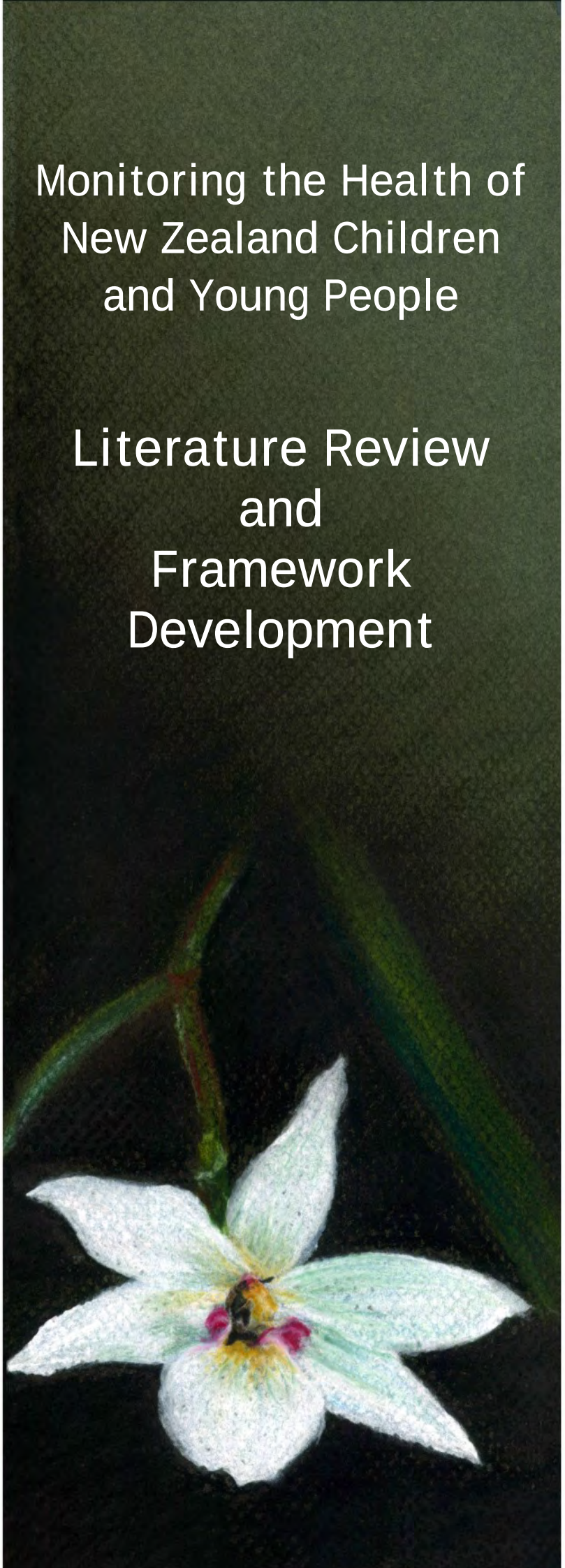
Monitoring the Health of New Zealand Children and Young People

Literature Review and Framework Development



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Cover Artwork by Heidi Baker

Winika cunninghamii is a small native orchid which grows on well lit tree trunks and branches in the New Zealand native bush. It produces delicate pink and white flowers between December and January each year. During each flower's brief life cycle it relies on sustenance drawn from the parent plant, whose strength in turn is based on a secure attachment to a larger tree. From this stable vantage point, the plant is able to draw the moisture and light it requires from the surrounding environment. The tree in turn relies on a well functioning ecosystem, which provides the rain and nutrients it requires to sustain its growth over many years. Each of these connections is vital in allowing a single bud to develop and blossom during the summer months.

Foreword

"If you don't know where you are going, any road will take you there." - The Cheshire Cat to Alice in Wonderland – Lewis Caroll

The health and well being of our children and young people reflects the outcomes of very complex ecological interactions with their environment. Outcomes for the current generation of children and young people will determine the future success or failure of the community and society as a whole. The relatively short periods of time which gestation, infancy, childhood and adolescence occupy, have more power to shape the individual than much longer periods of time later in life. Optimizing the ecological contexts in which individuals grow to maturity is a key goal for every community.

For thousands of years we have been defining signs, symptoms and tests that can be used to assess the health and well being of individuals. The summation of these findings guides future care and treatments. Increasingly we are aware that information needs to be gathered about whole communities to guide future investment and audit the effects of changes, planned or otherwise. The process is one of developing appropriate indicators to monitor change, guide direction, promote progress and benchmark one community or nation against others.

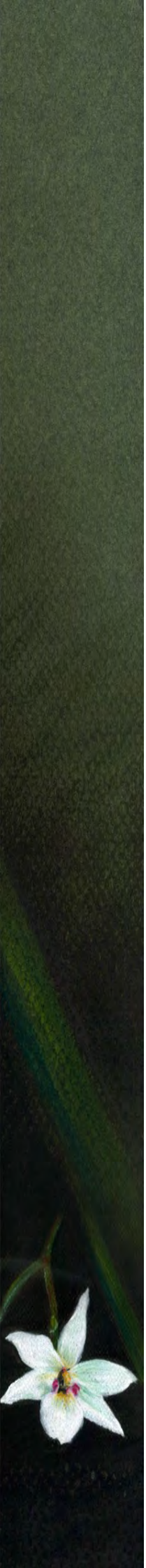
Some indicators have been tracked for generation's e.g. infant mortality. While tracking this alone is valuable it has similarities to the use of canaries in mines. Infants are sensitive markers of the success or failure of our community. We require greater detail to follow and modify causal pathways that lead to adverse outcomes. Investment in health or welfare today may result in major cost saving in justice or increased tax take over 30 years. Good indicators allow the monitoring of important investments and can help justify cost shifting across sectors as well as noting untoward effects of good intentioned action. Evidence based purchasing and planning decisions are dependent on good information on current status to guide targeting and rationing of services. The far reaching impacts that result from the health and wellbeing status of our children and young people mean monitoring and responding to changing indicators must be given a very high priority.

The development of this report has started with the wisdom available from international publications and best practice. Consultation has begun to set an indicator framework within the New Zealand context. These reports will allow wider consultation across the community. Best value from indicators is only obtained when robust processes exist to collect the information, monitor outcomes and develop new pathways and processes in response. Once this current work is completed further substantial challenges lie ahead to maximize the benefits that can ensue.

The true measure of a nation's standing is how well it attends to its children – their health and safety, their material security, their education and socialization, and their sense of being loved, valued, and included in the families and societies into which they are born. [1]

Dr Nick Baker

President, Paediatric Society of New Zealand



List of Contributors

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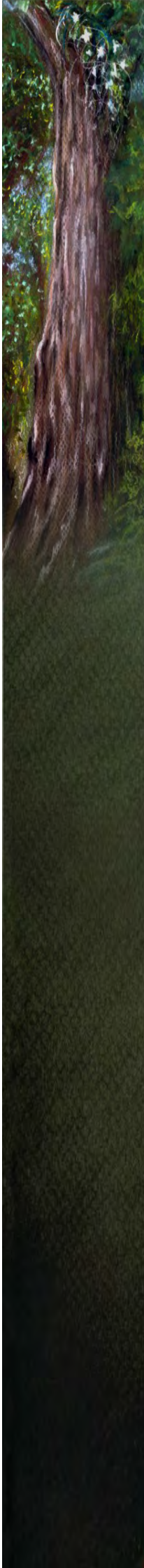

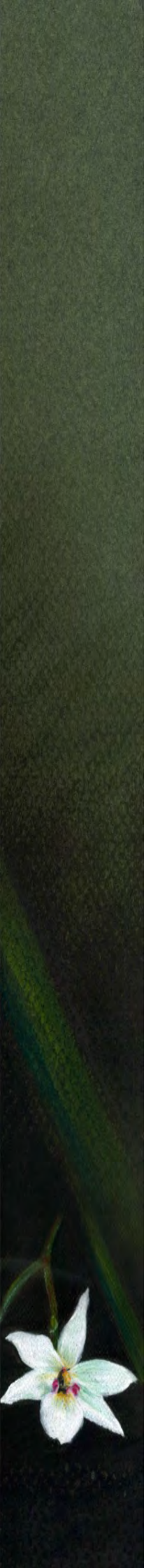

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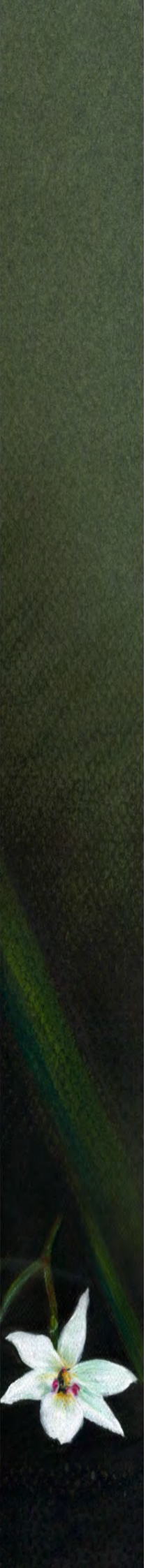


Executive Summary

Introduction

Children and young people make up a third of New Zealand's population and collectively represent a national taonga or treasure, whose health and wellbeing need to be safeguarded in order to ensure the future prosperity of this country. While the majority of New Zealand children and young people do enjoy good health, some groups experience a disproportionate burden of morbidity and mortality, either as a result of long term health conditions or accidents, or a range of historical and economic factors impacting on the resources available to their families. While New Zealand Government policies in recent years have accorded a high priority to reducing such disparities in health outcome, to do so in any coordinated manner requires in the first instance, that the health status of children and young people be visible.

In beginning to address this issue, in early 2006 the Ministry of Health funded a project in conjunction with the Paediatric Society to develop a child and youth health monitoring framework for New Zealand. This report is the first of two arising from this project and presents the background information used to guide the project's development. It is divided into four main sections, the first of which explores New Zealand's recent approaches to monitoring the health of its children and young people. This is followed by a review of the theoretical basis for population health surveillance and some of the approaches other countries have taken in this area. The methodology used by the Project Team to develop a child and youth health monitoring framework is then discussed, before a series of recommendations are made as to the additional measures which may be required to ensure that the information produced as a result of this project, can be used to achieve maximal health gains for New Zealand's children and young people. This report is accompanied by a second report, The New Zealand Child and Youth Health Indicator Handbook, which provides more detailed information on the framework developed as a result of this project and the indicators contained within it.

Section 1: NZ's Current Approach to Monitoring Child & Youth Health

Introduction and Methodology Used

In New Zealand during the past decade, there have been a large number of publications produced by a variety of agencies, which have contributed to the monitoring of child and youth health. A review of these publications was seen as vital in providing answers to the following key questions:

1. During the past decade, what approaches has New Zealand taken to monitor the health of its children and young people, and have these approaches met the information needs of the health sector?
2. Are there any unmet information needs which need to be taken into account when designing a framework to monitor the health of New Zealand children and young people?
3. Are there any useful elements of New Zealand's recent monitoring approaches that should be carried forward into future framework development?

In undertaking this review, reports published during the past decade which derived their child and youth health information from routinely collected data sources AND which either explored a variety of child or youth health issues at a single point in time OR

monitored a single issue in the same format on more than one occasion, were included. The search strategy specifically exclude one-off research reports, literature reviews which collated the findings of other publications and reports based on one-off surveys, where there was no intention of repeating the survey in future years.

Results of the New Zealand Literature Review

A search of the New Zealand literature using the criteria listed above resulted in a large number of publications being reviewed. While the aims and objectives of these publications varied, in general terms they fell into one of five main categories:

1. **Cross Sectional Reviews Based on Routinely Collected Data**: These reports fell into four main categories: 1) Reports which brought together a wide range of data sources to provide a cross sectional overview of child and youth health; 2) Reports which explored the impact of changes in Government policies on child and youth outcomes; 3) Reports which considered the wellbeing of children and young people in the context of New Zealand's obligations under United Nations Conventions and Declarations; 4) Reports which explored how resources might be allocated to improve child and youth wellbeing, but in doing so provided illustrative case studies in the New Zealand context. While each had a slightly different focus, collectively they provided a broad and a detailed overview of the health issues experienced by New Zealand children and young people. Very few however (with the exception of those with a policy focus), referenced earlier reports undertaken by others outside their organisations, with the majority instead focusing on the presentation of new information derived from its original data sources. Similarly, while most cross sectional reports covered similar topics, no two agencies reported on exactly the same indicators, or used the same theoretical model when interpreting the relationships between them.

2. **Cross Sectional Reviews Based on National Survey Data**: A number of reports also used information derived from national surveys to provide cross sectional reviews of child and youth wellbeing. These reports included Statistics New Zealand's "New Zealand Now:" series, which produced two reports on children and one on young people, the Youth 2000 Survey which produced an overall national report, as well as separate reports on Maori and Asian young people, and non-heterosexual youth, and the NZ Children's Nutrition Survey, which produced an overview of the survey's main findings on child growth and nutrition.

3. **Ongoing Monitoring in the Context of Total Population Health**: While no cross sectional review ran to more than two editions, a number of Government agencies have monitored subsets of child and youth health indicators in their total population reports. The longest running of these was the *Progress on Health Outcome Targets* series, with 7 reports being published between 1993/4 and 1999. These reports monitored progress towards public health targets and contained specific child and youth sections, with each indicator being accompanied by a target, an analysis of progress towards this target and strategies via which this target might be achieved. Following health sector restructuring in 2000, Public Health Intelligence took over this monitoring role and in 2002 published the first report in a series entitled *An Indication of New Zealanders' Health*. These reports again focused on total population health, but included specific child and youth sections. In addition, the MOH also uses a basket of indicators to monitor the performance of DHBs. While these indicators vary from year to year, in general terms they reflect progress towards achieving the objectives of the NZ Health Strategy. Finally, the Ministry of Social Development's *Social Report* and Statistics New Zealand's *Demographic*

Trends also report on baskets of indicators, some of which are of relevance to child and youth health.

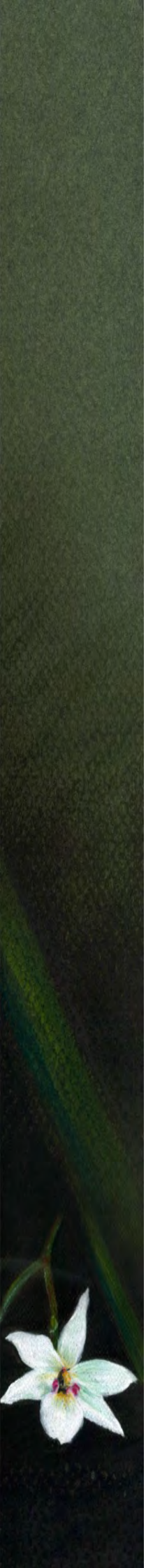
4. **Ongoing Monitoring of Single Child and Youth Health Issues**: While most current reporting series are relatively recent in their origins, a number of agencies have consistently monitored aspects of child and youth health over many years. Examples include the annual *Fetal and Infant Deaths* series, produced since 1978 and the *New Zealand Hearing Screening Statistics* series produced since the mid 1990s. A number of more recent publications have also monitored aspects of child and youth health including cancer registry notifications, youth smoking rates, physical activity, neonatal intensive care admissions and a range of indicators in the Maternity Reports. While each, in itself is insufficient to provide an overall picture of child and youth health, collectively they provide valuable insights in a number of areas dating back over many years.

5. **Ongoing Monitoring with a Child and / or Youth Health Focus**: In addition, a number of organisations have also undertaken more comprehensive monitoring of child and youth health. Of these, the one which came closest to establishing an ongoing child and youth focused monitoring series was the intersectoral collaboration that arose between the Ministries of Social Policy, Education and Health as a result of the Strengthening Families initiative. This collaboration produced a series of three reports (1998, 1999, 2000) which monitored progress towards key targets set in 1997 as part of the Strengthening Families Strategy. The Child and Youth Mortality Review Committee, a statutory committee established to "*review and report on deaths of children and young people between 4 weeks and 24 years of age*", has also published 3 annual reports since its inception, with the most recent providing an overview of deaths occurring during 2002-04. The New Zealand Child and Youth Epidemiology Service, has also produced two reports to date, with its first report on child and youth health status being provided to participating DHBs in 2005 and its second, on the determinants of child and youth health being released in 2006. Finally, the New Zealand Paediatric Surveillance Unit (NZPSU), which was established with MOH funding in 1997 to provide active surveillance for acute flaccid paralysis in the context of the WHO's polio eradiation programme, has monitored a number of uncommon, high impact child and youth outcomes during the past decade.

Limitations of New Zealand's Current Approaches to Monitoring

While the above review clearly indicates that New Zealand has a wealth of information on the health of its children and young people, a closer inspection reveals a number of distinct limitations. These include:

1. **Cost and Duplication of Effort**: New Zealand's fragmented approach to monitoring has meant that there remains a paucity of detailed information which has been reported on consistently over time. The "one off" nature of many publications also means that institutional memory is unlikely to accumulate, with much of the learning associated with the collation, cleaning and coding of data being lost as staff are dispersed to other tasks at the end of a project. In such cases, there remains the potential for the allocation of resources to be disproportionately directed towards the production and release of reports, rather than the development of process and pathways via which the information thus produced might be utilised to improve the health of children and young people. The lack of coordination has also led to considerable duplication of effort, with many detailed cross sectional reviews being released within 1-2 years of each other. While it is likely that each arose from a clearly perceived need, such an



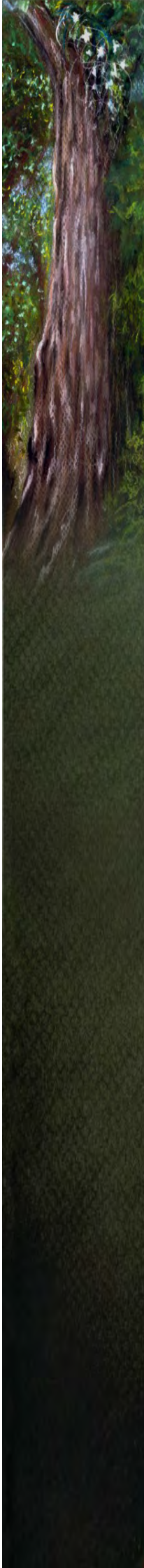
approach is clearly cost-inefficient, particularly for DHBs and small NGOs, whose allocation of resources to these reviews may potentially have diverted them away from other core activities. Finally, despite the large number of child and youth heath reports produced during the past decade, no child and youth heath focused reporting series has ever managed to monitor the same of indicators for more than three years at a time. This has significant implications from an end-user point of view, as while it is currently possible to utilise "one-off' reports to establish child and youth heath priority areas, having implemented interventions to address these issues, subsequent editions cannot be relied upon to monitor progress in the same key areas.

2. **Lack of Consistent Indicator Selection Criteria**: The review also highlighted significant inconsistencies in the child and youth indicators monitored by different Government agencies, with the MSD, Public Heath Intelligence, the MOH's indicators of DHB performance and the Child and Youth Health Toolkit all monitoring different indicator sets over different time frames. Similarly, amongst cross sectional reports, no two agencies reported on the same indicator sets, or used the same conceptual framework. In understanding the reasons for this lack of consistency, a review of the indicator selection criteria used by these agencies revealed considerable diversity, and in the case of many cross sectional reports, the rationale for indicator selection was never specifically stated. While such diversity has allowed New Zealand to consider issues from a variety of different perspectives, in the absence of clearly defined selection criteria, which take into account public heath importance as well as issues of data quality, there may be a tendency for monitoring to default to those issues for which routine data is available, while equally important issues without such data sources, quietly slip below the public health radar. Such an approach also makes it very difficult for information end users to be reassured that prioritisation decision and strategies developed as a result of these reports are based on an assessment of all of the issues involved, with such information potentially reinforcing the allocation of limited resources to high profile conditions, at the expense of others whose profile is less well known.

3. **Lack of a Consistent Framework for Considering Relationships Between Indicators**: In addition, during the past decade no two New Zealand agencies utilised exactly the same theoretical framework when presenting the information in their reports. Frameworks used included a model developed by the Public Health Commission to underpin its Progress on Health Outcomes series, the 10 Social Domains used by the MSD in its Social Report and the life-cycle transitions framework used in the MOH's Child and Youth Health Toolkit. While again, this pluralistic approach has given the sector the opportunity to consider child and youth health issues from a variety of different perspectives, it also has a number of distinct limitations. Firstly, despite the large number of publications on child and youth health during the past decade, there remains no common platform for initiating dialogue within the health sector, or with other sectors holding responsibility for child and youth wellbeing. This is of particular concern in the context of New Zealand's decentralised health sector, with its 21 DHBs, who each have a responsibility to assess and then develop strategies to improve the health of children and young people in their regions. Without a common framework for considering these issues, the potential exists for population health strategies to evolve in 21 different directions, as each DHB finds its own solutions to the same problems. Similarly, without an understanding of where their own DHB's outcomes fit in the context of the wider determinants of health, it may be difficult for DHB's to initiate dialogue with other agencies, or to develop intersectoral approaches which are based on a shared understanding of the issues involved.

4. **Tensions Between Representative National Level Monitoring and the Need for Detailed Information at a Regional Level**: In assessing how well New Zealand's recent approaches to monitoring have met the information needs of the health sector, it is also necessary to consider the uses to which this information will be put. At present, these fall into two main categories: 1) **Traditional Monitoring**, which highlights progress in areas of major public health concern and fulfils overseas reporting obligations. Traditional monitoring usually focuses on a basket of key indicators, which are selected on the basis of data quality, validly and their coverage of key priority areas. Cost and strict data quality criteria, often limit the number of indicators monitored and preclude the exploration of issues for which there is no data. While such approaches are useful for tracking progress in key areas, once strategic priorities have been established, they are of more limited utility in assessing the health needs of a population, in order to establish these priorities, or for tracking progress in areas where national data is lacking; 2) **Health Needs Assessment (HNA)**, is the process whereby health care resources are allocated based on an understanding of the health needs of a population. Inherent in this process is the need for prioritisation and the best possible use of available resource. HNAs need to consider the diverse health needs of the community, the groups at greatest risk and those whose needs are not being met by current service delivery. By necessity this requires a broader coverage of issues, a greater level of detail on the groups at greatest risk and consideration being given to issues for which traditional data sources are often unavailable.

   While both of these functions are vital to the operation of the health sector, the current sector's structure significantly influences the magnitude of demand associated with each. In 2000 the Public Health and Disability Act divided the health sector into 21 District Health Boards (DHBs) whose role it was to fund and provide services to geographically defined populations. In addition, each DHB was required *"to regularly investigate, assess and monitor the health status of its resident population, any factors that the DHB believes may adversely affect the health status of the population and the needs of that population for service".* Under the same legislation, the MOH retained key roles in monitoring the provision of services by DHBs and in providing policy advice and ministerial services. In assisting DHBs to perform their population health monitoring functions, in 2000 the MOH released a guide on Health Needs Assessment, which in addition to containing information on how HNAs should be undertaken, outlined an expectation that they would be updated at least every three years. DHBs have now undergone two complete cycles of HNA, with the most recent round being completed during 2004-05. While these HNAs consider the health needs of the entire population, during the latest cycle the majority also included child and youth sections. The size and scope of these sections varied considerably however, although most included coverage of hospital admissions, mortality, hearing screening, oral health and teenage pregnancy. In understanding the reasons for this heterogeneity, it is important to consider some of the issues associated with their production. While to a certain extent, the allocation of resource has followed the transfer of accountability (DHBs are funded to carry out HNAs in their regions), a lack of local expertise in many small to medium sized DHBs has often meant that DHBs have had to pool their resources, or to purchase support from outside agencies in order to complete this task. While these collaborative efforts have meant that clusters of DHBs have ended up with HNAs in very similar formats, in the majority of cases the support provided was technical, rather than in areas such as child and youth health per se. As a consequence, there still remains no



consensus as to which child and youth indicators should be included, or how the relationships between them should be portrayed.

In considering these issues within the context of the literature review above, it becomes apparent that a mismatch may be emerging between the needs of DHBs for comprehensive and detailed regional child and youth health information, and the efforts of the sector to date, which have either produced such information only at a national level, or where a regional breakdown has been provided, this has only been in the context of a limited basket of monitoring indicators. While, within the health sector structure at present, the responsibility for HNA also resides at a regional level, the expertise required to produce it is often scarce in small to medium sized DHBs. While solutions to this problem are beyond the scope of this review, with nearly 75% of Vote Heath funding now being channelled through DHBs and the majority of prioritisation decisions and strategy development occurring at a regional level, such a mismatch may significantly impair the sector's ability to develop strategies to improve the health of New Zealand's children and young people.

Implications for Monitoring Framework Development

On reviewing the findings of the review above a number of implications emerge for future framework development. These include:

1. Within the NZ health sector at present, a large number of Government and non-Government agencies have an interest in child and youth health. Consultation with these agencies will be necessary in order to ensure that any new monitoring framework developed meets their information needs.
2. New Zealand has a wealth of routinely collected data on child and youth health, as well as its determinants at a population level. In some cases this information has been collected for more than a decade in a consistent format, making valid time series comparisons possible. This information means that many of the building blocks are already in place for developing a comprehensive child and youth health framework.
3. A large number of agencies have included sections on the underlying determinants of health in their reports, or have devoted the entire report to exploring the ways in which Government policies have shaped the health and wellbeing of children and young people. There thus appears to be considerable support within the sector, for including these key elements in any monitoring framework developed.
4. During the past decade there have been a large number of reports on children and young people, with many being released within 1-2 years of each other and with very similar content. This is clearly cost ineffective and suggests the need for a single agency that is responsible for collating all of the available information and for setting a cyclic timetable for future report production.
5. During the past decade, no one agency has produced a cross sectional review of child and youth wellbeing that has run to more than two editions. Similarly, the provision of consistent time series data on more limited baskets of indicators has often been cut short by health service restructuring. Such changes significantly reduce the utility of the data for planning purposes. Thus in developing a monitoring framework, attention needs to be paid to the most appropriate organisation(s) to host such an innovation, as well its sustainable resourcing in the medium to longer term.
6. Similarly, the heterogeneous indicator selection criteria utilised across the sector has meant there is no single set of child and youth health indicators monitored consistently across all Government agencies. An undue reliance on

available data has also meant that the indicators in current use may not provide a balanced coverage of all of the major issues. As a consequence, during the course of framework development, attention needs to be paid to developing a set of selection criteria place a high priority on public health importance.

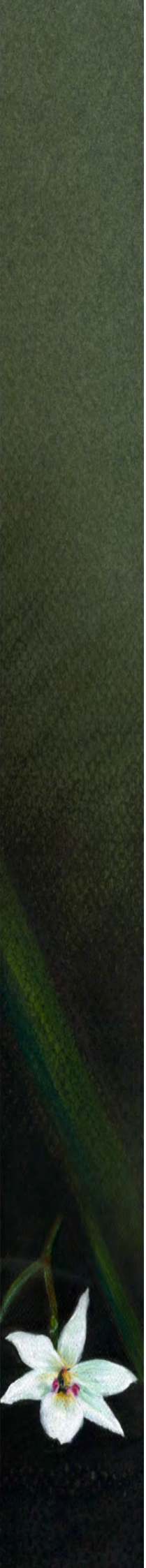
7. In addition, no one theoretical framework has consistently been used within the sector to portray the complex relationships between health outcomes and their determinants at a population level. While a number of the frameworks previously used might serve as a starting point, all would require adaptation for use in a child and youth population. Consideration would also need to be given to the high priority recent NZ reports have placed on policy analysis, as well as the more traditional pathways via which socioeconomic factors shape health outcomes at a population level.
8. Finally, the current health sector structure and disproportionate information needs of DHBs mean that any new monitoring framework would need to blend traditional monitoring, with HNA at a population level. In this context, there may be considerable utility in developing a broadly based indicator set, whose membership was chiefly governed by public health importance, and from this set drawing a more limited subset, for use in national level monitoring. While the former could be utilised by DHBs in their HNAs, the latter could be used nationally to track progress in key priority areas.

Section 2: Origins of Population Health Monitoring & Overseas Approaches

While the above review provided an overview of New Zealand's recent approaches to monitoring child and youth health and highlighted some of the sector's current information needs, this in itself is insufficient for informing the development of a monitoring framework for use in the New Zealand health sector. What is also required is an understanding of the current literature on population health surveillance and the elements which are considered essential for establishing an effective surveillance system, as well as knowledge of approaches taken by other developed countries in this area. In addressing each of these issues, the literature review which follows briefly explores the origins of population health surveillance, the elements considered essential to an effective surveillance system and the characteristics of a good public health indicator. The use of theoretical frameworks to underpin any framework developed is then discussed, before moving on to consider how child and youth health monitoring is occurring at a global, regional and national level overseas. The review concludes with a discussion of the implications of the findings of the review for future framework development.

Population Health Monitoring: Historical Origins & Key Concepts

Public health surveillance is the epidemiological foundation for modern public health. Although surveillance methods were originally developed as part of efforts to control infectious diseases, modern surveillance systems have expanded their scope to include information on non-communicable diseases and injuries, their risk factors, and the social and environmental contexts in which they occur. Accompanying this expansion has been increasing interest in the development and use of public health indicators and comprehensive child and youth indicator frameworks have been developed in a number of different countries. While each country's' unique needs mean that no two frameworks are identical, the majority were developed using very similar methodologies, and as a consequence, share many similar structural elements. Thus before reviewing the approaches taken by other developed countries to monitor the health of their children and young people, the following sections briefly review the



origins of public health surveillance, the characteristics of a good public health indicator and the use of theoretical models which underpin framework development.

Public Health Surveillance: Historically, numerical methods have been used to monitor public health since the late 1600s. During the early 20th century, elements of surveillance were increasingly applied to the detection of epidemics and the prevention and control of infectious disease. As the 20th century progressed, the potential usefulness of surveillance as a tool to address other issues became recognised, with the expansion of surveillance to include chronic diseases and their risk factors, being accompanied by a broadening of surveillance's objectives. With the main objectives of traditional infectious disease surveillance being to identify cases of communicable disease and to facilitate their immediate public health control, traditional surveillance requires the rapid collection, analysis and dissemination of data, with emphasis being placed on getting information rapidly into the hands of "those who need to know". In contrast, the objective of chronic disease surveillance is to estimate the burden of disease, so that public health priorities can be established, prevention and control programmes be developed and resources allocated to meet health care demand. While achieving these objectives requires the use of a wider range of data sources, reporting timeframes may be much longer (e.g. annually or less frequently) depending on the health sector's demand.

When evaluating the performance of surveillance systems in order to ensure that they are collecting the most useful information, in the most effective manner for disease prevention and control, these differing objectives need to be taken into account,. Such an evaluation needs to review of the surveillance system's objectives, its mode of operation and its performance and to make a series of recommendations as to how this performance could be improved. In undertaking such an assessment, surveillance systems can be judged against to a series of 10 attributes, which include Simplicity, Flexibility, Data Quality, Sensitivity, Positive Predictive Value, Representativeness, Timeliness, Acceptability, Stability and Cost. Such an evaluation should not focus solely on the extent to which each attribute is achieved, but rather on achieving an appropriate balance across attributes.

Public Health Indicators: Public health indicators are used to provide a population view of health, which is directed towards public health action. They play an important role in advocacy, accountability, and in monitoring public health initiatives. In developing public health indicators two factors need to be taken into account: the characteristics which make a good public health indicator and the need for a set of criteria which will determine which indicators should be monitored over time. This section discusses each of these in turn: 1) **The Characteristics of a Good Public Health Indicator**; While there has been a burgeoning interest in the use of indicators to guide public heath practice, in many instances the validity of existing indicators has never been evaluated. In an attempt to address this deficit, Flowers et al developed a list of criteria which could be used when developing new indicators, or to assess the fitness for purpose of indicators already in common usage. These included Relevance, Face Validity, Construct Validity, Behaviour, Clear Specification, Repeatability, Construction and Deconstruction, Feasibility and Balance. In addition, others have suggested that indicators need to be developed to meet a specific purpose, be responsive to the public health policy environment in which they operate, be built on consensus, be based on a conceptual framework and be produced in a timely manner; 2) **Selection Criteria for Determining Which Indicators to Monitor over Time**; In recent years, advances in information technology and the availability of routinely collected data have meant that a large number of indicators meet the criteria outlined above. As a consequence, it is often necessary to develop a set of criteria which facilitates the narrowing down of a Long List of candidate indicators, to a more manageable list, which can then be monitored in over time. In the context of limited

resources, it is essential that this shorter list only contains issues of public health importance, so that the greatest public good can be achieved with the funds available. While selection criteria vary from agency to agency, most reflect a desire to achieve a balance between disease prevalence and severity, issues of disparity, and whether a condition is amenable to public health intervention.

Theoretical Frameworks: Current concepts of health recognise that many interconnected aspects of society, the environment and individuals all contribute to wellbeing. Yet many reports still continue with "basket approaches', simply grouping indicators into categories without explicitly considering the relationships between them. While such approaches may assist in estimating the burden of disease and in identifying disparities, they do not translate into a shared understanding of causality, or provide any insights into the most appropriate levels for intervention. In such situations, a unified theoretical model is useful as it provides an integrated picture of health and an understanding of the ways in which its interconnected determinants shape outcomes at a population level. Models which locate each indicator's position in this causal chain are also of value in helping to understand the relationships between indicators, as well as providing balance to the indicators selected, by identifying the dimensions of health which are particularly important.

