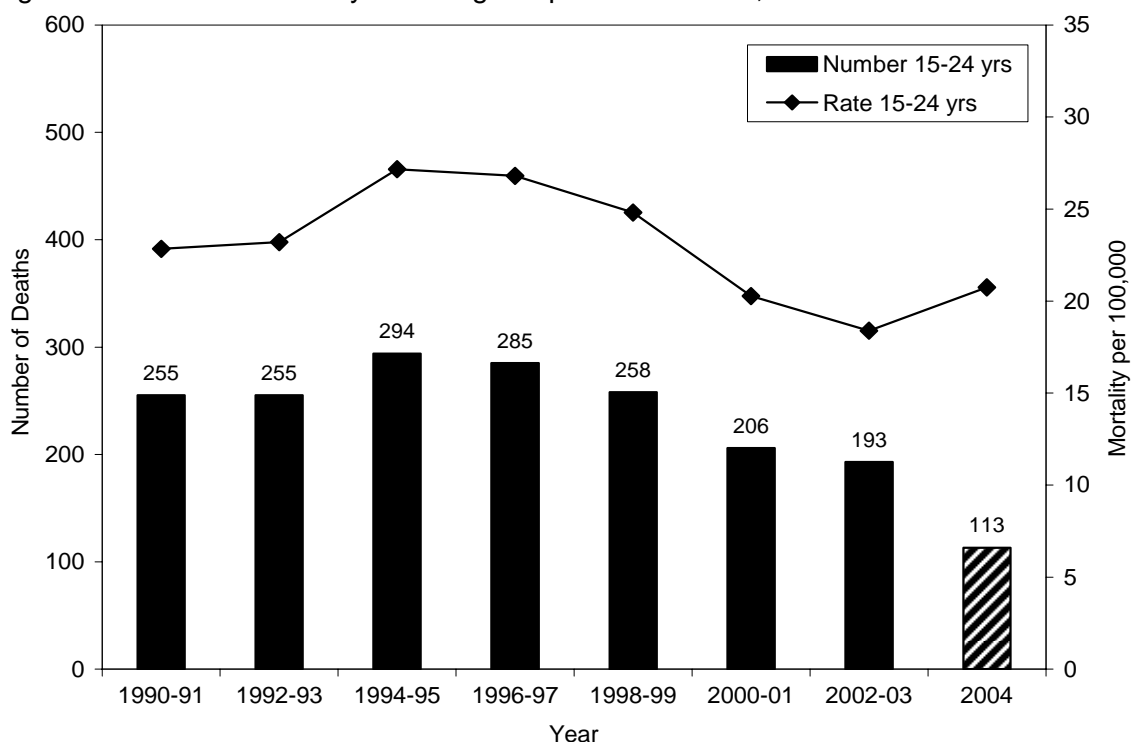
New Zealand Trends

Suicide rates amongst New Zealand young people increased during the early 1990s reaching a peak in 1996, and thereafter declined. During 2004 however, there was again an increase in suicide mortality in this age group (**Figure 168**).

Age and Gender Differences

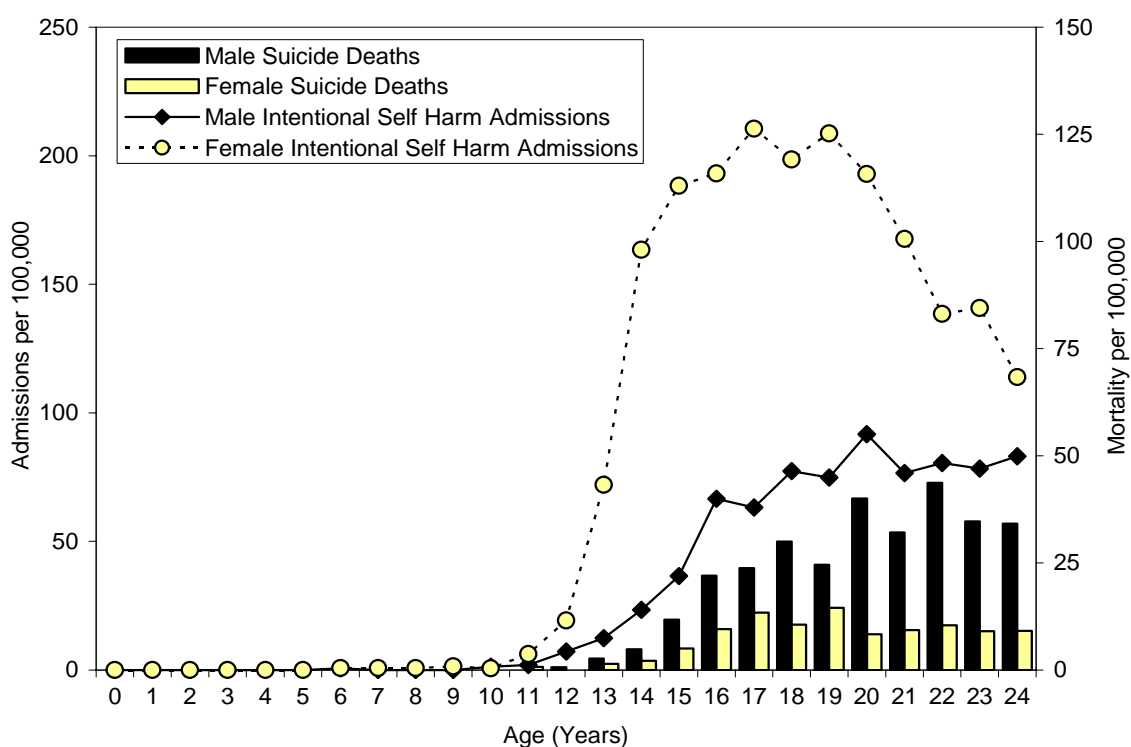
While suicide rates during 2000-2004 were highest for young men in their early 20s, hospital admissions for self-inflicted injuries during 2002-2006 were highest for young women in their mid to late teens (**Figure 169**).

Figure 168. Suicide Mortality in Young People 15-24 Years, New Zealand 1990-2004



Source: Numerator-National Mortality Collection; Denominator-Census; *Deaths for 1990-2003 are per 2 year period. Deaths for 2004 are for single year only.

Figure 169. Hospital Admissions (2002-2006) for Self Inflicted Injury and Deaths (2000-2004) from Suicide in New Zealand Children & Young People by Age and Gender



Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Census

Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

During 2002-2006, self inflicted injury admissions for Pacific young people were *significantly lower* than for European or Māori young people, but *significantly higher* than for Asian / Indian young people. Rates were also *significantly higher* for females and those in the more deprived (Deciles 5-10) areas (**Table 125**).

In contrast, during 2000-2004 suicide rates for Pacific young people were similar to those of European and Asian / Indian young people, but *significantly lower* than those of Māori young people. Rates were *significantly higher* for males and those in the more deprived (decile 7-10) areas (**Table 126**). During 1996-2004, suicide rates for Pacific and European young people were intermediate between those of Māori and Asian / Indian young people (**Figure 170**).

Table 125. Risk Factors for Hospital Admission for Self Inflicted Injury in Young People 15-24 Years, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	94.46	1.00		1-2	90.63	1.00	
2	86.92	0.92	0.76-1.11	3-4	97.81	1.08	0.95-1.23
3	88.58	0.94	0.78-1.13	5-6	130.86	1.44	1.28-1.62
4	107.13	1.13	0.94-1.35	7-8	148.75	1.64	1.46-1.84
5	124.60	1.32	1.11-1.57	9-10	137.64	1.52	1.35-1.71
6	136.78	1.45	1.23-1.71	Prioritised Ethnicity			
7	142.76	1.51	1.28-1.78	Māori	139.18	0.97	0.89-1.06
8	154.42	1.63	1.39-1.91	Pacific	72.56	0.51	0.43-0.60
9	155.48	1.65	1.41-1.93	European	143.04	1.00	
10	119.24	1.26	1.07-1.49	Asian/Indian	48.26	0.34	0.29-0.40
Gender							
Female	176.57	1.00					
Male	72.11	0.41	0.38-0.44				

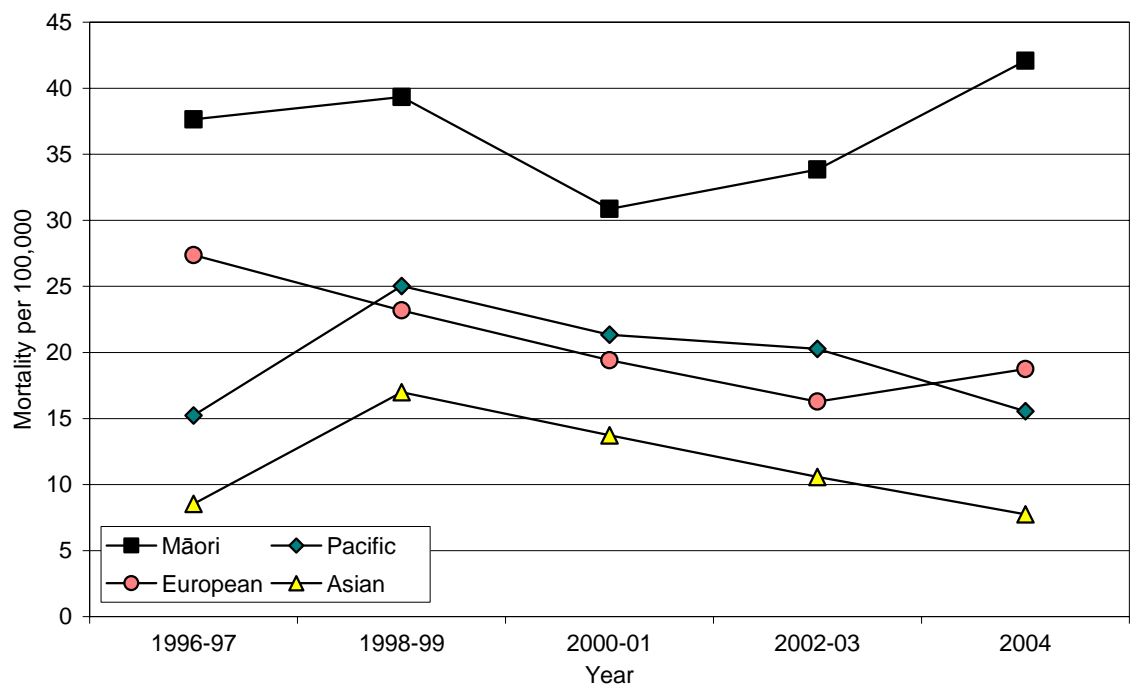
Source: Numerator-National Minimum Dataset; Denominator-Census; Note: Rate per 100,000 per year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted.

Table 126. Risk Factors for Suicide in Young People 15-24 Years, New Zealand 2000-2004

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Quintile				Prioritised Ethnicity			
1-2	12.75	1.00		Māori	34.38	1.91	1.57-2.32
3-4	17.03	1.34	0.96-1.87	Pacific	19.69	1.09	0.77-1.54
5-6	17.62	1.38	0.99-1.92	European	18.03	1.00	
7-8	21.74	1.71	1.25-2.34	Asian/Indian	11.00	0.61	0.42-0.89
9-10	25.86	2.03	1.51-2.74				
Gender							
Female	9.94	1.00					
Male	29.19	2.94	2.41-3.59				

Source: Numerator-National Mortality Collection; Denominator-Census; Note: Rate per 100,000 per year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted.

Figure 170. Suicide Mortality in Young People 15-24 yrs by Ethnicity, New Zealand 1996-2004



Source: Numerator-National Mortality Collection; Denominator-Census; Ethnicity is Level 1 Prioritised

Self Inflicted Injury Admissions and Suicide Mortality Amongst Pacific Groups in New Zealand

Self Inflicted Injury Admissions: During 2002-2006, (with the exception of Fijian and (Any) Other Pacific young people), hospital admissions for self inflicted injuries amongst young people in New Zealand's largest Pacific groups were *significantly lower* than for non-Māori non-Pacific young people (small numbers prevented valid comparisons for Tokelauan, Sole Niue and Sole Other Pacific young people). Self inflicted injury admissions for Fijian young people however, were *significantly higher* than for non-Māori non-Pacific young people (**Table 127**).

Suicide Mortality: In contrast, (with the exception of Sole Cook Island Māori young people), there were *no significant differences* between the suicide mortality rates of New Zealand's largest Pacific groups and non-Māori non-Pacific young people (small numbers prevented valid comparisons for Niue, Fijian, Tokelauan and "Other" Pacific young people). Suicide mortality rates for Sole Cook Island Māori young people however, were *significantly higher* than for non-Māori non-Pacific young people. Despite this, a total of 41 (Any) Pacific young people died as a result of suicide between 2000 and 2004 (**Table 128**).

Table 127. Distribution of Hospital Admissions for Self Inflicted Injury in Pacific Young People 15-24 Years by Pacific Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Any Samoan	60	12.0	53.6	0.43	0.33-0.56
Any Tongan	20	4.0	50.3	0.40	0.26-0.62
Any Cook Island Māori	39	7.8	75.1	0.60	0.44-0.82
Any Niue	8	1.6	39.3	0.31	0.15-0.62
Any Fijian	24	4.8	287.4	2.29	1.53-3.42
Any Tokelauan	<5	s	s	s	s
Any Other Pacific	10	2.0	137.2	1.10	0.59-2.05
Any Pacific	168	33.6	73.8	0.59	0.50-0.69
Any Māori	678	135.6	139.2	1.11	1.02-1.21
Non-Māori Non-Pacific	2560	512.0	125.3	1.00	0.95-1.06
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 100,000	RR	95% CI
Sole Samoan	41	8.2	57.0	0.46	0.34-0.63
Sole Tongan	12	2.4	45.4	0.36	0.20-0.63
Sole Cook Island Māori	19	3.8	71.3	0.57	0.36-0.89
Sole Niue	<5	s	s	s	s
Sole Fijian	11	2.2	317.7	2.54	1.41-4.59
Sole Tokelauan	<5	s	s	s	s
Sole Other Pacific	<5	s	s	s	s
Sole Pacific	95	19.0	66.9	0.53	0.43-0.65
Sole Māori	505	101.0	205.6	1.64	1.49-1.81
Non-Māori Non-Pacific	2560	512.0	125.27	1.00	

Source: Numerator-National Minimum Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate Ratios compared to the non-Māori non-Pacific group and are unadjusted; s: Rates not calculated due to small numbers.

Table 128. Distribution of Deaths due to Suicide in Pacific Young People 15-24 Years by Pacific Group, New Zealand 2000-2004

Any Pacific					
Pacific Group	Number: Total 2000-04	Number: Annual Average	Rate per 100,000	RR	95% CI
Any Samoan	12	2.4	11.3	0.70	0.39-1.25
Any Tongan	9	1.8	24.7	1.54	0.79-2.99
Any Cook Island Māori	13	2.6	26.7	1.66	0.95-2.89
Any Niue	<5	s	s	s	s
Any Fijian	<5	s	s	s	s
Any Tokelauan	<5	s	s	s	s
Any Other Pacific	<5	s	s	s	s
Any Pacific	41	8.2	19.1	1.19	0.86-1.65
Any Māori	162	32.4	34.4	2.14	1.77-2.59
Non-Māori Non-Pacific	314	62.8	16.0	1.00	
Sole Pacific					
Pacific Group	Number: Total 2000-04	Number: Annual Average	Rate per 100,000	RR	95% CI
Sole Samoan	7	1.4	10.2	0.63	0.30-1.33
Sole Tongan	6	1.2	25.5	1.59	0.71-3.57
Sole Cook Island Māori	9	1.8	34.8	2.17	1.12-4.21
Sole Niue	<5	s	s	s	s
Sole Fijian	<5	s	s	s	s
Sole Tokelauan	<5	s	s	s	s
Sole Other Pacific	<5	s	s	s	s
Sole Pacific	27	5.4	20.1	1.25	0.84-1.85
Sole Māori	134	26.8	55.7	3.47	2.83-4.25
Non-Māori Non-Pacific	314	62.8	16.0	1.00	

Source: Numerator-National Mortality Collection; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate Ratios compared to the non-Māori non-Pacific group and are unadjusted; s: Rates not calculated due to small numbers.

Summary

During 2002-2006 (using prioritised ethnicity), self inflicted injury admissions for Pacific young people were *significantly lower* than for European or Māori young people, but *significantly higher* than for Asian / Indian young people. In contrast, during 2000-2004 suicide rates for Pacific young people were similar to those of European and Asian / Indian young people, but *significantly lower* than for Māori young people. During 2002-2006 (using the (Any) / Sole classification), with the exception of Fijian and (Any) Other Pacific young people, self inflicted injury admissions for Pacific young people were *significantly lower* than for non-Māori non-Pacific young people (small numbers prevented valid comparisons for Tokelauan, Sole Niue and Sole Other Pacific young people). Admissions for Fijian young people however, were *significantly higher* than for non-Māori non-Pacific young people. In contrast, during 2000-2004 (with the exception of Sole Cook Island Māori young people), there were *no significant differences* between the suicide mortality rates of NZ's largest Pacific groups and non-Māori non-Pacific young people (small numbers prevented valid comparisons for Niue, Fijian, Tokelauan and "Other" Pacific young people). Suicide mortality for Sole Cook Island Māori young people however, was *significantly higher* than for non-Māori non-Pacific young people.