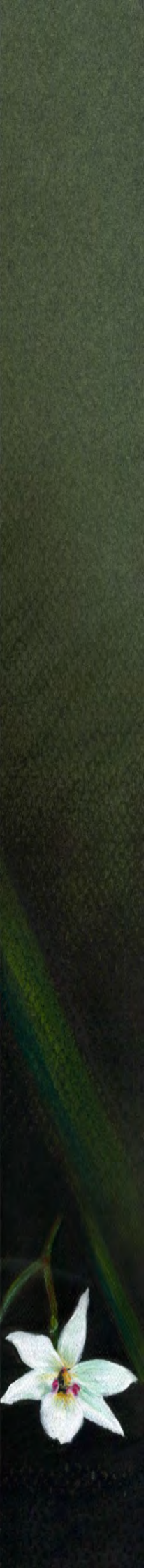
Yet despite their considerable utility, such frameworks are only recent innovations, reflecting an evolution of thought over the past two decades, which has increasingly recognised the multiple and interacting determinants of health and the influence they have on population level outcomes. While such concepts underlie many of the monitoring frameworks developed in recent years, it is notable that that no two countries, or groups of countries have developed exactly the same framework for monitoring the health of their children and young people. Instead each has taken these same concepts and constructed a "multidimensional map", which best describes these complex relationships within the context of their own child and youth populations. Despite this, many of frameworks share common dimensions including: 1) **Multiple Influences**; All frameworks to some extent recognize that health arises not only from individual characteristics and behaviours, but from many interconnected aspects of the social, economic and physical environment; 2) **Etiologic Pathways**; Many frameworks also group indicators in a manner which explicitly considers the etiologic sequences linking the underlying determinants with outcomes at the population level; 3) **Lifecourse Dimensions**; A number of frameworks also include a lifecourse dimension, and arrange their indictors in a manner which reflects the key developmental stages progressing from birth → late adolescence. Such approaches allow for the cumulative effects of exposures to be considered, during critical and sensitive periods of development.

Population Health Monitoring: Overseas Models

During the past decade, a number of countries have developed frameworks to monitor total population health. Several have adapted these frameworks for use in their child and youth populations, while others have developed similar frameworks from scratch. A reviewing approaches have other countries taken to monitoring the health of their children and young people, and assessing whether any of these approaches might be of use in the New Zealand context, the following section reviews a range of international (e.g. WHO, UNICEF) and regional monitoring initiatives (e.g. EU), before exploring those occurring at a national level (e.g. Australia, UK). The section concludes with a discussion of the implications of the findings of this review, for framework development in the New Zealand context.

Global Monitoring Agents

There are several international organisations which undertake global population health monitoring. The largest of these are the World Health Organisation (WHO), the United Nations Children's Fund (UNICEF) and the Organisation for Economic Co-operation



and Development (OECD). While only UNICEF has a specific child health mandate, all of these agencies collect data pertaining to children and young people.

Regional Monitoring Agencies

A number of organisations also routinely monitor health at a regional level and of these the European Union's *Integrated Approach to Establishing European Community Health Indicators* (ECHI) Project is probably the best example. This project was established, to develop a coherent set of European Community Health Indicators, which were to be selected on the basis of explicit criteria and to be supported by all Member States. ECHI-1 was completed in 2001, and comprised a list of approximately 190 indicators, as well as a framework which was incorporated into all subsequent monitoring projects. In addition to ECHI-1, several related projects were undertaken during the same period, which further defined indicators in specific areas such as child, perinatal and reproductive health. Of these, the Child Health Indicators of Life and Development (CHILD) project, which commenced in 2000, aimed to address the underlying determinants of health, as well as the more traditional health status measures. The project included children from birth to 17 years and utilised an adapted ECHI framework to identify 35 core indicators and 17 key areas for future development.

National Level Monitoring

Most developed countries monitor population health, although not all have developed specific reporting frameworks for child and youth health. Countries which have done so include the UK, the USA, Australia, Canada and Italy, and while each has utilised a similar methodology, the evolution of these frameworks has diverged in order to taken into account previous monitoring initiatives and the unique needs of each country's child and youth populations.

Summary and Implications for Framework Development
The findings of this review have a number of implications for the development of a child and youth health monitoring framework for New Zealand. These include:

1. Any monitoring framework developed needs to be broad in its scope and in addition to traditional health outcomes, needs to include coverage of the underlying determinants of health, risk and protective factors and some commentary on health service utilisation.
2. A theoretical model which reflects the concepts of population health currently prevailing within the health sector would need to be developed to underpin framework development.
3. Two sets of selection criteria would be required to govern the inclusion of indicators within the framework, with one focusing on the characteristics of the indicator itself and the other focusing on its public health importance.
4. While principles of public health best practice would need to guide the project's methodology, the approach taken would also need to be flexible enough to take into account previous population health monitoring initiatives and frameworks, and the unique health needs of New Zealand's children and young people.

Section 3: Developing a Child & Youth Health Monitoring Framework for NZ

The above review suggests that New Zealand's approaches to monitoring child and youth health may need to be rethought, if the future information needs of a regionally devolved and population focused health sector are to be met. New Zealand is not alone in needing to consider this issue however, with a number of other developed countries reviewing the ways in which they have monitored the health of their children and young people during the past 5-10 years. The section which follows outlines the approach taken by Project Team to develop a child and youth health monitoring framework for New Zealand. It begins by briefly reviewing the main findings of the previous literature reviews, with a view to identifying the key elements which would be required in a framework developed for local use. It then outlines the five phases of the project's development, with more detail on the framework eventually developed and each of the indicators contained within it, being provided in the Indicator Handbook which accompanies this publication.

Implications of Previous Literature Reviews for Indicator Framework Development
The literature reviews above highlighted a number of key issues which would need to be taken into consideration when developing a monitoring framework for use in the New Zealand health sector. These issues, which were considered by the Project Team at their first meeting included:

1. The framework would need to reflect key issues currently accorded a high priority by the New Zealand health sector. These include the role of Maori as tangata whenua and the Crown's obligations under the Treaty of Waitangi, the health sector's current emphasis on reducing disparities in health and the growing recognition of the role Government policies play in the genesis of child and youth health.
2. In the context of a regionally devolved and population focused health sector, the framework would need to provide a comprehensive map of the important issues, so that national and regional HNAs, and prioritisation and resource allocation decisions could be made using the information produced. In achieving this objective, it would be necessary to use indicator selection criteria

which specifically considered public health importance, and the framework would also need to provide information in areas where routine data sources were lacking.

3. From the same framework a smaller subset of monitoring indicators would need to be drawn, which provided a balanced overview of child and youth health issues in the context of total population reports. This subset would need to be drawn in a representative manner and in addition to public health importance, data quality criteria would need to be developed, to ensure that the subset could be monitored in a valid manner over time.
4. The framework would need to be based on a sound theoretical model, which governed the balance of indicators included, as well as how the relationships between them were portrayed. The level in the causal chain at which each indicator sat would need to be identified, as would its potential effects at crucial points in the lifecourse.
5. To ensure that the framework stood up to international scrutiny, it would be necessary to ensure that those elements considered best practice overseas were incorporated into the project's methodology. These included adequate sector wide consultation, transparent processes, sound indicator selection criteria, adequate scrutiny of data quality, and the use of a theoretical model which reflected prevailing views of population health.

Child and Youth Health Indicator Project Overview and Key Phases

The Indicator Project Team was formed in February 2006 and over the next 12 months, using a methodology which was loosely based on similar work overseas, developed a child and youth health monitoring framework for New Zealand. The section which follows reviews of the 5 phases the project's development:

1. **Phase 1: Development of a Project Methodology, Indicator Selection Criteria and Streams for Topic Based Consultation**: During this phase, a Project Team and Steering Committee was formed, the overseas literature was searched for methodologies and selection criteria used by other developed countries and the first face to face meeting of the Steering Committee was held. At this meeting, a draft methodology and set of indicator selection criteria were developed, and the child and youth health was divided into a number of topic based streams, which would guide the first stages of consultation. Each of these streams was then assigned a *Stream Head* from within the Committee, or the name of a key expert was suggested, who the Project Staff could contact to discuss the issue further.
2. **Phase 2: Stream Based Consultation and Development of a Theoretical Model**: During this phase, a literature search was performed and a *Long List* of all of the measures used to assess child and youth health in New Zealand during the past decade was created. This list was then divided into the topic based streams previously created by the Steering Committee and nominated Stream Heads were provided with a list of the indicators within their stream. By means of email, one to one interviews, or small group discussions, Stream Heads and their networks were asked to comment on the indicators within their stream, whether additional indicators should be considered, and which issues should be accorded the greatest priority. A literature search and consultation were also undertaken in order to inform the development of a theoretical model which best described the relationships between the factors contributing to the health of New Zealand children and young people.
3. **Phase 3: The Narrowing Down of the Long List to a Medium List of Indicators**: At their second face to face meeting, the results of stream based consultation and a draft theoretical framework were presented to the Steering

Committee and Stream Heads. During this meeting the *Long List* of candidate indicators was shortened to a *Medium List* using an electronic voting system and the selection criteria previously developed by the Project Team. The indicators in this *Medium List* were then incorporated into the draft theoretical framework and a consultation document was developed, for use during the next phase of consultation.

4. **Phase 4: Consultation on the Draft Indicator Framework and Medium List of Indicators**: During this phase, feedback on the draft indicator framework was sought from those working in the health sector. A 39-page consultation document which outlined the project, the draft theoretical framework and the *Medium List* of indicators was disseminated throughout the child and youth health sector and the draft framework was presented at a number of meetings of child and youth health professionals. Towards the end of this phase, a "Top 12" voting document was disseminated through the same networks, which asked participants to draw from the *Medium List,* 12 indicators which they felt would best represent child and youth health issues in the context of total population health reporting.
5. **Phase 5: Incorporating the Feedback from Consultation into the Final Framework and the Development of a "Top 20" Subset**: At their third face to face meeting, the Steering Committee reviewed the results of the sector wide consultation and a *Final List* of indicators was developed, which reflected the feedback of those working in the sector, as well as the results of previous prioritisation rounds. In addition, a "Top 20" indicator subset was agreed on, which provided coverage of risk and protective factors and determinants, as well as the "Top 12" child and youth health outcomes. An Indicator Handbook was then developed, which outlined how the framework might be used within the health sector and provided more detailed information on each of the indicators contained within it.

Section 4: Summary and Final Recommendations

Having explored New Zealand's recent approaches to monitoring the health status of its children and young people, as well as the work undertaken by other countries in this area, and having developed a monitoring framework for use in the New Zealand health sector, the final section of this report makes a series of recommendations as to the action which may be required, to ensure that the framework developed as a result of this project, can be used to achieve maximal health gains for New Zealand children and young people. These recommendations include:

1. During the past decade there have been a large number of reports on the wellbeing of New Zealand children and young people, which have often been released within 1-2 years of each other and frequently contain very similar content. Yet no one agency has been able to produce a comprehensive review of child and youth health that has run to more than two editions and the monitoring of more limited baskets of indicators has often been cut short by health service restructuring. If New Zealand is to develop a strategic approach to improving the health of its children and young people, this fragmentation and duplication of effort needs to stop. The health sector needs to make a commitment to monitoring the health of its children and young people and to allocate resources to this end.
1. A single national agency needs to assume responsibility for monitoring child and youth health and for setting a timetable for reporting which meets the health sector's needs. This monitoring agency needs to be set up in such a way that it is resistant to health sector restructuring, yet at the same time is flexible, so that

new indicators can be added as new issues emerge, or new data sources come on line. In addition, to ensure its ongoing relevance, the framework used by this monitoring agency needs to be updated at least once every 5 years.

2. Once an organisational structure for ongoing monitoring has been established and timelines put in place for its periodic review, the technical aspects of monitoring need to move into the background, with the focus being directed towards developing systems which ensure that the information thus produced is used to improve the health of children and young people. In achieving this aim, monitoring needs to be viewed as the first stage in Health Needs Assessment, with subsequent stages including the review of current strategies and health services and a formal assessment of where these are not meeting population health needs. Traditionally, this is then followed by a round of prioritisation that determines which issues are to be awarded the highest priority in the short, medium and longer term. Implementation of strategies to address priority areas is then followed by an evaluation of their effectiveness. The cycle begins anew with another evaluation of the health status of the population. Unless such processes can be put in place to integrate child and youth health monitoring with these prioritisation and planning cycles, it is unlikely that the information thus produced will be used to maximal advantage. Because the level of integration which currently occurs is different at a national and regional level, recommendations in each of these areas are addressed in turn.

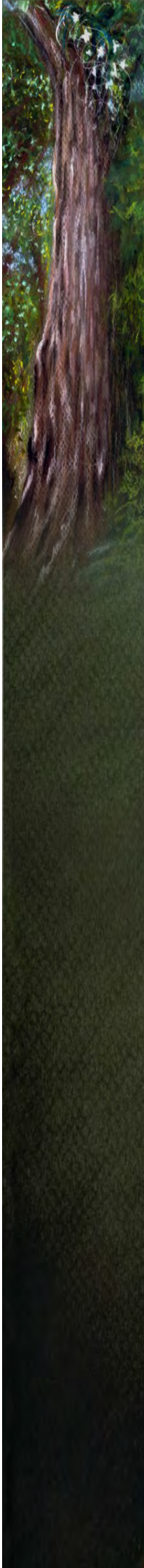
3. At a regional level, health information is already integrated into DHBs prioritisation and planning processes, with DHBs having completed two full cycles of HNA. A review of the latest round of these HNAs however suggested that the child and youth health information contained within these reports is extremely variable, with the number of issues covered and the contextual information accompanying each indicator differing markedly from region to region. It is thus recommended that the “Top 20” indicator subset arising from this project should be considered by DHBs when planning their total population HNAs, and that more detailed reviews using the entire framework should be considered by regional Child and Youth Health Services, either on an ongoing basis or at a minimum, prior to embarking on child and youth health strategy development.

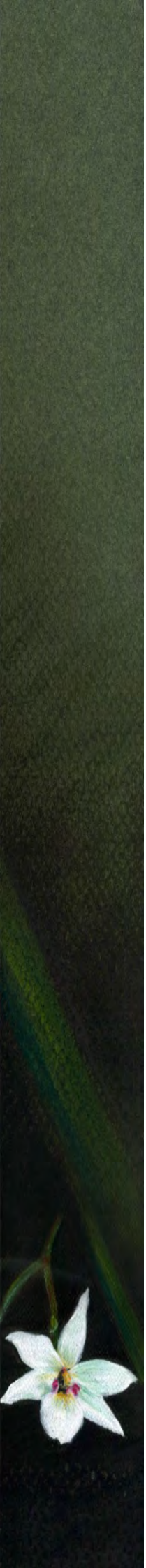
4. At a national level, no comparable infrastructure exists which allows for a regular cycle of population HNA and for the ongoing prioritisation of issues in child and youth health. As a consequence, the potential exists for strategy development to occur differently in 21 DHBs and for the MOH to have difficulties in coordinating action in this area. At a minimum, it is thus recommended that the MOH produces a national child and youth health report, based on this framework at least once every three years, with the reporting cycle coinciding with the DHBs HNAs. In addition, as is occurring at a DHB level, it is recommended that a process of ongoing evaluation and prioritisation be put in place nationally, so that at any given moment the health sector is aware of the current priorities in child and youth health, as well as interventions planned to achieve gains in key priority areas. While an infrastructure to facilitate this process would need to be developed, at bare minimum a series of annual prioritisation workshops would need to occur, so that regional and national level strategies could be developed in a coordinated manner.

5. Feedback following presentation of the draft framework at the National Mokopuna Ora conference would also suggest that separate national level reports may also be needed to assess the health of Maori (and Pacific) children and young people. While such reports might be based on a framework similar to that developed during this project, it is likely that additional resource would be

required to ensure that the information thus produced was interpreted within the context of Maori and Pacific world views. In addition, the marked health disparities experienced by Maori and Pacific children and young people, would also suggest that additional national level prioritisation processes may be necessary, in order to ensure that their health needs are addressed in a manner which reflects the priorities of the communities in which they are living.

6. Finally, while the “Top 20” indicator subset was developed to provide guidance on the most appropriate balance of indicators to represent child and youth issues in the context of total population reports, it was never intended that this subset should be used to determine which issues should receive the greatest priority in terms of resource allocation or strategy development. It is thus recommended that the “Top 20” subset be re-evaluated during any first round of national level prioritisation, and only after this has occurred, should the subset be used to reflect the health sector’s key priorities in child and youth health.





Introduction

Children and young people make up a third of New Zealand's population and collectively represent a national taonga or treasure, whose health and wellbeing need to be safeguarded in order to ensure the future prosperity of this country. While the majority of New Zealand children and young people do enjoy good health, some groups experience a disproportionate burden of morbidity and mortality, either as a result of long term health conditions or accidents, or a range of historical and economic factors impacting on the resources available to their families. While New Zealand Government policies in recent years have accorded a high priority to reducing such disparities in health outcome, to do so in any coordinated manner requires in the first instance, that the health status of children and young people be visible.

While there have been a large number of one-off and limited edition publications on the health status of New Zealand children and young people in recent years, and a number of Government agencies have monitored limited baskets of child and youth health indicators, no one Government or non-Government agency has taken overall responsibility for collating all of the available information on child and youth health, prioritising it, arranging it into a logical framework and then using this framework to monitor child and youth health over any period of time. As a result, it remains difficult to answer any of the following questions:

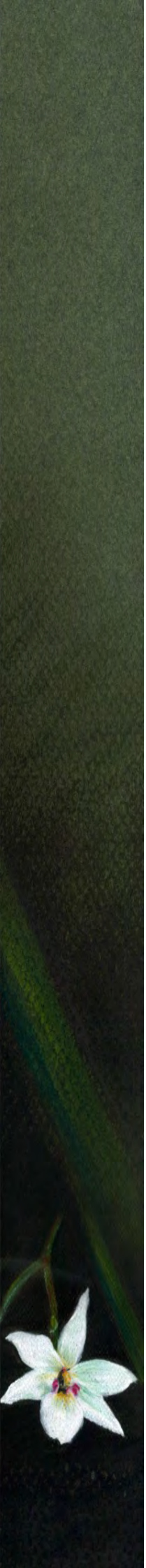
1. What is the current health status of New Zealand's children and young people?
2. Are the issues highlighted in recent New Zealand publications selected because of their public health importance, or merely because routine data was available with which to track their prevalence over time?
3. What are the underlying determinants that shape the health of children and young people in this country and is there any evidence for disparities in their distribution?
4. Within the health sector at present, is there sufficient information to inform prioritisation or to guide evidence based planning, or the purchasing of services?
5. Is there evidence that the Government is meeting its obligations under the Treaty of Waitangi with respect to health outcomes for Maori children and young people?

Without answers to each of these questions, a coordinated national approach to improving the health of New Zealand children and young people is likely to be impossible. It was with this in mind that the Paediatric Society of New Zealand and the Ministry of Health embarked on a project to develop a child and youth health monitoring framework for use in the New Zealand health sector. This report is the first of two arising from this project and fits into the reporting sequence as follows:

Report 1: Literature Review and Indicator Framework Development

This report presents the background information which was used the guide the process of indicator framework development and describes the methodology used by the Project Team in some detail. It is divided into four main sections:

1. **New Zealand's Current Approach to Monitoring Child and Youth Health**. This section explores the approaches taken by New Zealand Government and non-Government agencies to monitoring the health of children and young people over the past decade. It discusses some of the limitations inherent in the approaches used to date, and in particular highlights the significant duplication of effort which has occurred within the sector, as well as the inability of current approaches to provide an overall map of child and youth health, which can be



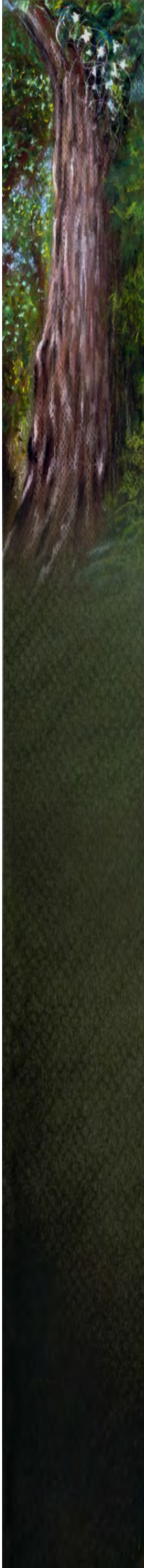
used to inform prioritisation and planning decisions. The section concludes with a brief overview of the health sector's current child and youth health information needs and the implications these have for future framework development.

2. **The Origins of Population Health Monitoring and Other Countries' Approaches to Date**. This section begins by briefly describing the origins of modern population health surveillance and the elements currently considered essential for effective surveillance system functioning (e.g. scientifically valid indicators, sound selection criteria, a theoretical model which governs the types of indicators included, as well as how the relationships between them are portrayed). It also reviews the approaches taken by other developed countries to monitor the health of their children and young people, with a view to identifying methodologies which could inform the process of framework development in the New Zealand context.
3. **Developing a Child and Youth Health Monitoring Framework for New Zealand.** This section explores the methodology used by the Project Team to develop a monitoring framework for the New Zealand health sector. It begins by briefly reviewing of the findings of the previous literature reviews, in order to identify the current information needs of the health sector, as well as those elements considered best practice in the overseas context. It then describes the formation of a Project Steering Committee, and the development of a methodology and set of selection criteria to guide the Project Team through the early stages of indicator framework development. During this period a Long List of candidate indicators was assembled, which was then pared down to a Medium and then a Final List using a set of selection criteria, feedback from consultation within the health sector, and the expert opinions of Steering Committee members. Simultaneously, a theoretical model was developed which helped guide the way in which the relationships between indicators were presented, and a "Top 20" subset of indicators was created, which could be used to represent child and youth health issues in the context of total population health reports. The section concludes with an overview of the monitoring framework developed as a result of this project, with more detail on each of the indicators contained within it being presented in the Indicator Handbook which accompanies this Report.
4. **Summary and Final Recommendations:** This section briefly reviews the main findings of the report and makes a series of recommendations as to the additional steps which will be required, if the indicator framework developed as a result of this project, is to be used to achieve maximal health gains for New Zealand's children and young people.

Report 2: The New Zealand Child and Youth Health Indicator Handbook

The Indicator Handbook which accompanies this report presents the Child and Youth Health Monitoring Framework in detail and provides information on each of its four domains, as well as the indicators contained within them. It also provides examples of how the framework's two dimensional structure, with its four vertically organised domains (Historical, Policy and Economic Context → Cultural and Socioeconomic → Risk and Protective Factors → Whanau and Individual Outcomes) and horizontal lifecourse dimension, can be used to help understand the relationships between indicators and to identify the most appropriate levels for population health interventions. The Handbook also contains a detailed description of each of the indicators in the framework, including information on their data sources, statistical methods, trends over time, and distribution by sociodemographic factors (e.g. gender, age, ethnicity, NZ

Deprivation Index decile). Thus, in addition to providing an overview of the framework developed as a result of this project, it is hoped that this Handbook will also provide the reader with a comprehensive update on the current state of child and youth health in New Zealand, as well as the key determinants which shape outcomes at a population level.



Section 1: New Zealand's Current Approach to Monitoring Child and Youth Health

New Zealand's Current Approach to Monitoring Child and Youth Health

Introduction

In New Zealand during the past decade, aspects of child and youth health have been monitored by a variety of Government and non-Government agencies, resulting in a considerable body of literature on child and youth wellbeing. Yet, despite a number of agencies bringing together multiple data sources to produce comprehensive "snapshots" of child and youth health, none have ever run beyond a second edition. Similarly, while several Government agencies have monitored selected baskets of child and youth health indicators, either in the context of total population health or in their own right over the past decade, many of these initiatives have been cut short by health sector restructuring, and no child focused reporting series has ever run beyond three editions. This fragmented approach to monitoring has significant implications for the literature review which follows, necessitating the search of a large number of Government and non-Government agency websites, research bibliographies and Medline databases for publications which could potentially be viewed as contributing to the monitoring of child and youth health in this country.

Despite this, a review of the recent New Zealand literature on child and youth health monitoring was seen as being of value in providing the Project Team with answers to the following questions:

1. What approaches has New Zealand taken during the past decade to monitor the health of its children and young people, and have these approaches met the information needs of the health sector?
2. Are there any unmet information needs which need to be taken into account when designing a framework to monitor the health of New Zealand children and young people?
3. Are there any useful elements of New Zealand's recent monitoring approaches that should be carried forward into future framework development?

In answering each of these questions, the review that follows begins by providing an overview of the New Zealand publications produced during the past 10 years which contained significant child and youth health content, the agencies who produced them, the issues they covered and whether they were intended as one-off reports or as part of an ongoing monitoring process. This is followed by a critique of some of the strengths inherent in New Zealand's current approaches to monitoring, as well as some of the limitations, including the significant fragmentation and duplication of effort that is currently occurring, the lack of consistent indicator selection criteria or a common theoretical framework which considers the relationships between indicators, and tensions between the need for a representative indicator subset for national level monitoring and the need for comprehensive and detailed Information at a DHB level. The review concludes with a brief summary of the current information needs of the New Zealand health sector and the implications these have for indicator framework development.

Literature Review Inclusion and Exclusion Criteria

Because of the large number of publications in recent years which could potentially be viewed as contributing to child and youth health monitoring, it was necessary to

develop a set of inclusion and exclusion criteria which restricted the review to those that were of direct relevance to the project. The following review thus presents the results of a search of Government and non-Government agency websites, internet sites, research bibliographies and Medline databases for New Zealand publications during the past 10 years which met the following criteria:

1. The publication must have derived its child and youth health information from routinely collected data sources (e.g. hospital admission, birth registration, mortality datasets, ongoing national surveys and Censuses, publicly available policy documents) AND
2. Was either cross sectional i.e. explored a variety of child or youth health issues at a single point in time OR monitored a single issue in the same format on more than one occasion.

The search strategy specifically excluded:

1. One-off research reports where data was collected at a single point in time and for the purpose of a research project i.e. the majority of research publications identified using Medline. Such exclusions were made on the basis that traditional research methodologies were likely to be impractical for the ongoing monitoring of a large number of child and youth health issues over an extended period of time.
2. Literature reviews which collated the findings of other publications but which in themselves did not present any new analysis of primary data. Such publications were of use however, in identifying other publications which met the inclusion criteria for this review.
3. One off publications in academic journals which utilised national data sources to explore single issues e.g. bronchiolitis, injury. While such publications were considered when developing a Long List of candidate indicators, their methodology and focus were seen as being research based and they were not considered further in this part of the review.
4. Reports based on sub-national or one-off surveys where there was no intention of repeating the report in the same format in future years.

The focus on the past decade was seen as being important for a number of reasons:

1. Advances in computer technology and modern statistical software have transformed the type of analyses possible using routinely collected data. Thus publications produced over a decade earlier may not reflect the current expectations of the health sector for accurate and detailed child and youth health information.
2. The New Zealand health sector has undergone major structural changes during the past decade, with DHBs now taking responsibility for improving the health of the children and young people in their care and a much greater emphasis being placed on reducing socioeconomic and ethnic disparities in health outcome. As a consequence, it is likely that more recent publications better reflect the current information needs of the health sector (e.g. breakdown by DHB, ethnicity, NZDep) and the purposes for which it will be used (e.g. DHB prioritisation and strategic planning).
3. The publications most relevant to this review are “grey literature” publications, more commonly published on Government and non-Government Agency websites than in traditional medical journals. With many older “grey literature” publications being either unsearchable using traditional search engines, or not held in academic libraries, it is likely that coverage of publications prior to 1996

would have been incomplete, potentially producing a biased view of the approaches to monitoring used over a decade ago.

Results of the New Zealand Literature Review

A search of the New Zealand literature using the criteria listed above resulted in a large number of publications being included in the review. While the aims and objectives of these publications varied considerably, in general terms they fell into one of five main categories:

1. Cross Sectional Reviews Based on Routinely Collected Data
2. Cross Sectional Reviews Based on National Survey Data
3. Ongoing Monitoring in the Context of Total Population Health
4. Ongoing Monitoring of Single Child and / or Youth Health Issues
5. Ongoing Monitoring with a Child and / or Youth Health Focus

The following sections review the characteristics of each of these categories in turn, the reports contained within them, and the collective contributions each made to the monitoring child and youth health in New Zealand during the past decade.

Cross Sectional Reviews of Child and Youth Health and Wellbeing

Using the inclusion criteria above, a total of 13 publications were identified which utilised routinely collected data sources to provide cross sectional overviews of child and youth wellbeing (Table 2, Table 3). Of these, four [2-5] were second editions of earlier reports, although a number of others signalled their intention to update the current report at a future point in time [6, 7]. Notably, none ran to a third edition. While each brought together a variety of different data sources and considered a wide range of issues, their underlying aims varied considerably. In general terms however, they fell into one of four main categories:

1. Reports which brought together a wide range of data sources to provide a cross sectional overview of child and youth health (e.g. SIDS, nutrition, smoking, injury, justice) [4, 6-10]
2. Reports which explored the impact of Government social policies over the past two decades on a range of child and youth outcomes [5, 11];
3. Reports which considered the wellbeing of children and young people within the context of New Zealand's obligations under United Nations Conventions and Declarations [2, 3, 12];
4. Reports which explored how resources might be optimally allocated to improve child and youth wellbeing, but in doing so provided illustrative case studies of child and youth health in the New Zealand context [6, 13, 14]

While each of these reports had a slightly different focus, the collective contribution they made to the understanding of child and youth health issues was significant, and included:

1. As a group, the reports provided a broad and a detailed overview of the types of health issues currently being experienced by New Zealand children and young people.
2. In addition, the majority also provided information on the underlying determinants of child and youth health (e.g. family income, education, housing, NZDep deprivation).

3. The number of reports also highlighted the role changes in Government policy played in the health and wellbeing of New Zealand children and young people.

When viewed as a group however, these reports also tended to have a number of collective drawbacks. These included:

1. Despite the large number of publications on child and youth health during the past decade, very few cross sectional reports (with the exception of those with a policy focus), referenced earlier reports undertaken by others outside their organisations. Instead, the majority focused on the presentation of new information derived from its original data sources (e.g. Census data, hospital admission data, youth justice statistics).
2. While most cross sectional reports covered very similar topics (e.g. most began with a demographics section, followed indicators grouped into broad topic areas), no two agencies used exactly the same indicators, or the same theoretical model when considering the relationships between them. In fact, in the vast majority of cases the links between the various indicators contained within these reports were never explicitly considered.

Cross Sectional Reviews Based on National Survey Data

In addition to routine data sources, a number of other reports used information derived from national surveys (e.g. Census, Youth 2000, Children's National Nutrition Survey) to provide cross sectional reviews on aspects of child and youth wellbeing (Table 4). These included Statistics New Zealand's "New Zealand Now" series, which published two reports (1995, 1998) on children [15] and one (1998) on young people [16]. While these reports were predominantly based on Census data (e.g. demographics, family composition, household income), this was supplemented with information derived from other sources (e.g. mortality, education) in order to provide a more comprehensive snapshot of the issues faced by New Zealand children and young people.

While the Ministry of Health's "A Portrait of Health" series, derived from the New Zealand 1992/93, 199/97 and 2002/03 Health Surveys also contained information on the health and wellbeing of New Zealand young people (15-24 years), survey questions were predominantly adult focused, with large sections devoted to chronic diseases (e.g. heart disease, high blood pressure) and their risk factors (e.g. nutrition, overweight, smoking, alcohol consumption). In contrast, the Youth 2000 Survey focused solely on young people aged 12-18 years and in addition to producing an overview report entitled "New Zealand Youth. A Profile of their Health and Wellbeing" [17], the research group also produced separate reports on Maori [18] and Asian young people [19] and non-heterosexual youth [20]. Issues covered in these reports included: culture and ethnicity; home and family; school; health and community; use of health services; nutrition and weight; cigarettes, alcohol and other substances; mental heath and emotional wellbeing. Finally, the NZ Children's Nutrition Survey, the first in a 8-10 year cycle by the Ministry of Health, provided information on a range of nutritional issues affecting children 5-14 years (e.g. dietary intake, physical activity, food purchasing behaviour and weight and BMI) [21].

Ongoing Monitoring in the Context of Total Population Health

While none of the comprehensive cross sectional reports has ever run to more than two editions, a number of Government agencies have included subsets of child and youth health indicators in their ongoing monitoring of total population health (Table 5). Of these, perhaps the longest running series was "Progress on Health Outcome Targets", which comprised 7 reports published annually between 1993/4 and 1999, which monitored progress towards specific public health targets. The series was established by the former Public Health Commission, who initially set the strategic

direction for public health in 1993/94, although this was later revised following wide consultation. While the reporting series focused on total population health, each report contained child and youth sections which covered topics including breastfeeding, congenital and inherited conditions, fluoride and oral health, immunisation, rheumatic fever, SIDS, child hearing loss, child abuse, injuries in young people, sexually transmitted diseases, alcohol, cannabis, youth suicide. Of note, each of the indicators was accompanied by a target, an analysis of progress towards this target and strategies via which this target might be achieved.

Following the health sector restructuring arising from the Public Health and Disability Act in 2000, Public Health Intelligence was delegated the Ministry of Health's statutory responsibility to monitor population health, and in 2002 published the first report in a new series entitled "An Indication of New Zealanders' Health". Specific targets were not included in this reporting series, which again focused on total population health, but included specific child and youth sections. Indicators in these reports were presented in hierarchically arranged domains: Socioeconomic Factors, Environmental Factors and Risk / Protective Factors, and an "Outcomes" domain which was divided into 6 age groups (total population, infancy, children, young people, adults, older people). Within these age brackets relevant indicators included:

1. **Infants:** Infant Mortality, Low Birth Weight, Breastfeeding, Burns Admissions, Falls Admissions, Poisoning Admissions.
2. **Children:** Pertussis, Measles and Meningococcal Disease Admissions and Notifications, Hearing Screening, Oral Health, Injury Mortality.
3. **Youth:** Teenage Fertility, Youth Suicide, Motor Vehicle Mortality, Rheumatic Fever.

While the indicators contained in these reports have remained relatively constant over time, the format has changed considerably, with information in more recent reports being presented in a much more compact format and with a much greater emphasis on DHB level data [22].

In addition to national level monitoring, the Ministry of Health also uses a basket of key indicators to monitor performance at a DHB level [23]. While the actual indicators monitored have varied from year to year, in line with the Minister of Health's annually stated expectations, in general terms these indictors reflect progress towards achieving the 13 population health objectives of the New Zealand Health Strategy. Table 1 summarises those indicators of relevance to child and youth health which have been monitored by the MOH since 2001.

Similarly, the Ministry of Social Development (MSD) and Statistics New Zealand have both monitored baskets of indicators over the past decade, some of which are of relevance to child and youth health. The MSD's Social Report [24], produced annually since 2001, monitors indicators within 10 Domains, each of which are thought to capture a discrete component of wellbeing. These 10 Domains include Health, Knowledge and Skills, Paid Work, Economic Standard of Living, Civil and Political Rights, Cultural Identity, Leisure and Recreation, Physical Environment, Safety and Social Connectedness. While the reports have a total population focus, a number of indicators (e.g. population with low incomes, early childhood education, school leavers with higher qualifications) are of relevance to the child and youth population. In addition, these same 10 Domains were used as the basis for the Ministry of Social Development's "Children and Young People: Indicators of Wellbeing in New Zealand" report [7] which, because of its current "one-off" status, was considered in the Cross Sectional Reviews section presented previously. Similarly Statistics New Zealand's "Demographic Trends" series, which provides commentaries on major demographic indicators, has been published on an annual basis since 1997. These reports include a

number of indicators of relevance to child and youth health including sections on population structure and changes, births and induced abortions over time [25].

Table 1. Child and Youth Health Related Indicators of DHB Performance

Indicator	2001/2	2002/3	2003/4	2004/5	2005/6
Oral health: Mean MF Score at Year 8	●	●	●	●	●
Oral health: % of children caries free at 5 years	●	●	●	●	●
Hearing: % of children passing school entry hearing screening test	●	●	●		
Asthma: Readmission within 30 days for children < 5 yrs and 5-14 yrs	●	●			
Asthma: Discharge rates in children < 5 years and 5-14 years			●		
LBW: Babies born in public hospital with low birth weight	●	●	●	●	●
Breastfeeding: Full breastfeeding rate at 6 weeks and 3 months	●	●			
Ambulatory sensitive admissions: In 0-4, 5-14 and 15-25 year olds		●	●	●	●
Immunisation: Children fully immunised at 2 years	●	●	●	●	●
Immunisation: % under 20 years old immunised with MeNZB					●
BFHI: Progress in implementing the Baby Friendly Hospital Initiative	●	●	●	●	●
Teenage Pregnancy: Births and terminations in mothers 13-17 years				●	
Healthy Eating Healthy Action: % of active Health Promoting Schools					●

Ongoing Monitoring of Single Child and Youth Health Issues

While the majority of current reporting series are relatively recent in their origins (e.g. the Social Report commenced in 2001, the Indication of New Zealander's Health Series commenced in 2002) a number of other agencies have consistently monitored aspects of child and youth health over many years. Examples include the "Fetal and Infant Deaths" series [26], produced annually by the MOH since 1978 and the "New Zealand Hearing Screening Statistics" series produced annually by the National Audiology Centre since the mid 1990s [27]. In addition, a number of more recent publications have also monitored specific aspects of child and youth health (Table 6, Table 7) including cancer registry notifications, youth smoking rates, physical activity, neonatal intensive care admissions and a range of perinatal indicators in the Maternity Reports [28] (e.g. birth weight, postnatal readmissions, breastfeeding). While each of these reporting series, in itself is insufficient to provide an overall picture of child and youth health, collectively they provide valuable insights in a number of different areas dating back over a number of years.

Ongoing Monitoring with a Child and Youth Health Focus

In addition to specific child and youth issues, a number of organisations have also undertaken more comprehensive monitoring of child and youth health during the past decade (Table 8). In this category, perhaps the one which came closest to establishing an ongoing child and youth focused monitoring series was the intersectoral collaboration that arose between the Ministries of Social Policy, Education and Health

as a result of the Strengthening Families initiative. This collaboration produced a series of three reports (1998, 1999, 2000 [29]) which monitored progress towards key targets set in 1997 as part of the Strengthening Families Strategy. Issues covered included mortality, hospital admission rates, injury, child abuse and neglect, low birth weight, hearing screening referral rates, immunisation, early childhood education, smoking, alcohol and drug risk behaviour, school leavers with formal qualifications, with each agency taking responsibility for the indicators which fell within their jurisdiction. It is not immediately apparent why this reporting series ceased after the 2000 report, which is unfortunate as of all the monitoring initiatives outlined in this review, this one potentially showed the most promise in terms of intersectoral collaborations to monitor child and youth health.

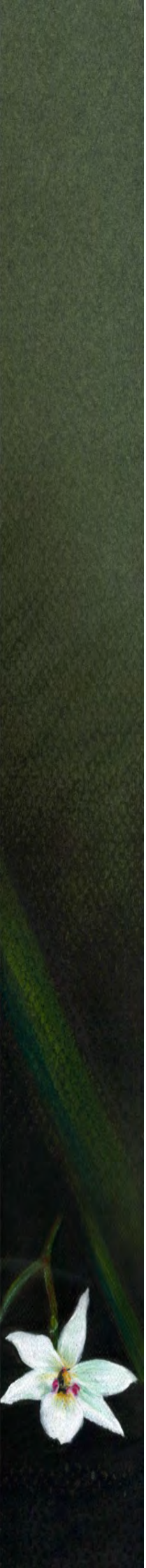
In addition, the Child and Youth Mortality Review (CYMRC), a statutory committee established under Section 18 of the NZ Public Health and Disability Act 2000 to "*review and report on deaths of children and young people between 4 weeks and 24 years of age*", has published 3 annual reports since its inception, with the most recent providing an overview of deaths occurring during 2002-2004 [30]. Relevant subsections include total infant, post-neonatal, child and youth mortality. While only being recently established, and solely focused on mortality, the legislative basis of the Committee and relative security of its ongoing funding, offer the potential for a standardised approach to child and youth mortality reporting to evolve in future years [30].

Similarly, the New Zealand Child and Youth Epidemiology Service, a joint venture between the Paediatric Society of New Zealand and Auckland UniServices, is another recent addition in the area of child and youth health monitoring, with its first report on child and youth health status being provided to participating DHBs in 2005 [31] and its second report on the determinants of child and youth health being released in 2006. While at present being available only to participating DHBs, the reports nevertheless provide a comprehensive overview of child and youth health issues across a range of topic areas, as well as national level data on each of the outcomes under study.

Finally, the New Zealand Paediatric Surveillance Unit (NZPSU), which was established with MOH funding in 1997 to provide active surveillance for acute flaccid paralysis in the context of the WHO's polio eradiation programme, has monitored a number of other uncommon, high impact child and youth outcomes during the past decade. These include haemolytic uraemic syndrome, congenital rubella, perinatal HIV exposure, vitamin K deficiency bleeding, prolonged infantile cholestasis, inborn errors of metabolism, pertussis admissions < 12 months, foregut and hindgut malformations, and pneumococcal meningitis. Surveillance relies on the voluntary participation of paediatricians and other specialist working with children, who every month are sent a reply-paid card or email and are asked to report on whether they have seen any cases of the conditions under surveillance. Information, where possible is cross referenced with other data sources (e.g. hospital discharge data) and surveillance reports are published annually [32]. While the NZPSU has monitored a range of child health outcomes over the past decade, its focus on uncommon conditions, high turnover (surveillance for many conditions only lasts for 1-2 year) and labour intensiveness (the reporting burden is unlikely to permit an expansion to collecting data on a range of more frequent conditions) ultimately limit its utility as a tool for monitoring child and youth health issues in a public health context.

Strengths & Limitations of Current Approaches to Monitoring

The above review clearly indicates that New Zealand has a wealth of information on the health and wellbeing of its children and young people, which has been produced by a variety of different organisations, using a variety of different data sources, over the



past decade. While at first glance this may suggest that the health sector currently has sufficient information with which to make prioritisation decisions and to fund and plan its services, a more detailed review reveals a number of distinct limitations inherent in the current approach. The following section begins by reviewing the strengths of New Zealand's recent approaches to monitoring the health of its children and young people, before considering a number of limitations under the following headings:

1. Cost and Duplication of Effort
2. Lack of Consistent Indicator Selection Criteria
3. Lack of a Consistent Framework for Considering Relationships Between Indicators
4. Tensions Between Representative National Level Monitoring and the Need for Detailed Information at a Regional Level

Table 2. Cross Sectional Reviews Based on Routinely Collected Data (1/2 cont…)

Publication	Organisation	Year	Report Content
Our Children's Health. Key Findings on the Health of New Zealand Children [9] Child Health Programme Review [13]	Ministry of Health	1998	Two related documents providing the basis for the strategic direction of the Child Health Strategy. Our Children's Health uses information from a range of sources to identify patterns and trends in child health. Topics covered include morbidity and mortality, infant health, disabilities, tamariki Maori hauora, nutrition, tobacco, alcohol & drugs, sexual and reproductive health, communicable diseases, injury, abuse and violence, mental health, chronic disease. The Child Health Programme Review reviewed child health programs with a view to building on those delivering the best health gain and improved family function. Four key intervention areas identified were tobacco control measures, home visiting programs, interventions to protect children from unintentional injuries and improved health services.
Children in New Zealand: United Nations Convention on the Rights of the Child. Second Periodic Report of NZ [3]	Ministry of Youth Affairs	2000	This report includes New Zealand's relevant developments in law, policy and practice since its *Initial Report* as well as plans to improve children's rights. Details include legislative, judicial, administrative and other adopted measures that affect the provisions of the United Nations Convention on the Rights of the Child (UNCROC/Convention).
The Top 10 Report [8]	Waikato District Health Board	2001	Overview of the most important indicators of child and youth health in the Auckland and Waikato regions. Issues covered included population demographics, fertility, mortality, potentially avoidable hospitalisations, asthma, gastroenteritis, lower respiratory tract infections, notifiable infectious diseases, oral health, and hearing loss.
Children and Young People in New Zealand: Key Statistical Indicators [4]	Barnardos	2001 2003	Comprehensive overview of child and youth health and wellbeing using routinely collected data courses. Sections include population demographics, family structure, early childhood education, education, health and disability, child poverty, working children and young people, children at risk, risk behaviour, youth offending.
Our Children: The Priority for Policy [5]	Child Poverty Action Group	2001 2003	Review of the current wellbeing of NZ children, with a focus on evaluating Government policy from child poverty perspective. Includes sections on NZ children and poverty, why children are poor, targeting vs. universal support for children, family and work structures, housing, health, education, social services and social hazards.
When the Invisible Hand Rocks the Cradle: New Zealand Children in a Time of Change [11]	UNICEF Innocenti Working Paper Series	2002	Review of the impact of economic and social reforms in NZ since mid-1980s on the wellbeing of children. Includes review of impacts of reforms on trends in family income, employment, income inequality, poverty and deprivation, housing, health (infant mortality, suicide, and meningococcal disease), education, child protection and youth justice.
New Zealand Youth Health Status Report [10]	Ministry of Health	2002	Comprehensive overview of youth health and wellbeing statistics including mortality and morbidity; injury, unintentional injury, abuse and violence; mental health, mental illness and suicide; alcohol and drugs; cannabis; tobacco; gambling; nutrition, obesity and physical activity; diabetes; sexual and reproductive health.

Table 3. Cross Sectional Reviews of Based on Routinely Collected Data (2/2)

Publication	Organisation	Year	Report Content
Investing in Well-being: An Analytical Framework [14]	NZ Treasury	2002	Undertaken in context of project to identify cost-effective interventions to improve outcomes for children and young adults and to maximise value of government expenditures across the social sector. Sections include case studies of poor outcomes in (e.g. youth suicide, teenage pregnancy, educational underachievement, economic inactivity, ethnic disparities); a review of child development and the causes and contributors to poor outcomes; a review of aspects of social interventions necessary to improve wellbeing (timing, success factors, targeting), as well as some selected case studies (youth suicide, teenage pregnancy, educational underachievement, economic inactivity).
Children and Youth in Aotearoa 2003 [2]	Action for Children and Youth Aotearoa	(1996) 2003	Second non-governmental organisations report to the United Nations Committee on the Rights of the Child (first in 1996). Includes broad overview of issues facing children and young people in NZ including civil rights and freedoms; family environment and alternative care; basic health and welfare; education leisure and cultural activities; special protection measures. Contains in depth review of available literature, strategy documents and available statistics.
Making New Zealand Fit for Children. Promoting a National Plan of Action for NZ Children [12]	UNICEF	2003	Report arose in the context of UNICEF NZ's responsibility to promote the "A World Fit for Children" Declaration and to support the development of a national plan of action. Aims to identify and explore specific health issues that warrant inclusion in a national Plan for Action. Includes 5 background papers on foundations of child and youth health, major causes of morbidity and mortality, immunisation, unintentional injury, nutrition and breastfeeding. Information sources include child and youth health statistics, government strategy documents, personal interviews with key informants, and consultation with children.
Child and Youth Health Toolkit [6]	Ministry of Health	2004	Document targeting professionals working in health sector which aims to provide up to date and evidence based information and guidance on: 1) the best ways to reduce inequalities and achieve health gains for children; 2) a range of indicators for measuring progress on improving child health outcomes; 3) useful tools and directions for DHBs, managers, clinicians and primary health organisations. Part 1 outlines approaches necessary to improve child and youth health and to reduce inequalities. Part 2 provides detailed information and guidance on how to improve specific child and youth health indicators.
Children and Young People: Indicators of Wellbeing in New Zealand [7]	Ministry of Social Development	2004	Report presents 35 indicators of the social wellbeing of children and young people in New Zealand. Indicators capture different aspects of the 10 social outcome domains of the Social Report in areas such as health (low birth weight, infant mortality, hearing screening, obesity, youth smoking, <18 birth rate, youth suicide), care and support, economic security, safety, education, civil rights, justice, culture and identity, social connectedness and environment.

Table 4. Cross Sectional Reviews Based on National Survey Data

Publication	Organisation	Year	Report Content
A Portrait of Health. Key Results of the 2002/03 New Zealand Health Survey [33]	Ministry of Health (Public Health Intelligence)	1994 1998 2004	Cross sectional report on the key findings of the 2002/03 NZ Health Survey (earlier surveys 1992/93 and 1996/97). While the report is total population focused it includes a breakdown of results by age, providing information on the 15-24 age group for key indicators including chronic disease (mainly adult focused), vegetable and fruit intake, physical activity, overweight and obesity, alcohol use, smoking, health service utilisation, and self reported health status
New Zealand Now: Children [15]	Statistics New Zealand	1995 1998	Part of the New Zealand Now series drawing on the results of the 1991 (1995 Edition) and 1996 (1998 Edition) Census to explore a range of topics (e.g. Maori, women, housing). Report sheds light on the areas of children's lives measured by official statistics e.g. demographics, health and education, families and households, economic circumstances.
New Zealand Now: Young New Zealanders [16]	Statistics New Zealand	1998	Part of the New Zealand Now series drawing on the results of the 1996 Census, as well as other sources, to explore a range of topics (e.g. Maori, women, housing). Report sheds light on aspects of young people's (12-25 years) lives including demographics, family composition, education, employment, income and health.
New Zealand Youth. A Profile of Their Health and Wellbeing [17]	Adolescent Health Research Group	2003	Summary of the findings of Youth 2000, A National Secondary School Youth Health Survey (National Level Survey, to be repeated in 2007). Sections include culture and ethnicity, home and family, school, health, community and ways forward. Separate reports explore issues for Maori young people [18], Asian young people [19], non-heterosexual youth [20] [20] and young people's experiences with alcohol [34].
NZ Food, NZ Children: Key Results of the 2002 National Children's Nutrition Survey [21]	Ministry of Health	2003	Overview of the results of the 2002 National Children's Nutrition Survey

Table 5. Reports Associated with Ongoing Monitoring in Context of Total Population Health

Publication	Organisation	Year	Report Content
Demographic Trends [25]	Statistics New Zealand	Annual	Statistics NZ's main reference volume on population and related statistics. Published annually it provides commentaries and tables on major demographic indicators including population change and structure, births, marriages, divorce, death, life expectancy, external migration, induced abortions and population projections.
Progress on Health Outcome Targets [35]	Ministry of Health	Annual (1994-99)	Series of 7 annual reports in the State of Public Health series established by former Public Health Commission to monitor progress towards specified public health targets. Reports have a total population focus but contain a large number of child and youth health indicators (e.g. breastfeeding, congenital & inherited conditions, fluoride and oral health, immunisation, rheumatic fever, SIDS, child hearing loss, child abuse, injuries in young people, sexually transmitted diseases, alcohol, cannabis, youth suicide).
Indicators for DHB Performance [36]	Ministry of Health	Annual	Indicators used to measure DHB performance in Government's priority areas. Child indicators change from year to year with 03/04 cycle including progress on Baby Friendly Hospital Initiative, immunisation, hearing screening, asthma admissions, low birth weight, ambulatory sensitive admissions, oral health.
The Social Report [24]	Ministry of Social Development	Annual	Report uses a set of indicators to monitor trends across 10 domains which together reflect overall wellbeing and quality of life in NZ. Total population focus with small number of child / youth indicators including early childhood education, school leavers with higher qualifications, families with low incomes.
An Indication of New Zealander's Health [22]	Ministry of Health (Public Health Intelligence)	2002 2004 2006	Complete set of national indicators, with large proportion pertaining to child and youth health (infant mortality, low birth weight, breastfeeding, drowning, injuries, hearing failure at school entry, oral health, unintentional injuries, asthma, teenage pregnancy, youth suicide, road traffic injury mortality). Changes in format over reporting period include more compact reporting and greater DHB focus in more recent reports.
Chart Books: Tatau Kahukura (Maori Health Chart Book) [37], Tupu Ola Moui (Pacific Health Chart Book) [38], Asian Health Chart Book [39]	MOH (Public Health Intelligence)	2005 2006	First in series of monitoring reports on health status of particular groups (Maori, Pacific, Asian). Reports have total population focus with some child and youth health indicators including hearing screening, unintentional injury, low birth weight, infant mortality, SIDS, breastfeeding

Table 6. Reports Associated with Ongoing Monitoring of Single Child and / or Youth Health Issues (1/2 cont….)

Publication	Organisation	Year	Report Content
Sexually Transmitted Infections in New Zealand. Annual Surveillance Reports [40]	ESR	Annual	Annual summary of Sexually Transmitted Infections in NZ. Based on clinic and laboratory surveillance of total population, with breakdown by age.
Notifiable and Other Diseases in New Zealand [41]	ESR	Annual	Annual summary of infectious disease notifications in NZ. Total population focus with breakdown by age.
Fetal and Infant Deaths [26]	MOH (NZ Health Information Service)	Annual	Annual report presenting data on the numbers and rates of live births, infant deaths and fetal deaths registered in New Zealand 3 years previously.
Cancer: New Registrations and Deaths [42]	MOH (NZ Health Information Service)	Annual	Annual report presenting information on new cases of primary cancer diagnosed and reported to the NZ Cancer Registry, usually 3-4 years previously. Contains section on child and youth cancer registrations as well as total population data.
New Zealand Hearing Screening Statistics [43]	MOH (National Audiology Centre)	Annual	Annual report on referral rates for children failing hearing screening tests at 3 and 5 years of age. Includes breakdown by ethnicity and DHB
New Zealand Deafness Notification Data [44]	National Audiology Centre	Annual	Annual report on notifications to NZ Deafness Database (children <18 years who meet permanent hearing loss criteria)
Oral Health Data from Dental Health Services [45]	Ministry of Health	Annual	Data on oral health status of 5 and 12 year old children as provided by the School Dental Service.
Reports of the Australian and New Zealand Neonatal Network [46]	Australian and New Zealand Neonatal Network	Annual	Annual reports on all high risk infants admitted to newborn nurseries in Australia and NZ who meet specific criteria (live born, admitted to NICU <28 days of age and either <32 weeks gestation, <1500g birth weight, receiving assisted ventilation for 4+ hours or major surgery).
Report on Maternity [28]	Ministry of Health	Annual	Report presents information on maternal and newborn services provided at NZ hospitals and in the community. Includes sections on mother and pregnancy, labour and birth, babies and birth outcomes (birth weight, stillbirths, neonatal deaths) and issues during the postnatal period (readmissions, postnatal care, breastfeeding).

Table 7. Reports Associated with Ongoing Monitoring of Single Child and / or Youth Health Issues (2/2)

Publication	Organisation	Year	Report Content
Education Statistics of New Zealand [47]	Ministry of Education	Annual	Annual overview of a basket of key education indicators including early childhood education; Maori medium education; highest attainment at school leaving; stand-downs, suspensions, exclusions and expulsions; tertiary participation.
Report of 1999-2005 National Year 10 Smoking Surveys [48]	Action on Smoking and Health (ASH) (Funded by Ministry of Health)	Annual	Since 1997, ASH has conducted annual surveys of smoking behaviour amongst Year 10 (14-15 year old) students and since 1999, these surveys have collected information from >30,000 students annually. Questionnaires are self administered and cover demographic variables as well as smoking related issues. The survey is useful for monitoring smoking behaviour of 14-15 year old students and for understanding trends and risk factors for smoking initiation
SPARC Trends. Trends in Participation in Sport and Active Leisure 1997-2001 [49]	Sports and Recreation New Zealand	2003	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 on their participation in sport and active leisure. Reports are of utility in exploring trends and determinants of active leisure amongst NZ children and young people.
Injury Prevention Research Unit Fact Sheets [50]	Injury Prevention Research Unit	Intermittent	The Injury Prevention Research Unit produces a variety of Fact Sheets and publications, with a number of these of relevance to child and youth health e.g. causes of injury related hospital admission and mortality by age.

Table 8. Reports Associated with Comprehensive Monitoring with a Child and / or Youth Health Focus

Publication	Organisation	Year	Report Content
New Zealand Paediatric Surveillance Unit Annual Reports [32]	NZ Paediatric Surveillance Unit	Annual	Annual report on a number of uncommon, high-impact paediatric conditions under active surveillance. Initially established to provide surveillance for acute flaccid paralysis (WHO polio eradication) but extended to include other conditions (currently haemolytic uraemic syndrome, congenital rubella, perinatal HIV exposure, vitamin K deficiency bleeding, prolonged infantile cholestasis, inborn errors of metabolism, pertussis admissions < 12 months, foregut and hindgut malformations, pneumococcal meningitis).
Strengthening Families. Report on Cross–Sectoral Outcome Measures and Targets [29]	Intersectoral. Ministry of Social Development	1998, 1999, 2000	Arising out of the Strengthening Families Initiative and intersectoral collaboration between the Ministries of Social Policy, Education and Health. Reports focused on monitoring progress towards key outcome measures and targets set in 1997 as part of the Strengthening Families Strategy. Outcomes included mortality, hospital admission rates, injury, child abuse and neglect, low birth weight, hearing screening referral rates, immunisation, early childhood education, smoking, alcohol and drug risk behaviour, school leavers with formal qualifications.
NZ Child and Youth Mortality Review Committee Annual Reports [30]	Child and Youth Mortality Review Committee	Annual since 2004	Review of child and youth mortality (postnatal-24 years) using Child and Youth Mortality Review Committee's national datasets. Includes sections on infant mortality, post neonatal mortality, child mortality and youth mortality
New Zealand Child and Youth Epidemiology Service Annual DHB Reports [31]	NZ Child and Youth Epidemiology Service	Annual since 2005	Annual monitoring of basket of child and youth health indicators over 3 year period for participating DHBs.

Strengths of New Zealand's Current Monitoring Approaches

The above review of the literature highlights a number of strengths inherent in New Zealand's approaches to monitoring child and youth health over the past decade. These include:

1. The lack of a single agency primarily responsible for child and youth health monitoring has meant that a large number of Government and non-Government agencies have stepped forward to play a role, and these Agencies have invested considerable resources in order to produce reports on child and youth wellbeing.
2. There is a wealth of routinely collected data on child and youth health outcomes (e.g. hospital admissions, mortality, births, oral health, hearing), as well as on their determinants at a population level (e.g. education, income, family composition). In some cases this information has been collected for more than a decade in a consistent format (e.g. mortality, hearing screening, oral health), making valid time series comparisons possible.
3. The large number of comprehensive reports exploring child and youth health issues from different vantage points provide, not only provides a valuable overview of the key issues facing New Zealand's children and young people, but also provides an indication as to what a variety of Government and non-Government agencies feel are the most important issues for children and young people at a population level.

This multi-agency approach to monitoring however also has a number of distinct disadvantages, which will be considered in more detail in each of the four sections which follow.

Cost and Duplication of Effort

New Zealand's fragmented approach to child and youth health monitoring has meant that, while we now have a reasonable literature on the health status of children and young people and by default a set of frequently measured indicators, there remains a paucity of detailed child and youth health information which has been reported on in a consistent format over any period of time. Such an approach is suboptimal for a number of reasons:

1. The "one off" nature of many of the publications produced means that institutional memory is unlikely to accumulate, with much of the learning associated with the collation, cleaning and coding of the various data sources being lost as staff are dispersed to other tasks at the end of the project period. As a result, it is likely that many of the cross sectional reports published during the past decade were produced by Project Teams in the first stages of their evolutionary development i.e. involved in the costly and time consuming processes of locating, collating and cleaning primary data sources and developing reporting templates from scratch, with few having the luxury of being able to refine their reporting frameworks in subsequent editions, or establish long term relationships with the end users of their reports. In such cases there remains the potential for the allocation of resources to be disproportionately directed towards the production and release of the reports themselves, rather than towards developing process and pathways via which the information thus produced might best be utilised to improve the health of children and young people.
2. The lack of a single coordinating agency with a sector mandated responsibility to monitor child and youth heath has also led to considerable duplication of effort, with many detailed cross sectional reviews of child and youth health

being released within 1-2 years of each other. While it is likely that each arose from a clearly perceived need for up to date child and youth health information, such an approach is clearly cost-inefficient, particularly for DHBs and small NGOs on limited budgets, whose allocation of resources to child health status reviews may potentially have diverted them away from other core activities e.g. health promotion and programme development.

3. Finally, despite the large number of child and youth heath reports produced during the past decade, with the exception of the former Public Health Commission, no one agency has managed to monitor the same basket of child and youth indicators in the same format for more than three years at a time. This has significant implications from an end-user point of view, as while it is currently possible to utilise "one-off' and limited edition cross sectional reports to establish child and youth heath priority areas (e.g. the MOH used their 1998 "Our Children's Health" [9] to inform the development of the Child Health Strategy), having implemented interventions to address these issues, later editions of the same report cannot be relied upon to monitor progress in these key priority areas.

A Lack of Consistent Indicator Selection Criteria

In addition to duplication of effort, the review of the New Zealand literature also highlighted a number of inconsistencies in the indicators monitored by various Government agencies. In 2004, the Ministry of Social Development (MSD) released a report outlining 35 indicators which it considered to be of value for monitoring the wellbeing of children and young people in New Zealand [7]. The same year the Ministry of Health's indicator's of DHB performance contained 7 key child health indicators [23], of which only 2 appeared in the MSD's framework. Similarly, in 2004 Public Health Intelligence reported on 13 indicators across its infancy / child / youth outcomes domain, of which 5 appeared in the MSD's list and 3 appeared in the MOH's DHB performance list. Finally, the 2004 Child and Youth Health Toolkit [6] proposed 10 indicators which could be measured at various points across the period 0→18 years and while 7 were the same as those monitored by Public Health Intelligence, only 5 appeared in the MSD's indicator list. (Of note, common to all was "low birth weight", an indicator whose deficiencies will be discussed shortly).

Similarly at the level of cross sectional reporting, no two agencies utilised exactly the same indicators, or reported on child and youth health issues using the same conceptual framework. While the broad categories tended to be similar (e.g. most included sections on population demographics, health outcomes and a variety of social determinants), within these categories coverage varied considerably, with issues for which routine data sources were available (e.g. asthma admissions, infant mortality, family income), being reported on more frequently, than those for which less data was available (e.g. disability, child mental health).

In understanding the reasons for this lack of consistency across national level reports, a review of the selection criteria used by different Government and non-Government agencies was informative. A search of the methodology sections of each of these reports revealed that in many cases, the criteria guiding indicator selection were not specifically stated. Where selection criteria were stated, these varied from report to report and included:

1. Selecting indicators based on the following criteria: 1) reflects important aspects of population health; 2) sensitive to differing health status between population groups; 3) provides a balanced set of measures covering various dimensions of health; 4) able to be updated at least every 5 years; 5) where possible, allows international comparison [51].

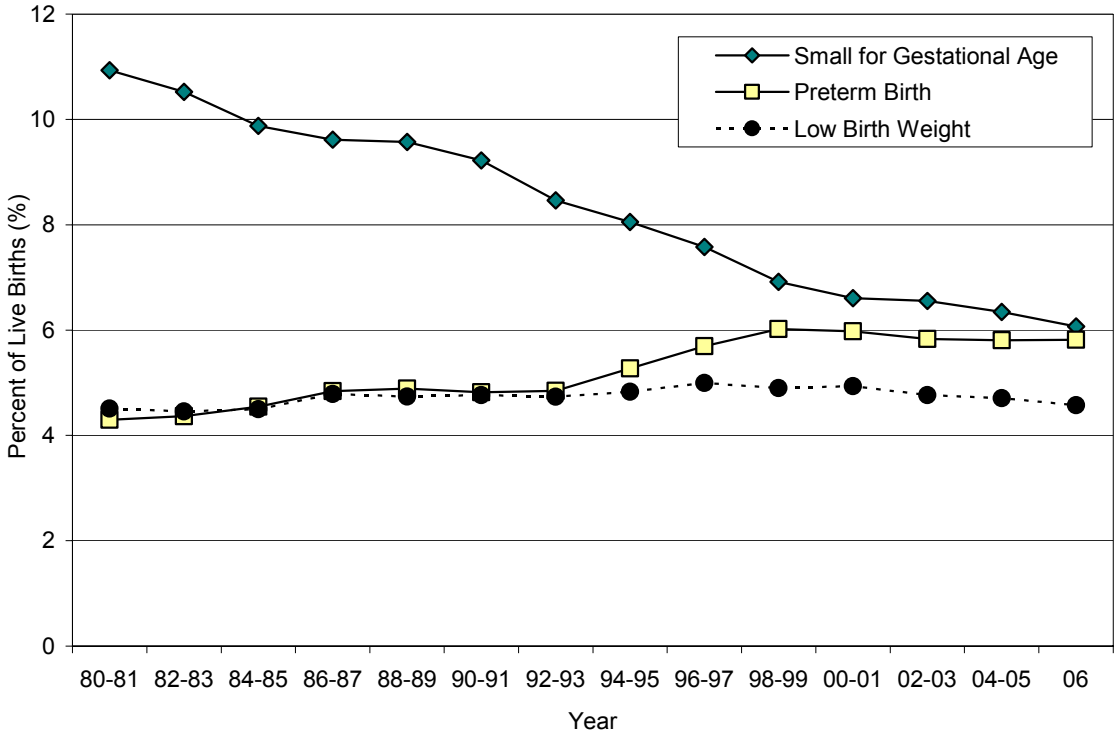
2. Selecting indicators which can be reliably and validly monitored, which focus on salient health issues and issues which address the 13 population health objectives identified in the New Zealand Health Strategy [22].

3. Selecting indicators which capture unique aspects of the 10 Social Outcome Domains of the Social Report [7]. (Indicators in the Social Report were themselves selected against the following criteria: relevant to the social outcome of interest, based on broad support, grounded in research, able to be disaggregated, consistent over time, statistically sound, timely, allow international comparison [24]).
4. Selecting indicators based on key developmental and life-cycle transitions and the most common morbidities in different age bands, with attention being given to the availability of reliable national datasets, which allow analysis by DHB, age and ethnicity, and on indicators which focus on access to services [6].
5. Selecting the Top 10 causes of potentially avoidable mortality and hospital admissions [8].

Such an analysis potentially suggests that the lack of consistency of indicators monitored across the sector may, at least in part, reflect the diversity in indicator selection criteria used by different Government and non-Government agencies. While this diversity has provided New Zealand with a breadth of information on child and youth health and the ability to consider issues from a variety of different perspectives, such an approach also has a number of distinct drawbacks. These include:

1. In the absence of clearly defined selection criteria, which take into account public heath importance as well as issues of data quality, there may be a tendency for indicator selection to default to those issues for which there is routinely available data, while equally important issues without routine data sources quietly slip below the public health radar. In New Zealand, the indicator which most readily illustrates this point is low birth weight, which appears in all of the national monitoring frameworks outlined above. Low birth weight (birth weight <2,500g) is readily measured using national birth registration data and is a composite indicator, simultaneously reflecting babies who have been born prematurely as well as those who have failed to adequately grow in utero. As Figure 1 demonstrates, while New Zealand's rates of low birth weight have remained relatively static during the past 20 years, rates of preterm birth (<37 weeks gestation) have increased by 47%, while rates of small for gestational age (SGA, a birth weight <10th percentile for gestational age, a proxy for fetal growth restriction) have decreased by 45%. In addition, the public health interventions required to address each of these issues differ significantly, with the most important risk factors for SGA being cigarette smoking and maternal nutrition [52]. In contrast, in many cases of preterm birth the aetiology is unknown, with overseas research also suggesting that improvements in obstetric surveillance and the selective delivery of high risk babies, may well increase rather than decrease preterm birth rates at a population level [53]. As a consequence, despite being one of New Zealand's most frequently used perinatal indicators, low birth weight has not only missed two of the largest shifts in perinatal outcome during the past decade, but also it is of very limited utility in guiding public health interventions. In contrast, issues such as disability and childhood mental illness, which are of considerable public health importance, are very infrequently reported on in national child and youth heath reports.