Individual and
Whanau Health
and Wellbeing

Sexual and
Reproductive
Health

Teenage Pregnancy

Introduction

Teenage pregnancy encompasses three distinct outcomes: births, terminations of pregnancy and spontaneous miscarriages amongst women <20 years of age. While New Zealand's teenage birth rates have declined in recent years, the number of therapeutic abortions has increased steadily, resulting in a small overall increase in teenage pregnancy rates. Teenage birth rates are highest amongst Māori > Pacific > European women, and although abortion rates are slightly higher amongst Māori, Māori women who do become pregnant in their teenage years are less likely to seek a therapeutic abortion [317].

High teenage pregnancy rates are a cause for concern, as young maternal age has been associated with a number of adverse birth outcomes [318]. In New Zealand, teenage pregnancy increases the risk of both preterm birth and small for gestational age [170]. There is currently debate however, as to whether it is the social or biological factors that play the greatest role, with risk of preterm birth amongst teens disappearing in a number of different studies, once the effects of socioeconomic disadvantage had been taken into account [318]. In addition to its biological effects, teenage pregnancy may also impact on educational attainment, not only of the young women themselves, but also the aspirations and opportunities available to their children [319].

The following section explores teenage birth rates amongst Pacific women in New Zealand using information available from the Birth Registration Dataset.

Data Source and Methods

Definition

Births to Women < 20 Years of Age

Data Source

Numerator: Birth Registration Dataset: All births to women <20 years of age

Denominator: NZ Census: All women aged 15-19 years

Indicator Category: Ideal B

Notes on Interpretation

In the analysis of total teenage pregnancy rates, information on terminations was obtained from the Abortion Supervisory Committee and miscarriage rates were estimated at 10% of induced abortions and 20% of live births [317].

Statistical Significance Testing

95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

New Zealand Distribution and Trends

New Zealand Trends

While New Zealand's teenage birth rates declined during 1980-2006, teenage pregnancies did not, with a gradual increase in the number of teenagers seeking therapeutic abortion. Thus by 2003, for every woman giving birth in her teenage years, there was one corresponding therapeutic abortion (**Figure 171**).

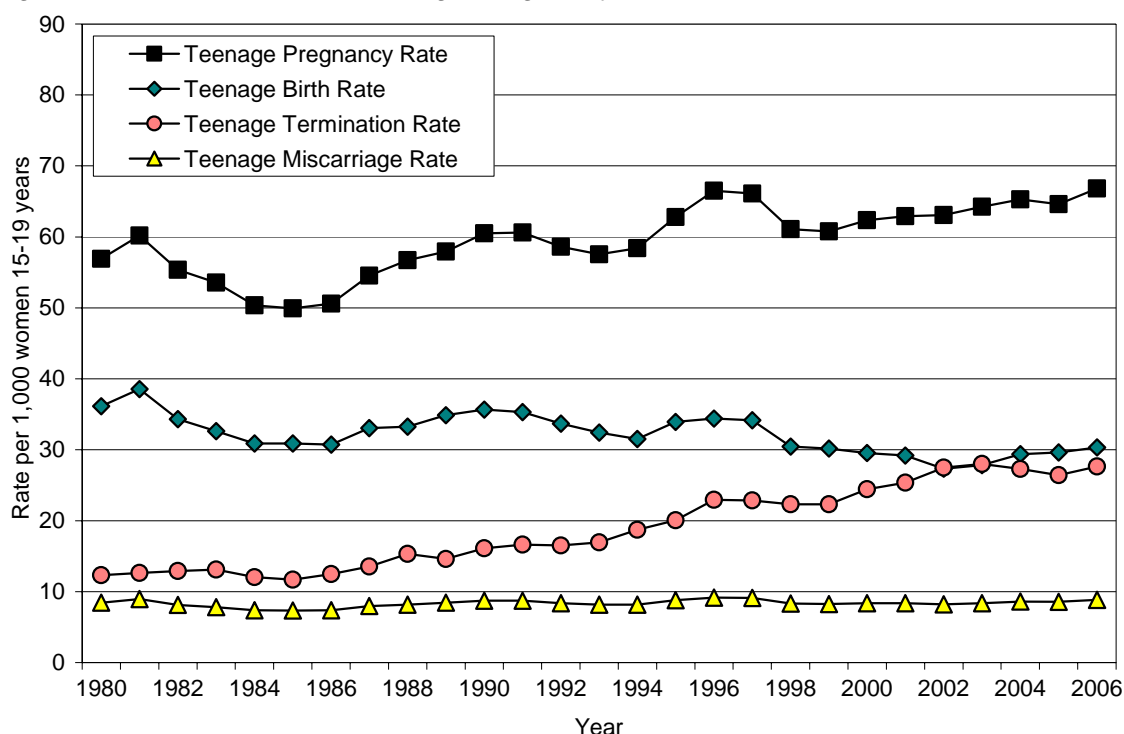
Distribution by Prioritised Ethnicity and NZ Deprivation Index Decile

During 2002-2006, teenage birth rates for Pacific women in New Zealand were *significantly higher* than for European and Asian / Indian women, but *significantly lower* than for Māori women (**Table 129**). Similar ethnic differences were seen during 1996-2006 (**Figure 172**). Higher teenage birth rates for Pacific women (compared to

European and Asian / Indian women) however, need to be viewed in the context of the higher overall fertility rates for Pacific women, and the fact that during 2001-2005 birth rates for Pacific women were higher than for European and Asian / Indian women in nearly every maternal age group (**Figure 173**).

During 2002-2006, teenage birth rates were *significantly lower* for women living in the most affluent (Decile 1) areas. From this baseline, rates increased progressively with increasing NZDep deprivation, with the highest rates being seen amongst women living in the most deprived (Decile 10) areas (**Table 129**).

Figure 171. New Zealand's Teenage Pregnancy Rates, 1980-2006



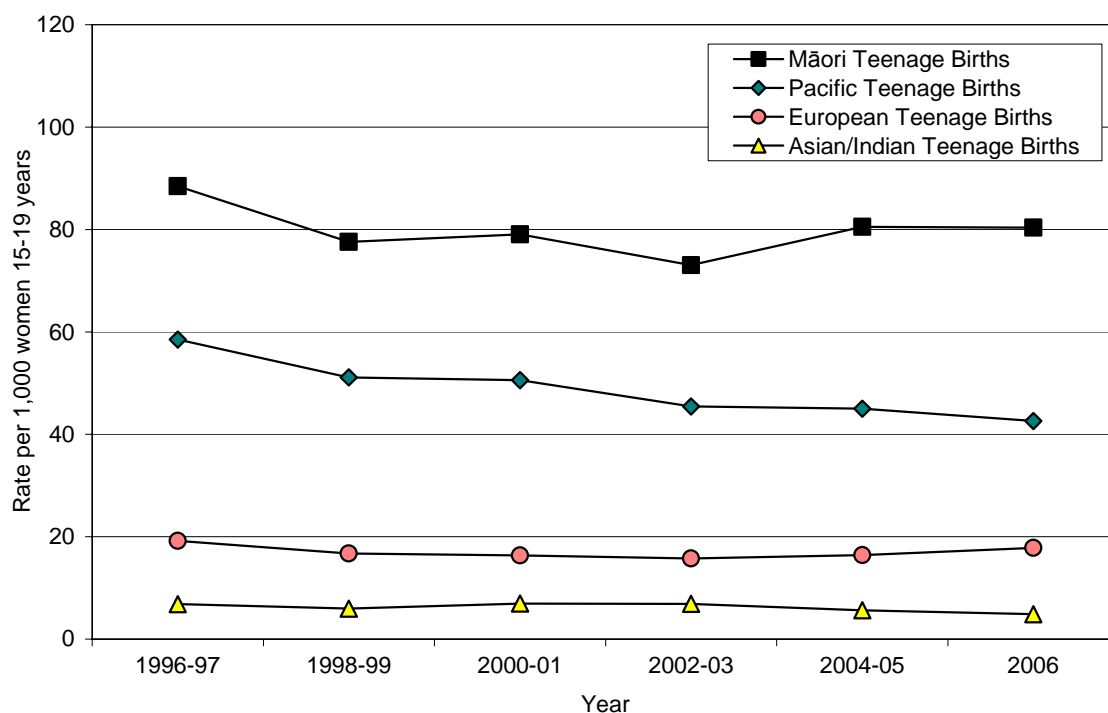
Source: Numerators-Birth Registration Dataset and Abortion Supervisory Committee; Denominator Census (Miscarriages-see notes in text box above)

Table 129 Teenage Birth Rates by Maternal Ethnicity and NZ Deprivation Index Decile, New Zealand 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	6.56	1.00		1-2	7.97	1.00	
2	9.45	1.44	1.28-1.62	3-4	15.47	1.94	1.80-2.09
3	12.57	1.92	1.71-2.15	5-6	24.00	3.01	2.81-3.23
4	18.48	2.82	2.53-3.14	7-8	37.16	4.66	4.37-4.97
5	20.01	3.05	2.74-3.39	9-10	51.82	6.50	6.10-6.92
6	27.89	4.25	3.84-4.71	Prioritised Ethnicity			
7	33.32	5.08	4.59-5.62	Māori	77.64	4.72	4.58-4.86
8	40.80	6.22	5.64-6.86	Pacific	44.65	2.72	2.60-2.85
9	42.96	6.55	5.94-7.22	European	16.43	1.00	
10	60.49	9.23	8.39-10.16	Asian/Indian	5.94	0.36	0.33-0.40

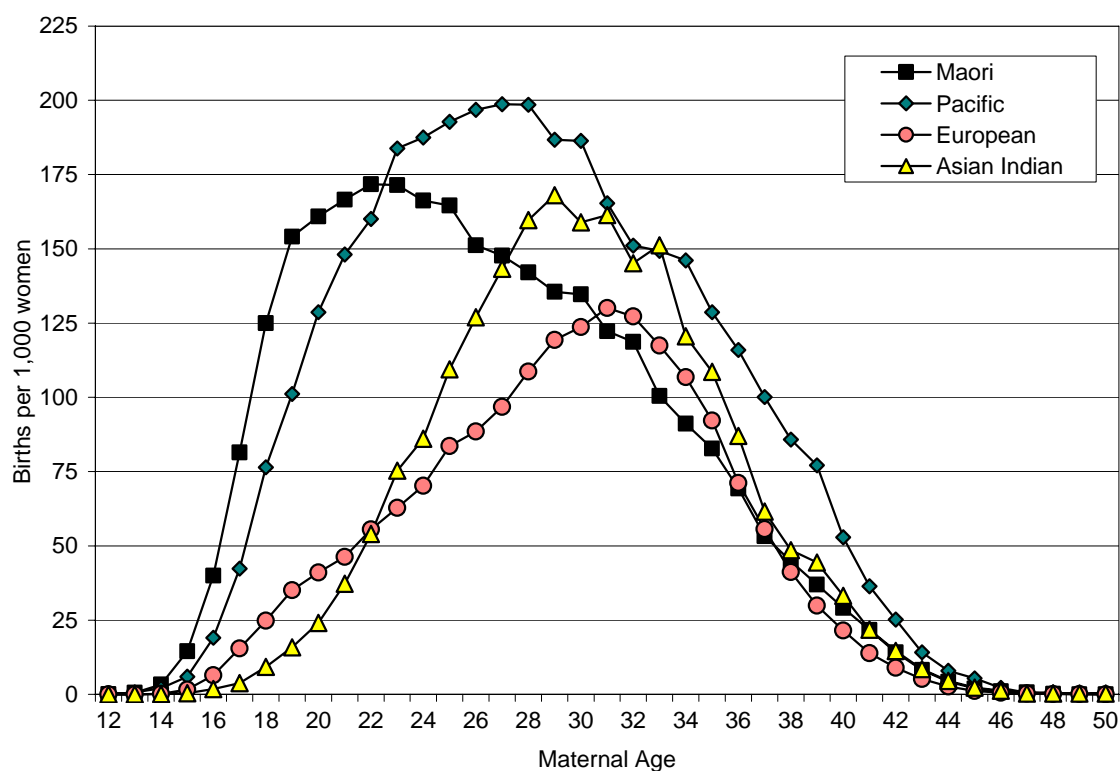
Source: Numerator-Birth Registration Dataset; Denominator-Census; Rate per 1,000 women aged 15-19 yrs per year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

Figure 172. Teenage Birth Rates by Maternal Ethnic Group, New Zealand 1996-2006



Source: Numerator-Birth Registration Dataset; Denominator-Census; Ethnicity is Level 1 Prioritised

Figure 173. Birth Rates by Maternal Age and Ethnicity, New Zealand 2001-2005



Source: Numerator-Birth Registration Dataset; Denominator-Census; Ethnicity is Level 1 Prioritised

Teenage Births Amongst Pacific Groups in New Zealand

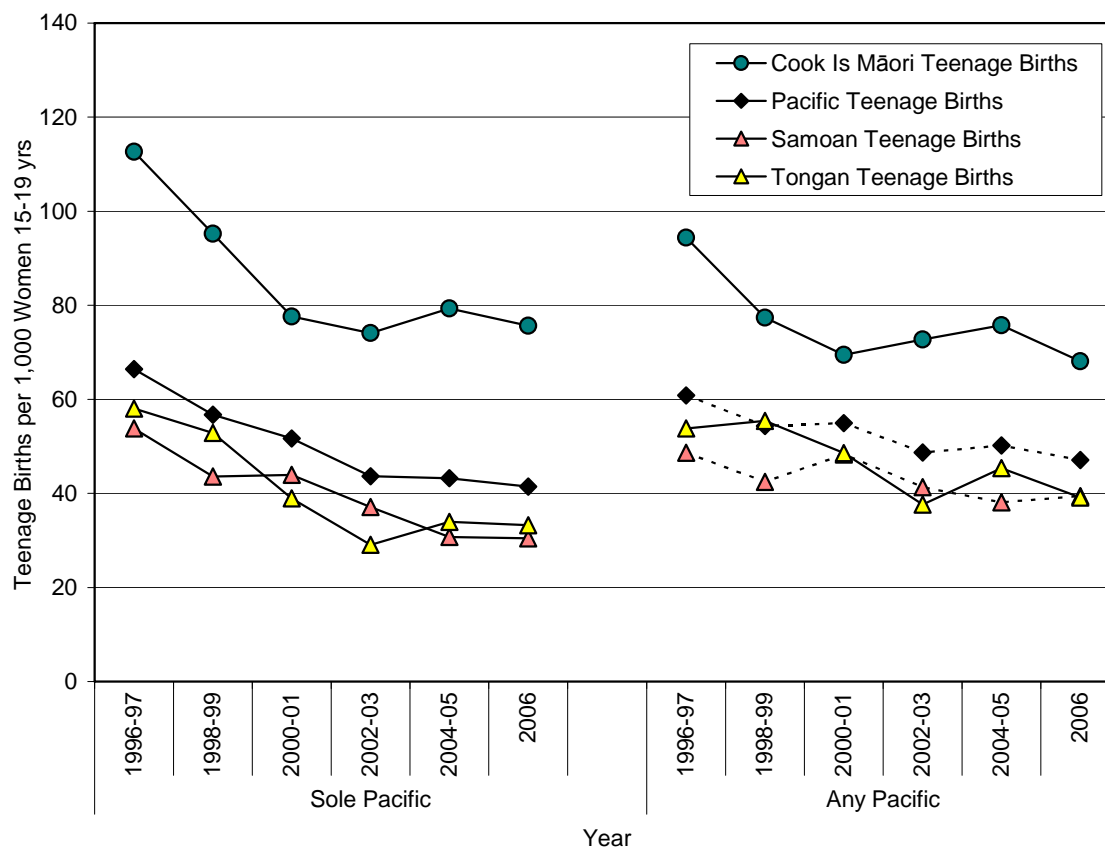
During 2002-2006, teenage birth rates for all of New Zealand's largest Pacific groups (with the exception of Sole Fijian women) were *significantly higher* than for non-Māori non-Pacific women. Within the (Any) category, teenage birth rates for Cook Island Māori and Niue women were *significantly higher* than for the other Pacific groups studied. Similarly, within the Sole category, rates for Cook Island Māori women were *significantly higher* than for Samoan, Tongan, Fijian, Tokelauan and "Other" Pacific women (**Table 130**). During 1996-2006, teenage birth rates were higher for Cook Island Māori women than they were for Tongan and Samoan women in both the Sole and (Any) categories (**Figure 174**).

Table 130. Distribution of Teenage Births (Excluding Terminations and Miscarriages) in Pacific Women by Pacific Ethnic Group, New Zealand 2002-2006

Any Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR*	95% CI
Any Samoan	1,232	246.4	39.6	2.78	2.62-2.95
Any Tongan	443	88.6	41.2	2.89	2.63-3.17
Any Cook Island Māori	1,085	217.0	73.0	5.13	4.82-5.46
Any Niue	370	74.0	65.7	4.61	4.17-5.10
Any Fijian	67	13.4	30.8	2.16	1.70-2.74
Any Tokelauan	68	13.6	38.2	2.68	2.12-3.39
Any Other Pacific	91	18.2	46.3	3.25	2.66-3.98
Any Pacific	3,077	615.4	49.0	3.44	3.30-3.59
Any Māori	10,732	2,146.4	77.6	5.45	5.29-5.61
Non-Māori Non-Pacific	7,312	1,462.4	14.2	1.00	
Sole Pacific					
Pacific Group	Number: Total 2002-2006	Number: Annual Average	Rate per 1,000	RR*	95% CI
Sole Samoan	631	126.2	33.1	2.32	2.14-2.51
Sole Tongan	225	45.0	32.1	2.25	1.97-2.56
Sole Cook Island Māori	557	111.4	76.6	5.38	4.95-5.85
Sole Niue	115	23.0	65.8	4.62	3.87-5.52
Sole Fijian	14	2.8	17.1	1.20	0.71-2.02
Sole Tokelauan	27	5.4	41.9	2.94	2.03-4.26
Sole Other Pacific	43	8.6	48.4	3.40	2.54-4.56
Sole Pacific	1,612	322.4	43.0	3.02	2.86-3.18
Sole Māori	6,633	1,326.6	102.0	7.17	6.94-7.40
Non-Māori Non-Pacific	7,312	1,462.4	14.2	1.00	

Source: Numerator-Birth Registration Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details); Rate ratios are compared to the Non-Māori Non-Pacific group and are unadjusted.

Figure 174. Teenage Birth Rates by Pacific Group, New Zealand 1996-2006



Source: Numerator-Birth Registration Dataset; Denominator-Census; Ethnicity assigned using Any / Sole Classification (see page 11 for details)

Summary

Teenage pregnancy encompasses three distinct outcomes: births, terminations of pregnancy and spontaneous miscarriages amongst women <20 years of age. While New Zealand's teenage birth rates declined during 1980-2004, teenage pregnancies did not, with a gradual increase in the number of teenagers seeking therapeutic abortion. Thus by 2003, for every woman giving birth in her teenage years, there was one corresponding therapeutic abortion.

During 2002-2006 (using prioritised ethnicity), teenage birth rates for Pacific women in New Zealand were *significantly higher* than for European and Asian / Indian women, but *significantly lower* than for Māori women. Higher teenage birth rates for Pacific women however, need to be viewed in the context of the higher overall fertility rates for Pacific women and the fact that during 2001-2005, birth rates for Pacific women were higher than for European and Asian / Indian women in nearly every maternal age group.

During 2002-2006, (using the (Any) / Sole classification system), teenage birth rates for all of New Zealand's largest Pacific groups (with the exception of Sole Fijian women) were *significantly higher* than for non-Māori non-Pacific women. Within the (Any) category, teenage birth rates for Cook Island Māori and Niue women were *significantly higher* than for the other Pacific groups studied. Similarly, within the Sole category, teenage birth rates for Cook Island Māori women were *significantly higher* than for Samoan, Tongan, Fijian, Tokelauan and "Other" Pacific women.

Sexually Transmitted Infection

Introduction

Research would indicate that 10-30% of New Zealand young people have had sexual intercourse by the time they reach 15 years of age, with the figure increasing to over 50% by 16-17 years [214]. Factors associated with early sexual intercourse include female gender, a background of socioeconomic disadvantage, sexual abuse in childhood and alcohol misuse in early adolescence [214]. Sexually transmitted infections (STI) are relatively common amongst those 15-24 years, with chlamydia being the most frequently diagnosed STI, followed by genital warts, non specific urethritis, genital herpes and gonorrhoea [320]. While chlamydia and gonorrhoea are more common amongst Pacific and Māori groups, viral conditions such as genital warts and genital herpes are more common amongst Europeans [214].

While changes in STI surveillance in recent years make precise time series analysis difficult, rates of both chlamydia and gonorrhoea appear to have increased during the past 5 years [320]. This is of concern, as STIs can lead to the development of serious sequelae such as pelvic inflammatory disease, ectopic pregnancy and infertility, as well as facilitating the transmission of HIV [320]. The following section briefly describes the characteristics of the most common STIs occurring in 15-24 year olds, before reviewing the available data on the distribution of chlamydia and gonorrhoea at a regional level. Because laboratory based surveillance data does not include information on ethnicity, in New Zealand at present it is very difficult to obtain ethnic specific rates for common sexually transmitted infections (while sexual health clinics do report on STIs by ethnicity, the lack of an appropriate denominator precludes the calculation of rates). Despite these limitations, the available evidence would suggest that STIs are as much an issue for Pacific young people in New Zealand as they are for other ethnic groups and the trends highlighted in this section need to be interpreted with this in mind.

Data Source and Methods

Definition

Laboratory Based Notifications for Chlamydia and Gonorrhoea in Young People < 25 Years.

Data Source and Interpretation

The information on sexually transmitted infections (STIs) in this analysis was obtained from the ESR's Annual Surveillance Reports (Appendix 4) and is based on information from their laboratory based surveillance systems. While a number of sexual health and family planning clinics also report voluntarily to ESR regarding the numbers of STIs seen, a lack of a clearly defined denominator means that it is impossible to estimate population prevalence from the information provided. In addition, because other practitioners within the primary care setting also treat young people for STIs, the figures given cannot be taken as representative of the total population. Laboratory based reporting however is also undertaken in a number of regions (Auckland, Waikato, Bay of Plenty), and because these laboratory's have clearly defined catchments, it is possible to estimate rates for chlamydia and gonorrhoea for these populations.

Indicator Category: Bookmark C

Statistical Significance Testing: Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance.

Common STIs in New Zealand

Chlamydia: Caused by the organism *Chlamydia trachomatis*. Infection may be asymptomatic in 70% of females and 50% of males. Untreated, chlamydia can lead to pelvic inflammatory disease (PID), ectopic pregnancy and infertility in females and urethritis, epididymo-orchitis, arthritis and infertility in males. Infection can also be transmitted to infants at the time of birth, leading to conjunctivitis and pneumonia [321].

Gonorrhoea: Caused by the organism *Neisseria gonorrhoea*. Infection may be asymptomatic in 50% of females and 10% of males. Untreated, gonorrhoea can lead to PID in females, epididymo-orchitis in males and severe conjunctivitis in neonates [321].

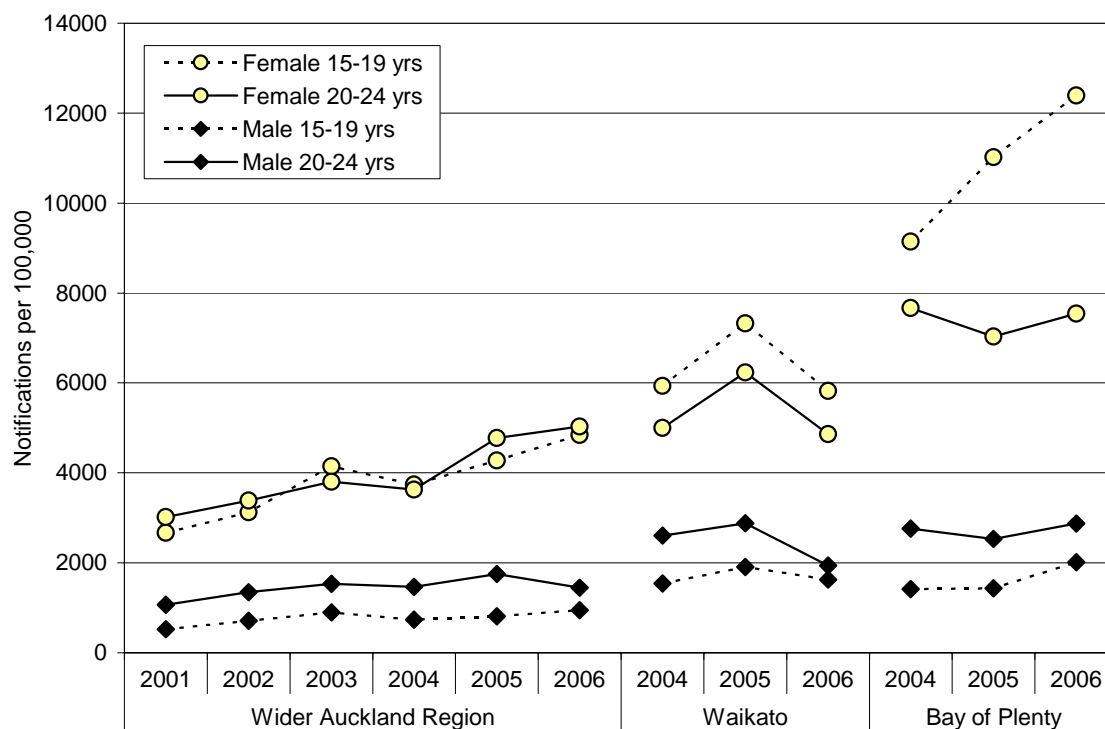
Genital Herpes: Caused by *Herpes simplex* virus (HSV) Type 1 or 2. Infections are associated with painful vesicular eruptions/ulcerations of genital skin and mucus membranes, which may become recurrent. Vaginal delivery in pregnant women with active infection may lead to infection of the newborn, resulting in severe systemic disease [321].

Genital Warts: Caused by infection with the human papillomavirus (HPV), which leads to the formation of small, soft, pink growths on the genitals which may become pedunculated. Warts may be solitary or cauliflower like and are generally painless [231]. Infection may be with types 6 and 11, or with the more high risk types 16 and 18, which are associated with a higher risk of cervical cancer [321].

Laboratory Based Notifications for STIs

Laboratory notification data from the Auckland, Waikato and Bay of Plenty regions during 2004-2006 suggested that chlamydia infections in these regions were more common amongst females than males. While for females, chlamydia was more common in the 15-19 year old age group, for males infections were more common amongst those aged 20-24 years. In addition, while there were large regional variations in chlamydia notifications during this period, in two out of the three regions studied, notifications exhibited a general upward trend (**Figure 175**).

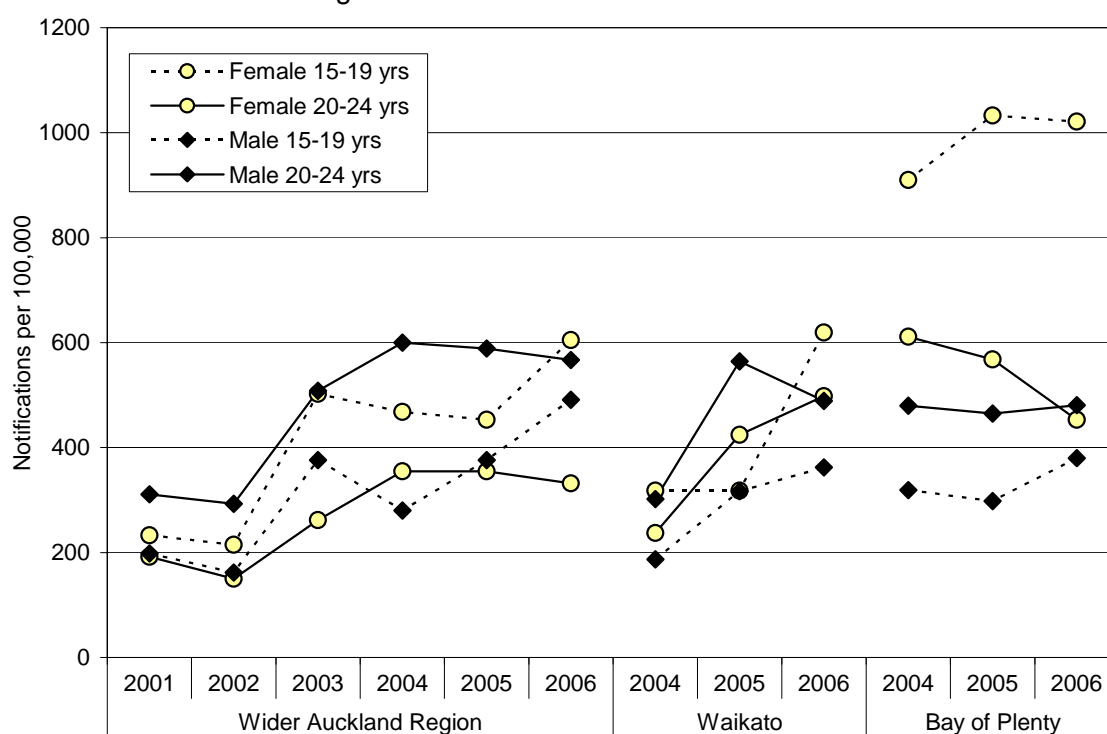
Figure 175. Laboratory Notifications for Chlamydia in Young People 15-24 Years, Selected New Zealand Regions 2001-2006



Source: ESR

During 2004-2006, while gonorrhoea infections were much less common than chlamydia amongst those aged 15-24 years, in two out of the three regions studied gonorrhoea rates also exhibited a general upwards trend. Gender and age differences however, were much less marked than they were for chlamydia (**Figure 176**).

Figure 176. Laboratory Notifications for Gonorrhoea in Young People 15-24 Years, Selected New Zealand Regions 2001-2006



Source: ESR

Summary

While no rates were able to be calculated from Sexual Health and Family Planning Clinic data, laboratory based surveillance during 2004-2006 suggested that chlamydia and gonorrhoea were both relatively common infections amongst those aged 15-24 years and that rates for both conditions were exhibiting a general upward trend. This is of concern, as STIs can lead to the development of serious sequelae such as pelvic inflammatory disease, ectopic pregnancy and infertility, as well as facilitating the transmission of HIV. While data limitations also meant that reliable ethnic specific rates could not be calculated, the available evidence would suggest that STIs are as much of an issue for Pacific young people in New Zealand as they are for other ethnic groups.



The New Zealand Child and Youth Health Indicator Framework and Appendices

Introduction to the NZ Child and Youth Health Indicator Framework

The New Zealand Child and Youth Indicator Framework was developed to assist those working in the health sector to consider all of the issues which need to be taken into account when planning services and strategies to improve the health of children and young people. The indicators included within the framework were selected following an extensive review of the New Zealand and overseas literatures and a two stage consultation process involving the child and youth health workforce. A more detailed description of the methodology used is outlined in *Monitoring the Health of New Zealand and Young People: Literature Review and Framework Development* [322]. This report highlighted New Zealand's currently fragmented approaches to monitoring child and youth health, as well as the need for a comprehensive framework which blends the functions of population health monitoring (i.e. the tracking of a basket of key indicators), with those of Health Needs Assessment (i.e. a broad coverage of all of the major issues, so that prioritisation decisions can be made in an evidence based manner). The report also highlighted the need for a sound theoretical model which governed the types of indicators included within the framework (e.g. health outcomes, risk factors, social determinants, policy), as well as how the relationships between these indicators were portrayed. The end result was the creation of a framework which arranged a comprehensive basket of child and youth health indicators into four vertically orientated domains, which intersected with a horizontal life course dimension (**Figure 177**). These four hierarchically arranged domains, designed to reflect the key steps in the causal pathways linking the wider social and political environment through to health outcomes at the population level, were:

1. Historical, Economic and Policy Context
2. Socioeconomic and Cultural Determinants
3. Risk and Protective Factors
4. Individual and Whanau Health and Wellbeing

The sections which follow briefly outline the broad scope of each of these domains in turn, before presenting a single example (hospital admissions for bronchiolitis during the first year of life), to illustrate how the framework might be used to assist those working in the health sector to consider the most appropriate intervention points for particular population health issues.

Domain 1: The Historical, Economic and Policy Context

While much research in recent years has focused on the underlying determinants of health (e.g. education, income, occupation), and how they lead to disparities in health outcome, it is only more recently that consideration has been given to how these determinants themselves have come to be inequitably distributed. In New Zealand, it is likely that three factors have played an important role:

1. Historical Factors: Understanding the current disparities in health experienced by Māori children and young people cannot occur without an understanding of New Zealand's colonial history and the declines in health status which occurred following the erosion of the economic and cultural base for Māori whanau and iwi, from the early 1800s onwards. Similarly for Pacific children and young people, an understanding of the historical factors which led to the migration of Pacific peoples to New Zealand is necessary.

2. Policy Factors: In recent years there has been an increasing awareness of the role Government policies play in shaping the distribution of the determinants of health. This is of particular relevance in the New Zealand context, where a period of rapid economic and social policy reform during the 1980s and early 1990s saw income inequalities rise rapidly and large numbers of children, particularly in sole parent, or Māori, or Pacific households falling below the poverty line (net-of-housing-cost-income <60%).
3. Macroeconomic Factors: In addition to Government policies, a range of other factors influence the distribution of health determinants at a population level (e.g. overseas commodity prices and interest rates, the value of the NZ dollar, immigration, unemployment rates). Each of these factors exerts downstream effects on the resources available to families with children and as a consequence, the distribution of health determinants at a population level.

While each of these issues is vital to shaping the current health status of New Zealand children and young people and if left unaddressed, may hinder initiatives to reduce disparities in health outcome, the theoretical and historical nature of these higher level factors does not readily lend itself to monitoring using routinely collected data sources. Instead, within this framework these issues are highlighted by means of guest editorials, which discuss the relevance of these higher level factors to child and youth health. It is intended that these editorials will be updated at least once every three years, in line with the other indicators within this framework.

Domain 2: Socioeconomic and Cultural Determinants

Research over the past decade has highlighted the significant role socioeconomic factors play in shaping child and youth health outcomes, as well as the role a secure cultural identity plays in ensuring their wellbeing. This domain provides coverage of some of the key determinants of health for New Zealand children and young people, and as far as possible has been developed to align with the Ministry of Social Development's 10 domains of social wellbeing. The domain is divided into 4 key streams: Cultural Identity; Economic Standard of Living; Education Knowledge and Skills; and Service Provision, Access and Utilisation, and within each of these streams a number of key indicators are presented, each highlighting a different facet of these key determinants.