Figure 1. Rates of Small for Gestational Age, Preterm Birth and Low Birth Weight, New Zealand Singleton Live Births 1980-2006

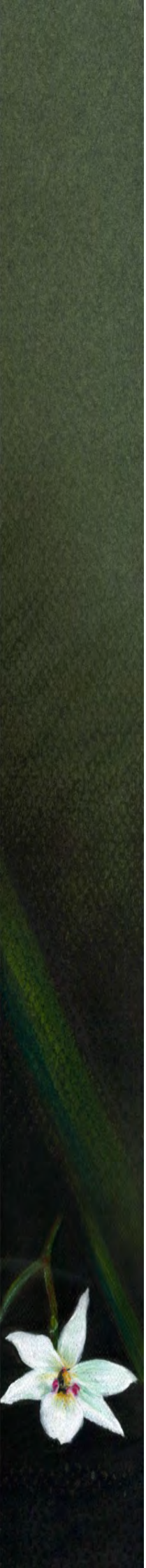


2. Secondly, and partly as a result of the issues discussed above, the lack of consistent and transparent selection criteria makes it very difficult for information end users to be reassured that prioritisation decisions made and strategies developed as a result of national level reports, are based on an assessment of all of the issues involved. This in turn has significant implications for resource allocation, as decisions made on the basis of potentially biased information may serve to reinforce the allocation of limited health resources to high profile conditions (e.g. asthma admissions), at the expense of others whose profile is less well known (e.g. disability).

Lack of a Consistent Theoretical Framework for Considering Relationships between Indicators

In addition to diverse indicator selection criteria, during the past decade no two New Zealand agencies utilised exactly the same theoretical framework when presenting the information contained in their reports. Such frameworks are useful for helping readers consider the relationships between indicators (e.g. an indicators position in the causal chain linking health determinants → risk factors → health outcomes), as well as for identifying the most appropriate levels for population health interventions. Some of the frameworks utilised in child and youth health reports over the past decade have included:

1. As part of the MOH's Progress on Health Outcomes series, annual reports were supplemented by more comprehensive 5-yearly reviews of population health status and its determinants. The 1999 review entitled 'Our Health, Our Future" [54] included a diagram of the underlying conceptual model underpinning the MOH's population health monitoring initiatives at that time. The model had four tiers, with pathways linking higher level factors (e.g. social structure, culture) → health determinants (e.g. socioeconomic factors and risk exposures) → risk factors → health outcomes, with specific examples being provided of indicators within each category (Figure 11). The first report in Public Health Intelligence's "An Indication of New Zealander's Health" series [22] utilised a similar structure, with indicators being grouped according to three levels of causation:



Socioeconomic and Environmental Determinants of Health → Risk Factors → Outcomes. The Outcomes domain was further subdivided into 6 age categories: Whole of Life, Infants (0-4 years), Children (5-14 years), Youth (15-24 years), Adults (25-64 years) and Older People (65+ years).

2. Both the Social Report [24] and MSD's Indicators of Children and Young People's Wellbeing [7] grouped indicators into 10 social outcome domains, each capturing a discrete component of wellbeing. These domains comprised health, knowledge and skills, paid work, economic standard of living, civil and political rights, cultural identify, leisure and recreation, physical environment, safety and social connectedness, and each was accompanied by a statement which outlined the outcomes desired for the domain (*e.g. Health: All people have the opportunity to enjoy long and health lives. Avoidable deaths, disease and injuries are prevented. All people have the ability to function, function and live independently or appropriately supported in society*). While the domains were not hierarchical in nature and the links between them were not explicitly considered, they were thought to be interconnected (e.g. participation in health and leisure was thought to impact on physical and mental health, as well as on social networks) [24].
3. The MOH's Child and Youth Health Toolkit [6] utilised the concept of life-cycle transitions, with indicators being grouped into 4 key age groups: Pre-conception, pregnancy, birth and infancy (<1 year); Infancy to preschool (1-4 yrs); Preschool to primary school (5-11 yrs); Childhood to Adolescence (12-18 yrs). Key workforce groups who also potentially impacted at these points in the life-cycle were also considered within the framework. Similarly, the Strengthening Families reporting series [29] grouped indicators by age (0-6 yrs, 5-24 years) and while hierarchical relationships between indicators were not considered, a lead agency was allocated to take prime responsibility for each issue.

In addition, a number of authors [4, 9, 10] did not specifically discuss the underlying theoretical frameworks used to guide the structuring of their reports, but rather grouped indicators into broadly related categories (e.g. demographics, family structure, education, disability, alcohol and drugs, sexual health) and then presented information on each of these in turn. While this considerable diversity provided the opportunity for the health sector to consider child and youth heath issues from a variety of different perspectives, such an approach also has a number of distinct limitations:

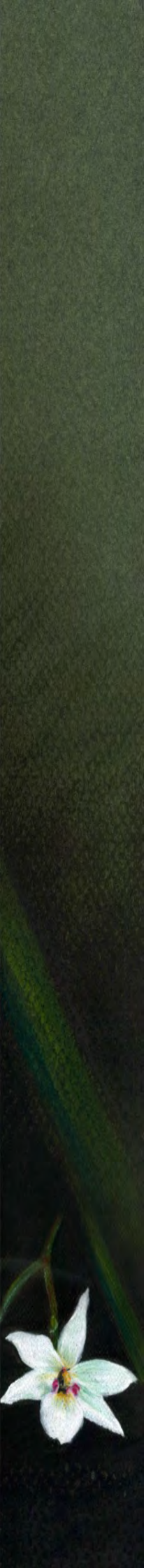
1. Despite the large number of child and youth health publications produced over the past decade, that there is still no common frame for initiating dialogue between different parts of the health sector, or with other sectors who also hold responsibility for child and youth wellbeing. This is of particular concern in the context of New Zealand's current health system, which in 2000 as a result of the Public Health and Disability Act saw the creation of 21 DHBs, each with the responsibility of assessing and then developing strategies to improve the health of children and young people in their regions. Without a common framework for considering child and youth health issues, or for engaging in dialogue with neighbouring DHBs, the potential exists for child and youth health strategies to evolve in 21 different directions, as each DHB finds its own solutions to the same problems. Similarly, without a shared understanding of where their own DHB's outcomes fit in the context of the wider determinants of health, it may be difficult for DHB's to initiate dialogue with other agencies (e.g. Education, Child Youth and Family Services), in order to begin to develop intersectoral approaches to improve child and youth health in their regions.

2. Similarly, without a clear understanding of the ways in which the underlying determinants of health combine with risk and protective factors to shape the health outcomes of children and young people, it is unlikely that DHBs will be able to develop successful interventions which will improve outcomes in the longer term. The ability to link their own health outcome data with information on determinants at a regional level, if interpreted in within the context of an appropriate framework, may well provide DHBs with valuable insights into the most effective intervention points for addressing child and youth health issues in their regions.

Tensions between Representative National Monitoring and the Need for Detailed Information at a Regional Level

While the analysis to date has considered some of the more structural aspects of child and youth health monitoring (e.g. total population vs. child and youth health focused, one-off reports vs. ongoing monitoring), in assessing how well New Zealand's recent approaches to monitoring have met the information needs of the health sector, it is also necessary to consider the end users of this information and the uses to which it will be put. At present, these tend to fall into three main areas:

1. **Traditional Monitoring**: This is of considerable utility in highlighting progress in areas of major public health concern (e.g. SIDS) and fulfilling overseas reporting obligations (e.g. international benchmarking of infant mortality). Traditional monitoring usually focuses on a basket of key indicators (e.g. infant mortality, youth suicide), which are selected on the basis of data quality, validly and their coverage of key priority areas. Cost and strict data quality criteria (to ensure the validity and comparability of indicators over time), often limit the number of indicators able to be monitored and preclude the exploration of issues for which there are no reliable data sources. As a consequence, while such approaches are of utility in tracking progress in key areas, once strategic priorities have been established, they are of more limited utility in exploring the health needs of a population, in order to establish these priorities, or for tracking progress in areas where national datasets are unavailable.
2. **Health Needs Assessment**: Health Needs Assessment (HNA) is the process whereby health care resources are allocated based on an understanding of the health needs of a population [55]. Inherent in this process is the need for prioritisation and the best possible use of available resources. HNAs are usually undertaken in a series of steps as follows: setting the objectives for the HNA → collecting data on the need for health services (e.g. basic demographics, morbidity, mortality, disability) → reviewing the scope and coverage of available services → identifying gaps where service coverage does not meet health needs → prioritising to ensure the optimal use of available resources [55]. Inherent in this approach is the need to consider the diverse health needs of the community, the groups at greatest risk and to identify those whose needs are not being met by current service delivery. Such an approach, by necessity requires a much broader coverage of issues than that provided by traditional monitoring, a greater level of detail on the groups at greatest risk (e.g. age, ethnicity, NZDep, gender, rural / urban) and consideration being given to issues for which traditional data sources are often unavailable (e.g. disability, mental health). In some circumstances, it may also necessitate the utilisation of non-routine data sources (e.g. the extrapolation of overseas rates to the local population, the use of "one-off" surveys or research project reports) in order to estimate the health needs of a population.
3. **National Level Prioritisation and Advocacy**: While Health Needs Assessment, in the current context, has tended to be regarded as the domain of



the DHBs, similar processes are necessary at a national level in order to ensure that sufficiently detailed information is available for national strategy development, as well as for the advocacy purposes of non-Government Organisations and other groups with an interest in child and youth health.

While each of these functions is vital to the operation of the health sector, in considering the magnitude of the demand associated with each, and whether New Zealand's current approaches are meeting this demand, it is necessary to consider the current structure of the New Zealand health and disability sector, which was established in 2000 by means of the New Zealand Public Health and Disability Act. This Act dissolved the Hospital and Health Services and the Health Funding Authority and divided their responsibilities between DHBs and the MOH as follows:

1. **District Health Boards**: The Act resulted in the creation of 21 DHBs whose role it was to fund and provide services to geographically defined populations. In addition, DHBs were required *"to regularly investigate, assess and monitor the health status of its resident population, any factors that the DHB believes may adversely affect the health status of the population and the needs of that population for services (Clause 23(1)(g)").* The allocation of resources followed this transfer of accountability, with nearly 75% of Vote Health spending currently flowing through DHBs [56], and the expectation being that part of this funding will be spent on regional Health Needs Assessment.

2. **Ministry of Health**: Under the Act, the MOH retained key roles in monitoring the provision of services by DHBs and in providing policy advice and ministerial services. The MOH's statutory population health monitoring functions under the Act were delegated to Public Health Intelligence, who currently provide a range of reports on health outcomes and their determinants at a population level.

In assisting DHBs to perform these population health monitoring functions, the MOH in 2000 released a document entitled "Health Needs Assessment for New Zealand: An Overview and Guide". In addition to information on how DHBs should undertake their Health Needs Assessments (HNAs), the MOH outlined its expectation that these would be updated at least once every three years [57]. DHBs have now undergone two complete cycles of these HNAs, with the first round being completed in 2001 and the second round being completed by most DHBs during 2004-05. While these HNAs are global in nature and consider the health needs of the entire population, during the 2004-05 cycle the majority also included child and youth health sections. The size and scope of these sections varied considerably however, ranging from a single page, to detailed reports 30+ pages in length. The number of indicators within these sections also varied, although most DHBs included some coverage of hospital admissions (e.g. asthma, injury, potentially avoidable), mortality (e.g. infant or by cause), hearing screening, oral health and teenage pregnancy. A number of DHBs also commissioned more detailed child and youth health status reports [31], placing these on their websites alongside their total population HNAs.

In understanding the reasons for the heterogeneity of child and youth information contained in these HNAs, it is important to consider some of the issues associated with their production. While to a certain extent, the allocation of resource has followed the transfer of accountability (DHBs are funded to carry out the HNAs in their regions), a lack of local expertise in many small to medium sized DHBs has often meant that these DHBs have had to pool their resources (e.g. the collaborative efforts of the South Island DHBs during the most recent round of HNA), or to purchase support from outside agencies (e.g. Central Region Technical Advisory Services (TAS), Public Health Intelligence, NZ Child and Youth Epidemiology Service, Wellington School of Medicine), in order to complete this task. While such collaborative efforts have meant

that clusters of DHBs have ended up with HNAs in very similar formats, in the majority of cases the support provided was technical (e.g. the provision of tables and graphs), rather than in areas such as child and youth health per se. As a consequence, there still remains no consensus across DHBs as to which child and youth indicators should be included in their HNAs, or how the relationships between these indicators should be presented in their reports.

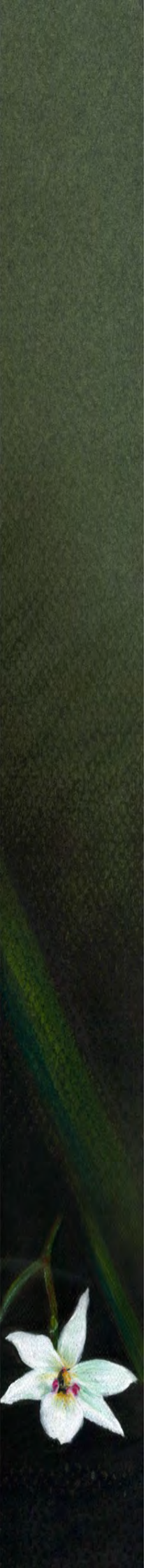
On considering these issues within the context of the literature review above, it becomes apparent that a mismatch may be emerging between the needs of DHBs for comprehensive and detailed regional child and youth health information, and the efforts of the sector to date, which have either produced such information only at a national level, or where a regional breakdown has been provided, this has occurred only in the context of a limited basket of monitoring indicators. While, within the health sector structure at present, the responsibility for the provision of this type of information also resides at a regional level, the expertise required to produce it is often scarce in small to medium sized DHBs. While solutions to this problem are beyond the scope of this review, with nearly 75% of Vote Heath funding now being channelled through DHBs and the majority of prioritisation decisions and strategy development occurring at a regional level, such a mismatch may significantly impair the sector's ability to develop evidence based strategies to improve the health of New Zealand's children and young people.

Such findings also have significant implications for monitoring framework development, and potentially suggest that the greatest needs within the sector at present are for regionally focused, detailed child and youth health information, which provides a broad coverage of all of the major issues, which can be disaggregated to allow for the targeting of high needs groups, and which utilises non-routine data sources to fill in gaps when traditional data is unavailable. While the need for a more limited subset of monitoring indicators is likely to remain, the creation of a framework which in the first instance, provides DHBs with a map of all of the major issues which they need to take into account when undertaking their regional HNAs, may well go a long way to creating some cohesion within the sector.

Implications for Monitoring Framework Development

As the above review has demonstrated, during the past decade there have been a large number of publications produced by a variety of Government and non-Government Agencies, which have reviewed the health of New Zealand children and young people. Collectively these reports can be viewed as having a number of strengths and limitations, many of which are or relevance to future monitoring framework development. On reviewing these, the following implications emerge:

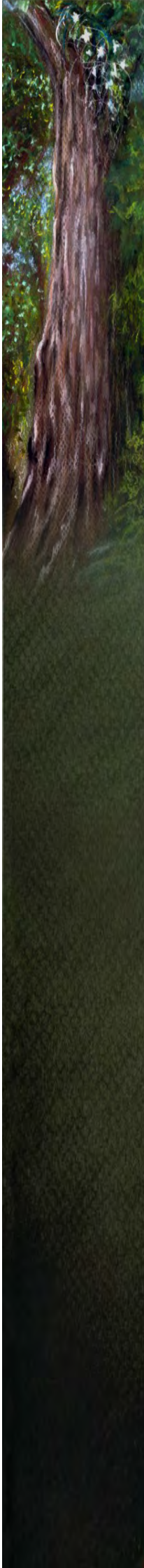
1. Within the NZ health sector at present, a large number of Government and non-Government agencies have an interest in child and youth health. Consultation with these agencies will be necessary in order to ensure that any monitoring framework developed as a result of this project will meet their information needs.
2. New Zealand has a wealth of routinely collected data on child and youth health outcomes (e.g. hospital admissions, mortality, births, oral health, hearing), as well as on their determinants at a population level (e.g. education, income, family composition). In some cases this information has been collected for more than a decade in a consistent format (e.g. mortality, hearing screening, oral health), making valid time series comparisons possible. The availability of this information means that many of the building blocks are already in place for developing a comprehensive child and youth health framework.



3. A large number of agencies have included sections on the underlying determinants of health in their child and youth reports, or have devoted the entire report to exploring the ways in which Government policies have shaped the health and wellbeing of children and young people. As a consequence, there appears to be considerable support within the sector for including these key elements in any monitoring framework developed.
4. During the past decade there have been a large number of reports on the wellbeing of New Zealand children and young people, with many of these reports being released within 1-2 years of each other and with very similar content. Such a process is clearly cost ineffective and potentially suggests the need for a single agency that is responsible for collating all of the available information on child and youth health and for setting a cyclic timetable for future report production, which coincided with the information needs of the health sector e.g. linked to DHB's 3 yearly HNAs.
5. During the past decade, no one New Zealand agency has been able to produce a cross sectional review of child and youth wellbeing that has run to more than two editions. Similarly, the provision of consistent time series data on more limited baskets of child and youth health indicators has often been cut short by health service restructuring. Such changes significantly reduce the utility of the data for planning and monitoring purposes and as a consequence, in developing a monitoring framework, due attention needs to be given to the most appropriate organisation(s) to host such an innovation, as well its sustainable resourcing in the medium to longer term.
6. Similarly, the heterogeneous indicator selection criteria utilised by various Government and non-Government agencies has meant that at present, there is no single set of child and youth health indicators monitored consistently across all Government agencies. An undue reliance on available data sources has also meant that the indicators in common use within the sector at present, may not provide a balanced coverage of all of the major issues in child and youth health. As a consequence, during the course of indicator framework development, attention needs to be paid to developing a set of selection criteria which not only take into account data integrity, but also place a high priority on public health importance.
7. In addition, within the health sector at present, no one theoretical framework has consistently been used to portray the complex relationships between child and youth health outcomes and their determinants at a population level. While a number of the frameworks previously utilised by the MOH might serve as a starting point for future framework development, all would require adaptation for use in a child and youth population. In addition consideration would need to be given to the high priority recent NZ reports have placed on policy analysis, as well as the more traditional pathways via which various socioeconomic and cultural factors shape health outcomes at a population level.
8. Finally, the current structure of the health sector and the disproportionate health information needs of DHBs mean that any monitoring framework developed for New Zealand use would need to blend traditional monitoring approaches, with those of heath needs assessment at a population level. In this context, there may be considerable utility in developing a broadly based indicator set, whose membership is chiefly governed by public health importance, and then from this set drawing a more limited subset, for use in national level monitoring. While the former could be utilised by DHBs for the purposes of health needs assessment, the latter could be at a national level to track progress in key priority areas.

Conclusion

While the above review has provided a broad overview of New Zealand's recent approaches to monitoring child and youth health and has highlighted some of the sector's current child and youth information needs, this in itself is insufficient for informing the development of a monitoring framework for use in the New Zealand health sector. What is also required is an understanding of the current literature on population health surveillance and the elements which are considered essential for establishing and effective surveillance system, as well as knowledge of the approaches taken by other developed countries to monitoring the health status of their children and young people. The following section reviews each of these issues in more detail.



Section 2: The Origins of Population Health Monitoring and Other Countries' Approaches

The Origins of Population Health Monitoring and Overseas Approaches

Introduction

In reviewing the key infrastructure required to guide effective public health action, the Oxford Textbook of Public Health, notes that a comprehensive national system for population-wide health monitoring and surveillance is essential. Such a system needs to be able to facilitate the on-going collection, analysis and interpretation of national population data, identify problems, set priorities for action and monitor progress in the priority areas thus set [58]. In considering how such a system could be developed to monitor the health of New Zealand's children and young people, an understanding of current best practice in this area, as well as the models used by other developed countries to monitor their children and young people's health is essential. While New Zealand's unique history and geography would preclude the wholesale adoption of another country's model, a review of the international literature is still of considerable utility in providing answers to the following questions:

1. What is the theoretical basis for population health surveillance, and which elements are considered essential in establishing an effective surveillance system?
2. In developing selection criteria to govern the inclusion of indicators in a monitoring framework, what are the key criteria that each indicator needs to be assessed against?
3. What approaches have other countries and groups of countries taken to monitoring the health of their children and young people, and who are the organisations involved in monitoring at a national level?
4. What are the underlying models of health used to guide monitoring overseas, and are any of the theoretical frameworks developed by other countries to portray the relationships between indicators, of use in the New Zealand context?

The following literature review seeks answers each of these questions in turn. It begins by briefly exploring the origins of population health surveillance and the elements considered essential in an effective surveillance system. It then goes on to explore the characteristics of a good public health indicator, as well as the need to develop a balanced set of selection criteria to govern which indicators will be monitored over time. The use of theoretical frameworks to guide the type of indicators included in monitoring (e.g. policy, socioeconomic, risk factors, outcomes) and the way in which the relationships between them are portrayed is then explored, before moving on to consider how child and youth health monitoring is occurring at a Global (e.g. WHO, UNICEF), regional (e.g. EU countries) and national (e.g. Canada, Australia) level. The latter part of this review has deliberately been restricted to countries and regions with developed economies, in order to ensure the information thus produced is of relevance to the New Zealand context.

Population Health Monitoring: Historical Origins and Key Concepts

Introduction

Public health surveillance is the epidemiological foundation for modern public health [59]. Although surveillance methods were originally developed as part of efforts to control infectious diseases, modern surveillance systems have expanded their scope to include information on non-communicable diseases and injuries, their risk factors, and the social and environmental contexts in which they occur [59]. Accompanying this expansion has been a large increase in the number of publications on the development and use of public health indicators [60] and comprehensive child and youth indicator frameworks have been developed in a number of different countries. While each country's' unique needs mean that no two frameworks are identical, the majority were developed using very similar methodologies, and as a consequence share many similar structural elements. Thus before reviewing the frameworks used by other developed countries to monitor the health of their children and young people, the following sections review some of their common structural elements and the methodologies used to develop them. In doing so, the review is divided into three main sections:

1. **Public Health Surveillance:** This section explores the origins of modern public health surveillance, its purpose and the essential elements of an effective surveillance system.
2. **Public Health Indicators:** This section defines the role of indicators in public health surveillance and explores some of the key elements necessary for the creation of a good public health indicator. It also considers the role indicator selection criteria play in governing which indicators are chosen for ongoing monitoring.
3. **Theoretical Frameworks:** This section considers the utility of theoretical frameworks in governing the type and balance of indicators selected for ongoing monitoring, as well as the ways in which the relationships between these indicators are portrayed. It explores some of the key dimensions included in these frameworks in recent years (e.g. multidimensional models of health, chains of causality, lifecourse dimensions).

Public Health Surveillance

Surveillance is "*the ongoing systematic collection, analysis and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know. The final link in the surveillance chain in the application of these data to prevention and control* [61]"

Historical Origins of Surveillance

Historically, one of the first documents to describe the use of numerical methods in monitoring public health was John Graunt's treatise *Natural and Political Observations on the Bills of Mortality*, published in 1662 [59]. William Farr however is the recognised founder of the modern concept of surveillance. As superintendent of the Statistical Department of the General Registrar's Office in Great Britain between 1839 and 1879

he collected, analysed and interpreted vital statistics on smallpox, cholera and other infectious diseases and disseminated information in weekly, quarterly and annual reports [59]. Similarly, Lemuel Shattuck in the United States published data that related infant and maternal mortality, and infectious diseases to living conditions and recommended a standardized nomenclature for the causes of disease and death, with the first such list being developed in 1893 [59].

During the early 20th century, elements of surveillance were increasingly applied to the detection of epidemics and the prevention and control of infectious disease. In 1899, the United Kingdom began compulsory notification for selected infectious diseases, while in the United States, national data collections on plague, small pox and yellow fever were initiated in 1878 and by 1925 all states were reporting weekly to the US Public Health Service. Similarly in 1907 the Office International d'Hygeine Publique, predominantly composed of European member states, was created to disseminate information on diseases such as cholera, plague and yellow fever in a monthly bulletin. By the 1940s Alexander Langmuir, the first chief epidemiologist at the Communicable Disease Centre in the United States, had laid the foundations for modern disease surveillance, with the creation of national notifiable disease reporting systems which relied on rapid collection and analysis of data, and the quick dissemination of findings to those who needed to know [62] In the decades that followed, other diseases were added to these surveillance systems and by the end of the 20th century, surveillance had made a vital contribution to public health efforts to eradicate smallpox and polio and to manage other conditions such as malaria and AIDS [59].

As the 20th century progressed, the potential usefulness of surveillance as a tool to address problems beyond infectious disease became recognised, with the 21st World Health Assembly in 1968 recommending that surveillance principles be applied to a wider range of conditions such as cancer and atherosclerosis, and to social problems such as drug addiction. But while many of the principles of infectious disease surveillance also underpin the monitoring of chronic disease, a number of modifications to traditional surveillance approaches have been necessary, including the expansion of traditional disease notifications systems to include information from sources such surveys, sentinel practices, cancer and mortality registers and other databases utilised for administrative purposes [59]. As a consequence, now in addition to traditional infectious disease surveillance, organisations such as the CDC in the USA have separate divisions dedicated to issues such as Injury Prevention and Control, Environmental Hazards and Health Effects and Chronic Disease Control and Prevention [63] and outcomes such as premature birth and birth defects are monitored on a routine basis.

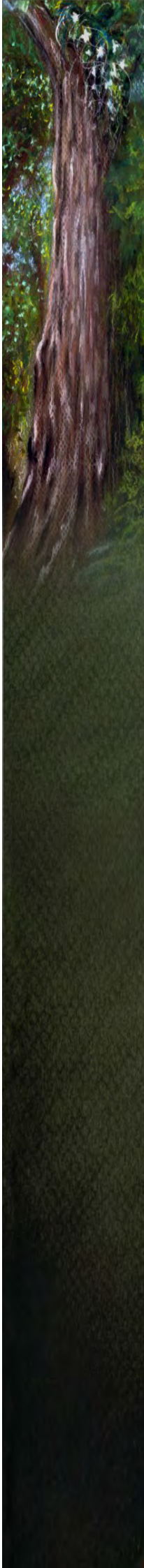
The Purpose of Surveillance

With the expansion of traditional infectious surveillance to include chronic diseases and their risk factors has come a broadening of objectives. As Table 9 suggests, the main objectives of traditional infectious disease surveillance are to identify cases of disease, whether they be single cases (e.g. contact tracing in the case of meningococcal disease), outbreaks (e.g. Hepatitis A clusters) or emerging epidemics (e.g. sentinel practice monitoring for influenza) and to facilitate their immediate public health control. Broader objectives include the detection of emerging public health threats and generating hypothesis for future research. As a consequence, traditional public health surveillance systems require the rapid collection, analysis and dissemination of data, with emphasis being placed on getting this information as quickly as possible into the hands of "those who need to know". In contrast, the main objective of chronic disease surveillance is to provide an estimate of the burden of disease (by time, place and person), so that public health priorities can be established, prevention and control programmes be developed and appropriate resources allocated to meeting future health care demand. While achieving this objective requires the use of a much wider

range of data sources (e.g. cancer and mortality registers, hospital admission data), the timeframe for dissemination may be much longer, with reports being produced annually, or even less frequently depending on the health sector's demand. As a consequence, when evaluating the performance of surveillance systems these differing objectives need to be taken into account.

Table 9. The Objectives of Surveillance

Traditional Infectious Disease Surveillance	Chronic Disease Surveillance
Key Objectives [59, 61]	
• Identifying cases of disease requiring immediate public health control (e.g. rifampicin for meningococcal disease contacts) • Monitoring disease incidence and distribution to alert health workers to changes in disease activity locally (e.g. influenza surveillance) • Identifying & managing outbreaks (e.g. Hep A) • Assessing disease impact & setting priorities for prevention (e.g. rheumatic fever) • Identifying risk factors for disease to support prevention measures (e.g. malaria) • Evaluating prevention & control activities (e.g. HIB immunisation effectiveness) • Identifying & predicting new hazards (e.g. CJD) • Monitoring changes in disease agents (e.g. TB drug resistance) • Generating & evaluating hypotheses about disease occurrence • Fulfilling statutory & international reporting requirements	• Defining public health priorities • Monitoring Trends • Describing problems and estimating the burden of disease • Characterising disease patterns by time, place & person • Suggesting hypothesis • Identifying cases for epidemiological research • Evaluating prevention and control programmes • Facilitating planning, including projection of future trends and health care needs
Data Sources, Analysis and Dissemination [59]	
• Regular data collection with a greater reliance on mandatory and voluntary infectious disease notification by health care providers and laboratories • Analysis often places emphasis on case counts and descriptions of time, place and person • Data collection, analysis and dissemination must be carried out in real time in order to facilitate rapid public health responses to infectious disease outbreaks	• Regular data collection but greater use of existing databases (e.g. cancer & mortality registers, hospital admission data) • Analysis usually places emphasis on rates, with a breakdown by time, place and person • Analysis and dissemination is usually less frequent e.g. annual or less frequently



Essential Elements of an Effective Surveillance System

In order to ensure that surveillance systems are collecting the most useful information, in the most effective manner for the purposes of disease prevention and control, it has been suggested that they be periodically evaluated. Such an evaluation should include a review of the surveillance system's objectives, a detailed description of its operation, an assessment of its performance and a series of recommendations as to how this performance could be improved [63]. In undertaking such an assessment, surveillance systems can be judged against to a series of 10 attributes, which collectively are important for effective surveillance system functioning [59]. As the importance of each of these attributes varies from system to system, and efforts to improve performance on one attribute may compete with efforts to improve performance on another, such an evaluation should not focus solely on the extent to which each attribute is achieved, but rather on achieving an appropriate balance across attributes [59].

These key attributes include:

1. **Simplicity**: This refers to both a system's structure and its ease of operation. Surveillance systems should be as simple as possible, while still meeting their objectives [63]. Simplicity is also closely related to acceptance and timeliness and may also influence the amount of resources required to operate the system [59].
2. **Flexibility**: Surveillance systems need to be able to adapt to changing information needs or operating conditions with little additional time, personnel, or allocated funds. Flexible systems can accommodate new health related events, changes in case definitions or technology, and variations in funding and reporting sources [63]. In addition, systems that use standard formats can be easily integrated with other systems [63].
3. **Data Quality**: Data quality reflects both the completeness and the validity of the data collected by a surveillance system. In addition to the issues of sensitivity and positive predictive value discussed below, quality may be influenced by the performance of screening and diagnostic tests, issues with case definitions and the level of training of staff undertaking data entry and coding. A large number of missing responses may suggest poor data quality [59].
4. **Sensitivity**: The sensitivity of a surveillance system can be judged by the completeness of its case reporting. If all people with the condition in the target population are detected, then sensitivity is ~100%. Sensitivity can be assessed by comparing data routinely collected by the system with that obtained from other sources (e.g. comparing AIDS notifications with hospital and laboratory records, and mortality data) [63]. While high sensitivity is particularly important for identifying outbreaks of infectious diseases, surveillance systems with lower sensitivity can still be useful for monitoring trends, as long as sensitivity does not change over time [59].
5. **Positive Predictive Value**: Positive predictive value refers to the proportion of reported cases who actually have the disease under surveillance. If all reported cases actually had the disease, then the positive predictive value would be 100%. A low positive predictive value may reflect incorrect diagnoses (false positives), a lack of specificity in the case definition, or errors in interpreting the case definition. In addition, positive predictive value also varies with the prevalence of the disease in the source population [63]. Evaluation of positive predictive value is difficult and relies on a careful evaluation of data from other sources (e.g. review of reported case's hospital records, to determine whether they actually had the diagnosis in question). A low positive predictive value may

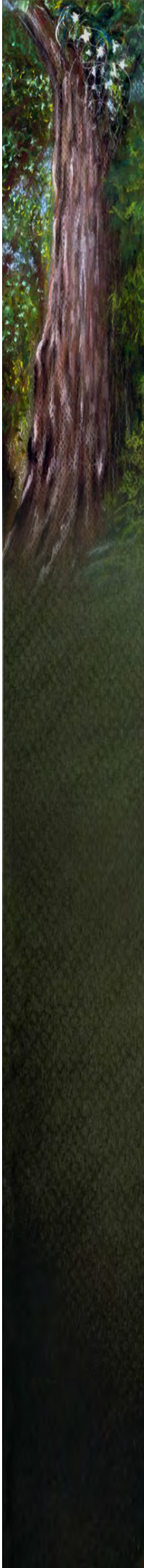
mean that non cases are investigated, or outbreaks identified which are not real, leading to costly investigations and undue public concern [59].

6. **Representativeness**: Representativeness is a measure of how well the reported cases in a population reflect all cases that actually occurred. Surveillance reporting is rarely complete and reported cases may differ from unreported cases in terms of demographic characteristics, access to health services or exposure history [63]. This lack of representativeness may impair a system's ability to accurately describe the distribution of disease in terms of time, place and person and as a consequence, to generalise the findings of surveillance data to the population at large, or to target high risk groups [59].
7. **Timeliness**: Timeliness refers to the entire surveillance cycle, from how quickly cases are reported to the distribution of surveillance reports [63]. Timeliness should be evaluated in terms of the ability of the system to make information available for the purposes of controlling a health related event, including the immediate control efforts, prevention of continued exposure and future programme planning. Thus a delay of 11 days in the context of a shigella outbreak may indicate a level of timeliness that is unsatisfactory for effective disease control, while in the case of cancer notifications, a delay of 1-2 years may be acceptable. With the advent of electronic communication, it is likely that the timeliness of many surveillance systems will improve [59].
8. **Acceptability**: Surveillance systems depend on the cooperation of many people and organisations over long periods of time. If procedures are easy to follow and useful information is returned to participants, then acceptability is likely to remain high [63]. Other factors which may influence the acceptability of a system include protection of confidentiality, time constraints, ease and cost of data reporting and whether the requirements for data collection and reporting have a legislative basis [63].
9. **Stability**: Stability refers to the reliability (i.e. the ability to collect, manage and provide data properly without failure) and availability (i.e. the ability to be operational when it is needed) of a surveillance system. Issues which effect stability include a lack of dedicated resources and workforce shortages, with unreliable or unavailable systems potentially delaying or preventing necessary public health action [59].
10. **Cost**: Surveillance systems incur costs in time, equipment and supplies which can be difficult to judge relative to their public health value [64].

While the objectives and scope of traditional surveillance systems have evolved over the past century to reflect the greater emphasis currently being placed on non-communicable diseases, injuries and their risk factors, some of the key attributes which determine what constitutes a good surveillance system remain the same. But while a systems level approach confers a number of distinct advantages in terms of considering the overall effectiveness of the system, in recent years there has also been a great deal of interest in the fundamental building blocks of surveillance systems i.e. the indicators themselves, and in defining the attributes which make a good public health indicator. The following section explores this issue in more detail.

Public Health Indicators

The World Health Organisation (WHO) defines a health indicator as being "*a characteristic of an individual, population or environment which is subject to measurement and which can be used to describe one or more aspects of the health of an individual or a population* [65]", with health in this context being defined as "*a state of complete physical, social and mental wellbeing and not merely the absence of*



disease and infirmity; health is a resource for every day life, not the object for living; it is a positive concept emphasising social and personal resources as well as physical capabilities [65]". Such definitions suggest that current views on what constitutes a health indicator are quite broad and encompass the more traditional measures of illness, disease and health related behaviours, as well as positive aspects of life (e.g. quality of life, life skills), and aspects of the social, economic and policy environments as they relate to health [60].

In addition to the definitions above, when considering what constitutes a health indicator, it is also useful to consider the uses to which these indicators will be put. Within the health sector at present, these tend to fall into two main categories:

1. **Public Health Indicators:** Public health indicators are used to provide a population view of health, which is directed towards public health action. They provide summary statistics which facilitate concise, comprehensive, and balanced judgements to be made about major aspects of health, or progress towards a healthier society [66], and have an important role to play in advocacy, accountability, and in monitoring public health initiatives [67].
2. **Health Care Performance and Quality Indicators:** Performance and quality indicators focus on whether healthcare systems are *"doing the right things, to the right people at the right time, and doing things right the first time [68]".* While performance indicators assess, the performance of health care systems as a whole (e.g. surgical waiting times) [69], quality indicators use specific and measurable elements of practice [60], to assess particular aspects of service delivery (e.g. monitoring the number of children receiving late surgical treatment for congenital dislocation of the hips, in order to assess the quality of screening during the neonatal period).

While ensuring access to quality health care is an essential component of any population health strategy, an exploration of the current theories governing healthcare performance monitoring is beyond the scope of this review. Instead, the remainder of this section focuses on public health indicators and on the characteristics which ensure that the information they provide is of the highest possible quality. In doing so, the section that follows is broken into two main sections:

1. **The Characteristics of a Good Public Health Indicator**: A large number of publications in recent years have focused on what constitutes a good public health indicator and on how to ensure that indicators measure the issues they purport to measure and are based on reliable and accurate data sources.
2. **Selection Criteria for Determining Which Indicators to Monitor over Time**: In the context of limited resources, decisions need be made about which issues should be monitored at a national or regional level. While the availability of reliable data is one aspect which requires consideration, emphasis needs also to be placed on selecting issues of major public health importance.

The Characteristics of a Good Public Health Indicator

While there has been a burgeoning interest in the development and use of indicators to guide public heath practice, in many instances the validity of existing indicators has never been evaluated. In an attempt to address this deficit, Flowers et al [70] developed a framework which could be used when developing new indicators, or to assess the fitness for purpose of indicators already in common usage. The authors proposed the following criteria, against which all new indicators should be assessed:

1. **Relevance:** There should be a clear rationale for developing an indicator, which includes a link to current policy.

2. **Face Validity:** Indicators should measure what they purport to measure e.g. deprivation Indexes should identify areas which people conventionally consider as being deprived.
3. **Construct Validity:** Many indicators are complex measures combining several elements into a single figure. These elements need to be plausible and the composition of the indicator should make sense e.g. selecting the most appropriate elements to collectively reflect small area deprivation.
4. **Behaviour:** A change in the value of an indicator should be interpretable, or for composite indicators, the indicator value should change in an appropriate direction if the underlying elements change.
5. **Clear Specification:** Clear and comprehensive information should be available about the construction of an indicator, including details about the numerator and denominator, and calculations necessary to derive the indicator value.
6. **Repeatability:** Most indicators are tracked over time. It is thus important to consider changes in the components of the indicator including changes in collection or coding of their underlying data. If a change is significant, it may be necessary to revise the indicator.
7. **Construction and Deconstruction:** For complex measures e.g. life expectancy, it is useful to be able to deconstruct the measure into its components e.g. cause or age specific mortality. This allows consideration of the source of any variations and allows interventions to be targeted to specific causes.
8. **Feasibility:** Indicators should usually be constructed using routinely collected data and calculations should be transparent, so that is it possible to reconstruct the indicator and derive the same values.
9. **Balance:** Ideally indicators should be balanced and not focus attention on one part of the system to the exclusion of the rest.

Other organisations have also developed similar sets of criteria to guide the definition and development of public health indicators. While the Australian Institute of Health and Welfare's criteria set contained a large number of those listed above, they also noted that indicators needed to be developed to meet a specific purpose, in a defined context and to be responsive to the public health policy environment within which they operated, yet at the same time be insulated against changes or influence from unrelated events [66]. In the Canadian context Etches et al [61] also noted that indicators needed to be built on consensus, be based on a conceptual framework and be able to be produced in a timely manner.

Criteria Governing the Selection of Indicators of Public Health Importance

In recent years, advances in information technology and the availability of routinely collected data sources (e.g. cancer, birth and mortality registers, hospital admissions) have meant that a large number of indicators may meet the criteria outlined above. As a consequence, it is often necessary to develop a set of criteria which facilitates the narrowing down of a Long List of candidate indicators, to a more manageable list, which can then be monitored in a systematic manner over time. In the context of limited public health resources, it is essential that this shorter list only contains issues of particular public health importance, so that the greatest public good can be achieved with the funds available [61]. While selection criteria vary from agency to agency, depending on the objectives of the system under review (Table 10) in general terms, most reflect a desire to achieve a balance between disease prevalence and severity,

issues of disparity, and whether it is likely that the condition is amenable to public health intervention.

Table 10. Indicator Selection Criteria from Two Different Agencies

NZ Manual for Public Health Surveillance [71]	European Union Child Health Indicators of Life and Development [72]
• The frequency of the health event • The severity of the health event • Disparities or inequalities associated with the heath event • The costs associated with the heath event • Preventability • Potential clinical course in the absence of an intervention • Public interest	• Is it evidence based / underpinned by research? • Is it a significant burden to society? • Is it a significant burden to the family? • Is it a significant burden to the individual? • Is it representative of significant population heath groups? • Is there data available and is this regular and repeatable to enable trend analysis? • Is the topic amenable to effective action? • Is the issue understandable to a broad audience?

The Role of Selection Criteria in Final Framework Development

In arriving at a final set of indicators, with which to monitor health over time, a question arises as to which set of criteria should take precedence in the final decision making process. While some have advocated for a stepwise approach, where each indicator must satisfy the current "developmental stage" before progressing to assessment at higher levels, others have highlighted the need for an underlying conceptual framework to guide the selection process. Advocates of the former approach suggest that in selecting indicators, scientific (e.g. explicit definition, validity, scientific soundness) and public heath importance (e.g. policy relevance, actionability) criteria should take precedence. Indicators meeting these criteria can then pass on to the next stage, which assesses their methodological soundness (e.g. measurability, sensitivity, acceptability, timeliness). Only if this tier of criteria is met, can the indicator pass on the final stage which considers its interpretability (e.g. specificity, comparability, representativeness, data quality) [66]. Others however argue that it should not be the feasibility of constructing an indicator (e.g. the availability of data and the capacity to perform analyses) which should guide the selection process, but rather its ability to be incorporated into a widely accepted conceptual framework, which provides an integrated picture of health and which clarifies at which level different indicators are measuring population health [66]. The following section considers the role of such conceptual frameworks in more detail.

Theoretical Frameworks

Current concepts of population health recognise that many interconnected aspects of society, the environment and individuals all contribute to health [73]. Yet many health status reports still continue with "basket approaches', simply grouping indicators into categories (e.g. health status, health service utilisation, demographic and economic factors), without explicitly considering the relationships between them. While such approaches may be of utility in estimating the burden of disease and in highlighting the presence of disparities in health outcome, they do not necessarily translate into a shared understanding of causality [66], or provide any insights into the most appropriate intervention points at a population level. In such situations, a unified theoretical model is of considerable utility. Such a framework may [66]:

1. Provide an integrated picture of health, as well as a theoretical basis for understanding the interconnected contributions society, the environment and individuals make to health outcomes at a population level.
2. Assist in locating each indicator's position on the causal pathways linking higher level social and environmental factors → health outcomes at the individual level and as a consequence, help in identifying the most appropriate intervention points, which are based on an understanding of the pathways involved.
3. Help to achieve the most appropriate balance of indicators by identifying the dimensions of population health which are particularly important. This in turn, may lead to more balanced discussions about which indictors should be targeted by interventions at a population level.

Yet despite their considerable utility, such frameworks are only recent innovations, reflecting an evolution of thought over the past two decades which has increasingly recognised the multiple and interacting determinants of health and the influence these have on population level outcomes. In tracking this evolution Etches et al [73] noted that while very early theories of health (1800s to early 1900s) recognised the influence of the social and physical environment, the reports of this era tended to be very simplistic, providing vary basic data on population health outcomes (e.g. infant mortality, life expectancy). During the 1950s-1980s, as the role of the non-medical aspects of health, and lifestyle related risk factors became increasingly recognised, population health indicators began to be mapped to frameworks in very focused areas (e.g. reviews of cardiovascular morbidity and mortality, their risk factors and health service utilisation by gender and geographic location). By the 1990s and early 2000s, such frameworks had become increasingly applied to population health as a whole and a number of theoretical models appeared in the literature which attempted to explain how such higher level social and economic factors became "biologically translated" into health outcomes at a population level [74].

While such multidimensional concepts of health underlie many of the monitoring frameworks developed in recent years, it is notable that that no two countries, or groups of countries have developed exactly the same framework for monitoring the health of their children and young people. Instead each has taken these same concepts and constructed their own "multidimensional map", which best describes these complex relationships within the context of their own child and youth populations. Despite this, many of these frameworks share a number of common dimensions:

1. **Multiple Influences**: All frameworks to some extent recognize that health arises not only from individual characteristics and behaviours, but from the many interconnected aspects of the social, economic and physical environment as well.
2. **Etiologic Pathways**: All indicator frameworks rely in a unifying concept of health, with many grouping indicators in a manner which explicitly considers the etiologic sequences linking the underlying determinants with outcomes at the population level.
3. **Lifecourse Dimensions**: A number of frameworks also include a lifecourse dimension, and arrange their indictors in a manner which reflects the key developmental stages progressing from birth → late adolescence. Such approaches allow for the (cumulative) effects of various exposures to be considered during critical and sensitive periods in children and young people's development.

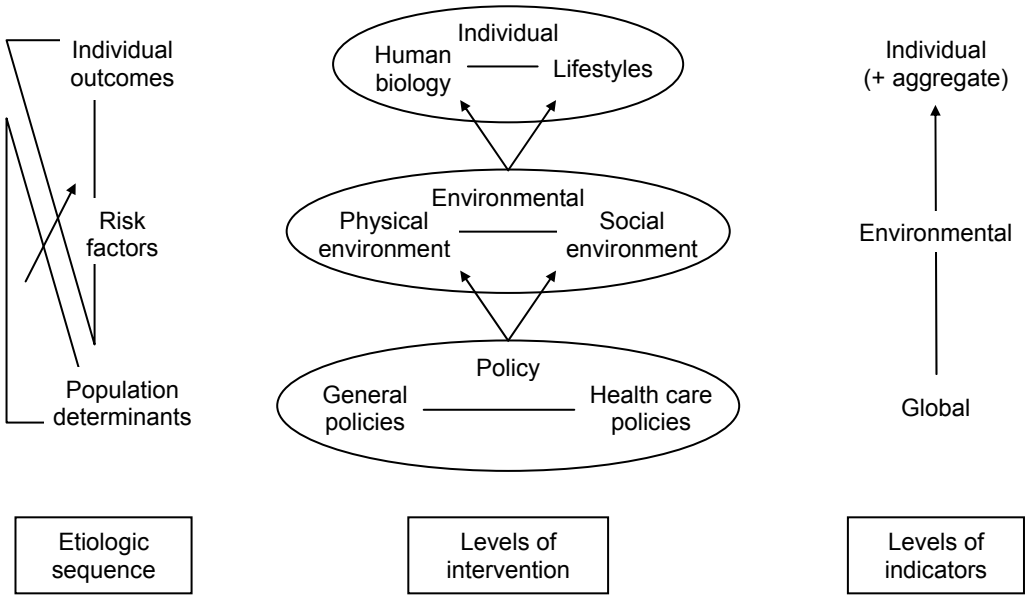
An example which typifies the first of these two dimensions is a framework put forward by McDowell et al [74], which suggests that the best way to establish a logical structure for a set of indicators is to base the framework on the etiologic sequences linking the

underlying determinants of health → risk factors → individual outcomes. In McDowell's framework, potential interventions are placed alongside indicators at each level, so that the most appropriate population health interventions at each level become apparent (Figure 2).

Similarly, an example which illustrates the lifecourse dimension is a framework which arose from the European Union's Child Health Indicators of Life and Development (CHILD) project, which developed a two dimensional map, with indicators being arranged vertically by their Outcomes, Processes and Determinants domains and then horizontally from birth → 18 years [71]. Such an approach assisted the authors in ensuring that there was an appropriate spread and balance of indicators across all of the relevant dimensions of health and at the needs of children and young people in all age groups had been considered (Figure 3).

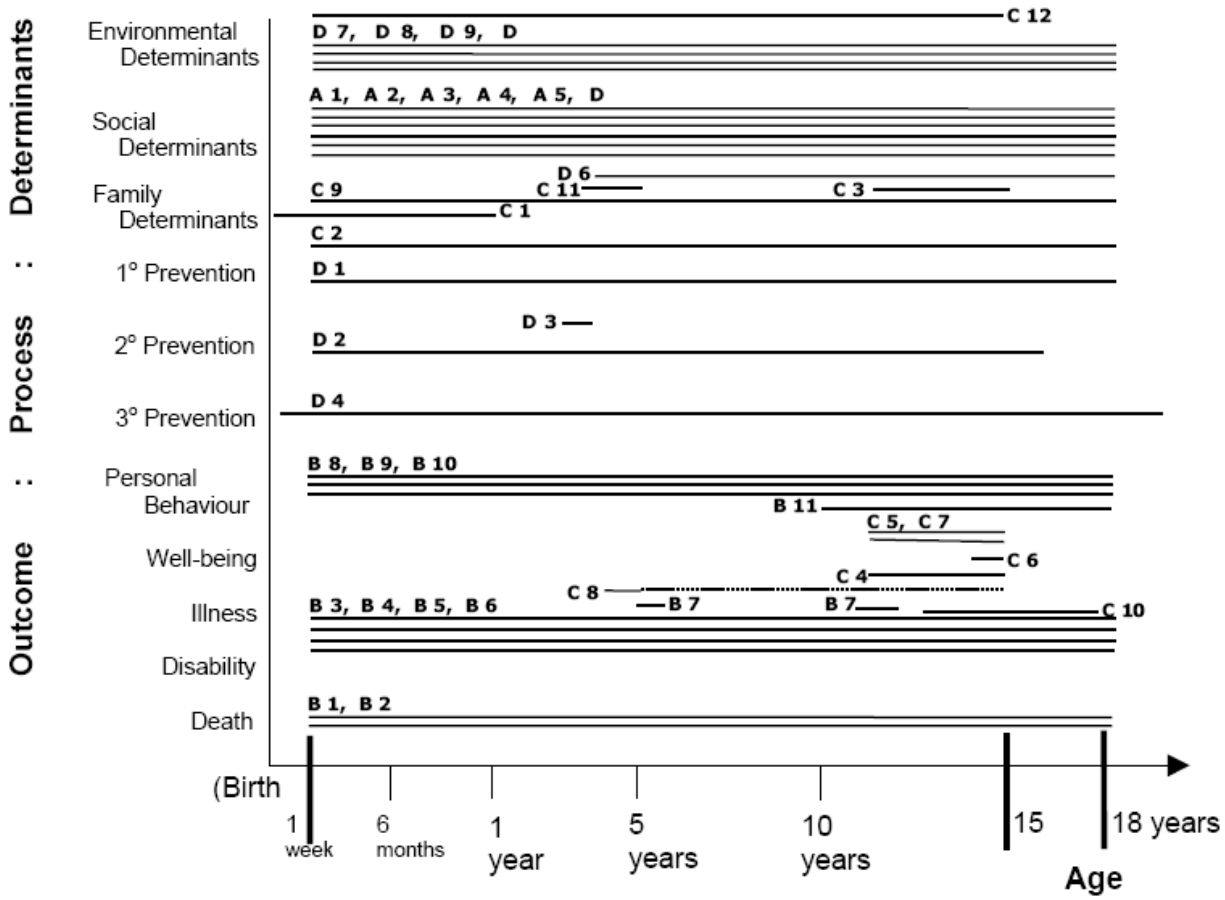
While many of the monitoring frameworks in the literature today contain elements which mirror these examples, the way in which each country combines these elements to produce a multidimensional map of child and youth health is unique. As a consequence, it is likely that many of these maps contain elements which may be useful in informing the process of indicator framework development, but which have not been highlighted above, as a result of the collective nature of the review. In order to address this gap, the following section reviews frameworks which have been used by other developed countries during the past decade, to monitor the health of their children and young people.

Figure 2. The Correspondence between Population Health Measures and Interventions to Enhance Health



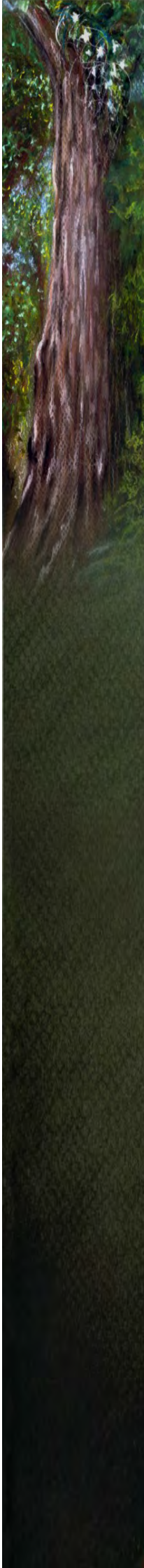
Source: McDowell et al. American Journal of Public Health [74]

Figure 3. Child Health Indicators of Life and Development Project's Domain and Lifecourse Dimensions



Source: World Health Organisation [75]

Population Health Monitoring: Overseas Approaches



Introduction

During the past decade, a number of countries have developed frameworks with which to monitor the health status of their populations. Several have then adapted these frameworks for use in their child and youth populations, while others have developed child and youth monitoring frameworks from scratch. A review of the work undertaken by other developed countries in this area would be extremely valuable in informing the current project, as it would assist in answering two of the questions posed previously:

1. What approaches have other countries and groups of countries taken to monitoring the health of their children and young people, and who are the organisations involved in monitoring at a national level?
2. What are the underlying models of health used to guide monitoring overseas, and are any of the theoretical frameworks developed by other countries to portray the relationships between indicators, of use in the New Zealand context?

The following section thus reviews the frameworks used by other developed countries during the past decade, to monitor the health of their children and young people. It begins by reviewing a range of international (e.g. WHO, UNICEF) and regional monitoring initiatives (e.g. EU), before exploring those occurring at a national level (e.g. Australia, UK). The section concludes with a discussion of the implications of the findings of this review, for framework development in the New Zealand context.

Methodology

The literature review which follows was limited to countries in the developed world. In recognition of New Zealand's international reporting obligations, a number of global monitoring agencies were also included (e.g. World Health Organisation, UNICEF, the OECD). While the search strategy included peer reviewed publications, a large number of those reviewed were "grey literature" publications, produced by a variety of Government and non-Government agencies, which described either a health indicator framework, or the processes and selection criteria used in indicator framework development.

A Medline search, as well as an internet search using the Google search engine was undertaken using the keywords 'health indicator', 'child health indicator', 'youth health indicator', 'health status', and 'child health status'. National and international health related websites were further searched using the keywords 'indicator', 'health indicator', 'child health' and 'youth health', with the websites providing the most useful information being outlined in Table 11.

Table 11. Websites included in Search Strategy

New Zealand Websites	International Websites
• New Zealand Government • Ministry of Health • Public Health Information Services • Public Health Intelligence • Ministry of Social Development • New Zealand branch of UNICEF • The Institute of Environmental Science & Research (ESR)	• World Health Organisation (WHO) • UNICEF • Organisation for Economic Co-operation & Development (OECD) • Commonwealth Fund • Demographic and Health Services (DHS) • Australian Institute of Health & Welfare (AIHW) • Canadian Institute for Health Information (CIHI) • European Union Public Health Website • United States Department of Health & Human Services Centre for Disease Control and Prevention (CDC) • United Kingdom Department of Health

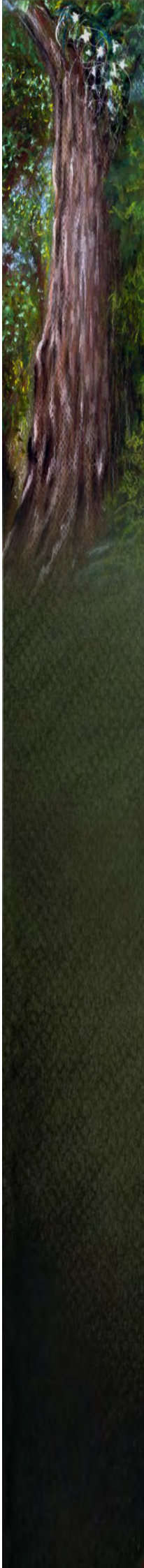
Global Monitoring Agents

There are several international organisations which undertake global population health monitoring. The largest of these are the World Health Organisation (WHO), the United Nations Children's Fund (UNICEF) and the Organisation for Economic Co-operation and Development (OECD). While only UNICEF has a specific child health mandate, all of these agencies collect data pertaining to children and young people. In addition, a number of other organisations collect and disseminate population health data, often focussing on particular areas or programmes (e.g. the United States Agency for International Development (USAID) carry out Demographic and Health Surveys (DHS)). Many of these agencies work collaboratively in the preparation of their reports, as is reflected in the multiple data sources accessed in the preparation of the UNICEF's The State of the World's Children Report in 2006 (Table 12). The following sections briefly summarise the work of these three global monitoring agencies: the WHO, UNIICEF and the OECD.

Table 12. Data Sources Used in UNICEF's The State of the World's Children 2006

Agencies	
• UNICEF • World Health Organisation • United Nations Population Division • United Nations Statistics Division • World Bank • United Nations Educational, Scientific & Cultural Organisation (UNESCO) • UNESCO Institute of Statistics (USI) • Multiple Indicator Cluster Surveys (MICS) - UNICEF • Demographic & Health Surveys (DHS) - USAID • Other National Surveys	• Joint United Nations Programme on HIV/AIDS (UNAIDS) • Behavioural Surveillance Surveys (BSS) • Reproductive Health Surveys (RHS) • International Telecommunications Union (Geneva) • Administrative Data • International Monetary Fund (IMF) • Organisation for Economic Co-operation & Development (OECD) • United States Agency for International Development (USAID)

Source: UNICEF [76]



World Health Organisation

The World Health Organisation is the United Nations specialized agency for health established in 1948. The WHO's goal is the attainment, by all peoples, of the highest possible levels of health. The production and dissemination of health statistics for health action at country, regional and global levels is a core WHO activity mandated by its Member States in its Constitution [77]. The WHO's Programme on Health Statistics is an integrated WHO initiative to strengthen country, regional and global health statistics for better policy making and programme implementation. The programme arose out of a call for more consistency in global health statistics and estimates of disease burden [75, 78]. At a country level, the WHO recognised that significant resources had often been allocated to measuring, monitoring and evaluating health status and health programmes. Reporting was frequently for specific accountability purposes however, or related to disease specific programmes, resulting in fragmentation and duplication of effort, with the haphazard collection of poor quality data from different sources and using different definitions, producing information that could not be compared between countries or over time. This situation often arose from frequent, uncoordinated requests for health information by various agencies, including the WHO, which further contributed to these inefficiencies [75, 77]. In response, WHO implemented new systems to harmonize data collection and to make the results more universally acceptable [12].

The WHO recently published a report entitled *World Health Statistics 2006*, updating the first edition published in 1997. This report covers 50 core health indicators, reflecting outcomes across the WHO's 192 Member States. These core indicators do not aim to capture all relevant aspect of health, but rather to provide a comprehensive summary of the current state of population health and health systems at a country level. Issues covered include mortality, morbidity, risk factors, coverage of selected health interventions, health systems, inequalities in health, and demographic and socio-economic factors (Figure 4). It is anticipated that an online version of *World Health Statistics* will be updated regularly. In addition, the WHO has collaborated in the development of child survival indicators and a child environmental health framework, and monitoring frameworks have also been developed for reproductive health and population environmental health.

UNICEF

The United Nations General Assembly created the United Nations International Children's Emergency Fund (UNICEF) in 1946 to help children affected by World War II and by 1953 UNICEF (now the United Nations Children's Fund), had become a permanent part of the United Nations [79]. In 1990, world leaders meeting at the *World Summit for Children* committed themselves to a World Declaration on the Survival, Protection and Development of Children and a Plan of Action that included 27 specific goals relating to children's survival, health, nutrition, education and protection, which were to be attained by 2000 [80]. During the 1990's, UNICEF prepared progress reports on the implementation of these goals and disseminated these via its flagship publications, *The Progress of Nations*, and *The State of the World's Children*.

In 2000, at the *United Nations Millennium Summit*, world leaders developed the Millennium Declaration, setting a series of collective priorities for peace and security, poverty reduction, the environment and human rights. From this declaration, the Millennium Development Goals (MDG) were drawn up, with goals and targets to be met by 2015 (Table 13). While the MDG had a total population perspective, six of the eight goals could be achieved if the rights of children to health, education, protection and equality were protected [12]. In 2002, the United Nations General Assembly Special Session on Children was convened to review progress since the 1990 Summit and to develop new targets and goals. This resulted in the *A World Fit for Children*

declaration and Plan of Action [80]. Six of the eight Millennium Development Goals match those set out in *A World Fit for Children* and UNICEF assumed a central role in helping to achieve these goals [81], in part by to reporting on progress towards both sets of goals annually in its publication *The State of the World's Children* (Figure 4).

Table 13. Millennium Development Goals and Targets

Millennium Development Goals	**Targets (From 1990 to 2015)**
1. Eradicate extreme poverty and hunger	• Halve the proportion of people whose income is less than $1 a day • Halve the proportion of people who suffer from hunger
2. Achieve universal primary education	• All children will be able to complete a full course of primary schooling
3. Promote gender equality and empower women	• Eliminate gender disparity in all levels of education
4. Reduce child mortality	• Reduce the under 5 mortality rate by two thirds
5. Improve maternal health	• Reduce the maternal mortality ratio by three quarters
6. Combat HIV/AIDS, malaria, and other diseases	• Halt and reverse the spread of HIV/AIDS • Halt and reverse the incidence of malaria and other major diseases
7. Ensure environmental sustainability	• Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources • Halve the proportion of people without sustainable access to safe drinking water and basic sanitation • By 2020, to have achieved a significant improvement in the lives of at least 100 million slum-dwellers
8. Develop a global partnership for development	• Address the special needs of the least developed countries, landlocked countries and small island developing States • Develop further an open, rule-based, predictable, non-discriminatory trading and financial system • Deal comprehensively with developing countries debt • In cooperation with developing countries, develop and implement strategies for decent and productive work for youth • In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries • In cooperation with the private sector, make available the benefits of new technologies, especially information and communication

Sources: UNICEF [76], World Health Organisation [82]

Figure 4. Global Health Monitoring Indicators from UNICEF's *State of the Worlds Children*, WHO's *World Health Statistics* (1/3 cont…)

Global Monitoring Sets		
Mortality	**WHO**	**UNICEF**
Under Five Mortality Rate	●	●
Infant Mortality Rate	●	●
Neonatal Mortality Rate	●	
Adult Mortality (15-60 years)	●	
Maternal Mortality Rate	●	●
Annual number of Births		●
Annual number of Under Five Deaths		●
Life Expectancy at Birth (years)	●	●
Female Life Expectancy as a % of Males		●
Healthy Life Expectancy (HALE) at Birth (years)	●	
HIV/AIDS Mortality	●	
TB Mortality by HIV Positive or Negative	●	
Age Standardised Mortality Rate by Cause	●	
Years of Life Lost by Cause	●	
% Cause of Death Children Under Five (Neonatal Causes, HIV/AIDS, Diarrhoeal Diseases, Measles, Malaria, Pneumonia, Injuries, Other)	●	
Morbidity	**WHO**	**UNICEF**
Adult HIV Prevalence Rate (15-49 years)	●	●
Estimated Number of People Living with HIV (0-49, 0-14, women 15-49)		●
HIV Prevalence in Pregnant Women (15-24) in Capital City		●
TB Prevalence/Incidence	●	
Confirmed Polio Cases	●	
Health Service Coverage	**WHO**	**UNICEF**
% Routine Expanded Programme on Immunisations funded by government		●
% Newborns Protected against Tetanus		●
Immunisation Coverage in 1 year old (%) - BCG		●
Immunisation Coverage in 1 year old (%) - DPT1		●
Immunisation Coverage in 1 year old (%) - DPT3	●	●
Immunisation Coverage in 1 year old (%) - Polio3		●
Immunisation Coverage in 1 year old (%) - Measles	●	●
Immunisation Coverage in 1 year old (%) - HepB3	●	●
% Under Fives Sleeping under a Mosquito Net		●
% Under Fives Sleeping under a Treated Mosquito Net	●	●
% Under Fives with Fever in the last two weeks receiving anti-malarial drugs		●
Anti-retroviral Coverage	●	
TB detection rate and treatment success rate under DOTS	●	
% Under Fives with an Acute Respiratory Illness in the last 2 weeks		●
% Under Fives with an Acute Respiratory Illness taken to a health provider	●	●
% Under Fives with Diarrhoea receiving Oral Rehydration Therapy in the last 2 weeks	●	●
Vitamin A Supplementation Coverage		●
% of Households Consuming Iodised Salt		●
Antenatal Care Coverage	●	●
Skilled Attendant at Delivery	●	●
Contraceptive Prevalence	●	●
Births by Caesarean Section	●	

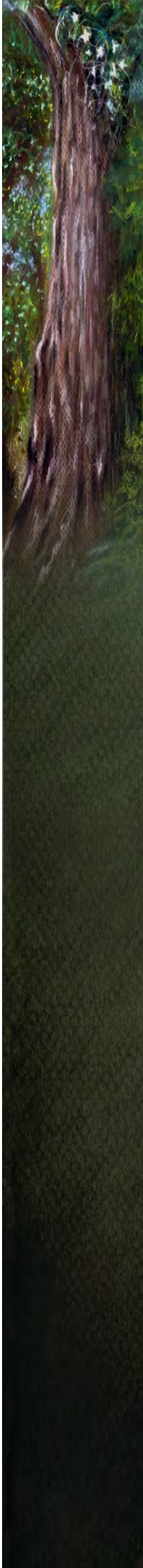


Figure 5. Global Health Monitoring Indicators from UNICEF's *State of the Worlds Children*, WHO's *World Health Statistics* (2/3 cont…)

Global Monitoring Sets		
Risk Factors	**WHO**	**UNICEF**
Breast feeding: - Exclusively breastfed under 6 months - Breastfed with complimentary food (6-9 months) - Still breastfeeding at 20-23 months		●
% of Newborns with Low birth weight	●	●
Stunting prevalence in Under Fives	●	●
Wasting prevalence in Under Fives	●	●
Underweight prevalence in Under Fives	●	●
Overweight prevalence in Under Fives	●	
Adults who are obese (>15 years)	●	
% Using Improved Drinking Water Sources		●
% Using Adequate Sanitation Facilities		●
% Population using solid fuels	●	
Tobacco Use in adolescents (13-15 years)	●	
Tobacco Use in adults (>15 years)	●	
Condom use by young people at high risk sex (15-24 years)	●	
HIV Knowledge and Behaviour - % who know a condom can prevent HIV - % who know a healthy looking person can have HIV - % who have comprehensive knowledge of HIV - % who used a condom at last high risk sex		●
Estimated Number of Orphaned Children (0-17) by AIDS / All causes		●
School Attendance Ratio of Orphaned Children to Non-Orphaned Children		●
Child Protection	**WHO**	**UNICEF**
Child Labour (5-14 years) by Gender		●
Child Marriage by Urban/Rural		●
% Births Registered by Urban/Rural		●
Female Genital Mutilation/Cutting (15-49 years)		●
Inequalities in Health	**WHO**	**UNICEF**
Under Five Mortality by Place of Residence, Wealth Quintile, Mothers Education	●	
Prevalence of Stunting in Under Fives by Place of Residence, Wealth Quintile, Mothers Education	●	
Skilled Attendant at Delivery by Place of Residence, Wealth Quintile, Mothers Education	●	
Measles Immunisation by Place of Residence, Wealth Quintile, Mothers Education	●	
Health Systems	**WHO**	**UNICEF**
Human Resources for Health (Physicians, Nurses, Midwives etc per 1000)	●	
Per Capita Expenditure on Health ($US)	●	
% Central Government Expenditure Allocated to Health	●	●
Total Health Expenditure as a % of Gross Domestic Product	●	
Government Health Expenditure as a % of Total Health Expenditure	●	
Private Health Expenditure as a % of Total Health Expenditure	●	
% of Deaths Registered	●	
Hospital Beds per 10 000	●	

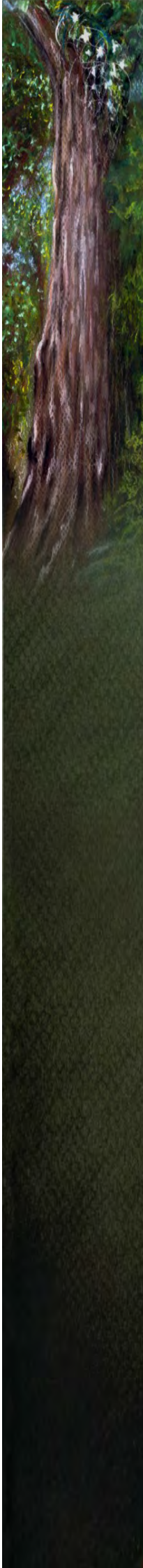


Figure 6. Global Health Monitoring Indicators from UNICEF's *State of the Worlds Children*, WHO's *World Health Statistics* (3/3)

Global Monitoring Sets		
Demographic and Socioeconomic Statistics	**WHO**	**UNICEF**
Population	●	●
Annual population Growth	●	●
Average Annual Growth Rate of Urban Population	●	●
% of Population Urbanized	●	●
Total Fertility Rate	●	●
Adolescent Fertility Proportion	●	
Adult Literacy Rate by Gender	●	●
Primary and Secondary School Enrolment by Gender	●	●
Primary and Secondary School Attendance by Gender		●
% Primary School Entrants Reaching Grade Five		●
Telephone and Internet access		●
Gross National Income per Capita	●	●
Gross Domestic Product per Capita average annual Growth Rate		●
Average Annual Rate of Inflation		●
% Population below $1 a day	●	●
Net Official Development Assistance (ODA) Inflow		●
% Share Household Income (lowest 40%, highest 20%)		●
Debt Service as a % of Exports of Goods and Services		●

Source: UNICEF [76], World Health Organisation [82]

Organisation for Economic Cooperation and Development (OECD)

The OECD Secretariat has been reporting on the health of Member countries since the mid 1980s. These reports source their information from the OECD's large international database on the health and health systems of member countries, with coverage of indicators in many cases going back as far as the 1960s. Since the mid-80s, information on over 1000 indicators has been published annually in CD-ROM format. The publication, entitled *OECD Health Data*, is divided into 10 parts: Health Status, Health Care Resources, Health Care Utilisation, Health Expenditure, Health Care Financing, Social Protection, Pharmaceutical Market, Non-Medical Determinants of Health, Demographic References, and Economic References.