Domain 3: Risk and Protective Factors

There is now a large body of literature outlining how risk and protective factors shape health outcomes at the individual level (e.g. how exposure to second hand cigarette smoke leads to hospital admissions for respiratory tract infections). However it is only more recently that attention has been directed towards understanding the ways in which the social determinants of health shape the distribution of these risk factors, as well as the pathways via which this might occur (e.g. social gradients in stress, leading to corresponding social gradients in cigarette smoking; financial constraints leading to a higher fat diet). The placing of this domain between Domain 2 (Socioeconomic and Cultural Determinants) and Domain 4 (Individual and Whanau Health and Wellbeing) is thus intentional, and intended to reflect an intermediate step in the causal pathway(s) linking higher level social and economic factors with individual health outcomes. The inclusion of individual risk and protective factors in this domain however, was guided by a literature review, as well as two rounds of consultation with the health sector.

Domain 4: Individual and Whanau Health and Wellbeing

The inclusion of a whanau dimension in the health outcomes domain arose following discussions with staff from the Māori SIDS Programme, who felt that the health and wellbeing of children and young people was inextricably interwoven with the wellbeing of their whanau, and that these two dimensions should be considered together. This

domain provides information on a large number of child and youth health outcomes, which are divided into 12 key streams including: Total Morbidity and Mortality; Whanau Wellbeing; Perinatal / Infancy; Well Health; Safety; Injury; Infectious Disease; Respiratory Disease; Chronic Conditions; Disability; Mental Health; Sexual and Reproductive Health. As with the Risk and Protective Factors domain above, the inclusion of individual indicators within each of these streams was guided by the initial literature review, followed by two rounds of consultation within the health sector.

The Lifecourse Dimension

The potential impact of the indicators within each of these four domains needs also to be considered within the context of the lifecourse, which within this framework spans the period 0 to 24 years. While the de-identified nature of the data used to create this framework means it is impossible to track the trajectory of any individual child as they progress from birth to early adulthood, **Figure 177** nevertheless highlights the points in the lifecourse at which each indicator might be considered to act. It is hoped that the two dimensional nature of the framework will thus assist the reader in considering the serial consequences that negative exposures have as a child passes from birth to 24 years and the manner in which the wider socioeconomic determinants of health shape the likelihood that it is the same child who e.g. is born with low birth weight, exposed to second hand cigarette smoke during infancy, admitted to hospital with pneumonia during their preschool years, fails school entry hearing screening, and who subsequently does poorly at school and leaves without formal qualifications. The potential intergenerational effects of these trajectories also need to be considered, as young people create a socioeconomic base for their own children in future years.

Using the Framework to Guide Public Health Action

While the framework was designed to provide a broad theoretical scaffolding for considering child and youth health, it was also intended that it be used as a practical tool to assist those working in the health sector to select the most appropriate intervention points for particular population health issues. In illustrating how the framework might be used to achieve this aim, the following section tracks a single health issue, hospital admissions for bronchiolitis in the first year of life, up through the various levels of the monitoring framework and in doing so highlights some of the likely reasons for the large socioeconomic and ethnic disparities in bronchiolitis admissions seen in New Zealand today. While the example used is simplistic and only considers at most one or two key determinants in each of the higher level domains, it is nevertheless hoped that this example will serve to illustrate how this framework might be used to plan strategies to address population health issues.

Example: Hospital Admissions for Bronchiolitis in Infancy

Bronchiolitis is a viral infection of the respiratory tract which commonly affects infants in their first year of life. It is the most common reason for admission to hospital with a lower respiratory tract infection amongst Pacific children in New Zealand (**Table 33**). Symptoms include coughing, wheezing, rapid breathing and difficulty in feeding and infants often require supplementary oxygen and fluids. Factors which increase the risk of bronchiolitis include age (<6 months), household crowding, older brothers and sisters attending day care, socioeconomic disadvantage, maternal smoking and a lack of breastfeeding. At a population level, any intervention which successfully reduced the incidence of bronchiolitis would not only reduce a significant burden of morbidity for New Zealand infants, but would also result in significant reductions in health care expenditure. The following section traces bronchiolitis and its determinants up through the 4 domains of the Indicator Framework in order to identify not only the extent of the problem, but also some of the factors which may need to be addressed if bronchiolitis admissions are to be reduced in the medium to longer term.



Figure 177. The New Zealand Child and Youth Health Monitoring Framework

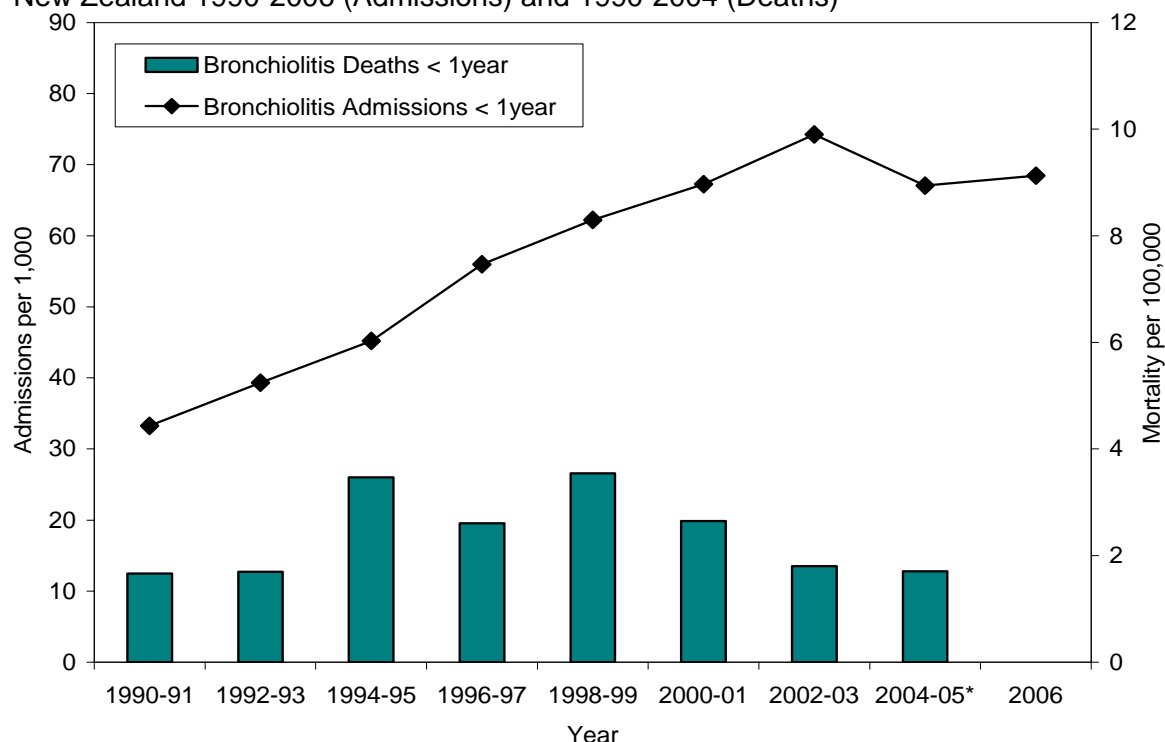
Historical, Economic and Policy Context	Life Course (years)																			
					5				10				15			20				
Historical Context																				
Macroeconomic & Policy Environment																				
Socioeconomic and Cultural Determinants	Life Course (years)																			
					5				10				15			20				
Cultural Identity																				
Enrolments in Kura Kaupapa Māori																				
Religious Affiliation																				
Languages Spoken																				
Economic Standard of Living																				
*Restricted Socioeconomic Resources																				
Children Reliant on Benefit Recipients																				
*Household Crowding																				
Young People Reliant on Benefits																				
Education: Knowledge and Skills																				
Participation in Early Childhood Education																				
*Educational Attainment at School Leaving																				
Senior Secondary School Retention Rates																				
Stand-down/Suspension/Exclusion/Expulsion																				
Service Provision and Utilisation																				
*Primary Health Care Provision and Utilisation																				
Risk and Protective Factors	Life Course (years)																			
					5				10				15			20				
Nutrition, Growth and Physical Activity																				
*Breastfeeding																				
*Overweight and Obesity																				
Nutrition																				
Physical Activity																				
Substance Use																				
*Exposure to Cigarette Smoke in the Home																				
Tobacco Use in Young People																				
Alcohol Related Harm																				

Individual and Whanau Health and Wellbeing	Life Course (years)																			
					5					10					15				20	
Total Morbidity and Mortality																				
*Most Frequent Admissions and Mortality																				
Whanau Wellbeing																				
Family Composition																				
Perinatal - Infancy																				
*Low Birth Weight - SGA and Preterm Birth																				
*Infant Mortality																				
Well Health																				
*Immunisation																				
Hearing Screening																				
*Oral Health																				
Safety																				
*Total and Unintentional Injuries																				
*Injuries Arising from Assault																				
CYF Notifications																				
Family Violence																				
Infectious Disease																				
*Serious Bacterial Infections																				
Meningococcal Disease																				
Rheumatic Fever																				
Serious Skin Infections																				
Tuberculosis																				
Gastroenteritis																				
Respiratory Disease																				
*Lower Respiratory Morbidity and Mortality																				
Bronchiolitis																				
Pertussis																				
Pneumonia																				
Bronchiectasis																				
Asthma																				
Chronic Conditions																				
*Diabetes and Epilepsy																				
Cancer																				
Disability																				
*Disability Prevalence																				
Congenital Anomalies Evident at Birth																				
Blindness and Low Vision																				
Permanent Hearing Loss																				
Mental Health																				
Callers to Telephone Counselling Services																				
Mental Health Inpatient Admissions																				
*Self Harm and Suicide																				
Sexual and Reproductive Health																				
*Teenage Pregnancy																				
Sexually Transmitted Infection																				

Note: *Indicators included in the Top 20

Domain 4: Individual and Whanau Health and Wellbeing

Figure 178. Hospital Admissions and Deaths due to Bronchiolitis in Infants < 1 Year, New Zealand 1990-2006 (Admissions) and 1990-2004 (Deaths)



Source: Numerators-National Minimum Dataset and Mortality Collection; Denominator-Birth Registration Dataset; *Deaths in 2004-05 are for 2004 only

Table 131. Gender, Ethnicity, NZ Deprivation Index Decile and Risk of Hospital Admission for Bronchiolitis in New Zealand Infants < 1 Year, 2002-2006

Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	24.60	1.00		1-2	26.90	1.00	
2	29.10	1.18	1.05-1.32	3-4	37.20	1.38	1.28-1.48
3	34.70	1.41	1.27-1.57	5-6	49.90	1.85	1.73-1.98
4	39.30	1.60	1.44-1.77	7-8	71.70	2.66	2.50-2.83
5	44.80	1.83	1.65-2.03	9-10	129.40	4.81	4.54-5.10
6	54.10	2.20	2.00-2.42	Prioritised Ethnicity			
7	66.00	2.69	2.45-2.96	Māori	110.00	2.95	2.86-3.05
8	76.20	3.10	2.83-3.40	Pacific	161.90	4.34	4.18-4.50
9	103.60	4.22	3.86-4.61	European	37.30	1.00	
10	151.70	6.18	5.67-6.74	Asian/Indian	16.60	0.45	0.41-0.50
Gender							
Female	55.00	1.00		Male	84.50	1.54	1.50-1.58

Source: Numerator-National Minimum Dataset; Denominator-Birth Registration Dataset; Rate per 1,000 per year; Ethnicity is Level 1 Prioritised; RR: Rate Ratios are compared to the European group and are unadjusted

In New Zealand during 1990-2006, bronchiolitis admissions increased progressively, reaching a peak of 75.5 per 1,000 in 2002-2003, and then declined. In contrast, mortality remained relatively static at 1-2 deaths per year during 1990-2004 (**Figure 178**). Bronchiolitis is predominantly a disease of infancy, with the majority of hospital admissions and deaths occurring in the first year of life, although a small number also

occur between 1-2 years of age. In addition to young age, during 2002-2006 hospital admissions for bronchiolitis were *significantly higher* amongst males, (Prioritised) Pacific > Māori > European > Asian / Indian infants and those living in the most deprived areas (**Table 131**).

Domain 2: Socioeconomic and Cultural Determinants

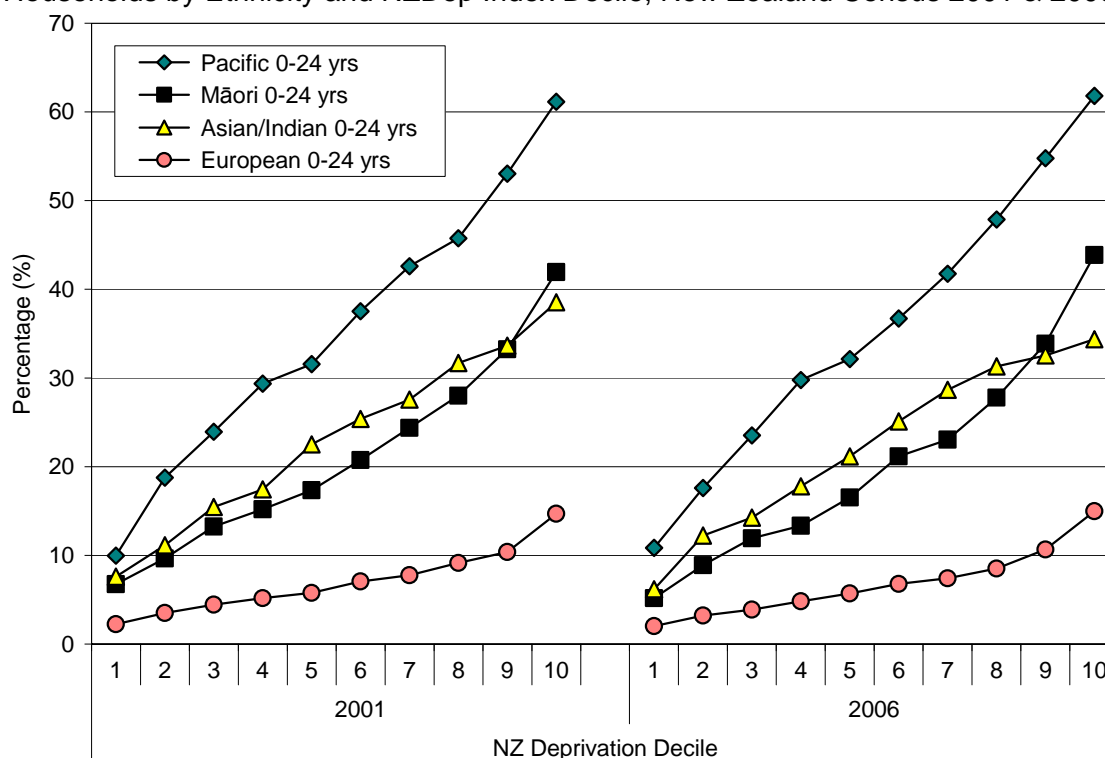
Domain 3: Risk and Protective Factors

The above figures suggest that bronchiolitis is a significant problem for New Zealand infants, and while data for 2004-2006 suggests that the recent large increases in hospital admissions for bronchiolitis may be beginning to taper off, Pacific and Māori infants and those in the most deprived areas still experience a disproportionate burden of morbidity. In order to understand some of the reasons for these disparities however, it may be necessary to consider two factors which sit in the higher levels of this framework, household crowding and exposure to cigarette smoke in the home.

Household Crowding

In New Zealand at both the 2001 and 2006 Censuses there were marked socioeconomic and ethnic disparities in the proportion of children and young people living in crowded households (**Figure 179**). These figures are based on the Canadian Crowding Index and reflect the proportion of families with children and young people who required 1 or more additional bedrooms to meet their family's needs. During both periods, while the proportion of children and young people living in crowded households increased in a stepwise manner with each increase in socioeconomic deprivation for all ethnic groups, at any given level of deprivation crowding rates remained higher for Pacific > Asian / Indian and Māori > European households. Thus over 60% of Pacific and 40% of Māori children and young people in the most deprived (Decile 10) areas lived in crowded housing.