In 2001, with the aim of increasing the accessibility of their data, the OECD began publishing *Health at a Glance*, a biannual publication of core indicators based on OECD Health Data in the following areas: Health Status, Health Care Resources and Utilisation, Health Expenditure and Financing, Non-Medical Determinants of Health, Demographic and Economic Context. These core indicators were considered by the Secretariat to be those of particular interest from a health policy perspective, and were the ones most often requested by users of the database [83]. In addition, the OECD has also recently commenced work on the OECD Health Care Quality Indicators Project, with the intention of developing national-level indicators with which to assess the technical quality of medical care provision [84]. This project builds on work initiated by the Commonwealth Fund International Working Group on Quality Indicators in 2000 and has brought together 21 countries, the World Health Organization (WHO), the European Commission (EC), the World Bank, and leading research organisations, such as the International Society for Quality in Health Care and the European Society for Quality in Healthcare (ESQH). The expert group representing these countries and organisations identified five priority areas for initial development: cardiac care, diabetes, mental health, patient safety, and health promotion together with primary care.

Regional Monitoring Agencies

In addition to global monitoring agencies, a number of organisations routinely monitor the health status of countries at a regional level. Of these the European Union is probably the best example of how coordinated approaches can be developed to monitor health across a number of different jurisdictions. In addition, the Arctic Region has also developed a similar regional monitoring network and the following section reviews each of these in turn.

European Union (EU)

In the 1950s, Eurostat was established as the Statistical Office of the European Community, (which later became the European Union (EU)), and is currently the primary source of statistics for the EU. In 1997 the European Commission's Health Monitoring Programme (HMP) was established, with the objective of setting up a Community Health Monitoring system. Under the auspices of the HMP, a project entitled an *Integrated Approach to Establishing European Community Health Indicators (ECHI)* was established, to develop a coherent set of European Community Health Indicators. These indicators were to be selected on the basis of explicit criteria and to be supported by all Member States. ECHI-1 was completed in 2001, and comprised a list of approximately 190 indicators, as well as a framework which was incorporated into all subsequent HMP projects (Table 14). The framework was based on a public health model developed by Canadian Health Minister Marc Lalonde, who suggested that health was determined by four key domains: biological and genetic factors, lifestyle, the environment, and the health care system [85], which the ECHI project

subsequently renamed: Demographic and Socio-economic Situation, Health Status, Determinants of Health, and Health Systems. In addition to ECHI-1, several waves of HMP Projects were undertaken during the same period, which further defined indicators in specific areas (e.g. the CHILD Project (Child Health Indicators of Life and Development), PERISTAT (Indicators for Monitoring and Evaluating Perinatal Health in Europe), EUDIP (Diabetes Mellitus Indicators), REPROSTAT (Reproductive Health Indicators in the European Union)).

Table 14. European Community Health Indicators (ECHI) Framework

<table>
<tr><th>Demographic and Socio-Economic Situation</th><th>Determinants of Health</th><th>Health Systems</th></tr>
<tr><td>Population
• Population status
• Population dynamics

Socio-economic Factors
• Education
• Employment/Occupation
• Income distribution
• Household situation
• Ethnic origin citizenship
• General economics</td><td rowspan="2">Personal and Biological Factors
• Biological (risk) factors
• Personal conditions

Health Behaviours
• Substance use
• Nutrition
• Other health-related behaviours

Living and Working Conditions
• Physical environment
• Working conditions
• Social & cultural environment</td><td rowspan="2">Prevention, health protection and health promotion
• Disease prevention
• Health promotion
• Health protection

Health care resources
• Facilities
• Manpower
• Education
• Technology

Health care utilisation
• In-patient care utilisation
• Out-patient care utilisation
• Surgical operations and procedures
• Medicine use/medical aids

Health expenditure and Financing
• Health care system
• National expenditure on health
• Expenditure on medical services
• Medical goods dispensed to outpatients
• Total health expenditure by provider, age group, source

Health care quality/performance
• Subjective indicators
• Health care process indicators
• Health outcomes</td></tr>
<tr><td>Health Status

Mortality
• Life expectancy and related indicators
• General mortality
• Infant and Perinatal deaths
• Disease-specific Mortality

Morbidity, disease specific

Generic Health Status
• Perceived health
• Chronic conditions general
• Functional limitations
• Activity restrictions
• General mental health
• General quality of life
• Absenteeism from work
• Inequality measure

Composite Health Status Measures
• Disability Free Life Expectancy</td></tr>
</table>

Source: European Community Health Indicators Monitoring [86]

In 2001, ECHI-2 commenced as a continuation of ECHI-1. The ECHI-2 achievements include:

1. **Further definition of the European Community Health Indicators**: This included integration of indicators from the other HMP Projects, resulting in what is termed the 'Long List' of approximately 400 indicators arranged within the ECHI framework.
2. **Creation of 'User Windows'**: This idea was conceived during ECHI-1 and allows for the selection of a subset of indicators from the full ECHI list, based on a particular perspective or interest such as child and youth health, health inequalities, maternal health, injuries. In addition, a 'short list' of indicators was defined as a subset of approximately 80 core indicators, which were then given priority in terms of implementation.

3. **Priority Implementation and Reporting on the ECHI Shortlist**: Core ECHI indicators are reported on by Eurostat, and also via the EU-Health Portal website. The capacity for 'user windows' exists within the EU-Health Portal, and will be expanded on as the ability to report on the Long List of indicators occurs.
4. **Updating of the International Compendium of Health Indicators (ICHI-2):** This compendium presents definitions for ECHI indicators, and indicators used by Eurostat, WHO, and OECD. A website, www.healthindicators.org which enables ready access to these definitions and which includes the ECHI user windows, is under development.

In 2005, as a continuation of ECHI-1 and ECHI-2, the European Community Health Indicators Monitoring Project (ECHIM) was launched, as a three year project to further develop and implement health indicators and health monitoring in the EU and within EU Member States [87]. It is notable that in each of these phases, close collaboration with Eurostat, the EU Health and Consumer Protection Directorate-General (DG-Sanco), the UN, WHO, and OECD was seen as being integral to the project. The importance of working together to reduce the differences in data requirements and reporting between these agencies was seen as being an essential part to reducing duplication of effort and inefficiency [88].

Child Health Indicators of Life and Development (CHILD)

This project was part of the EU Health Monitoring Program and started in 2000, at the same time as the maternal and perinatal health project, PERISTAT. The CHILD project aimed to address the underlying determinants of health, as well as the more traditional health status measures. The project included children from birth to 17 years, and to avoid overlaps with the PERISTAT project, children were further subdivided into the following age categories: 1 week - 4 years, 5-9 years, 10-14 years, and 15-17 years. The project utilised an adapted ECHI framework and identified 35 core indicators and an additional 17 key areas for future development (Table 15). The indicators developed by this project were in turn, integrated back into the ECHI project Long List, with many also being selected for the ECHI short list. A Child Health user window was also developed which included the indicators from the ECHI Long List which were relevant to child health.

Indicators for Monitoring and Evaluating Perinatal Health in Europe (PERISTAT)

The PERISTAT project was also part of the EU Health monitoring Programme and aimed to develop an indicator set for monitoring and evaluating perinatal health in Europe. Perinatal indicators were defined as those pertaining to measures of maternal, foetal, and infant health during pregnancy, delivery, and the post-partum period, or their underlying determinants. The framework developed for this project was loosely based on the ECHI project framework, but contained a number of modifications including: combining the ECHI Demographic and Socio-economic Situation and Determinants of Health domains into a single Population Characteristics and Risk Factors domain and dividing the ECHI Health Status domain into Maternal and Neonatal Health categories (Table 16). As with the CHILD project, the PERISTAT indicators have been integrated into the ECHI Long List, a number have also been included in the ECHI short list, and a Perinatal Health user window has been developed.

Arctic Region

In addition to the EU, in 1998 the Sustainable Development Working Group of the Artic Council, whose member countries include Canada, Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden and the United States established the Future of Children and Youth of the Arctic Initiative[88]. The initiative had 2 components; a Health Programme which promoted health and wellbeing, and the Networking Programme. One of the Health Programme's first objectives was to examine and

identify gaps in the existing data and studies related to the health of children and youth in the Arctic. A framework and indicator set were developed to report on the health status of children and youth residing in the Region: Alaska, Arctic Canada (Yukon, Northwest Territories, and Nanavut), Greenland, Iceland, Arctic Norway (Troms), Arctic Sweden (Norrbotten), Artic Finland (Lapland) and Arctic Russia (Chukotka). The framework consisted of two broad categories, Biophysical and Psychosocial, and included 16 indicators (Table 17).

Table 15. Child Health Indicators of Life and Development (CHILD) Framework

Demographic and Socio-Economic Determinants	**Health Determinants, Risk, and Protective Factors**	**Child Health Systems and Policy**
A1 Socio-economic Circumstances **A2** Children in Poverty **A3** Parental Educational Attainment **A4** Child in Single Parent Households **A5** Asylum Seekers	*Parental Determinants* **C1** Breastfeeding **C2** Household Environmental Tobacco **C3** Parental Support *Child Lifestyle Determinants* **C4** Physical Activity **C5** Tobacco Smoking **C6** Alcohol Abuse **C7** Substance Misuse *Other Factors* **C8** Overweight and Obesity **C9** Children in Care **C10** Early School Leavers **C11** Educational Enrolment **C12** Air Pollution Exposure	*Health Systems Policy* **D1** Marginalised Children's Healthcare **D2** Parental Inpatient Accompaniment *Health System Quality* **D3** Immunisation Coverage **D4** Leukaemia 5-year Survival *Social Policy Indicators* **D5** Physical Punishment **D6** Anti-bullying policies in schools *Physical Protection Policy* **D7** Child Transportation Safety **D8** Exposure to Lead **D9** Exposure to Hazardous Noise **D10** Environmental Tobacco Smoke
Child Health Status and Well-being *Child Mortality* **B1** Child Mortality Rates **B2** Selected Cause-specific Mortality *Child Morbidity* **B3** Cancer **B4** Diabetes **B5** Asthma **B6** Infectious Diseases **B7** Dental Morbidity *Injuries to Children* **B8** Burns Necessitating Admission **B9** Poisoning Necessitating Admission **B10** Fracture of Long-bones *Mental Health of Children* **B11** Attempted Suicide		

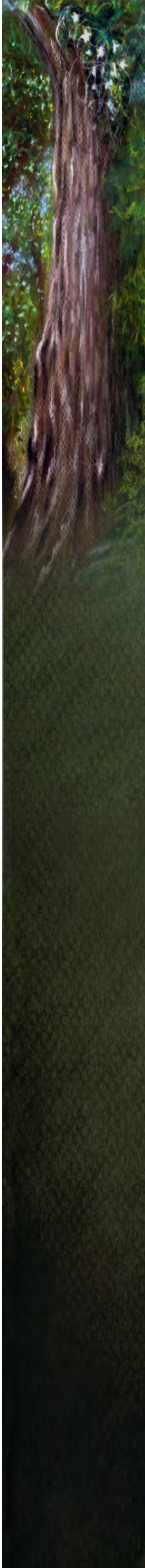
Table 16. PERISTAT Framework

Category	Core	Recommended	Recommended: Further Development Needed
Neonatal health	C1 Fetal mortality rate C2 Neonatal mortality rate C3 Infant mortality rate C4 Birth weight distribution C5 Gestational age distribution	R1 Prevalence of selected congenital anomalies (Down's syndrome Neural tube defects) R2 Distribution of APGAR score at 5 minutes	F1 Causes of perinatal death F2 Prevalence of cerebral palsy F3 Prevalence of hypoxic ischemic encephalopathy
Maternal health	C6 Maternal mortality ratio	R3 Maternal mortality by cause of death	F4 Prevalence of severe maternal morbidity F5 Prevalence of trauma to the perineum F6 Prevalence of faecal incontinence F7 Postpartum depression
Population characteristics or risk factors	C7 Multiple birth rate C8 Distribution of maternal age C9 Distribution of parity	R4 Percentage of women who smoke during pregnancy R5 Distribution of mothers' education	F8 Distribution of mothers' country of origin
Health care services	C10 Distribution of births by mode of delivery by parity, plurality, fetal presentation, previous Caesarean Section	R6 Percentage of all pregnancies following fertility treatment R7 Distribution of timing of 1st antenatal visit R8 Distribution of births by mode of onset of labour R9 Distribution of place of birth R10 Percentage of infants breast-feeding at birth R11 Percentage of very preterm births delivered in units without a NICU	F9 Indicator of support to women F10 Indicator of maternal satisfaction F11 Births attended by midwives F12 Births without medical intervention

Table 17. Arctic Region Child and Youth Health Framework

Biophysical	Psychosocial
Demography • Population Youthfulness • Maternal Age *Maternal Behaviour* • Breastfeeding *Preventive Health Services* • Prenatal Care • Immunisation *Health Outcomes* • Preterm Birth • Low Birth Weight • Infant Mortality • Major notifiable Infectious Diseases	*Education* • Education *Behaviour of Children and Youth* • Tobacco Use • Substance Abuse *Health Outcomes* • Child Abuse and Neglect • Unintentional Injuries • Suicide

Source: Arctic Council Sustainable Development Working Group [89]



National Level Monitoring

Most developed countries monitor population health at a national level, although not all have specific reporting frameworks for child and youth health. The following sections review the approaches taken by the United Kingdom, Canada, the United States, Australia and Italy to monitor the health status of their children and young people.

United Kingdom

In 2001, the Department of Health announced the development of a new National Service Framework (NSF) [90]. The NSF for Children, Young People and Maternity Services was a 10 year programme intended to stimulate long-term and sustained improvement in children's health, and by 2014 health, education and social services were expected to meet the evidence based standards set. These standards were divided into the following areas:

- Promoting health and well-being, identifying needs and intervening early
- Supporting parenting
- Child, Young Person and Family Centred Services
- Growing up into adulthood
- Safeguarding and promoting the welfare of children and young people
- Children and young people who are ill
- Children and young people in hospital
- Disabled children and young people and those with complex health needs
- The mental health and psychological well-being of children and young people
- Maternity services

At the heart of the children's NSF was a fundamental change in thinking about health and social services delivery, which aimed to re-orientate service design and delivered around the needs of children their families, rather than around the needs of the organisations delivering them.

In 2003, a green paper called *Every Child Matters* was published, which built on existing plans to strengthen preventive services in the UK. [91] The paper was based on wide consultation with those working in children's services, and with parents, children and young people and prompted debate about the most appropriate approach to service delivery. In 2004, *Every Child Matters: Change for Children* was published, which highlighted a new approach to the well-being of children and young people, dividing this into five outcome domains (Table 18):

1. Be Healthy
2. Stay Safe
3. Enjoy and Achieve
4. Make a Positive Contribution
5. Achieve Economic Wellbeing

Table 18. Every Child Matters Outcomes Framework (1/2 cont…)

Be Healthy					
AIMS	Children and Young People are physically healthy	Children and Young People are mentally and emotionally healthy	Children and Young People are sexually healthy	Children and Young People live healthy lifestyles	Children and Young People choose not to take illegal drugs
TARGETS / INDICATORS	Infant Mortality Rate % Obese U11	Death from suicide and undetermined injury Improvement in access to CAMHS	U18 conception rate Diagnostic rate of new episodes of STIs among U16 & 16-19yo	Average alcohol consumption %Children who are regular smokers %Children eating 5+ fruit & vegetables day	Harm caused by illegal drugs Has 3 components including reduce use of Class A drugs by U25s
Stay Safe					
AIMS	Children and Young People are safe from maltreatment, neglect, violence and sexual exploitation	Children and Young People are safe from accidental injury and death	Children and Young People are safe from bullying and discrimination	Children and Young People are safe from crime and anti-social behaviour in and out of school	Children and Young People have security, stability and be cared for
TARGETS/ INDICATORS	Re-registrations on Child Protection Register	Number of 0-15yo injured or killed in road traffic accidents	%11-15 you who state they have been bullied in the last 12 months	Fear of crime and anti-social behaviour	%U16 looked after for >2½ yrs living in same placement for >2yrs or placed for adoption %Care cases completed in the courts within 40 weeks
Enjoy and Achieve					
AIMS	Children and Young People are ready for school	Children and Young People attend and enjoy school	Children and Young People achieve stretching national educational standards at primary school	Children and Young People achieve personal and social development and enjoy recreation	Children and Young People achieve stretching national educational standards at secondary school
TARGETS/ INDICATORS	Level of development reached at the end of the foundation stage, including narrowing the gap in the 20% most disadvantaged areas	Half days missed through absence	%7yo achieving L2 at KS1 %11yo achieving L4 in English and Maths Educational achievement of 11yo LAC compared with peers	Take-up of sporting opportunities by 5-16yo Take-up of cultural and sporting opportunities among >16yo	%14yo achieving L5+ in English, Math, Science & ICT %16yo achieving the equivalent of 5 A*-C GCSE Educational achievement of 16yo LAC compared with peers

Table 19. Every Child Matters Outcomes Framework (2/2)

Make a Positive Contribution					
AIMS	Children and Young People engage in decision making and support the community and environment	Children and Young People engage in law-abiding and positive behaviour in and out of school	Children and Young People develop positive relationships and choose not to bully or discriminate	Children and Young People develop self-confidence and successfully deal with significant life changes and challenges	Children and Young People develop enterprising behaviour
TARGETS/ INDICATORS	%Children in secondary schools participating in (a) election of school / college councils (b) mock general elections Voluntary community engagement	Reduce level of offending Crimes brought to justice Permanent and fixed period exclusions	%10-19yo admitting to (a) bullying another pupil in last 12 months (b) attacking, threatening or being rude due to skin colour, race or religion	Measure to be identified	%18-24yo who are self-employed, manage own business or have seriously thought about starting their own business
Achieve Economic Well-being					
AIMS	Children and Young People engage in further education, employment or training on leaving school	Children and Young People are ready for employment	Children and Young People live in decent homes and sustainable communities	Children and Young People have access to transport and material goods	Children and Young People live in households free from low income
TARGETS/ INDICATORS	% 16-18yo not in education, employment and training	% 19yo achieving L2+ in NVQ 2 or equivalent % 18-30yo participating in higher education	% social housing & vulnerable households in the private sector in a decent condition Cleaner, safer & greener public spaces, and quality of the built environment in deprived areas	Level of material deprivation & low income	% children living in relative low-income households including % children living in workless households Stock and take-up of childcare for all families

Note: Summarised from original which can be found at www.everychildmatters.gov.uk/aims/outcomes/. Inspection details not included. U: Under; CAMHS: Child and Adolescent Mental Health Services; STI: Sexually transmitted infection

This approach focused on narrowing the gap between disadvantaged children and their peers, with an emphasis being placed on improving outcomes for children with special educational needs and disabilities, and those being looked after in care. For young people, the emphasis was on reducing teenage pregnancies and supporting those who were not in education, employment or training. An Outcome Framework was also developed to act as the basis for local prioritisation and planning for local change. The framework considered the relationships between outcomes, aims, targets, indicators and inspection criteria, with the aims being framed positively and a move from output to outcome accountability being evident.

In 2004, National Statistics UK also released *The Health of Children and Young People*, a report on the health and health related behaviour of those aged <20 years during 1990-2001[92]. This report presented overviews of the following 12 topics:

- Child population
- Diet, Nutrition, Dental Health and Exercise
- Infectious Diseases
- Asthma and Allergic Diseases
- Disability
- Mental Health
- Provision and Use of Services
- Drug-use, Smoking and Drinking
- Adolescent Sexual Health
- Social Inequalities
- Congenital Anomalies
- Childhood Cancer

Canada

In 1998, the Canadian Institute for Health Information (CIHI) and Statistics Canada launched a collaborative project to identify measures that could be used to report on the health of Canadians and their health system [93]. The primary goal was to provide high quality and comparable information which could be used by Canadian health regions to monitor the health of their populations and to support the functioning of the health system for which they were accountable. In May 1999, the first Consensus Conference on Population Health Indicators was convened, with conference participants agreeing on a conceptual model for the project, the Health Indicator Framework. This total population framework contained four domains: Health Status, Non-Medical Determinants of Health, Health System Performance, and Community and Health System Characteristics. A set of core indicators were selected which reflected key strategic directions adopted by the Federal / Provincial / Territorial Advisory Committee on Population Health (Table 20). In addition, a list of indicators that at the time did not satisfy the conditions for inclusion, but which could be considered for future development, was prepared.

Since the time of the conference the Health Indicator Framework has continued to evolve [94] and the concept of equity has been introduced as a cross-cutting dimension. In order to improve the understanding of health related disparities, the equity dimension requires that indicators be disaggregated by income, age, gender, ethnicity, education and urban / rural residency. CIHI and Statistics Canada have identified data sources and developed methods to produce indicators from both the core and future lists and a bi-annual *Health Indicators e-publication* has been created, which is accessible via the internet.

Perinatal Health Indicators for Canada

The Laboratory Centre for Disease Control (LCDC) is Canada's national public health agency. In 1995, LCDC's Bureau of Reproductive and Child Health began to develop the Canadian Perinatal Surveillance System (CPSS) to provide expert analysis and timely reporting on perinatal health determinants and outcomes in Canada [94]. The CPSS is undertaken in collaboration with the CIHI, Statistics Canada, and provincial and territorial governments.

One of the earliest tasks in the development of CPSS was the identification of monitoring indicators. This process was undertaken by a multidisciplinary national Steering Committee in consultation with perinatal health groups, with the selection criteria including consideration of the scientific properties of the indicator, the feasibility of collecting the data, and the public health importance of the problem. A total of 43 indicators were selected by the committee, with a further 9 indicators added following consultation (Table 21). These indicators included measures of health outcome, as well as risk and protective factors. A manual was produced which included a detailed description of each of these indicators and data sources, although it was initially only possible to report on 24 indicators due to data availability. The set was viewed as evolving however and was expected to change over time, in response to the changing health status of the population, as well as an anticipated increase in data availability. Subsequently, reports have included an expanded subset of the original 43 indicators.

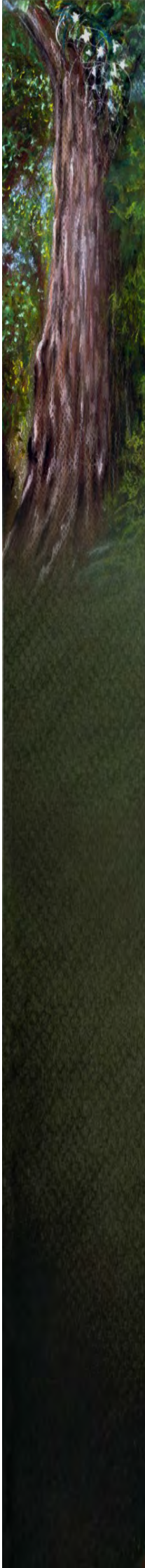


Table 20. Canadian National Consensus Conference on Population Health Indicators - Health Indicators Framework

Health Status			
Well-being	**Health Conditions**	**Human Function**	**Deaths**
Self-rated health Self-esteem	Body Mass Index Chronic Conditions: Arthritis, Rheumatism, Diabetes, Asthma, High Blood Pressure, Chronic Pain, Depression Low birth weight Cancer Incidence Injuries Food & waterborne conditions	Disabilities/limitation Functional Health Two-week Disability Days Activity limitation Disability free life expectancy	Infant / Perinatal Mortality Life Expectancy Total Mortality Circulatory Disease Deaths Cancer Deaths Respiratory disease deaths Unintentional injury deaths AIDS deaths Potential years of life lost
Non-Medical Determinants of Health			
Health Behaviours	**Living & Working Conditions**	**Personal Resources**	**Environmental Factors**
Smoking status Smoking initiation Frequency of heavy drinking Leisure time physical activity Dietary practices Breastfeeding	High school graduates Post-secondary graduates Unemployment Rate Youth unemployment Long term unemployment rate Children in low income families Average personal income Median share of income' Government transfer income Housing Affordability Decision Latitude at work	Social support Life stress	Exposure to second hand smoke
Health System Performance			
Acceptability	**Accessibility**	**Appropriateness**	**Competence**
	Influenza immunisation in 65+ Screening mammography Cervical Cancer screening	Caesarean section	
Continuity	**Effectiveness**	**Efficiency**	**Safety**
	Pertussis, Measles, TB, HIV, Chlamydia, Pneumonia & influenza hospitalisation Deaths due to medically treatable diseases: Bacterial Infections, Cervical Cancer, Hypertensive Disease, Pneumonia Ambulatory sensitive conditions 30-day AMI in hospital mortality 30-day stroke in hospital mortality Readmissions for: AMI, Asthma, Prostatectomy, Hysterectomy, Pneumonia	May not require hospitalisation Expected compared to actual stay	Hip fracture hospitalisation In hospital hip fracture
Community and Health System Characteristics			
Community	**Health System**		**Resources**
Population Population Density Dependency Ratio Urban Population Aboriginal Population Immigrant Population 1- and 5-year mobility Lone-parent families Visible Minorities Teen pregnancy	Inflow/Outflow ratio and utilisation rates: Coronary Artery Bypass Graft Hip replacement Knee replacement Hysterectomy Contact with alternative health care providers Contact with health professionals Contact with health professionals about mental health Contact with dental professionals		Health Professionals (physicians etc)

Source: Canadian Institute for Health Information [92]

Table 21. Canadian Perinatal Surveillance System Indicators

Behaviours And Practices	
Prevalence of Prenatal Smoking *Prevalence of Exposure to Environmental Tobacco Smoke during Pregnancy Prevalence of Prenatal Alcohol Consumption *Prevalence of Folic Acid Use in the Periconceptional Period Prevalence of Breastfeeding Rate of Live Births to Teenage Mothers Rate of Live Births to Older Mothers *Proportion of Mothers with a Low Pre-pregnancy Body Mass Index	*Prevalence of Illicit Drug Use During Pregnancy *Proportion of Pregnant Women with a Low Educational Level *Proportion of Pregnant Women Living Without a Partner *Proportion of Pregnant Women Reporting no Social Support *Proportion of Pregnant Women Reporting Physical Abuse *Proportion of Pregnant Women Reporting high Psychosocial Stress
Health Services	
Labour Induction Rate Caesarean Section Rate Rate of Operative Vaginal Deliveries Rate of Trauma to the Perineum Rate of Early Maternal Discharge from Hospital after Childbirth Rate of Early Neonatal Discharge from Hospital after Birth *Rate of Assisted Conception *Proportion of Births in Women with No First Trimester Prenatal Visit	*Rate of Prenatal Obstetrical Ultrasound Utilisation *Use of Antenatal Steroids in <34 weeks *Use of Surfactant in Pregnancies of <34 Weeks Gestation *Rate of Electronic Fetal Heat monitoring *Rate of General Anaesthesia Use in Caesarean Deliveries *Rate of Regional Anaesthesia Use in Deliveries *Rate of Mother/Infant Separation *Rate of Client Satisfaction with Services
Maternal Health Outcomes	
Maternal Mortality Ratio Induced Abortion Ratio Ectopic Pregnancy Rate Severe Maternal Morbidity Ratio Rate of Maternal Readmission after Discharge Following Childbirth	*Spontaneous Abortion Rate *Proportion of Mothers with Low Weight Gain Rate *Prevalence of Postpartum Depression
Fetal And Infant Health Outcomes	
Preterm Birth Rate Post-Term Birth Rate Fetal Growth: Small For Gestational Age Rate, Large For Gestational Age Rate Fetal And Infant Mortality Rate Severe Neonatal Morbidity Rate Multiple Birth Rate Prevalence of Congenital Anomalies Circumcision Rate	Rate of Neonatal Hospital Re-Admission after Discharge at Birth *Resuscitation Rate in Low Birth Weight Neonates *Proportion of Low Birth Weight Neonates with Low Five-Minute Apgar Score *Proportion of Low Birth Weight Neonates with Low Cord Blood pH *Proportion of Low Birth Weight Neonates with Abnormal Cord Blood Base Deficit *Prevalence of Group B Streptococcal Infection

Source: Health Canada [94] . *Not included in the initial set due to data availability issues

United States

In the United States, child health reporting is undertaken at a federal, regional, and state level by government and non-government agencies including the Maternal and Child Health Bureau, the Federal Interagency Forum on Child and Family Statistics, and the Annie E Casey Foundation.

Maternal Child and Health Bureau

The Health Resources and Services Administration's Maternal and Child Health Bureau has been reporting on the health status and service needs of American children since the early 1990s. Its annual *Child Health USA* reports (Table 22) contain information on more than 50 health and health care indicators relating to infants, children, adolescents, children with special health care needs, and women of child bearing age. In addition to population characteristics, reports also address health status and health services utilisation, presenting some additional data by state or city [95].

Table 22. Child Health USA 2005 Indicator Framework

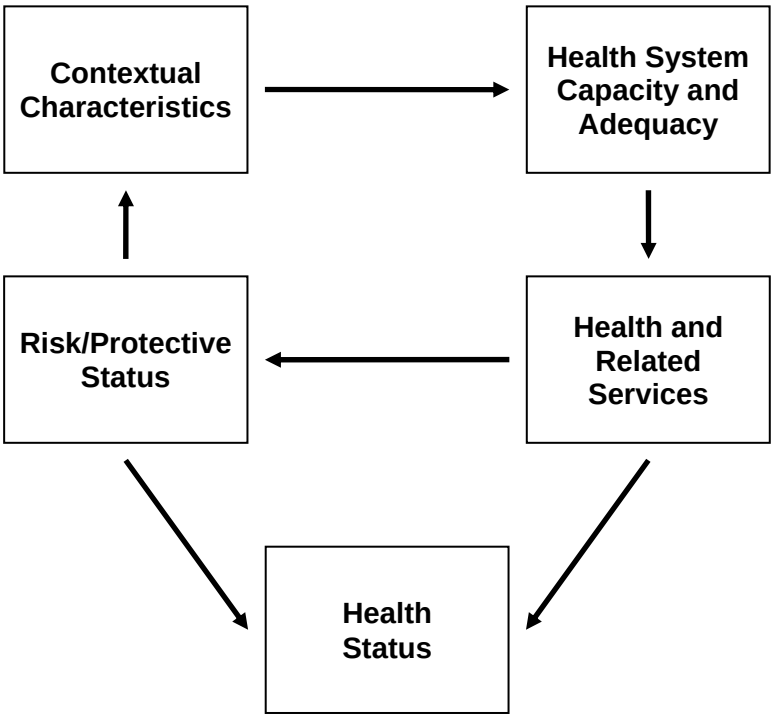
Health Status	**Population Characteristics**
Infants	Population of Children
Breastfeeding	Children of Foreign-Born Parents
Low Birth Weight	Children in Poverty
Very Low Birth Weight	School Dropouts
Neonatal and Postneonatal Mortality	Maternal Age
Maternal Mortality	Working Mothers and Child Care
Infant Mortality	**Health Services Financing and Utilisation**
International Infant Mortality Rates	Vaccination Coverage
Children	Immunisation Schedule
Health Status of Children	Timing of Dental Care
Asthma	Timing of Physician Visits
Mental Health	Receipt of Preventive Care
Child Abuse and Neglect	Place of Physician Contact
Paediatric AIDS	Hospital Utilisation
Vaccine-Preventable Diseases	Health Care Financing
Hospitalisation	Prenatal Care
Child Mortality	**State Data**
Childhood Deaths Due to Injury	State Child Health Insurance Enrolment Statistics
Adolescents	Medicaid Enrolees, Expenditures Utilization
Adolescent Childbearing	Health Insurance Status of Children
Sexual Activity	Children Who Are Uninsured
Sexually Transmitted Infections	Low Birth Weight, Prenatal Care, and Births to Women Under Age 18
Adolescent and Young Adult HIV/AIDS	Infant and Neonatal Mortality Rates
Physical Activity and Overweight	**City Data**
Mental Health Treatment	Birth Weight
Violence	Infant Mortality
Substance Abuse	Prenatal Care
Cigarette Smoking	
Total Adolescent Mortality	
Adolescent Mortality from Traffic and Firearm Injuries	

Source: Child Health USA [95]

The Maternal and Child Health Indicators Project

In 1994, the 3-year Maternal and Child Health Model Indicators Project was initiated, with the aim of "*providing a panoramic view of the health of mothers and children, within a framework that encourages problem solving*". A model was developed which included five domains: Health Status, Risk / Protective Factors, Health and Related Services, Health System Capacity and Adequacy, and Contextual Characteristics, with arrows highlighting the interrelationships between each (Figure 7, Table 23). The Project Working Group suggested that indicators in the Health Status, Health System Capacity and Adequacy, and Contextual Characteristics domains lent themselves to routine surveillance, whereas those in the Risk / Protective Factors and Health Services domains should only be examined closely if related indicators in the other domains reached unacceptable values.