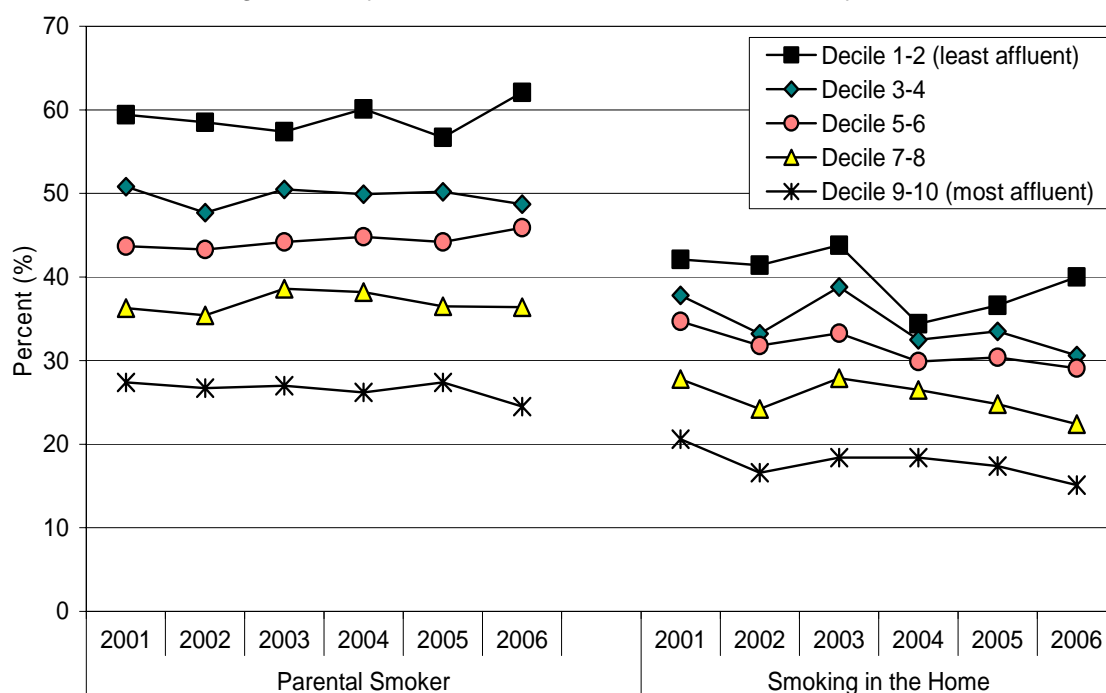
Figure 179. Proportion of Children and Young People 0-24 Years Living in Crowded Households by Ethnicity and NZDep Index Decile, New Zealand Census 2001 & 2006



Source: Statistics New Zealand; Ethnicity is Level 1 Prioritised; Only includes those where crowding status is known.

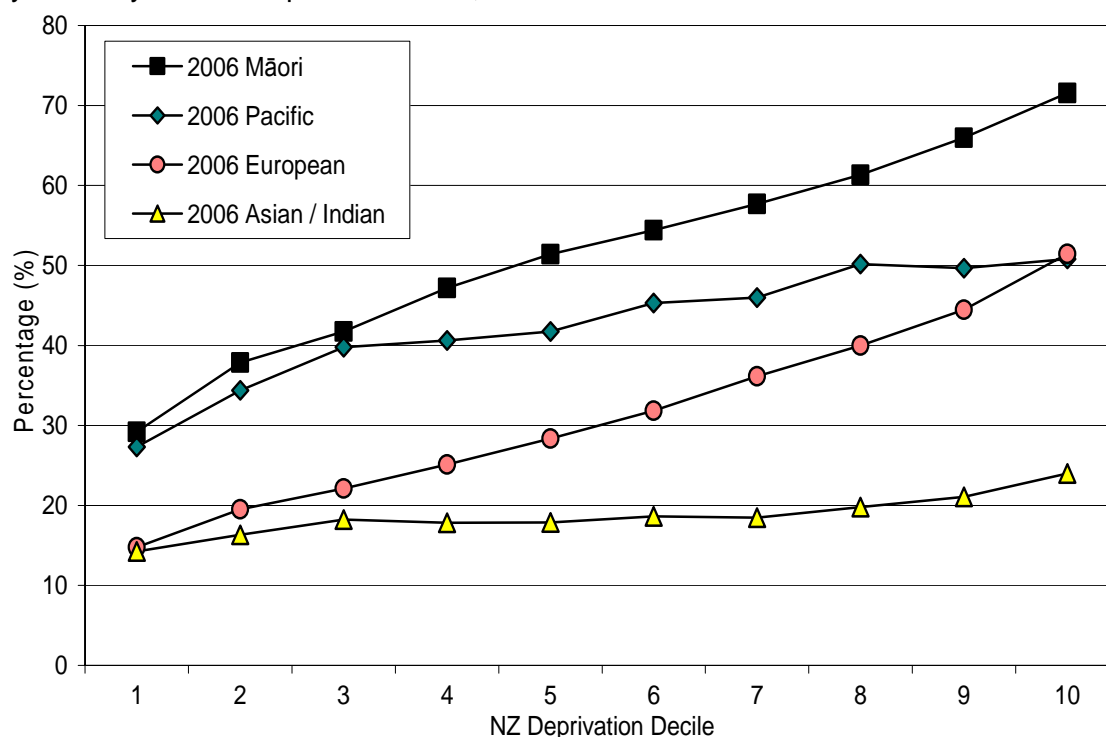
Exposure to Cigarette Smoke in the Home

Figure 180. Proportion of Year 10 Students with Parents Who Smoke, or Who Live in a Home with Smoking Inside by School SES Decile, NZ ASH Surveys 2001-2006



Source: Action for Smoking and Health (ASH) Surveys

Figure 181. Proportion of Children < 15 Years who Live in a Household with a Smoker by Ethnicity and NZDep Index Decile, New Zealand at the 2006 Census



Source: Statistics New Zealand; Ethnicity is Level 1 Prioritised

In New Zealand during 2001-2006, Action for Smoking and Health (ASH) Surveys suggested that there were marked socioeconomic differences in the proportion of Year 10 students whose parents smoked, or who lived in homes with smoking inside, with rates being consistently higher for those attending schools in the most deprived areas (**Figure 180**). Similarly, data from the 2006 Census suggested that the proportion of children living in a household with a smoker increased with increasing NZDep deprivation for each of New Zealand's largest ethnic groups, but that at nearly every level of deprivation, the proportion living in a household with a smoker was higher for Māori > Pacific > European > Asian / Indian children (**Figure 181**).

Domain 2: Socioeconomic and Cultural Determinants

A brief review of the above figures suggests that some of the disparities in hospital admission rates for bronchiolitis amongst Māori and Pacific infants and those in the most deprived areas may have arisen from corresponding disparities in common risk factors such as household crowding and exposure to cigarette smoke and that interventions targeting these risk factors may be necessary, if hospital admissions for bronchiolitis are to be reduced in future years. In order to ensure that any interventions developed to address these risk factors result in real long term change however, the reasons for the disparities in their distribution need also to be understood. In this context, the figures above illustrated two other key points:

1. That ethnic differences exist for crowding and exposure to second hand cigarette smoke, even when differences in socioeconomic deprivation are taken into account.
2. That for all ethnic groups, increasing socioeconomic deprivation was associated with higher levels crowding and exposure to second hand cigarette smoke.

While each of these issues could be explored in more detail within the higher levels of this framework, for brevity's sake the following example explores only the role socioeconomic disadvantage plays in shaping infant's exposures to cigarette smoke and crowding in their homes.

The Distribution of Births by New Zealand Deprivation Index Decile

In New Zealand all births are assigned a domicile code, based on the usual residential address of the mother at the time of her baby's birth registration. This allows births to be linked to the NZ Deprivation Index, a small area index of deprivation, which assigns each domicile in New Zealand a decile ranking ranging from 1 (the least deprived 10% of areas) to 10 (the most deprived 10% of areas). **Figure 182** summarises the average NZDep Index decile into which New Zealand babies were born during 1980-2006 and illustrates two main points:

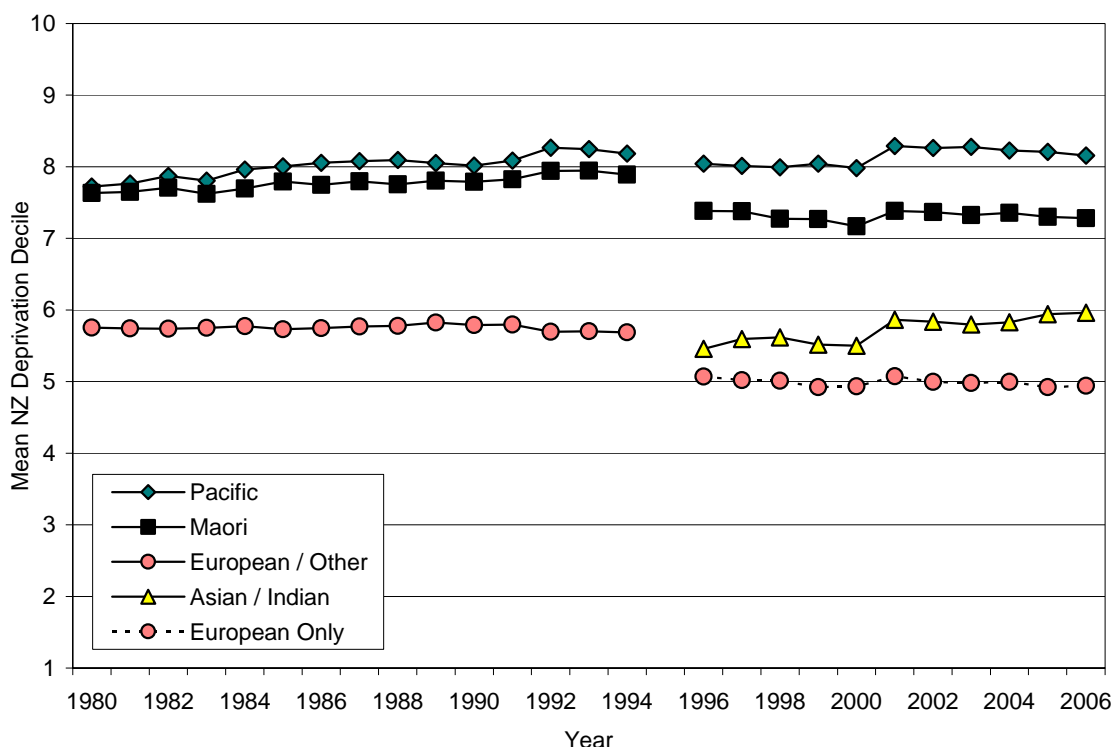
1. That on average Pacific and then Māori babies were born into more deprived areas than European / Other babies.
2. That in relative terms, the socioeconomic position of Pacific and Māori babies did not improve appreciably during this 26 year period. (Note: the NZDep Index is a relative scale, comparing those living in e.g. the 10% most and least deprived areas and thus cannot provide any commentary on absolute differences in socioeconomic resources during this period. Thus while incomes for those in the most deprived areas may have increased during this period, if they did not increase at a faster rate than for those in the least deprived areas, then their relative ranking may have stayed the same, even though absolute increases in income may have led to improvements in health status for those in the most deprived areas during this period).

The above findings are particularly relevant to understanding ethnic differences in the distribution of risk factors for bronchiolitis during this period. As the previous section



has suggested, for every increase in socioeconomic deprivation, exposure to second hand cigarette smoke and household crowding increased for all ethnic groups. Thus the over representation of Māori and Pacific infants in the most deprived areas may well make a large contribution to their disproportionate exposure to these risk factors during infancy. The fact that all of the ethnic differences were not accounted for by relative socioeconomic disadvantage, however, suggests that other pathways in addition to the one highlighted above may be in operation and thus additional explanations may also need to be sought from other levels within this framework.

Figure 182. Mean NZ Deprivation Index Decile of Births by Ethnicity, New Zealand 1980-2006

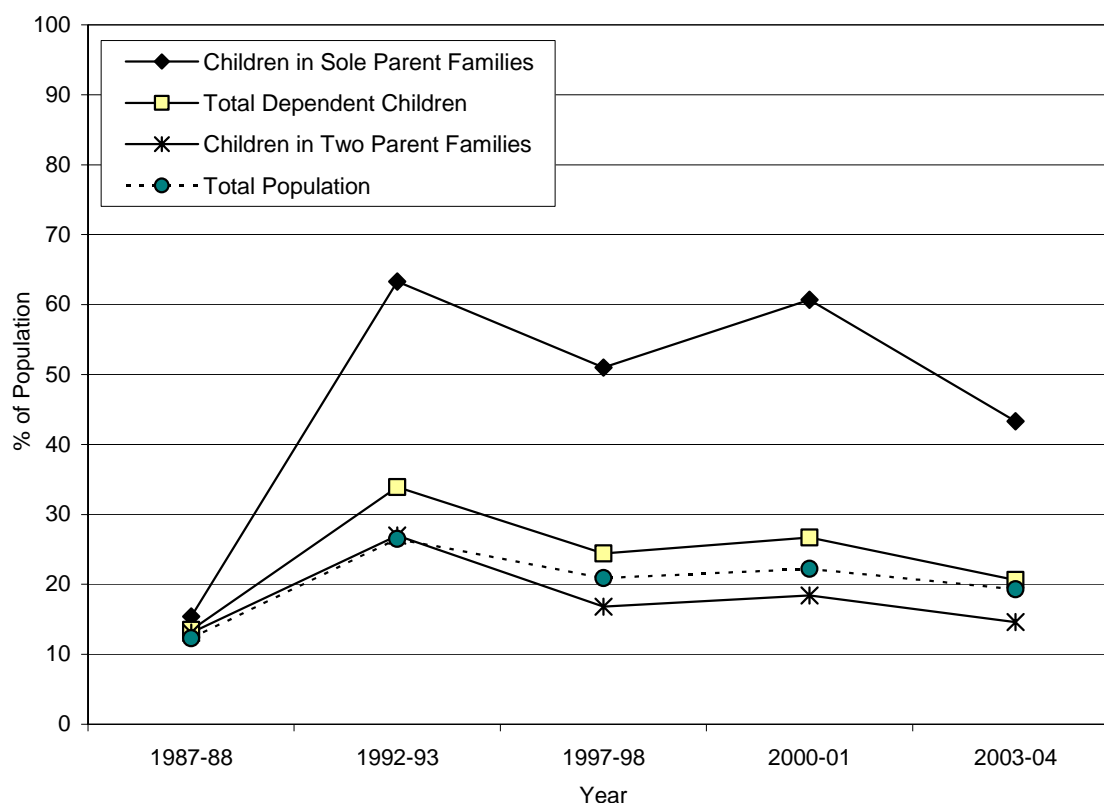


Source: Birth Registration Dataset; Note: Change in ethnicity definition in 1995. Ethnicity prior to 1995 is ancestry based, but after 1995 is Level 1 Prioritised. NZ Deprivation Index Decile is mapped to NZDep1996 and NZDep 2001

Domain 1: Historical, Economic and Policy Context

While many contemporary analyses of the social determinants of health would accept the socioeconomic differences shown in **Figure 182** as the starting point in a cascade which ultimately leads to poorer health outcomes, this monitoring framework highlights the fact that like any other indicator, the relative socioeconomic positions of New Zealand's largest ethnic groups are shaped by factors operating in the domains above. For example, it is possible for the distribution of the underlying determinants of health (e.g. the proportion of families with children living below the poverty line (Net-of-Housing-Cost Income <60 Percent Line)) to change very rapidly in response to changes in the policy environment and prevailing macroeconomic conditions (**Figure 183**). While it is beyond the scope of this brief example to fully explore the roles that historical, political and wider economic factors have played in shaping the underlying determinants of health, several of the editorials which appear in this report consider the influence these factors have had on shaping the determinants of health for Pacific children and young people.

Figure 183. Proportion of Population with Incomes Below the Poverty Line (Net-of-Housing-Cost Income <60 Percent Line Benchmarked to 1998 Median), Selected Years 1988-2004



Source: The Social Report 2006 [43], derived from Statistics NZ's Household Economic Survey (1988-04)

Conclusion

While this brief review is necessarily simplistic and does not take into account many of the complexities in operation in the real world (e.g. parental smoking and crowding are not the only risk factors for bronchiolitis, socioeconomic circumstances are not the only factors contributing to parental smoking, socioeconomic deprivation is not the only factor leading to ethnic disparities in health), it is hoped that this example will nevertheless serve to illustrate how the framework can be used to gain a better understanding of current health status of New Zealand's Pacific children and young people, as well as to provide some insights into the most appropriate intervention points for particular child and youth health issues.

Limitations of Current Indicators

One of the central aims of the Child and Youth Health Indicator project was to develop an overall map of all of the issues which needed to be taken into account when planning child and youth health services and strategies at a population level. Yet very early on in the course of consultation it became apparent that adequate data sources were available for only a fraction of the issues that those working in the health sector considered important to child and youth health. In order to ensure that issues for which adequate data was available did not take undue precedence over those for which reliable data was lacking, it was decided early on that a set of indicator selection criteria would be developed, which awarded a high priority to public health importance. Where an issue was deemed to have met these criteria but where routine data sources were lacking, “non-traditional” data sources would then be considered, in order to ensure that the issue did not fall below the public health radar.

Such an approach however, meant that many of the indicators included in the Indicator Framework may not have met the stricter data quality criteria utilised by other Government agencies. In order to highlight the impacts that such data quality issues may have had on the interpretability of the data, it was felt necessary to grade each indicator on the degree to which it captured the issue it was designed to measure, as well as the quality of its data source. Thus each indicator in the framework was assigned to one of three categories: Ideal, Proxy or Bookmark, and an assessment made as to whether its data sources were Excellent (A), Adequate (B), or whether Further Work (C) was required in order to improve the interpretability of the indicator (**Table 132**). These categories are outlined below:

1. **Ideal Indicators:** An indicator was considered ideal if it offered the potential to measure the total extent of a particular issue e.g. because the birth registration dataset captures >99% of births in New Zealand and information on gestational age is >98% complete, the preterm birth indicator derived from this dataset was considered ideal, in that it allowed conclusions to be drawn about trends in the incidence of preterm birth over time.
2. **Proxy Indicators:** In many cases, while it was not possible to measure the full extent of an issue, it was possible to assess the number of children and young people attending publicly funded services for its management e.g. while hospital admission data is unable to provide any commentary on the total number of injuries occurring in the community (as many injuries are treated in primary care, or at home), such data is nevertheless useful for assessing the workload such injuries create for secondary and tertiary services. One of the chief limitations of proxy indicators, however, is the variable extent to which they capture the total burden of morbidity (e.g. while nearly all non-fatal cases of meningococcal disease are likely to be captured by hospital admission data, the same datasets are likely to record only a fraction of gastroenteritis cases occurring in the community). While it is generally assumed that if admission thresholds remain constant (i.e. that children with a given level of severity for a condition will be managed in the same way), then such indicators can be used to track trends in the underlying burden of morbidity, in reality such thresholds are very seldom static and vary in ways which are both predictable (e.g. the introduction of pulse oximetry altering admission thresholds for infants with bronchiolitis over time) and unpredictable (e.g. differences in the ways in which DHBs upload their emergency department cases to the National Minimum Dataset). Thus while being of considerable utility in planning for future health service demand, such indicators are less useful for tracking temporal trends in the total burden of morbidity occurring in the community.

3. Bookmark Indicators: In many cases, consultation suggested that there was a need for indicators in areas where no data sources existed e.g. indicators to assess the prevalence of disability amongst New Zealand children by diagnostic category (e.g. autism, cerebral palsy) and by degree of functional impairment (e.g. visual acuity, degree of hearing loss). While more traditional approaches to indicator development might have suggested that such issues should be excluded from the monitoring framework until such time as high quality data sources could be developed, such approaches may also have inadvertently resulted in the needs of children and young people with these conditions slipping below the public health radar, and as a consequence being awarded a lesser priority in resource allocation decisions. Thus it was decided that a number of “Bookmark Indicators” should be created, which served to highlight particular issues until such time as more appropriate data sources could be developed. Where possible, such indicators would use currently available data sources to capture particular facets of the wider issue e.g. the current Mental Health Section contains three indicators – Children Calling Telephone Based Counselling Services, Inpatient Hospital Admissions for Mental Health Issues and Hospital Admissions and Mortality from Self Inflicted Injuries. While it is acknowledged that collectively these indicators fail to capture the full scope of child and youth mental health issues (the majority of which are managed on an outpatient basis and are thus not adequately represented by inpatient hospital admissions), it is nevertheless hoped that these indicators will serve as a “Bookmark” for child and youth mental health issues, until such time as better indicators can be developed.

A more detailed review of each of the data sources used to develop this Framework is included in the series of Appendices which follow. Readers are urged to be aware of the contents of these Appendices when interpreting the information in this report, and in particular the manner in which the inconsistent uploading of Emergency Department cases to the National Minimum Dataset hinders the interpretation of hospital admission trend data.

Table 132. Indicator Categories Based on the Type of the Indicator and the Quality of its Data Source

Indicator Type	Data Quality		
	Excellent (A)	Adequate (B)	Further Work Required (C)
Ideal	Measures total extent of an issue and data quality permits appropriate interpretation of trends and population level differences (No NZ indicators currently in this category)	Measures total extent of an issue and data quality permits adequate interpretation of information once the limitations of the datasets have been outlined E.g. Interpretation of trends in highest attainment at school leaving requires an understanding of changes associated with the roll out of the NCEA which began in 2002. While such changes make interpretation of trends difficult, improvements in data quality per se are unlikely to improve this situation	Measures total extent of an issue but data quality limits appropriate interpretation E.g. While theoretically the MOH's two oral health indicators provide near complete coverage of children at 5 and 12 years of age, in reality information is only collected on those who have completed treatment, potentially discounting the poor oral health status of children still undergoing treatment for dental caries at these points in time
Proxy	Measures attendances at publicly funded services for management of an issue and data quality permits appropriate interpretation of trends and population level differences (No NZ indicators currently in this category)	Measures attendances at publicly funded services for management of an issue and data quality permits adequate interpretation once the limitations of the datasets have been outlined E.g. Hospital admission data, when combined with mortality data, provides a reasonable overview of the incidence of invasive meningococcal disease. While a number of data quality issues apply to all indicators derived from these datasets (e.g. accuracy of coding), such limitations are unlikely to significantly hinder the interpretation of the data in this context	Measures attendances at publicly funded services for management of an issue but data quality currently limits appropriate interpretation E.g. Because of the inconsistent manner in which some DHBs have uploaded their emergency department cases to the hospital admission dataset over time, it is difficult to interpret trends in hospital admissions for minor injuries with any certainty. Thus while cross sectional analyses provide an overview of the types of injuries presenting to secondary and tertiary services, interpretation of trend data is significantly impeded by the quality of the datasets
Bookmark	Measures one facet of a wider issue, or provides a brief overview of the literature in an area where no data sources currently exist. Data quality for isolated facets permits appropriate interpretation. (No NZ indicators currently in this category)	Measures one facet of a wider issue, or provides a brief overview of the literature in an area where no data sources currently exist. Data quality for isolated facets permits adequate interpretation once the limitations of the datasets have been outlined E.g. The 2002 Children's Nutrition Survey provides a reasonable snapshot of overweight and obesity amongst New Zealand children at a single point in time. For this isolated snapshot, data quality permits adequate interpretation of the issues covered by this survey	Measures one facet of a wider issue, or provides a brief overview of the literature in an area where no data sources currently exist. Data quality for isolated facets limits appropriate interpretation E.g. In the absence of routine data on the extent of alcohol related harm amongst New Zealand young people, an analysis of hospital admissions with mention of alcohol in any of the first 15 diagnostic codes provides a snapshot of the types of issues presenting to secondary care services. Significant data quality issues however preclude this data being used to make any inferences about trends in alcohol related harm

Appendix 1: The National Minimum Dataset

Mode of Data Collection

The National Minimum Dataset (NMDS) is New Zealand's national hospital discharge data collection and is maintained by the New Zealand Health Information Service (NZHIS). The information contained in the dataset has been submitted by public hospitals in a pre-agreed electronic format since 1993. Private hospital discharges for publicly funded events (e.g. births, geriatric care) have been submitted since 1997. The original NMDS was implemented in 1993, with public hospital information back loaded to 1988 [323]. Information contained in the NMDS includes principal and additional diagnoses, procedures, external causes of injury, length of stay and sub-specialty code and demographic information such as age, ethnicity and usual area of residence.

Dataset Quality and Changes in Coding Over Time

There are a number of key issues which must be taken into account when interpreting information from the NMDS. Many of these issues arise as a result of regional differences in the way in which data is coded and uploaded to the NMDS. These include:

1. Inconsistencies in the way in which different providers upload day cases to the NMDS, and how this has changed over time.
2. The changeover from the ICD-9 to ICD-10 coding system, and irregularities in the way in which diagnoses and procedures are allocated ICD codes.
3. Changes in the way in which ethnicity information has been collected over time and across regions (Appendix 6).

The following sections discuss the first two of these issues, while the third is discussed in Appendix 6, which reviews the way in which ethnicity information is collected and coded within the health sector.

1. Inconsistencies in the Uploading of Day-Cases to the NMDS

One of the key issues with time series analysis using hospital discharge data is the variability with which different providers upload day cases to the NMDS. Day cases are defined as cases that are admitted and discharged on the same day, with the "three hour rule" (treatment time >3 hours) traditionally being utilised to define an admission event. In contrast patients who spend at least one (mid)night in hospital are classified as inpatients irrespective of their length of stay [324].

In the past, there have been significant regional variations in the way in which different providers have uploaded their day cases to the NMDS, leading to problems with both time series analysis and regional comparisons. These inconsistencies have included:

1. During the mid 1990's, a number of providers began to include A&E events as day cases if the total time in the Emergency Department (including waiting time) exceeded 3 hours, rather than uploading only those whose actual treatment time exceeded 3 hours [324]. NZHIS provided feedback which rectified this anomaly and since January 1995 the correct procedure has been used (these additional cases were coded using medical and surgical sub-specialty codes and are thus difficult to filter out using traditional Emergency sub-specialty filters).



2. Over time, a number of providers have become more efficient at recording the time of first treatment within the Emergency Department (rather than time of attendance) and thus during the late 1990s and early 2000s have become more efficient in identifying emergency department cases which meet the 3-hour treatment rule and are thus eligible to be uploaded to the NMDS. This has resulted in a large number of additional cases being uploaded to the NMDS, particularly in the upper North Island.
3. In addition, some providers admit cases to their short stay observation units while other providers do not, leading to regional variations in the appearance of day cases in the NMDS [325].

Previous Attempts to Address Inconsistent Uploading at the Analytical Stage

When producing their annual Hospital Throughput reports, the Ministry of Health has adopted the following filter to ensure regional and time series comparability with respect to day patient admissions [325]. In its analyses it excludes all cases where:

1. the admission and discharge date are the same (length of stay = 0)
2. and the patient was discharged alive
3. and the health specialty code on discharge is that of Emergency Medicine (M05, M06, M07, and M08).

While this coding filter succeeds in ensuring a degree of comparability between regions and across time (although it fails to correct the anomalies occurring during the mid 1990s when A&E cases were uploaded using medical sub-specialty codes), the exclusion of emergency day cases from time series analysis has a number of limitations including:

1. Exclusion of only those with a length of stay of 0 days means that those emergency cases who begin their treatment late at night and are discharged in the early hours of the following morning (up ¼ of emergency cases have a length of stay of 1 day in some DHBs) are included as genuine hospital admissions, whereas those who begin their treatment early in the morning and are discharged late in the afternoon or the evening of the same day are excluded.
2. With a move towards the development of specialist paediatric emergency departments in larger urban centres (e.g. Auckland), there remains the possibility that some larger DHBs are now seeing and treating a number of acute medical patients within the emergency setting, while in regional centres similar patients continue to be assessed on the paediatric medical ward / assessment unit and thus receive a paediatric medical specialty code. The exclusion of all emergency presentations from time series and sub-regional analysis may thus differentially exclude a large portion of the workload occurring in large urban centres where access to specialist advice and treatment is available within the Emergency Department setting.

The potential impact of inconsistent uploading of day cases to the NMDS is likely to be greatest for those conditions most commonly treated in the emergency department setting. Analysis of 2001-2003 hospital admission data suggests that >1/3 of NMDS emergency department discharges for those 0-24 years were due to injury, with another 1/3 were due to ambulatory sensitive conditions (e.g. asthma, gastroenteritis, respiratory infections). In contrast, only 2% of those presenting with bacterial meningitis and 4% of those with septic arthritis were discharged with an emergency sub-specialty code.

Further sub-analysis of these two admission categories however demonstrated that inclusion / exclusion of emergency department admissions had quite different effects

depending on the category of admission under study (injury vs. ambulatory sensitive admissions) and whether the region had access to a specialist Paediatric Emergency Department. In this analysis the Wider Auckland Region, (comprising 1/3 of the New Zealand population and whose residents have access to specialist Paediatric Emergency Departments) was compared to the rest of New Zealand. For ambulatory sensitive admissions, exclusion of emergency department cases resulted in Auckland's admission rates being consistently lower than in the rest of New Zealand. It was only when emergency cases were included in this analysis that Auckland's admission rates began to approximate those of the rest of New Zealand. In contrast for injuries, inclusion of emergency department cases resulted in hospital admissions in the Auckland Region consistently exceeding the rest of New Zealand. It was only when emergency cases were excluded from the analysis that Auckland's injury admission rates began to approximate those of the rest of New Zealand. (These findings occurred despite Auckland having a similar proportion of children living in the most deprived NZDep small areas as the rest of New Zealand).

Loosely interpreted, the findings of this analysis suggest that the workload of large specialist paediatric emergency departments must not be discounted when examining trends in ambulatory sensitive or other medical admissions, as it is only when emergency cases are included in the analysis that the admission rates of the Wider Auckland Region (with its access to Specialist Paediatric Emergency care) begin to approximate the rest of New Zealand. In contrast, it is possible that specialist paediatric emergency departments have much less of an influence on admission thresholds for injury, with these being handled in a similar manner by different emergency departments across the country. Thus for injury data, the greater tendency for some emergency departments to upload their cases to the NMDS must be taken into account in any analysis.

Implications for Interpreting Time Series Analyses in these Reports

Throughout this report, analysis of time series and other information has been undertaken using unfiltered hospital admission data, with the exception of the injury and poisoning sections. Here emergency department discharges have been filtered out of the dataset, in an attempt to address some of the inconsistencies discussed above. Despite such an approach, there remains the potential for the inconsistent uploading of day cases to significantly influence the time series analyses presented in this report. In particular, such practices may lead to an over estimate of the number of medical admissions commonly treated in the emergency department setting (e.g. asthma, skin infections, respiratory tract infections), while at the same time the filtering out of injury/poisoning emergency cases may lead to undercounting for a number of more minor types of injury. Nevertheless, the filtering process utilised in this report are thought to provide the best balance when considering hospital admissions amongst those 0-24 years. Despite this, the reader must bear in mind that a potential for significant residual bias remains, when interpreting the time series analyses presented in this report.

2. Data Quality and Coding Changes over Time (ICD-9 and ICD-10)

Change Over from ICD-9 to ICD-10 Coding

From 1988 until June 1999, clinical information in the NMDS was coded using variants of the ICD-9 classification system (ICD-9 CM until June 1995, then ICD-9-CM-A until June 1999). From July 1999 onwards, the ICD-10 classification system has been used, although for time series analysis, back and forward mapping between the two classification systems is possible using pre-defined algorithms [323].

The introduction of ICD-10 represents the most significant change in the International Classification of Diseases (ICD) in over 50 years and uses an alphanumeric coding

system for diseases in which the first character of the code is always a letter followed by several numbers. This has allowed for the expansion of the number of codes to provide for recently recognised conditions and to provide greater specificity about common diseases (there are about 8,000 categories in ICD-10 as compared to 5,000 in ICD-9). While for most conditions there is a reasonable 1:1 correspondence between ICD-9 and ICD-10 codes, for some this may lead to some irregularities in time series analysis [326]. Where possible such irregularities will be highlighted in the text, although care should still be taken when interpreting time series analysis across the 1999-2000 period as some conditions may not be directly comparable between the two coding systems.

Accuracy of ICD Coding

In recent years the NZHIS has undertaken a number of reviews of the quality of ICD coding in the NMDS. In the latest audit 2708 events were audited over 10 sites during a 3 month period during 2001/2002. Overall the audit found that 22% of events required a change in coding, although this also included changes at the fourth and fifth character level. The average ICD code change was 16%, with changes to the principal diagnosis being 11%, to additional diagnoses being 23% and to procedure coding being 11%. There were 1625 external causes of injury codes, of which 15% were re-coded differently [327]. These findings were similar to an audit undertaken a year previously.

While the potential for such coding errors must be taken into consideration when interpreting the findings of this report, it may be that the 16% error rate is an overestimate, as in the majority of the analyses undertaken in this report, only the principal diagnosis (with an error rate of 11%) is used to describe the reason for admission. In addition, for most admissions the diagnostic category (e.g. lower respiratory tract infections) is assigned using information at the 3 digit level (with the 16% error rate also including issues with coding at the 4th or 5th digit level).

3. Ethnicity Information in the NMDS

The reader is referred to the Demography and Measurement of Ethnicity Section for a discussion of this issue.

Conclusion

In general the inconsistencies outlined above tend to make time series and (regional) comparative analyses based on the NMDS less reliable than those based on Mortality or Birth Registration data (where legislation dictates inclusion criteria and the type of information collected). While hospital discharge data still remains a valuable and reasonably reliable proxy for measuring the health outcomes of children and young people in this country, the reader is cautioned to take into consideration the biases discussed above, when interpreting the findings outlined in this report.

Appendix 2: The Birth Registration Dataset

Mode of Data Collection

Since 1995 all New Zealand hospitals / delivering midwives have been required to notify Internal Affairs (within 5 working day of delivery), of the birth of a live / stillborn baby 20+ weeks gestation or weighting >400g. Prior to 1995, only stillborn babies reaching 28+ weeks of gestation required birth notification. Information on the hospital's notification form includes maternal age, ethnicity, multiple birth status, and baby's sex, birth weight and gestational age. In addition parents must complete a Birth Registration Form within 2 years of delivery, duplicating the above information, with the exception of birth weight and gestational age, which are supplied only on hospital notification forms. Once both forms are received by Internal Affairs, the information is merged into a single entry. This 2-stage process it is thought to capture 99.9% of births occurring in New Zealand and cross checking at the receipting stage allows for the verification of birth detail [328].

Issues to Take into Account When Interpreting Information Derived from the Birth Registration Dataset

Because of the 2-stage birth registration process, the majority of variables contained within the birth registration dataset are >98% complete, and cross checking at the receipting stage (with the exception of birth weight and gestational age) allows for the verification of birth details. In addition, the way in which ethnicity is collected in this dataset confers a number of advantages, with maternal ethnicity being derived from the information supplied by parents on their baby's birth registration form. This has the advantage of avoiding some of the ambiguities associated with hospital and mortality data, which at times have been reported by third parties. Changes in the way ethnicity was defined in 1995 however make information collected prior to this date incomparable with that collected afterwards. For births prior to 1995, maternal ethnicity was defined by ancestry, with those having half or more Māori or Pacific blood meeting ethnic group criteria, resulting in three ethnic groups, Māori, Pacific and non-Māori non-Pacific. For births after 1995 maternal ethnicity was self identified, with an expanded number of ethnic categories being available and parents being asked to tick as many options as required to show which ethnic group(s) they belonged to. For those reporting multiple ethnic affiliations a priority rating system was introduced, as discussed in the Demography and Measurement of Ethnicity Section of this report.