Figure 7. Conceptual Model for Development and Interpretation of Maternal and Child Health Model Indicators



Source: Maternal and Child Health Bureau [96]

Table 23. Domains, Categories and Subcategories of Maternal and Child Health Model Indicators

Contextual Characteristics	**Risk/Protective Status**
Demographic Factors	Environmental Risks
Health Status	Health Behaviours
Disease and Injury Morbidity	Health Conditions
Communicable diseases	History
Sexually transmitted diseases	Nutrition And Exercise
Nutritional deficiencies	Perinatal Risk Factors
Dental diseases	Safety
Chronic diseases	Sexual Practices
Injuries	Social Situation
Sensory impairments	**Health-and Related Services**
Other	Health and Health-Related Services Utilisation
Mortality	Preventive Services
Total mortality	Primary Care Services
Cause-specific mortality	Specialty Care Services
Perinatal Morbidity	**Health System Capacity and Adequacy**
Maternal health	Acceptability of Services
Condition at birth	Accessibility of Services
Prenatal exposures	Availability of Services
Physical and Psycho-Social Functioning	Coordination of Services
	Scope of Services

Source: Maternal and Child Health Bureau [96]

Federal Interagency Forum on Child and Family Statistics

In 1994, seven Federal agencies joined to form the Interagency Forum on Child and Family Statistics. In 1997 the Forum was called upon to develop priorities for collecting enhanced data about children and young people, to improve the reporting and dissemination of information on the status of children to the policy community and the general public, and to produce more complete data on children at the State and local level. By 2006 the Forum had participants from 20 Federal agencies, including the Maternal Child and Health Bureau. Indicators were chosen by the Forum in consultation with the Federal policy-making community, foundations, academic researchers, and State and local children's service providers.

Reports have been published bi-annually since 1997 and include a summary on the improvements made in data collection during the period between each report and the steps that are still required in order to further improve monitoring. Indicators are reported on in four domains, Economic Security, Health, Behaviour, and Education (Table 23), and reports contain a section on Population and Family Characteristics to provide contextual information. Each report also includes sections which allow for reporting on additional topics of special interest, where there is insufficient data to do so more regularly (e.g. in *America's Children: Key National Indicators of Well-Being 2005* the "Specials Feature" included sections on children with asthma, high blood lead levels and emotional and behavioural difficulties, as well as sections on family structure and the well-being of children).

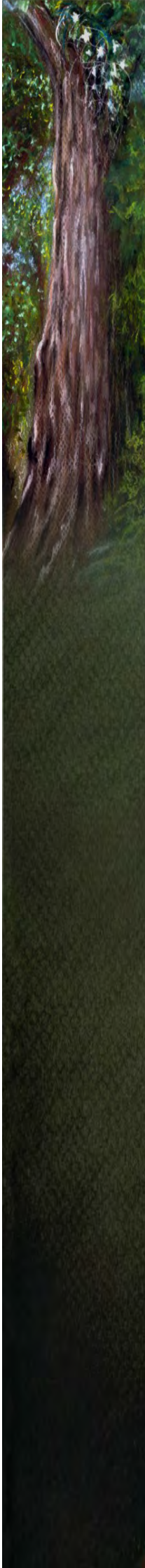


Table 24. America's Children: Key National Indicators of Well-Being 2005

Part 1: Population and Family Characteristics	
• Child Population • Children as a Proportion of the Population • Racial and Ethnic Composition • Children of at Least One Foreign-Born Parent • Difficulty Speaking English	• Family Structure and Children's Living Arrangements • Births to Unmarried Women • Child Care • Children's Environments (Ambient air quality, Exposure to environmental tobacco smoke)
Part II: Indicators of Children's Well-Being	
Economic Security Indicators	
• Child Poverty and Family Income • Secure Parental Employment • Housing Problems	• Food Security and Diet Quality • Access to Health Care
Health Indicators	
• General Health Status • Activity Limitation • Overweight • Childhood Immunization • Low Birth Weight	• Infant Mortality • Child Mortality • Adolescent Mortality • Adolescent Births
Behaviour and Social Environment Indicators	
• Alcohol Use • Illicit Drug Use	• Youth Victims and Perpetrators of Serious Violent Crimes
Education Indicators	
• Family Reading to Young Children • Early Childhood Care and Education • Mathematics and Reading Achievement • High School Academic Course taking	• High School Completion • Youth Neither Enrolled in School Nor Working • Higher Education

Annie E Casey Foundation

The Annie E. Casey Foundation is a private charitable organisation which was established in the United States in 1948. The primary mission of the Foundation is to foster public policies, human service reforms, and community supports that more effectively meet the needs of vulnerable children and their families. Since 1990, the Foundation as produced *Kids Count*, an annual national report on 10 child and youth indicators which measure the educational, social, economic, and physical well-being of children (Table 25). Indicators were chosen to reflect the wide range of factors affecting the wellbeing of children and to reflect their experiences across a range of developmental stages, as well as to provide information that could be comparable across States.

The Foundation also funds a nationwide network of state-level KIDS COUNT projects that provide a more detailed, community-by-community picture of the status of children. This has enabled the creation of an expanded set of approximately 75 indicators which can be accessed via the internet to make customised reports. This expanded set includes the ten KIDS COUNT indicators as well as indicators in the area of education, employment and income, health, health insurance, immigrant children, population and family characteristics, poverty, and youth risk factors.

Table 25. Annie E Casey Foundation KIDS COUNT Indicators

10 Key Indicators of Child Well-Being
• Infant mortality rate
• Percent low birth weight babies
• Child death rate (ages 1–14)
• Teen death rate (ages 15–19)
• Teen birth rate (ages 15–19)
• Percent of teens who are high school dropouts (ages 16–19)
• Percent of teens not attending school and not working (ages 16–19)
• Percent of children living in families where no parent has full-time, year-round employment
• Percent of children in poverty
• Percent of children in single-parent families

Australia

National Health Performance Committee
In 1999, the National Health Performance Committee (NHPC) was established to develop and maintain a national health performance framework. This framework, which was based on the Canadian Institute for Health Information framework, consisted of three tiers: health status and outcomes, determinants of health and health system performance, with equity being considered integral to each of these tiers (Table 26). The process of selecting the indicators for the 2003 National Report [97] began with an initial screen and review of evidence, followed by consultation with the National Public Health Partnership Group. The NHPC also consulted other jurisdictions and relevant organisations in order to ensure the scope and level of national reporting was appropriate for these respective groups. Selection criteria for health performance indicators were developed and additional criteria specific to reporting were compiled.

Australian Institute of Health and Welfare
Monitoring the progress of Australia's children is central to Australia's National Agenda for Early Childhood. At a 1998 workshop, convened by the Australian Institute of Health and Welfare (AIHW), a conceptual framework for the organisation of national child health information was endorsed, which included a set of key indicators arranged into three broad groups: Health Status and Outcome, Risk and Protective Factors, and Services and Interventions (Table 27). This framework was subsequently endorsed by the Australian Health Ministers' Advisory Council. While the original framework focused primarily on health, over time its scope has broadened to include a wider range of indicators related to child wellbeing [98].

In March 2004, the Australian Council for Children and Parenting (ACCAP) hosted a workshop which brought together a range of Government and non-Government stakeholders and academics, to consider a national reporting framework for Australia's children. The draft set of indicators developed by the AIHW were discussed and finalised, in a process that was influenced by previous work in Europe, Canada, and America, as well as ongoing work within Australia, including the pre-existing selection criteria developed by the National Health Performance Committee. Indicators were then organised into a framework based on the following questions:

- How healthy are Australia's children?
- How well are we promoting healthy child development?
- What factors can affect children adversely?

- How safe and secure are Australia's children?
- How well are Australia's children learning and developing?
- What kind of families and communities do Australian children live in?

Table 26. National Health Performance Framework

Health status and outcomes (Tier 1) **How healthy are Australians? Is it the same for everyone? Where is the most opportunity for improvement?**			
Health conditions	***Human function***	***Life expectancy and wellbeing***	***Deaths***
Prevalence of disease, disorder, injury or trauma or other health-related states	Alterations to body structure or function (impairment), activities (activity limitation) and participation (restrictions in participation)	Broad measures of physical, mental and social wellbeing of individuals and other derived indicators such as disability adjusted life expectancy (DALE)	Age and/or condition specific mortality rates

Determinants of health (Tier 2) **Are the factors determining health changing for the better? Is it the same for everyone? Where and for whom are they changing?**				
Environmental factors	**Socioeconomic factors**	**Community capacity**	**Health behaviours**	**Person-related factors**
Physical, chemical and biological factors such as air, water, food and soil quality resulting from chemical pollution and waste disposal	Socioeconomic factors such as education, employment, per capita expenditure on health and average weekly earnings	Characteristics of communities and families such as population density, age distribution, health literacy, housing, community support services and transport	Attitudes, beliefs, knowledge and behaviours, e.g. patterns of eating, physical activity, excess alcohol consumption and smoking	Genetic-related susceptibility to disease and other factors such as blood pressure, cholesterol levels and body weight

Health system performance (Tier 3) **How well is the health system performing in delivering quality health actions to improve the health of all Australians? Is it the same for everyone?**		
Effective	**Appropriate**	**Efficient**
Care, intervention or action achieves desired outcome	Care, intervention or action provided is relevant to the client's needs and based on established standards	Achieves desired results with most cost effective use of resources
Responsive	**Accessible**	**Safe**
Service provides respect for persons and is client orientated, including respect for dignity, confidentiality, participation in choices, promptness, quality of amenities, access to social support networks and choice of provider	Ability of people to obtain health care at the right place and right time irrespective of income, physical location and cultural background	The avoidance or reduction to acceptable limits of actual or potential harm from health care management or the environment in which health care is delivered
Continuous	**Capable**	**Sustainable**
Ability to provide uninterrupted, coordinated care or service across programs, practitioners, organisations and levels over time	An individual's or service's capacity to provide a health service based on skills and knowledge	System's or organisation's capacity to provide infrastructure i.e. workforce, facilities and equipment, and to be innovative and respond to emerging needs (research, monitoring)

Table 27. 1998 National Child Health Framework, Australian Institute of Health and Welfare

Health Status and Outcome	Services and Interventions	Risk and Protective Factors
• Health and Wellbeing • Growth and Development • Mortality, morbidity and injury • Safety and security	• Health services • Health programmes • Health promotion and intervention • Intersectoral services and community services	• Social, cultural and environmental factors • Biological and behavioural factors • Health knowledge

The subsequent report, *A Picture of Australia's Children 2005,* provided an overview of each of these indicators [99, 100] and work is ongoing to further refine a conceptual framework to govern the organisation of information on child health, development and wellbeing [101].

In addition, the AIHW also reports separately on the health and wellbeing of young people. Development of a youth health monitoring and reporting framework has followed the same general pathway as child health monitoring. In 2002, in consultation with the National Child and Youth Health Advisory Group, the previous National Youth Health Information Framework was extensively reviewed and modified to link it into the National Health Performance Framework [102]. The *Australia's Young People 2003* report*,* which reported on Australians aged 12-24 years, was based on this framework (Figure 8).

Reproductive Health Indicators

In 2002 the Australian Institute of Health and Welfare published it's inaugural report on Australian reproductive health indicators [71]. The four primary objectives of this report were to provide a snapshot of Australia's reproductive health status, a baseline for prospective measuring and monitoring, a comprehensive and cohesive description of currently available data sources and a foundation from which a comprehensive conceptual and information framework on reproductive health could be developed. The indicators chosen for this report were based on a set of indicators developed by the World Health Organisation and adapted for use in the Australian context. In addition, other key indicators were also nominated by the Reproductive Health Advisory Committee, with a final list of 44 indicators being chosen using a set of pre-determined selection criteria. A framework was developed which was divided into six domains: Fertility, Sub-fertility, Family Planning, Pregnancy and Childbirth, Cancer of the Reproductive Tract, and Sexually Transmissible Infections. Pregnancy and Childbirth was further divided into Prenatal / Antenatal Factors, Childbirth, Maternal Health Outcomes, Fetal and Infant Outcomes, and Pregnancy and Assisted Conception (Table 28).

Figure 8. National Youth Health Information Framework

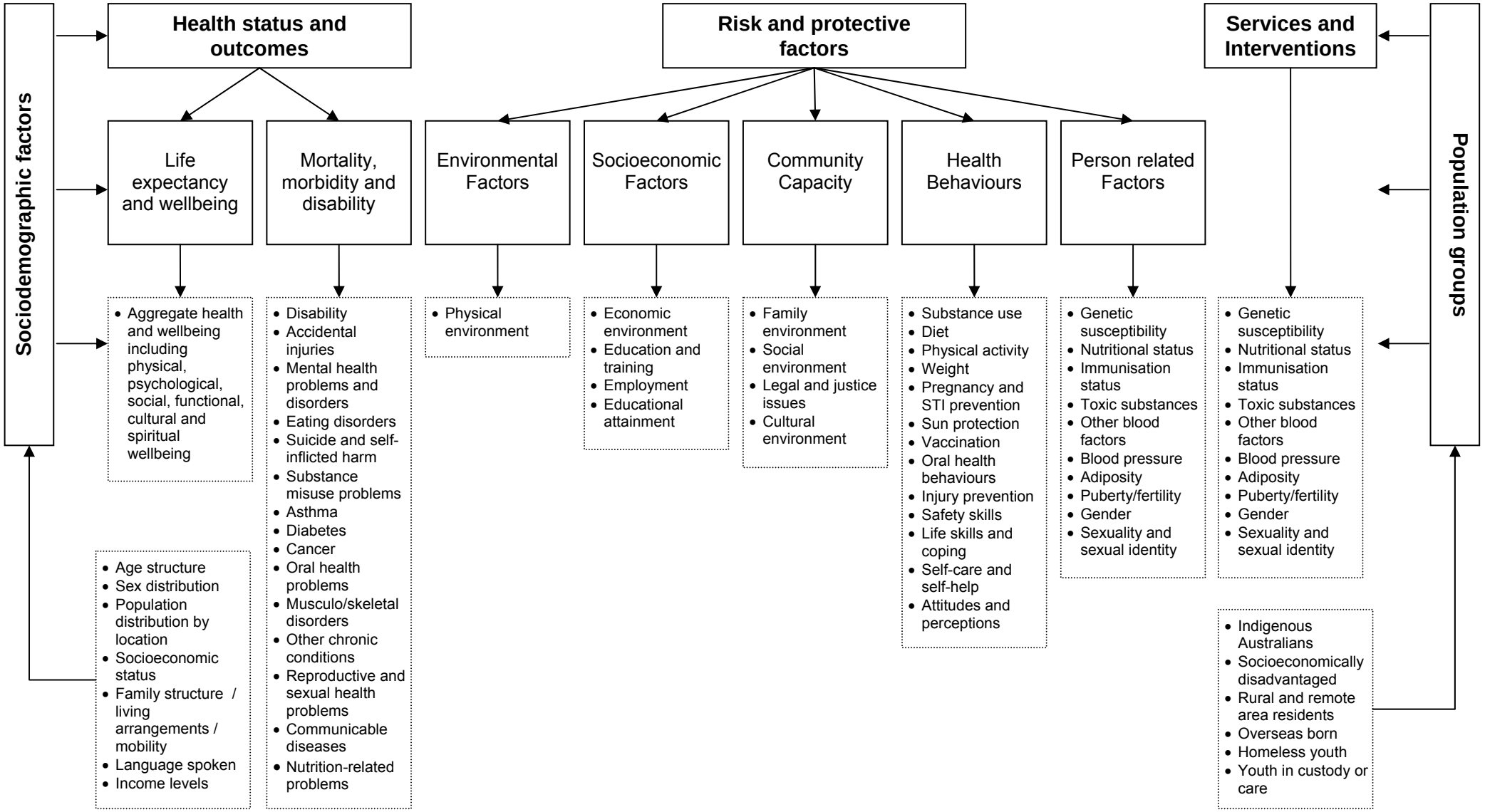


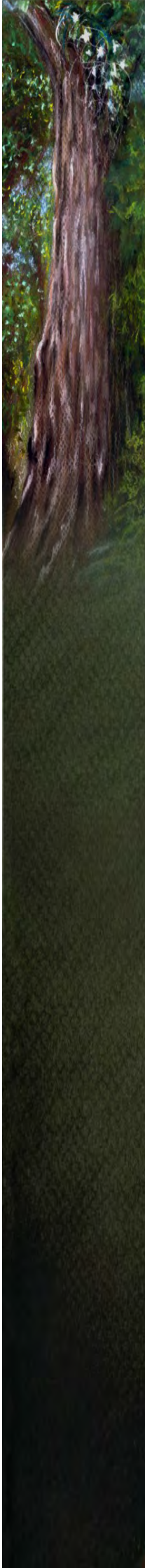
Table 28. Reproductive Health Indicators

Fertility Crude birth rate Total fertility rate Teenage fertility rate	**Fertility** Prevalence of infertility in women Prevalence of infertility in men Prevalence of erectile dysfunction Prevalence of Undescended testes	**Family Planning** Prevalence of contraceptive use Vasectomy rate Tubal Occlusion rate Hysterectomy rate Annual number of induced abortions

Pregnancy and Childbirth

Prenatal/antenatal Factors Prevalence of anaemia Periconceptual use of folate Prevalence of positive syphilis serology in pregnant women Prevalence of smoking in pregnancy Alcohol use in pregnancy Illicit drug use in pregnancy Prenatal diagnostic testing Percentage of women attending antenatal care	**Child birth** Percentage of labours which were induced / augmented Proportion of institutional deliveries Caesarean birth rate Proportion of vaginal births after caesarean section Rate of instrumental vaginal deliveries Percentage of births attended by skilled health personnel
Maternal Health Outcomes Maternal morbidity Maternal mortality ratio Ectopic pregnancy rate	**Fetal and infant health outcomes** Perinatal mortality rate Infant mortality rate Incidence of low birth weight Sex ratio of births
Pregnancy and assisted conception Pregnancy rates and outcomes after assisted conception Multiple pregnancy rate	

Cancer of the Reproductive Tract Proportion of women screened for cervical cancer Incidence and mortality of cervical cancer Incidence and mortality of ovarian cancer	**Sexually Transmissible Infections** Prevalence of sexually transmissible infections Prevalence of HIV among adolescents Knowledge of HIV-related prevention practices



Italy

During the late 1990s, the Ministry of Health in Italy initiated a project to develop a minimum set of indicators for perinatal, child and adolescent health, which would be useful for health planning at a local or regional level [71]. Indicator selection criteria were formulated and 35 indicators were selected by consensus at a number of meetings. Both outcome and systems indicators were included in the areas of:

- Fetal deaths
- Neonatal mortality
- Infant mortality
- 1-14yo Mortality
- 15-24yo Mortality
- Low birth weight
- Congenital malformations
- Disability
- Child abuse and neglect
- Child HIV
- Teenage pregnancies 15-19 years
- Drug addiction 15-19 years
- Caesarean births
- Breastfeeding
- Immunisation
- Full-time admission in special care institutions
- Admissions to hospital

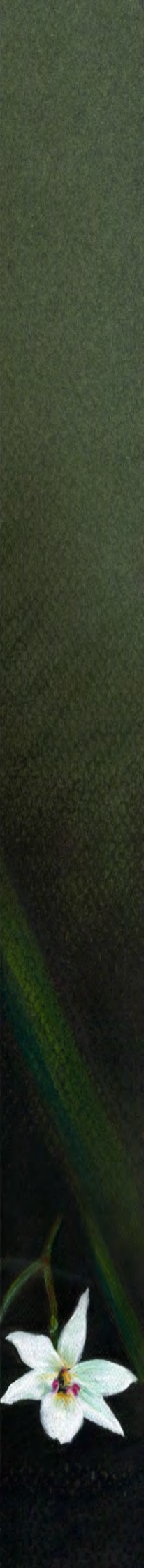
While it was considered beyond the scope of the project to devise a framework to assist in the interpretation of the data, or the identification of potential policy implications, several suggestions were made regarding a potential framework development including: providing national reference data for each indicator with breakdown by region and temporal trends over the last 5 years; providing scenario data e.g. birth rates, immigrated children, children in households under the poverty threshold, children not regularly attending secondary school, children assisted by social services, educational level of the population by age, class, and unemployment rate; providing an equity analysis by father's employment and / or mother's educational level.

Summary and Implications for Framework Development

The above review suggests that population health monitoring has evolved significantly over the past two decades, with the scope of traditional infectious disease surveillance expanding to include a wide range of non-communicable diseases and injuries. In addition, there has been increasing recognition of the ways in which society, the socioeconomic and physical environment and individuals all impact on population health and the need for unified theoretical frameworks which assist in understanding the complexity of these relationships.

In addition, recent collaborative efforts by Global monitoring agencies have focused on improving data collection, data quality, and the comparability of indicators across countries. In an attempt to increase efficiency and reduce duplication of effort, there has also been a move towards developing tighter definitions for indicator construction, for use by global, regional and national level agencies. In all cases, the scope of global and regional health monitoring is wide. In addition to indicators of health status, the wider demographic and socio-economic climate, the underlying determinants of health, and aspects of health systems are universally included. The emphasis different Global monitoring agencies place on each of these elements however, is influenced by the organisation's primary objectives (e.g. the WHO places a greater emphasis on health systems indicators than UNICEF).

At a national level, much work has been undertaken to develop indicators of child and youth well-being, and in the majority of countries reviewed health status reports also included information on the underlying determinants of health, risk and protective factors and aspects of the health care system. As monitoring has progressed,



(particularly in the UK and Australia), there has also been a trend towards an increasing breadth of monitoring, the development of theoretical models which assist in the interpretation of data, the identification of potential intervention points, and an emphasis on action.

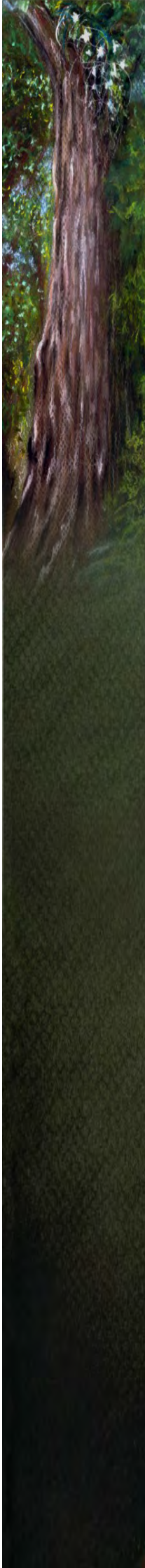
The findings of this review have a number of implications for the development of a child and youth health monitoring framework for New Zealand. These include:

1. Any monitoring framework developed for New Zealand use would need to be broad in its scope and in addition to the more traditional health outcomes, would need to include coverage of the underlying determinants of health, risk and protective factors and some commentary on health service utilisation.
2. A theoretical model for governing the types of indicators included in the framework and the manner in which the relationships between them were portrayed, would need to be developed. This model would need to reflect the concepts of population health currently prevailing within the health sector.
3. Two sets of selection criteria may be required to govern the inclusion of indicators within the framework, with one focusing on the characteristics of the indicator itself (e.g. scientific validity, data quality) and the other focusing on its public health importance (e.g. policy relevance, ability to be modified).
4. A broad and representative consultation phase would need to be included in the project's methodology, in order to ensure that the framework developed would meet the needs of those working with children and young people.
5. While a number of basic public health principles would need to guide the project's methodology (e.g. attention to data quality, sound selection criteria to guide prioritisation, theoretical frameworks which reflect the multidimensional nature of health, the need for wide consultation), the methodology would also need to be flexible enough to take into account previous local population health monitoring initiatives and frameworks, and the unique health needs of New Zealand's children and young people.

The following section outlines how, using some of the principles outlined above, the New Zealand Child and Youth Health Indicator Project Team developed such a monitoring framework for use in the New Zealand health sector.

Section 3: Developing a Child and Youth Health Monitoring Framework for New Zealand

Developing a Child & Youth Health Monitoring Framework for NZ



Introduction

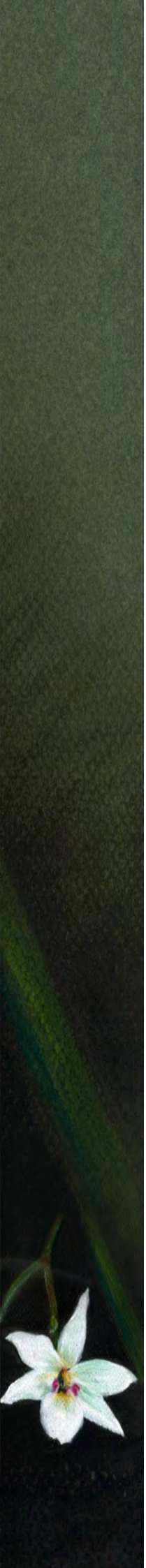
The above review potentially suggests that New Zealand's approaches to monitoring child and youth health may need to be rethought, if the future information needs of a regionally devolved and population focused health sector are to be met. New Zealand is not alone in needing to consider this issue however, with a number of other developed countries reviewing the ways in which they have monitored the health of their children and young people during the past 5-10 years. The section which follows outlines the approach taken by the Child and Youth Health Indicators Project Team to develop a child and youth health monitoring framework for New Zealand.

The section begins by briefly reviewing the main findings of the previous two literature reviews, with a view to identifying the key elements which would need to be included in any framework developed for local use. It then briefly outlines the five phases of the project's development, before returning to discuss each of these in turn. Accompanying these five sections are a series of appendices, which contain more detailed information on the indicator lists and documents developed during the course of the project, as well as the scores received by each indicator during the formal stages of prioritisation. The section concludes with an overview of the indicator framework finally developed, with more detail on each of the indicators contained within it, being provided in the Indicator Handbook which accompanies this publication.

Implications of NZ and Overseas Literature Reviews for Indicator Framework Development

A review of New Zealand publications during the past decade has suggested that New Zealand has never had a dedicated child and youth health monitoring programme whose reporting series has extended beyond three editions. The one off nature of many of the publications, as well as the loss of longer term monitoring series as a result of health sector restructuring, has meant that population child and youth health in New Zealand has remained in the early stages of its evolution, focusing on the collation of data and the presentation of reports, rather than on developing processes whereby the information thus produced, can be translated into public health action.

The review also suggested that there may be a mismatch evolving between the monitoring approaches utilised to date, and the information needs of a regionally devolved and population focused health sector. While in recent years there have been a several comprehensive national reviews of child and youth health, and subsets of child and youth health indicators have been monitored on in the context of total population reports, these two approaches have never coincided in a manner which has met the information needs of New Zealand's 21 DHBs. Instead, a lack of consistent selection criteria means it is difficult to exclude the possibility that data availability rather than public health importance has determined which issues are monitored at a national level. This in turn reduces the ability of such information to be used to inform prioritization and resource allocation decisions. While detailed cross sectional reviews may be more useful in this context, in New Zealand to date these have only been intermittent produced, have had variable formats which reflect the diverse aims of the organisations which produced them, and in the majority of cases have only provided information at a national level. In addition, the majority have lacked a unified theoretical



model which guides the balance of issues included, or the arrangement of indicators in a manner which reflects the relationships between them. As a consequence, while one approach offers continuity and the other offers breadth, neither has been able to provide both simultaneously in a manner which can inform strategy development, prioritisation and resource allocation decisions at a regional level.

The literature review also suggested that New Zealand was not alone on needing to consider these issues, with a body of knowledge rapidly evolving as other developed countries have adapted the principles and techniques of infectious disease surveillance to the monitoring of a wide range of health outcomes (e.g. non-communicable diseases, injuries, cancer) and their determinants (e.g. household income, education) at a population level. The need to increase efficiency and reduce duplication of effort has also been increasingly recognised, leading to the development of tighter definitions for indicator construction and improved methods of data collection, with greater attention now being paid to selection criteria, data quality and the comparability of indicators across countries. Evolving concepts of population health have also increasingly recognised the role interconnected aspects of society, the environment and individuals play in the genesis of health outcomes and comprehensive theoretical frameworks have been developed which attempt to portray these relationships using population health data.

In developing a framework which simultaneously addressed the information needs of the New Zealand health sector and contained those elements which the overseas literature suggested were essential to effective population health monitoring, each of these issues needed to be taken into account. After considering these, the Project team decided that any framework developed for use in the New Zealand context would need to contain the following elements:

1. The framework would need to reflect key issues currently accorded a high priority by the New Zealand health sector. These include the role of Maori as tangata whenua and the Crown's obligations under the Treaty of Waitangi, the health sector's current emphasis on reducing ethnic and socioeconomic disparities in health, the growing recognition of the role Government policies play in the genesis of child and youth health, and the varying needs of New Zealand's increasingly diverse and ethnically heterogeneous population.
2. In the context of New Zealand's regionally devolved and population focused health sector, the framework would need to be able to provide a comprehensive map of all of the important issues in child and youth health, so that national and regional health needs assessments, and prioritisation and resource allocation decisions could be made using the information thus produced. In order to achieve this objective, it would be necessary to utilise indicator selection criteria which specifically considered the relative public health importance of each issue, and the framework would also need to be able to provide information in crucial areas, where traditional data sources were lacking.
3. From the same framework a smaller subset of monitoring indicators would need to be drawn, which provided a balanced overview of child and youth health issues in the context of total population reports. This subset would need to be drawn in a representative manner and in addition to public health importance, data quality criteria would need to be developed, in order to ensure that this indicator subset could be monitored in a statistically valid manner over a period of time.
4. The framework would need to be based on a sound theoretical model, which governed the type and balance of indicators included, as well as how the relationships between them were portrayed. The level in the causal chain at

which each indicator sat would need to be identified, as would its potential effects at crucial points in the lifecourse.

5. In order to ensure that the framework stood up to international scrutiny, it would also be necessary to ensure that those elements which were considered best practice overseas were incorporated into the project's methodology. In this context issues such as adequate sector wide consultation, transparent processes, sound indicator selection criteria, adequate scrutiny of data quality, and the use of a theoretical model which reflected prevailing views of population health would all need to be taken into consideration.

With each of these essential elements in mind, the Project Team commenced work in February 2006, to develop a child and youth health monitoring framework which met the information needs of the New Zealand health sector. The following sections describe the methodology used by the Project Team during the various stages of this project's evolution, as well as the framework which was eventually developed, following a period of sector consultation.

Child and Youth Health Indicator Project Overview and Key Phases

The Indicator Project Team was formed in February 2006 and over the next 12 months, and using a methodology which was loosely based on similar work overseas, developed a child and youth health monitoring framework for New Zealand. The section which follows briefly reviews of the five main phases the project's development, before returning to discuss each of these in more detail:

1. **Phase 1: The Development of a Project Methodology, Indicator Selection Criteria and Streams for Topic Based Consultation**: During this phase, a Project Team and Steering Committee was formed, the overseas literature was searched for methodologies and selection criteria used by other developed countries and the first face to face meeting of the Steering Committee was held. At this meeting, a draft methodology and set of indicator selection criteria were developed, and the child and youth health was divided into a number of topic based streams, which would guide the first stages of consultation. Each of these streams was then assigned a "Stream Head" from within the Steering Committee, or the name of a key expert was suggested, who the Project Staff could contact to discuss the issue further.

2. **Phase 2: Stream Based Consultation and the Development of a Theoretical Model**: During this phase, a literature search was performed and a *Long List* of all of the indicators and measures used to assess child and youth health in New Zealand during the past decade was created. This list was then divided into the topic based streams previously created by the Steering Committee and nominated Stream Heads were provided with a list of the indicators within their stream. By means of email, one to one interviews, or small group discussions, Stream Heads and their networks were asked to comment on the indicators within their stream, whether additional indicators needed to be considered, and which issues should be accorded the greatest priority. A literature search and consultation were also undertaken during this phase, in order to inform the development of a theoretical model which best described the relationships between factors contributing to the health of New Zealand children and young people.

3. **Phase 3: The Narrowing Down of the Long List to a Medium List of Indicators**: At their second face to face meeting, the results of stream based consultation and a draft theoretical framework were presented to the Steering

Committee and Stream Heads. During this meeting the *Long List* of candidate indicators was shortened to a *Medium List* using an electronic voting system and the selection criteria previously developed by the Project Team. The indicators in this *Medium List* were then incorporated into the draft theoretical framework and a consultation document was developed, for use during the next phase of consultation.

4. **Phase 4: Consultation on the Draft Indicator Framework and Medium List of Indicators**: During this phase, feedback on the draft indicator framework was sought from those working in the health sector. A 39-page consultation document which outlined the project, the draft theoretical framework and the *Medium List* of indicators was disseminated throughout the child and youth health sector and the draft framework was presented at a number of meetings of child and youth health professionals. Towards the end of this phase, a "Top 12" voting document was disseminated through the same networks, which asked participants to draw from the *Medium List,* 12 indicators which they felt would best represent child and youth health issues in the context of total population health reporting.
5. **Phase 5: Incorporating the Feedback from Consultation into the Final Framework and the Development of a "Top 20" Subset**: At their third face to face meeting, the Steering Committee reviewed the results of the sector wide consultation and a *Final List* of indicators was developed, which reflected the feedback of those working in the heath sector, as well as the results of previous prioritisation rounds. In addition, a "Top 20" indicator subset was agreed on, which provided coverage of risk and protective factors and determinants, as well as the "Top 12" child and youth health outcomes. An Indicator Handbook was then developed, which outlined how the framework might be used within the health sector and provided more detailed information on each of the indicators contained within it.