Because this dataset captures 99.9% of births occurring in New Zealand, is >98% complete for most variables, collects self reported ethnicity in a standard manner and is collated and coded by a single agency, information derived from this dataset is likely to be of higher quality than that derived from many of New Zealand's other data sources. Limitations however include the relatively restricted number of variables contained within the dataset (e.g. it lacks information on maternal smoking, BMI or obstetric interventions) and the lack of cross checking for birth weight and gestational age (which is supplied only on the hospital notification form). The change over in ethnicity definition during 1995 also prohibits time series analysis by ethnicity over the medium to long term. Each of these factors must thus be taken into account when interpreting information in this report that has been derived from the Birth Registration Dataset.

Appendix 3: National Mortality Collection

Mode of Data Collection

The Mortality Collection is a dataset managed by the New Zealand Health Information Service (NZHIS), which classifies the underlying cause, for all deaths registered in New Zealand since 1988. Fetal and infant data is a subset of the Mortality Collection and contains extra information on factors such as birth weight and gestational age [329].

Each month Births, Deaths and Marriages send NZHIS electronic death registration information, Medical Certificates of Cause of Death and Coroner's reports. Additional information on the cause of death is obtained from the National Minimum Dataset (NMDS), private hospital discharge returns, the New Zealand Cancer Registry (NZCR), the Department of Courts, the Police, the Land Transport Authority, Water Safety NZ, Media Search and from writing letters to certifying doctors, coroners and medical records officers in public hospitals. Using information from these data sources, an underlying cause of death (ICD-9 and ICD-10) is assigned by NZHIS staff according to the World Health Organisation's rules and guidelines for mortality coding [329].

Data Quality Issues Relating to the Mortality Collection

Unlike the NMDS, where information on the principal diagnosis is coded at the hospital level and then forwarded electronically to the NZHIS, for the Mortality Collection each of the approximately 28,000 deaths occurring in New Zealand each year is coded manually within NZHIS. For most deaths the Medical Certificate of Cause of Death provides the information required, although coders also have access to the information contained in the NMDS, New Zealand Cancer Registry, LSTA, Police, Water Safety NZ and ESR [330]. As a consequence, while coding is still reliant on the accuracy of the death certificate and other supporting information, there remains the capacity for a uniform approach to the coding which is not possible for hospital admission data.

While there are few published accounts of the quality of coding information contained in the Mortality Collection, the dataset lacks some of the inconsistencies associated with the NMDS, as the process of death registration is mandated by law and there are few ambiguities as to the inclusion of cases over time. As a consequence, time series analyses derived from this dataset are likely to be more reliable than that provided by the NMDS. One issue that may affect the quality of information derived from this dataset however is the collection of ethnicity data, which is discussed in more detail in the Demography and Measurement of Ethnicity Section of this report.

Appendix 4: ESR Sexual Health Data

Mode of Data Collection

Under the Health Act 1956 and the Tuberculosis Act 1948, health professionals are required to notify their local Medical Officer of Health of any notifiable disease that they suspect or diagnose. Notification data are recorded on a computerised database (EpiSurv) and forwarded weekly to the Institute of Environmental Science and Research (ESR) where the information is collated and analysed on behalf of the Ministry of Health [248].

Data Quality and Completeness: Sexual Health Data

While Sexually Transmitted Infections (STIs) are not notifiable diseases in New Zealand, data on STIs of public importance (Chlamydia, gonorrhoea, genital herpes, genital warts, syphilis, and non-specific urethritis) are submitted voluntarily to ESR by a number of sexual health clinics, family planning clinics and student and youth health clinics. In addition, laboratory based surveillance data is submitted by laboratories in Auckland, Waikato, and the Bay of Plenty (Chlamydia and gonorrhoea) [248].

In general, clinic based surveillance systems tend to underestimate the overall burden of STIs in New Zealand, as a large percentage of these infections are diagnosed by other practitioners in the primary care setting. Laboratories however tend to receive specimens from all providers, making them a useful complimentary source of information in areas where laboratory based surveillance is operating (notification however is limited to Chlamydia and gonorrhoea). In areas where both SHC and laboratory surveillance data is available, estimates suggest that the real rates of Chlamydia are 3x higher and rates of gonorrhoea 2x higher than notifications by SHCs would suggest [331].

In terms of the information contained in this report, SHC data is probably most useful for highlighting the relative proportions of different types of STI in the primary care setting, as lacking a geographically defined population denominator SHC data is reported as the number of cases per 100 clinic attendees. In contrast, laboratory based surveillance data, which tends to have a more clearly defined geographic denominator, is of greater utility in estimating the overall burden of disease. Because of the patchy coverage however, neither surveillance system is able to provide a reliable estimates of the national burden of disease in this country [321].

Note: While parts of this material are based on data and information provided by the Institute of Environmental Science and Research Ltd on behalf of the Ministry of Health, the analyses, conclusions, opinions and statements expressed herein are those of the authors and not necessarily those of the Institute of Environmental Science and Research Ltd or the Ministry of Health.

Appendix 5: New Zealand Cancer Registry

Mode of Data Collection

The New Zealand Cancer Registry (NZCR) is a population based register established in 1948 to collect information on all primary malignant diseases diagnosed in New Zealand. The term “primary” refers to tumours which originate in a primary site and are thus neither extensions nor recurrences of pre-existing tumours. Cancers are registered once, in the year of their first known diagnosis and only one tumour is recognised per organ / pair, unless the second tumour is of a different histology. Incidence thus reflects the number of primary tumours diagnosed, rather than the number of individuals with cancer in any one year. (Squamous cell and basal cell skin cancers have traditionally been excluded from the Register, as have in-situ cancers since 1985) [332].

When the register was set up in 1948, it primarily used information sent by public hospitals to the National Minimum Dataset (NMDs). With the introduction of the Cancer Registration Act and the Cancer Registry Regulations during 1993 / 1994 however, it became a legal requirement for all New Zealand laboratories to report newly diagnosed cancers to the New Zealand Health Information Service (NZHIS) for inclusion in the NZCR. Notification data is then supplemented with that contained in the New Zealand death certificate and hospital admission databases. To ensure a high standard of data quality, NZCR staff screen all records when adding them to the Register and cancer deaths are reconciled to cancer registrations as they occur [326]. Since the advent of laboratory based reporting, the quality and the completeness of the data have improved significantly, meaning that data collected since 1995 cannot be directly compared with that collected in previous years [332].

In the NZCR, ethnicity is based on the concept of self-identification and utilises the same classification system employed in the 1996 census, with the Statistics NZ prioritisation system being employed for those reporting multiple ethnic affiliations (see Appendix 6). The ethnicity recorded in the Register is taken from hospital discharge information, the National Health Index (NHI) database or the mortality collection. Because an increasing number of registrations are now based on laboratory reports, where ethnicity is not always specified, there has been an increase in the number of cases for which ethnicity is unknown. Because these cases tend to be by default allocated to the non-Māori category, there remains the potential for undercounting of Māori in this situation.

Since November 2001 all cancer registrations have been coded using ICD-10-AM for the topographical site of the cancer and the International Classification of Diseases for Oncology (ICD-O-2) for the morphological type of the tumour. Prior to this date ICD-9-CM-A was used as far back as 1995 [326]. Data in the Cancer Registry is subject to small changes over time as late reports about cancer registrations are received. Thus information reported at an earlier time may differ slightly from that reported later [332].

Appendix 6: NZ Deprivation Index

The New Zealand Deprivation Index (NZDep) is a small area index of deprivation, which has been used as a proxy for socioeconomic status in this report. The main concept underpinning small area indexes of deprivation is that the socioeconomic environment in which a person lives can confer risks / benefits which may be independent of their own social position within a community [333]. They are thus aggregate measures, providing information about the wider socioeconomic environment in which a person lives, rather than about their individual socioeconomic status.

The NZDep was first created using information from the 1991 census, but has since been updated following each census. The NZDep2006 combines 9 variables from the 2006 census which reflect 8 dimensions of deprivation (**Table 133**). Each variable represents a standardised proportion of people living in an area who lack a defined material or social resource (e.g. access to a car, income below a particular threshold), with all 9 variables being combined to give a score representing the average degree of deprivation experienced by people in that area. While the NZDep provides deprivation scores at meshblock level (Statistics NZ areas containing approx 90 people), for the purposes of mapping to national datasets, these are aggregated to Census Area Unit level (≈1,000-2,000 people). Individual area scores are then ranked and placed on an ordinal scale from 1 to 10, with decile 1 representing the least deprived 10% of small areas and decile 10 representing the most deprived 10% of small areas [334].

Table 133. Variables used in the NZDep2006 Index of Deprivation[335]

No.	Factor	Variable in Order of Decreasing Weight in the Index
1	Income	People aged 18-64 receiving means tested benefit
2	Employment	People aged 18-64 unemployed
3	Income	People living in households with income below an income threshold
4	Communication	People with no access to a telephone
5	Transport	People with no access to a car
6	Support	People aged <65 living in a single parent family
7	Qualifications	People aged 18-64 without any qualifications
8	Owned Home	People not living in own home
9	Living Space	People living in households below a bedroom occupancy threshold

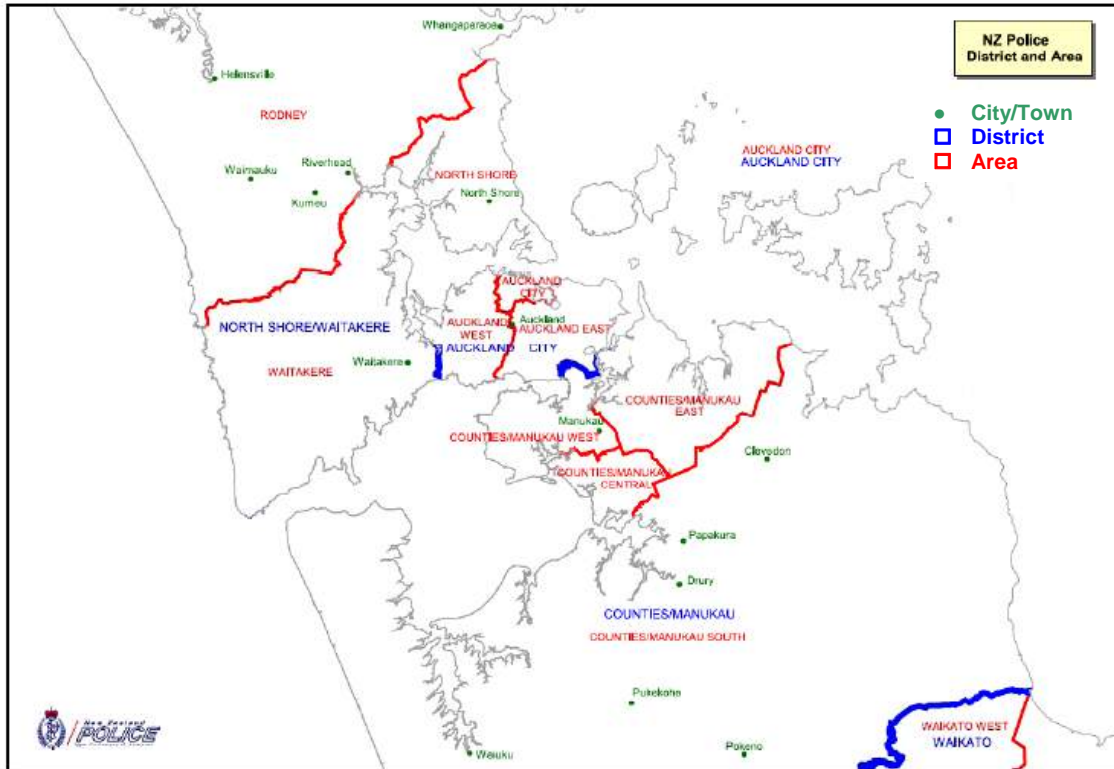
The advantage of NZDep is its ability to assign measures of socioeconomic status to the elderly, the unemployed and to children (where income and occupational measures often don't apply), as well as to provide proxy measures of socioeconomic status for large datasets when other demographic information is lacking. Small area indexes have limitations however, as not all individuals in a particular area are accurately represented by their area's aggregate score. While this may be less of a problem for very affluent or very deprived neighbourhoods, in average areas, aggregate measures may be much less predictive of individual socioeconomic status [333]. Despite these limitations however, the NZDep has been shown to be predictive of mortality and morbidity from a number of diseases in New Zealand.

Note: As New Zealand's national datasets have traditionally continued to use the previous Censuses' domicile codes for 1-2 years after any new Census, all of the numerators (e.g. numbers of hospital admissions, deaths) in the previous analyses

used NZDep2001 deciles. Because it was necessary to account for population growth between 2001 and 2006 however, denominators were created using both NZDep2001 and NZDep2006 deciles, with linear extrapolation used to create denominators for inter-Census years.

Appendix 7: Police Boundaries

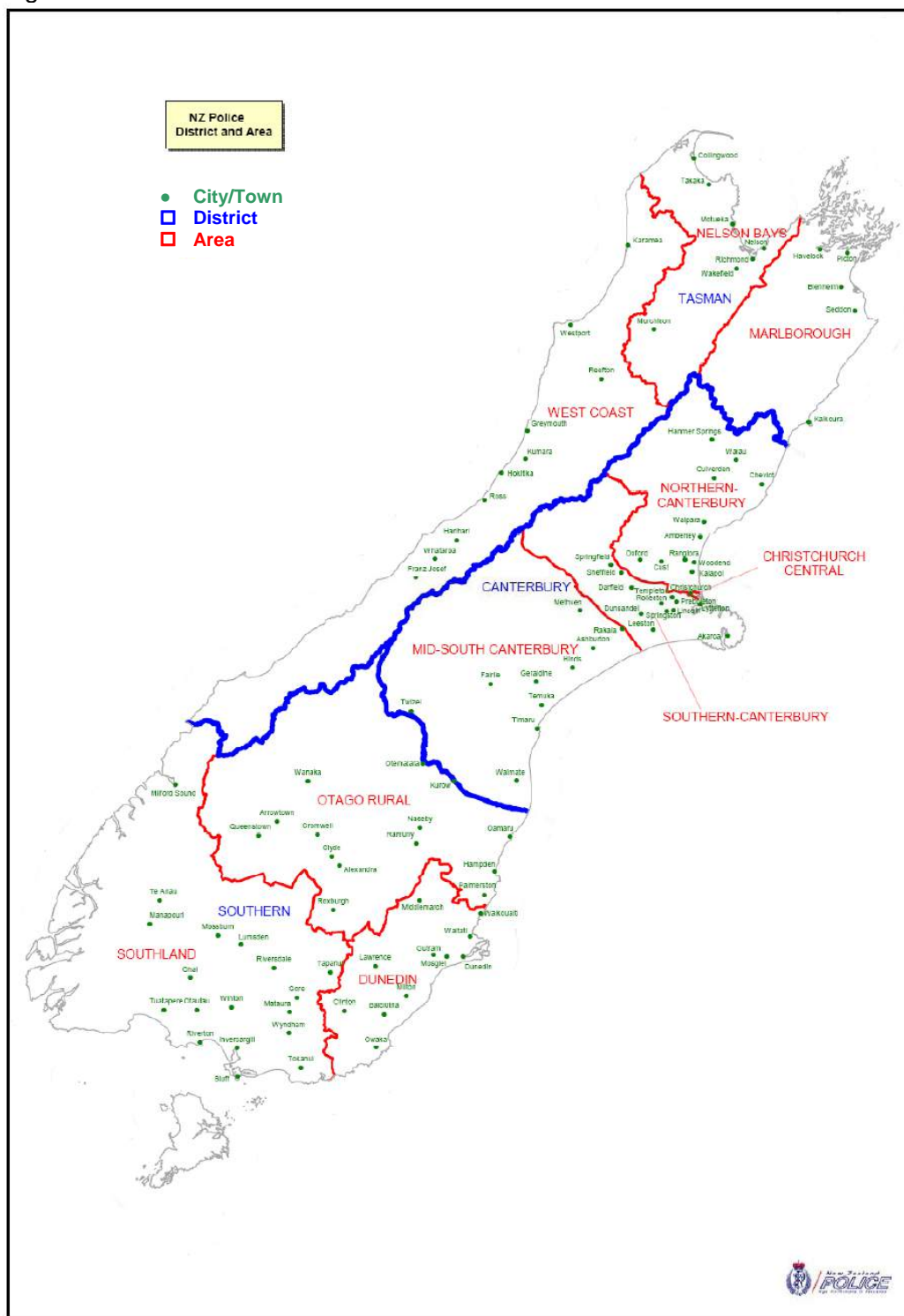
Figure 184. New Zealand Police Area Boundaries in the Auckland Region



Source: <http://www.stats.govt.nz/products-and-services/table-builder/crime-tables/maps.htm>



Figure 186. New Zealand Police Area Boundaries in the South Island



Source: <http://www.stats.govt.nz/products-and-services/table-builder/crime-tables/maps.htm>

Appendix 8: SPARC Regional Sports Trusts

SPARC is a crown entity that provides support through investment to a wide range of organisations that make sport happen. This includes 17 regional sports trusts who promote sport and physical activity to people of all ages in the community. The trusts are independent organisations, which receive money from SPARC according to their size and the population they serve. The location of these sports trusts is shown below.

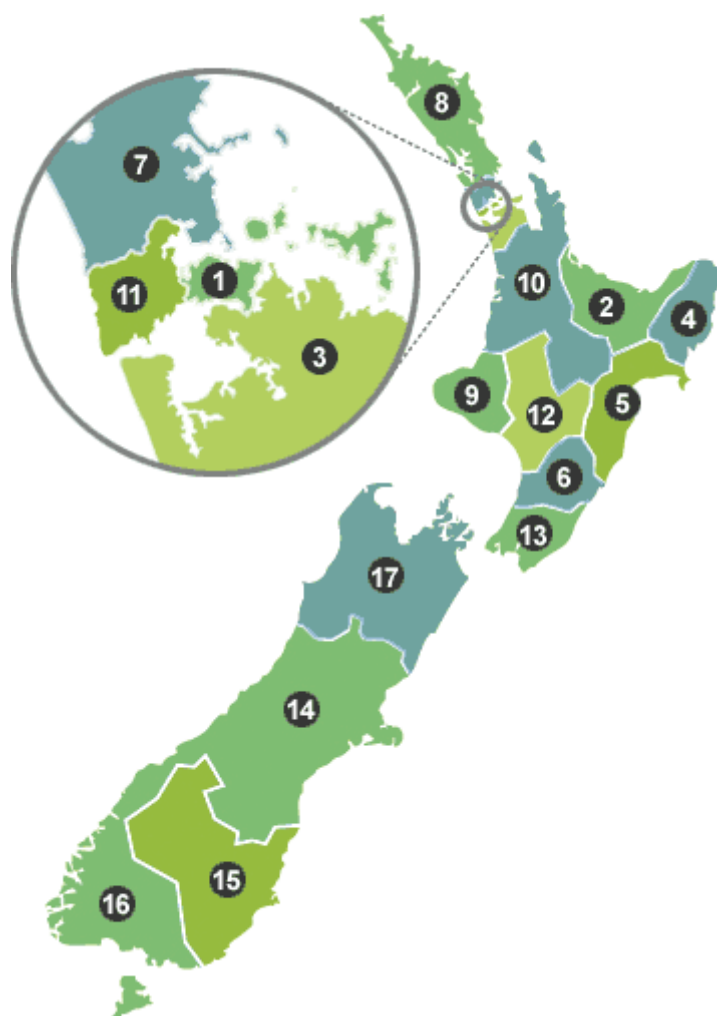
Figure 187. SPARC Regional Sports Trusts

North Island

1. Auckland
2. Bay of Plenty
3. Counties Manukau
4. Gisborne
5. Hawke's Bay
6. Manawatu
7. North Harbour
8. Northland
9. Taranaki
10. Waikato
11. Waitakere
12. Whanganui
13. Wellington Region

South Island

14. Canterbury/Westland
15. Otago
16. Southland
17. Tasman



Source: <http://www.sparc.org.nz>

Appendix 9: National Well Child Tamariki Ora Schedule

Table 134. Well Child - Tamariki Ora National Schedule from Birth to 12 Months

Health Education and Promotion	Health Protection and Clinical Assessment	Family or Whanau Care and Support
<p>Key topics to include:</p> <p>Recognition of illness</p> <p>Management of minor illnesses including colic, crying, minor skin complaints, fever</p> <p>Breastfeeding promotion - support and supervision of early postnatal breastfeeding</p> <p>Advice on maternal nutrition</p> <p>Support of infant feeding - instructions as necessary</p> <p>Contact plan for emergencies - include local agencies list plus 24 hour advice contact numbers</p> <p>SIDS prevention, including:</p> <ul style="list-style-type: none"> • sleep position • smokefree environment and bedsharing • breastfeeding promotion <p>CPR information/education</p> <p>Promotion of parenting skills, including:</p> <ul style="list-style-type: none"> • behaviour in first six weeks and other development stages • dealing with temperament • healthy sleep patterns • understanding why babies cry • feeding • infant/toddler behaviour management strategies • clothing, nappies • bedding, room temperature • ear health <p>Education and promotion of infants' developmental needs</p> <p>Promotion of immunisations: culturally appropriate explanation sessions on immunisation and screening process for all parents or whanau</p> <p>Promotion of smokefree environment</p> <p>Dealing with caregiver stress and fatigue</p> <p>Contraceptive advice for mother/parents</p> <p>Community networking with other well child care providers</p> <p>Promotion of safe environment</p> <ul style="list-style-type: none"> • car seats • fire safety • prevention of falls • hot water • sun exposure • lead exposure • poison, drugs etc • ensure safe and appropriate child care <p>Promotion of appropriate nutritional needs:</p> <ul style="list-style-type: none"> • introduction of solids • prevention of iron deficiency etc <p>Recognise rights of the child</p> <p>Ensure resources are:</p> <ul style="list-style-type: none"> • culturally and socially appropriate • delivered in a culturally and educationally appropriate manner <p>Collaboration with other providers</p>	<p>BIRTH</p> <p>Brief clinical assessment, including Apgar Score</p> <p>Initial breastfeed</p> <p>Vitamin K (IM)</p> <p>WITHIN 24 HOURS *See Note 1 re Vitamin K</p> <p>Full clinical examination including:</p> <ul style="list-style-type: none"> • observe infant • head circumference • cardiovascular system • weight • hips • eyes <p>Hepatitis B vaccine and immunoglobulin for infants of hepatitis B antigen +ve mothers</p> <p>BCG if indicated, per national TB guidelines</p> <p>Assessment of risk of sensorineural hearing loss or blindness and referral if necessary</p> <p>5 DAYS *See Note 1 re Vitamin K</p> <p>Review:</p> <ul style="list-style-type: none"> • antenatal and family history • birth events <p>Full clinical examination including:</p> <ul style="list-style-type: none"> • observe infant • head circumference • cardiovascular system • weight • hips • eyes <p>Metabolic screening ('Guthrie') test must be done by 5 days, can be taken 48 hrs after feeding introduced</p> <p>2 – 4 WEEKS *See Note 2 re additional services</p> <p>Growth/weight and nutritional assessment (includes maternal nutrition)</p> <p>Observe infant</p> <p>6 WEEKS *See Note 1 re Vitamin K</p> <p>Informed consent to Immunisation Programme</p> <p>Fill in Immunisation Certificate if non consent</p> <p>Immunisation (as per Immunisation Schedule)</p> <p>Clinical examination including:</p> <ul style="list-style-type: none"> • observe infant • head circumference • cardiovascular system • testicular descent • weight • hips • eyes <p>Developmental assessment</p> <ul style="list-style-type: none"> • observation and questioning <p>Questioning on hearing and vision (Audiology check for infants assessed at birth as at risk of hearing loss; and/or ophthalmology check if assessed risk of blindness)</p> <p>Ongoing review of growth and nutrition</p> <p>3 MONTHS</p> <p>Immunisation (as per Immunisation Schedule)</p> <p>Nutritional assessment/weight</p> <p>Questioning of hearing and vision</p> <p>Developmental assessment - observation and questioning</p> <p>5 MONTHS</p> <p>Immunisation (as per Immunisation Schedule)</p> <p>Nutritional assessment/weight</p> <p>Questioning of hearing and vision</p> <p>Developmental assessment - observation and questioning</p> <p>8 – 10 MONTHS</p> <p>Check immunisations</p> <p>Nutritional assessment/weight</p> <p>Questioning on hearing and vision</p> <p>Check for squint</p> <p>Developmental assessment - observation and questioning</p> <p>Tympanometry (in line with Preventing Child Hearing Loss, PHC 1995)</p>	<p>Key elements:</p> <p>Support person with mother at birth</p> <p>Opportunity to discuss parental or whanau concerns at all contacts</p> <p>Listen and respond to family or whanau concerns</p> <p>Review of psychosocial and environmental circumstances including cultural support</p> <p>Assessment of risk/presence of postnatal depression; ensure appropriate referral/management</p> <p>Promote family or whanau support</p> <p>Assessment of need for additional support for families in difficult circumstances or infants at higher risk of adverse health outcomes</p> <p>Crisis intervention if needed</p> <p>Promotion of community networking</p> <p>Assessment of parental relationship with child</p> <p>Mutually agreed plan of services between provider and family or whanau</p> <p>Contact numbers for:</p> <p>Crisis support and intervention e.g.</p> <ul style="list-style-type: none"> • GP/Midwife • NZ Children and Young Persons' Service • Public Health/rural District Nurse <p>Support groups such as:</p> <ul style="list-style-type: none"> • La Leche • Karitane Unit • Home Help • Pregnancy Help • play groups • coffee clubs <p>Provision of care activities, and link with culturally safe support networks, and/or referral as necessary</p> <p>Support for families in their contact with agencies such as NZ Income Support Service for child care subsidies etc</p>

Source: Ministry of Health [336]

Note 1: If IM Vitamin K is not given then a total of 3 oral doses of Vitamin K are to be given/offered at intervals marked with an *

Note 2: Additional discretionary services may be purchased and used as needed in the early weeks, or later.

Table 135. Well Child - Tamariki Ora National Schedule from 15 Months to School Entry

Health Education and Promotion	Health Protection and Clinical Assessment	Family or Whanau Care and Support
<p>Key topics to include:</p> <p>Education on the management of common childhood illness</p> <p>Promotion of home and environmental safety:</p> <ul style="list-style-type: none"> • home hazards • water • medicines, poisons • hot water • car seat • road • sun • safe home/neighbourhood • safe playgrounds • water safety/pool fencing etc <p>Education about and promotion of developmental needs of young children:</p> <ul style="list-style-type: none"> • play • language • appropriate nutrition etc <p>Promotion of dental health and enrolment with dental service</p> <p>Promotion of parenting skills, including:</p> <ul style="list-style-type: none"> • behaviour management • toileting • sleeping • socialisation with others • eating • minor illness management etc <p>Promotion of 'Keeping Yourself Safe'</p> <p>Discussion and promotion of preschool education facilities, Kohanga Reo, PAFT etc</p>	<p>15 MONTHS</p> <p>Immunisation (as per Immunisation Schedule)</p> <p>Sign Immunisation Certificate for completed early childhood immunisations</p> <p>Weight</p> <p>Questions on hearing and vision</p> <p>Check for squint</p> <p>Developmental assessment – observation/questioning (including language, mobility, behaviour)</p> <p>Tympanometry (in line with Preventing Child Hearing Loss, PHC 1995)</p> <p>21 – 24 MONTHS</p> <p>Questions on hearing and vision</p> <p>Check for squint</p> <p>Weight/Height</p> <p>Developmental assessment – observation/questioning (including language, mobility, behaviour)</p> <p>Review immunisation</p> <p>Dental assessment/enrolment</p> <p>3 YEARS</p> <p>Questions on hearing and vision</p> <p>Weight/Height</p> <p>Developmental assessment – observation/questioning (including language, mobility, behaviour)</p> <p>Tympanometry</p> <p>Visual acuity and check for squint</p> <p>Dental enrolment/assessment if not done earlier</p> <p>Review immunisation</p> <p>SCHOOL NEW ENTRANT</p> <p>Review immunisation</p> <p>Review child's history with parents/caregiver and school, taking regard of Privacy legislation</p> <p>Effective hand-over between well child care providers</p> <p>If indicated, physical/psychosocial/developmental assessment</p> <p>Dental assessment</p> <p>Tympanometry and audiology assessment</p> <p>Test eyes for acuity and squint</p>	<p>Key elements:</p> <p>Listen and respond to family or whanau concerns</p> <p>Review of psychosocial and environmental circumstances</p> <p>Assessment of need for additional support for families or whanau in difficult circumstances, and provide support, link with community resources/support groups, and referral to other agencies if necessary</p> <p>Support for families or whanau in their contact with agencies such as NZ Income Support Service for child care subsidies etc</p> <p>Mutually agreed plan of services between provider and family or whanau</p> <p>Facilitate involvement in child's preschool, Kura Kaupapa Māori activities</p> <p>Promote family or whanau support, community development issues that relate to child health</p> <p>Facilitation of community networking</p>

Source: Ministry of Health [336]

Appendix 10: Statistical Significance Testing and Its Use in This Report

Understanding Statistical Significance Testing

Inferential statistics are used when a researcher wishes to use a sample to draw conclusions about the population as a whole (e.g. weighing a class of 10 year old boys, in order to estimate the average weight of all 10 year old boys in New Zealand). Any measurements based on a sample however, even if drawn at random, will always differ from that of the population as a whole, simply because of chance. Similarly, when a researcher wishes to determine whether the risk of a particular condition (e.g. lung cancer) is truly different between two groups (smokers and non-smokers), they must also consider the possibility that the differences observed arose from chance variations in the populations sampled.

Over time, statisticians have developed a range of measures to quantify the uncertainty associated with random sampling error (i.e. to quantify the level of confidence we can have that the average weight of boys in our sample reflects the true weight of all 10 year old boys, or that the rates of lung cancer in smokers are really different to those in non-smokers). Of these measures, two of the most popular are:

1. **P values:** The p value from a statistical test tells us the probability that we would have seen a difference at least as large as the one observed, if there were no real differences between the groups studied (e.g. if statistical testing of the difference in lung cancer rates between smokers and non-smokers resulted in a p value of 0.01, this tells us that the probability of such a difference occurring if the two groups were identical is 0.01 or 1%. Traditionally, results are considered to be statistically significant (i.e. unlikely to be due to chance) if the probability is <0.05 (i.e. less than 5%) [337].
2. **Confidence Intervals:** A 95% Confidence Interval suggests that if you were to repeat the sampling process 100 times, 95 times out of 100 the confidence interval would include the true value. In general terms, if the 95% confidence intervals of two samples overlap, there is no significant difference between them (i.e. the p value would be ≥ 0.05), whereas if they do not overlap, they can be assumed to be statistically different at the 95% confidence level (i.e. the p value would be <0.05) [337].

The Use of Statistical Significance Testing in this Report

In the preparation of this report a large range of data sources were used. For the purposes of statistical significance testing however, these data sources can be considered as belonging to one of two groups: Population Surveys and Routine Administrative Datasets. The relevance of statistical testing to each of these data sources is described separately below:

1. **Population Surveys:** A number of indicators in this report utilise data derived from national surveys (e.g. Action for Smoking and Health (ASH) Smoking Surveys, the NZ Children's Nutrition Survey), where information from a sample has been used to make inferences about the population as a whole. In this context statistical significance testing is appropriate, and where such information is available in published reports, it has been incorporated into the text accompanying each graph or table (i.e. the words *significant*, or *not significant* in italics are used to imply that a

test of statistical significance has been applied to the data and that the significance of the associations are as indicated). In a small number of cases however, information on statistical significance was not available in published reports, and in such cases the differences described should be regarded as indicative only.

2. **Numbers and Rates Derived from Routine Administrative Data:** A large number of the indicators in this report are based on data derived from New Zealand's administrative data sets (e.g. Birth Registration, Hospital Admission, Mortality), which capture information on all of the events occurring in a particular category. Such datasets can thus be viewed as providing information on the entire population, rather than a sample and as a consequence, 95% confidence intervals are not required to quantify the precision of the estimate (e.g. the number of leukaemia deaths in 2000-2004, although small is not an estimate, but rather reflects the total number of deaths during this period). As a consequence, 95% confidence intervals have not been provided for any of the descriptive data (numbers, proportions, rates) presented in this report, on the basis that the numbers presented are derived from the total population under study.
3. **Rate Ratios Derived from Routine Administrative Data:** In considering whether statistical significance testing is ever required when using total population data Rothman [338] notes that if one wishes only to consider descriptive information (e.g. rates) relating to the population in question (e.g. New Zealand), then statistical significance testing is probably not required (as per the argument above). If however, one wishes to use total population data to explore biological phenomena more generally, then the same population can also be considered to be a sample of a larger super-population, for which statistical significance testing may be required (e.g. the fact that SIDS in New Zealand is 10x higher in the most deprived NZDep areas might be used to make inferences about the impact of the socioeconomic environment on SIDS mortality more generally (i.e. outside of New Zealand, or the 5 year period concerned)). Similarly, in the local context the strength of observed associations is likely to vary with the time period under study (e.g. in updating 5-year asthma admission data from 2002-2006 to 2003-2007, rate ratios for Pacific children are likely to change due to random fluctuations in annual rates, even though the data utilised includes all admissions recorded for that particular 5-year period). Thus in this report, whenever measures of association (i.e. rate ratios) are presented, 95% confidence intervals have been provided on the assumption that the reader may wish to use such measures to infer wider relationships between the variables under study [338].

The Signalling of Statistical Significance in this Report

In order to assist the reader to identify whether tests of statistical significance have been applied in a particular section, the *Data Sources and Methods* text box accompanying each indicator includes a small paragraph entitled *Statistical Significance Testing* (see examples below). It is suggested the reader briefly reviews this information before considering the analyses presented in the sections which follow.

Data Sources and Methods

Example 1

Statistical Significance Testing: Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance.

Example 2

Statistical Significance Testing: 95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section however, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see Appendix 10 for further discussion).

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