The following sections provide a more detailed discussion of the methodology used during each of these five phases. Each section is supported by a series of linked appendices, which provide additional information on the indicators and measures identified during the course of the project, the documents used during the various stages of consultation and the scores each indicator received during the three phases of prioritisation.

Phase 1: Development of a Project Methodology, Indicator Selection Criteria & Streams for Topic Based Consultation.

In designing a monitoring framework which would meet the needs of the New Zealand health sector, a suitably qualified Project Team and the development of an appropriate methodology were seen as being crucial to the project's ultimate success. Such a methodology needed to draw on elements of best practice from overseas experience, yet at the same time reflect what was achievable in the local context, given the resources available. The sections which follow briefly review the key events which took place during this phase of the project's development, including the formation of a Steering Committee to oversee the project and the hiring of a project coordinator to manage consultation on a day to day basis. A methodology was also agreed on which was based on overseas experience and a set of selection criteria were developed to determine which indicators would be included within the framework. Finally, consideration was given to how a theoretical model might be developed which could

govern the categories of indicators included, as well as how the relationships between them might be portrayed.

Formation of the Project Team and Steering Committee

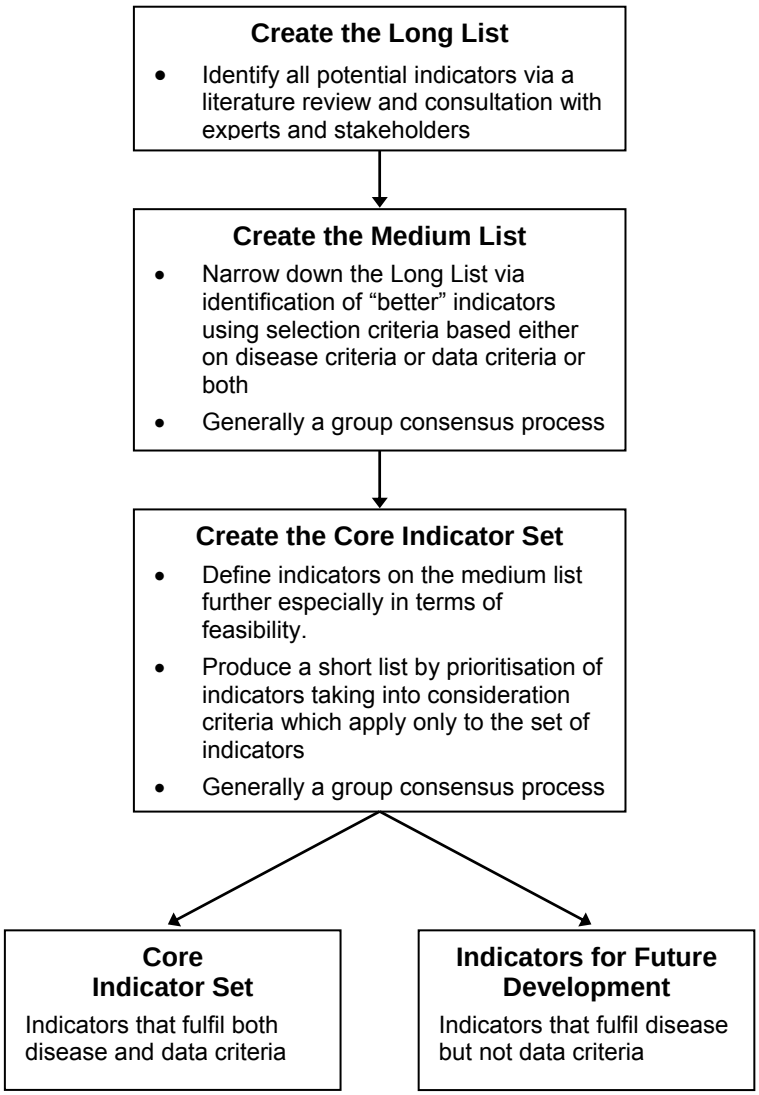
The first task undertaken during Phase 1 of this project was the formation of a Project Team, including a Steering Committee to oversee the process of indicator framework development. At a meeting of the New Zealand Child and Youth Epidemiology Service's (NZCYES) Steering Committee in December 2005, it was decided that the NZCYES Steering Committee would oversee the development of the project, with additional expertise being co-opted, in areas outside the Committees collective experience. The day to day operation of the project would be overseen by the NZCYES' Director and a project manager would be hired to coordinate consultation within the health sector.

The NZCYES' Steering Committee was seen as being ideal for overseeing of this project, as the composition of its membership was specifically designed to achieve representation across the spectrum of population child and youth health. This membership included the Heads of Department of the 4 clinical paediatric departments at NZ's 2 medical schools, 3 paediatricians elected by the Paediatric Society Membership (with one being designated as an adolescent health position), a representative from the National Child Health Manager's group, a representative from the Paediatric Society's executive and a representative from the NZCYES' joint venture partners in Kia Mataara Well Health, with expertise in Maori child health issues. In addition, NZCYES staff provided guidance on epidemiology and the use of NZ's national datasets, and a representative from the Ministry of Health was invited to attend each of the Steering Committee's meetings.

Decisions Made at the First Steering Committee Meeting

One of the first tasks of the Steering Committee was to agree on an appropriate methodology for the process of indicator framework development. In order to inform this process, a review of the overseas literature was undertaken prior to the Committee's first meeting and a total of 37 documents were identified which contained information on indicator selection and / or framework development. These documents included processes developed by a number of overseas agencies including the World Health Organisation (WHO), the Organisation for Economic Co-operation and Development (OECD), the Canadian Institute for Health and Information (CIHI), the European Union Community Health Monitoring Programme and the Centres for Disease Control and Prevention (CDC). In general the processes used by these agencies were similar, with a set of pre-determined selection criteria and a range of consensus processes being used to move from a long list of potential indicators to a shorter and more manageable list (Figure 9). While the Modified Delphi Processes used by a number of these organisations were considered, ultimately it was the methodology used by the European Union's Child Health Indicators of Life and Development (CHILD) Project which was seen as being the most appropriate, given the timeframe available [71]. This methodology, which was recommended to the Steering Committee at their first meeting, is outlined in Table 29.

Figure 9. Summary of Generic Methodology for Indicator Framework Development



At the first face to face meeting of the Steering Committee, the results of this preliminary literature review were presented and the EU CHILD Project's methodology was adopted as the preferred starting point for framework development. This early decision was useful, as the EU model then guided the Steering Committee through many of the other decisions which needed to be made in the early stages of the project's evolution. These included:

1. A process needed to be developed which allowed for the assembly of a comprehensive *Long List* of candidate indicators, which could then be shortened to a *Medium* and then a *Final List* through a process of consultation and prioritisation.
2. Indicator selection criteria needed to be developed, which awarded a higher priority to issues of public health importance, but also considered issues of data quality.
3. A theoretical model needed to be developed which governed the types of indicators included in the framework and the way the relationships between them were portrayed.

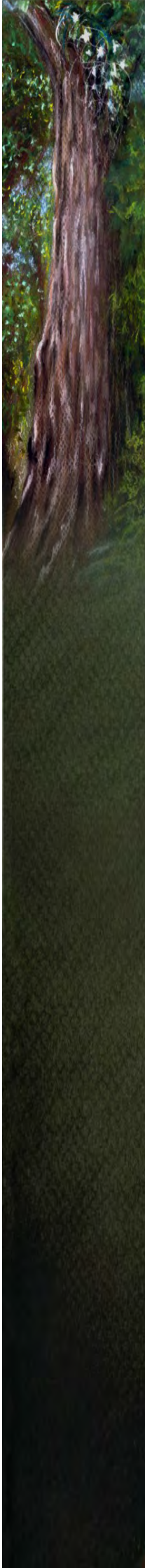


Table 29. The steps taken by the European Union Community Health Monitoring Programme's Child Health Indicators of Life and Development Project

During the initial stages of project development a number of initial steps were taken including:

- The formation of a project team and agreement on key principles of child health and the characteristics of the indicators (e.g. grounded in research, robust, comparable).
- The selection of a theoretical model (in this case the European Community Health Indicators (ECHI) Framework) to guide indicator framework development (the ECHI domain structure was subsequently modified to reflect the more child focused nature of the project).
- The breaking down of child population health into a number of key topics (e.g. mental health, nutrition, socioeconomic status and inequality) with a lead investigator being identified for each from amongst the Project Team members.
- The selection of a target age group (0-17 years) and the development of a set of technical criteria for assessing indicators (e.g. validity, consistency, sensitivity, feasibility, issues relating to definition).

Following the initial meeting where topics and themes were identified and Project Team members were assigned to take a lead on each, a number of further steps were taken:

- A literature search was undertaken on each of the key topics selected. The review highlighted key issues, health determinants and measurable features and resulted in a list being produced for each topic on the issues which appeared to be both relevant and measurable i.e. key candidate indicators.
- From this list, the first Long List of candidate indicators was assembled.
- This list was then distilled, as a result of group discussion to a Medium List of potentially robust items, for which initial draft definitions and evidence bases were assembled
- Each indicator in the Medium List was then assessed against a set of selection criteria which ranked indicators on factors such as their evidence base, burden to society, family or the individual, representativeness, repeatability, data availability and whether the topic was amenable to action.
- Following further discussions and using the criteria above, the Medium List of indicators was narrowed down to a final shorter list, which was then scrutinised for balance, robustness and comparability. This was followed by an assembly of the final definitions, templates and supporting report.

Source: CHILD Project [54].

Information from the preliminary literature review which informed each of these decisions was then provided to the Steering Committee. The following sections outline the decisions made by the Steering committee in relation to each of these issues at the time of their first meeting.

Project Time Line and Methodology

In developing a project timeline and methodology, it was decided that a similar process to that used by the EU's CHILD Project would be followed, although additional consultation would be required during the latter phases of the project. Initially this process focused on creating a comprehensive *Long List* of all of the measures which could be used to monitor child and youth health and then, using a pre-determined set of selection criteria and a consensus process, drawing from this list a smaller and more manageable indicator set, which was both balanced in its coverage and statistically valid.

In order to ensure that this *Long List* provided a comprehensive coverage of important issues, the Steering Committee divided child and youth health into a number of topic based streams (Table 30), which were loosely based on those used by the EU's CHILD Project, but also reflected the collective experience of the Committee members. A Committee member was then assigned to each stream, or if the topic was outside the committee's collective expertise, the name of a key expert was suggested, who might be contacted to provide guidance in that particular area. In addition it was also agreed

that a review of the New Zealand literature (which was ongoing) should be continued, so that any indicator used in New Zealand during the past decade to assess or monitor child or youth health, could be identified and included in the *Long List* of candidate indicators.

Table 30. Streams Selected by Steering Committee for Inclusion in Draft Framework

• Abuse and Neglect • Civic Rights and Responsibilities / Justice • Chronic Disease (including Oncology, Endocrine, Allergy and Eczema, Neurology, Cardiology) • Culture • Demography • Disability • Education • Environment (including Housing) • Historical, Economic, and Policy Context • Hearing • Infectious Diseases • Injury	• Lifestyle • Mental Health • Mortality and Morbidity • Nutrition, Physical Activity and Growth • Oral Health • Perinatal – Infancy • Respiratory • Sexual and Reproductive Health • Socio-economic Determinants (including Income) • Surgical • Well Health • Whanau Wellbeing

Following the formation of topic based streams and the appointment of "Stream Heads" a time line was agreed on for the rest of the project (Figure 10). This timeline allowed for a period of stream based consultation, during which time a *Long List* of candidate indicators would be assembled. This *Long List* would then be narrowed down to a *Medium List*, using a set of selection criteria which were to be developed. The Medium List would then be incorporated into a draft indicator framework and then disseminated widely within the health sector. Feedback from this sector based consultation would then be utilised during a second round of prioritisation, to ensure adequate balance and coverage was achieved in the final indicator set. By the end of their first meeting the Steering Committee had set a timeline for the work programme to follow and had outlined the key steps which would need to be undertaken in order to ensure the that processes used would both stand up to scrutiny, and would result in a framework which met the health sectors needs.

The Development of Indicator Selection Criteria

In developing a set of criteria to govern which issues should be included in the process of indicator framework development, it was considered vital that the current needs of the New Zealand health sector were taken into account. As suggested previously, in recent years these have centred on two key processes: national population heath monitoring and regional Health Needs Assessment. While national level monitoring requires indicators which meet minimum data quality criteria (e.g. routine data sources, consistency over time), regional Health Needs Assessments require a broad coverage of all of the major issues, in order to inform resource allocation and regional strategy development.

In order to meet both of these needs, it was decided that two sets of indicator selection criteria would be required with the first, based on public heath importance (e.g. prevalence, severity, evidence of disparities), taking precedence over the second, which related to data quality (e.g. availability of accurate national data sources, ability to track indicators over time). It was anticipated that these selection criteria would be utilised in a 2-stage process as follows:

1. In the first round of prioritisation, issues would need to be selected on the basis of their public health importance, irrespective of whether routine data was available with which to monitor their presence over time.

2. Once the above indicator set had been selected, subsequent prioritisation rounds could be used to identify a subset of indicators which also met data quality criteria and which could be used for population health monitoring over time.

This 2-stage process was seen as being necessary for three main reasons:

1. Prioritisation by public health importance would serve to highlight many issues which were of vital importance in the context of regional Health Needs Assessments (e.g. child mental health, disability), but which to date had avoided scrutiny because there was insufficient data with which to monitor them systematically over time.
2. Such an approach was also seen as being useful for identifying key gaps in the monitoring approaches used to date, and would serve as the basis for making recommendations as to how new data sources could be developed, which would enhance New Zealand's ability to monitor the health of its children and young people in future years.
3. Finally, it was thought that such a 2-stage process might serve to de-emphasis the importance of some current indicators, which may have been monitored over time merely because data was available for this purpose.

In order to inform the process of selection criteria development, a search of the New Zealand and overseas literature was undertaken for publications which specifically referred to indicator selection criteria in the context of population health monitoring. In total 27 documents were identified which contained information on indicator selection criteria, and of these 18 listed prioritisation criteria relating to Public Health Importance (Table 31) and all 27 listed criteria of relevance to the Data Quality (Table 32) of the candidate indicator.

Figure 10. Draft Timeline for the NZ Child and Youth Indicator Project

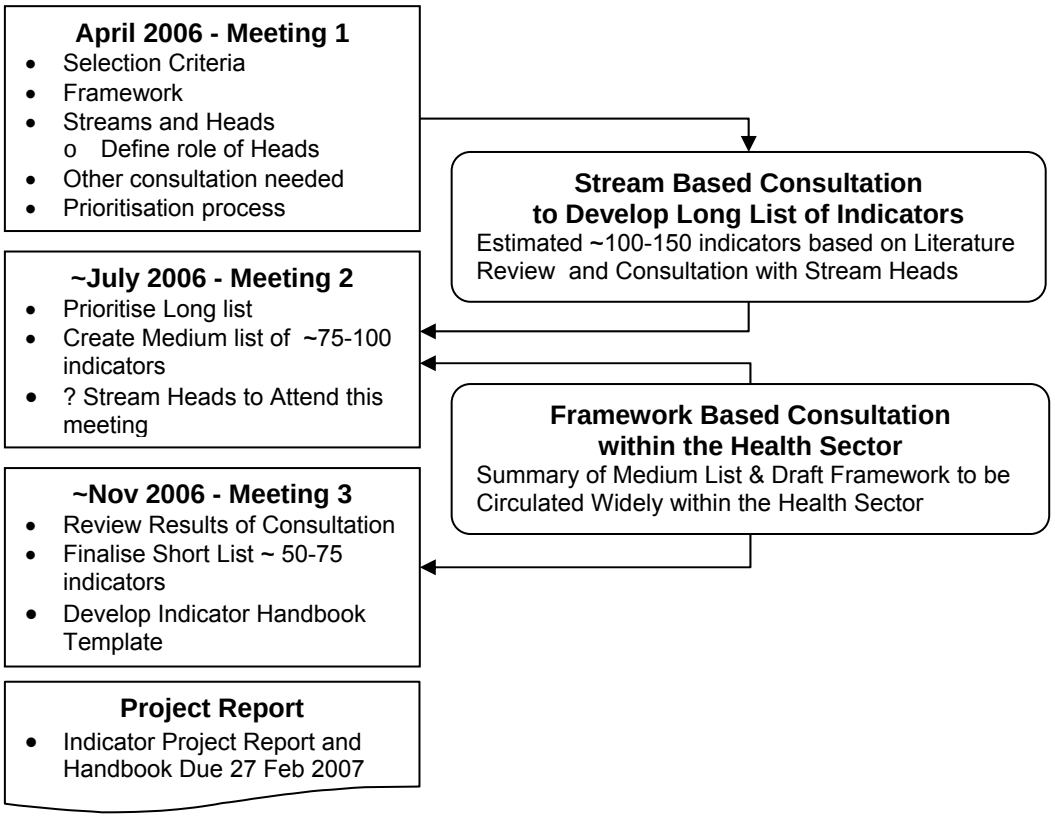
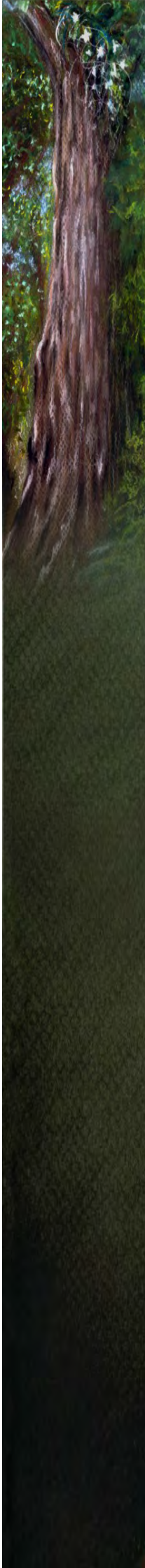


Table 31. Public Health Importance Selection Criteria Used in the NZ and Overseas Literature

Public Health Importance Criteria	Number of Publications
Of significant health impact, not further specified	12
Impact on disadvantaged groups or severe impact on population subgroups	7
Can be improved with intervention	4
High cost associated	3
Can be prevented with intervention	3
Of public interest	3
Large number affected	2
Severity of the event	2
Potential significant long term effects for the individual if untreated	2
Burden to society, not further specified	1
Burden to family, not further specified	1
Burden to individual, not further specified	1
Has a deteriorating trend or is likely to deteriorate	1
NZ performance is poor compared to other comparable countries	1
Clinical course in the absence of an intervention	1

Table 32. Data Quality Selection Criteria Used in the NZ and Overseas Literature

Data Quality and Other Criteria	Number of Publications
Derived from high quality data, statistically and methodologically sound	17
The most accurate statistic for measuring the level and extent of change in an outcome	16
Able to be clearly defined, measured consistently over time and to accurately monitor trends.	16
Sensitive to change over time	14
Relevant to the subject of the project e.g.: children and young people	14
Data required should be available or relatively easy to obtain	10
Consistent with international indicators to allow comparison	11
Ability to influence change in policy / strategy	10
Readily understandable to a broad audience	9
Capable of finer breakdown to compare outcomes for different groups	8
Comparable between regions within a country	7
Cost effective to compile and apply	6
Clear normal interpretation so change clearly represents an improvement/ deterioration.	6
Unaffected by minor changes in methodology and scale used in construction	5
Only reflects change in the issue or factor under consideration	5
Reports up to date information	4
Based on broad support so they will not be readily changed	3
Tied to health objectives/strategies	3
Acceptable to policy makers	2
A specific organisation can be held accountable for implementing relevant strategies	2
Indicator is future oriented - predicts future need rather than current health status	2
Must comply with basic human rights and require only data that are consistent with morals, beliefs, or values of the local population	1
Sound evidence on key influences and factors affecting outcome	1



The above review suggested that there were a large number of criteria which could be used to guide indicator selection, but that each organisation had defined their criteria in a slightly different manner. Thus, one of the first tasks of the Steering Committee was, taking this multitude of criteria into account, to develop a set of selection criteria which best suit the needs of the current project. In doing so the Steering Committee used the following process:

1. From each of the above lists, themes were identified which were common across a range of publications (e.g. significant health impact, burden to society, burden to family, large number affected were all considered to be measuring health impact at a population level).
2. Each of these themes was listed on a whiteboard and their essential elements were defined. Selection criteria and definitions were then assigned to each of these themes.
3. Steering Committee members where then asked to rank each of these criteria based on their relevance for the current project, bearing in mind that >4-5 separate public health and data quality criteria would become cumbersome during the later stages of the project.
4. The individual rankings of Steering Committee members were taken into account when making a consensus decision as to the most appropriate balance of selection criteria for use in this project.

This process resulted in two sets of selection criteria being developed for the project. These are outlined in Table 33 and Table 34. While all of the public health importance criteria were considered essential, a number of the data quality selection criteria (e.g. regionally comparable) were only considered to be desirable.

Table 33. Public Health Importance Selection Criteria Developed by Steering Committee

Criteria	**Sub-Criteria and Definition**
Significant Health Impact	Burden to individual - in terms of mortality, morbidity or function Burden to society - in terms of how common the condition is Cost, both direct and indirect (e.g. to health sector)
Modifiable	Potential exists to reduce health impact by prevention, early intervention or treatment (including issues of cost effectiveness)
Treaty of Waitangi / Inequalities	Disparity exists in subgroups within the population e.g. in terms of ethnicity, or socio-economic status.
Emergent	An emerging burden or a deteriorating trend is exhibited

Table 34. Data Quality Selection Criteria Developed by Steering Committee

Essential Criteria	**Sub-Criteria and Definition**
Face Validity	The indicator measures what it is intended to measure and is consistently sensitive in assessing this
Available	Data is routinely collected at a national level
Consistent	The method of data collection is clear and consistent over time, or any inconsistencies are well described
Disaggregatable	Data is capable of finer breakdown e.g. by age, gender, ethnicity, NZDep score, and region/DHB allowing comparison of different subgroups of the population.
Desirable Criteria	**Sub-Criteria and Definition**
Regionally Comparable	The definition of the measure is the same irrespective of region. The indicator is insensitive to regional variation in practice.
High Quality Data	Highly complete and accurate data

In addition to the selection criteria above, a series of recommendations were made as to the nature of the information which should accompany each indicator. In this context, it was suggested that all indicators be accompanied by:

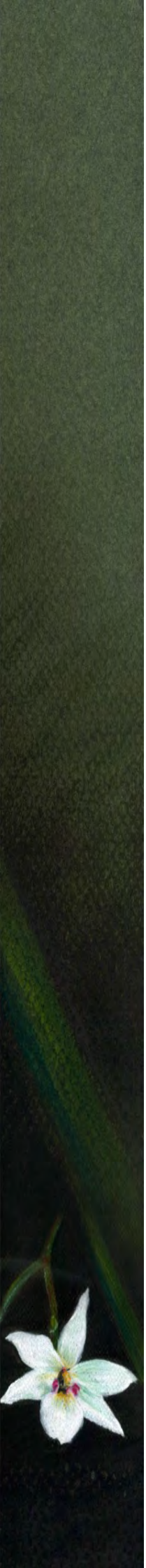
1. A definition of what the indicator is actually measuring.
2. An outline of the purpose of the indicator (e.g. for policy and planning, stimulate research, highlight disparities).
3. An indication as to which sectors might be most accountable for that indicator / have the greatest ability to modify it (e.g. Health, Education, Justice).
4. An analysis of trends over time, as well as a breakdown (where possible) by age, ethnicity, gender and NZ Deprivation Index decile.
5. A brief summary of risk factors which have been associated with the indicator, as well as the impact the indicator may have on others (e.g. household tobacco exposure may influence respiratory tract infections).

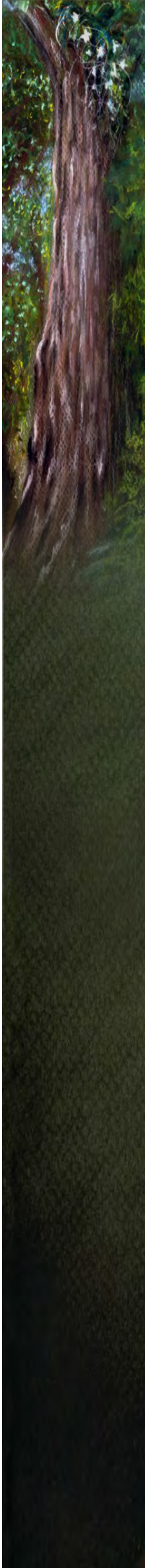
The Selection of an Initial Theoretical Model

In addition to the development of indicator selection criteria, thought needed to be put into the development of a theoretical model which considered the relationships between the various indicators included within the framework. While the developing of a theoretical model which met the needs of the NZ child and youth population was seen as something which would occur during the course of the project, in the project's early stages a very basic framework was seen as being necessary. At the first Steering Committee it was thus agreed that:

1. The framework would include children and young people from birth to 24 years. Issues during the antenatal period would only be considered if they directly impacted on infant health or wellbeing, as a similar national project was underway to develop indicators related to pregnancy and obstetric care. The age cut off of 24 years was selected to coincide with that used by the Child and Youth Mortality Review Committee.
2. A lifecourse dimension should be incorporated into the framework and at minimum outcomes should be broken into three categories: the perinatal period / infancy (<1 year), children 0-14 years and young people 15-24 years. Finer age bands could be used within individual indicator templates to explore issues of particular concern.
3. Pending the results of further consultation, the four domains used by the EU's CHILD Project would provide a logical starting point and would ensure adequate coverage of issues at different levels in the causal pathway. These four domains comprised: Demographic and Socioeconomic Factors; Health Determinants, Risk and Protective Factors; Health Status and Wellbeing; and Policy / Health Systems.

Having put in place a methodology which would guide the Project Staff's work over the next few months, the Steering Committee concluded their meeting, agreeing to meet again at the end of the stream based phase of consultation, at which time the first round of prioritization could occur.





Phase 2: Stream Based Consultation and the Development of a Draft Theoretical Model

During the second phase of the project's development, work occurred in two parallel work streams:

1. **Stream Based Literature Review and Consultation**: During this phase a *Long List* of child and youth health indicators was assembled using a process which integrated the findings of a literature review with stream based consultation within the health sector. The aim was to achieve as broad and as detailed coverage of child and youth health as possible, prior to the first round of prioritisation.
2. **Theoretical Model Development**: At the same time, work commenced on developing a theoretical model which would guide the types of indicators included in the framework, as well as the ways in which the relationships between them were portrayed. As with stream based consultation above, work in this area integrated the findings of a literature review with the views of those working in the health sector.

The following sections explore each of these work streams in turn.

Stream Based Literature Review and Consultation

The aim of the stream based consultation phase was to generate a comprehensive Long List of indicators, from which a more manageable Medium List could be drawn. Population child and youth health was divided into the streams previously identified by the Steering Committee and the work took place in two stages as follows:

Stage 1: Literature Review

A review was undertaken of all reports published during the past decade, which had used routinely collected data to assess the health and wellbeing of New Zealand children and young people. The measures used in each of these publications were entered into an ACCESS database and grouped according to the stream headings identified above. Approximately 70 documents met the broad inclusion criteria for this review (Table 37) and from these publications over 800 different measures of child and youth health status were identified. Many of these measures however, reflected different ways of assessing same health issue (e.g. % caries free and mean DMFT scores were both measures which assessed child oral health status) and as a consequence, consideration needed to be given to differentiating between "indicators", which would be subject to the prioritisation process (e.g. child oral health status) and the most optimal "measures", with which to monitor these issues (e.g. % caries free, mean DMFT scores). Table 38 in **Error! Reference source not found.** lists the indicators and measures that were identified during the course of this literature review (normal font), while the measures listed in italics are those which were suggested during the course of stream based consultation.

Stage 2: Stream Based Consultation

During the course of the literature review, further refinement of the topic based streams occurred, resulting in issues being consulted on in the streams listed in Table 35. "Stream Heads" for each of these streams were identified, and if not already members of the Steering Committee, were invited to take part on this phase of the consultation. Those agreeing to participate were provided with a Long List of ~130 indicators and / or measures and were asked to comment on those pertaining to their stream (usually 5-15 measures), in consultation with their networks. Consultation during this phase took place by means of email correspondence, one on one interviews and small group workshops held specifically to discuss particular issue.

Table 35. Streams for Stream Based Consultation Phase of Indicator Project

Abuse and Neglect	Lifestyle
Civic Rights and Responsibilities / Justice	Mental Health
Chronic Disease	Mortality and Morbidity
Culture	Nutrition, Physical Activity and Growth
Demography	Perinatal – Infancy
Disability	Respiratory
Education	Sexual and Reproductive Health
Environment	Socio-economic Determinants
Historical, Economic, and Policy Context	Surgical
Infectious Diseases	Well Health
Injury	Whanau Wellbeing

The questions asked during this phase of consultation were:

1. Are there any issues within this Stream which are not already covered by this draft list (i.e. are there other indicators we should potentially be considering)?
    a. For each additional indicator / issue suggested, please outline
        i. How this particular indicator should be defined and measured
        ii. The best data source for the proposed indicator
2. Within this Stream, which indicators do you consider to be essential, and which do you consider to be optional (this will help with later prioritisation, as it is likely that to achieve balance only 2-3 indicators may be included for each particular stream)?
3. Where a number of different measurement options are listed for a particular indicator, which ones do you feel are the most appropriate for routine use?
4. Do you consider the balance of the attached framework (stream list) to be adequate / are there any other issues you would like to raise at this point.

In total of 60 individuals were involved in the process of stream based consultation. Participants comprised a mixture of general, community and specialist paediatricians, child health managers, nursing staff, epidemiologists, public health physicians, surgeons, representatives of non-Governmental organisations and health professionals with expertise in Maori child health. A number of group sessions were held in areas where the issues were particularly complex, or where a large number of potential measures had been suggested (e.g. mental health, disability, socioeconomic determinants, injury), with the resultant feedback reflecting the consensus of the group, rather than an individual's expert opinion. In other cases, where logistics prevented small group meetings (e.g. child abuse), the results of several one to one interviews and email responses were combined by Project Team members to form an overall recommendation. During this phase a number of additional measures were also identified and these were added to the Long List shown in **Error! Reference source not found.**. The results of consultation were then fed back to the Steering Committee at their second meeting, and any recommendations made during this phase (e.g. the paucity of data on childhood disability, potential alternative measures for oral health status) were also included under the relevant sections of the Indicator Handbook.

Development of a Theoretical Model

In developing a theoretical model to underpin the framework, it was necessary to decide whether to create a model from scratch, or to adapt an existing model for use in the child and youth population. In creating a new model from scratch, it would have been necessary to undertake an in depth review of the literature in the areas of social and lifecourse epidemiology and to consider the theories put forward for explaining the

pathways linking higher level social and economic factors → risk and protective factors → health outcomes at a population level. In addition, publications on the effects various exposures had on critical and sensitive periods in children's development would need to have been reviewed in some detail. While undertaking such a review would have been of considerable utility in informing the process of framework development, a number of such reviews have recently been undertaken, both in New Zealand[103] and overseas [104, 105]. As repeating these reviews would have required the diversion of resources from other aspects of the project's development, it was thought that within the time frame available, it would be more useful to adapt an existing model for use in the child and youth population. Having done so, it would then be necessary to ensure that this model was consistent with the findings of these earlier reviews.

At the first Steering Committee Meeting in April, consideration was given to the type of model which might be required. It was agreed that any indicator framework developed as a result of the project would need to monitor not only traditional health outcomes, but the underlying determinants of child and youth health as well. In achieving the most appropriate balance between these types of indicators, it was thought that the EU CHILD Project's four domains might provide a useful starting point [24]. These domains comprised:

1. Demographic and Socioeconomic Factors
2. Health Determinants, Risk and Protective Factors
3. Health Status and Wellbeing
4. Policy / Health Systems

While these four domains were thought to provide adequate balance for many of the issues facing children and young people, such a framework reflected processes developed overseas and thus may not have reflected the unique needs of New Zealand's child and youth population. In addition, the Steering Committee felt that a life course dimension was necessary and that the indicator framework should cover the period from birth-24 years, in order to tie in with other work going on within the sector. Thus, rather than adopt the EU's CHILD Project model in its entirety, the Project Team used it as a starting point for further framework development. As with stream based consultation, framework development took place in two overlapping stages: Literature Review Consultation within the health sector. The following sections discuss each of these in turn.

Literature Review

During this phase of the project a literature review was carried out which explored frameworks previously used in New Zealand and overseas to monitor population health status. The review included overseas models which were specific to children and young people, as well as New Zealand models which could be adapted for use in this age group. While the findings of these reviews have been outlined previously, the key findings of relevance to this stage of the projects development were:

1. **Overseas Models**: While the methodology of indicator framework development and the underlying theories of population health used were very similar from country to country, no two countries or groups of countries ended up with exactly the same theoretical framework, or presented the links between indicators and groups of indicators in a similar manner. Despite this, many of these frameworks contained very similar elements, with the four domains of the EU's CHILD Project (Demographic and Socioeconomic Factors; Health Determinants, Risk and Protective Factors; Health Status and Wellbeing; Policy / Health Systems) typifying concepts on the interrelated and multilayered determinants of health which appeared in many of these frameworks.

2. **New Zealand Models**: In New Zealand, two theoretical models were identified as playing a significant role in population heath monitoring. The first of these, a model presented by the Public Health Commission in its 1999 Our Health: Our Future Report [54] was seen as being of the greatest utility in explaining the links between the underlying determinants of health and outcomes at a population level (Figure 11). This model arranged health issues in a hierarchical manner, with higher level factors (e.g. social structure and culture) influencing → the underlying determinants of health → risk factors → outcomes at a population level. Health determinants were further subdivided into socioeconomic pathways (e.g. education, workforce participation) and socioeconomic status (e.g. occupational class, income), which in turn were seen as influencing an individual's exposure to risk (e.g. behavioural risk factors, lifestyles and stress). Elements of this model can also be seen in Public Health Intelligence's current *The Health of New Zealander's* Series. The other model in current use was that developed by the Ministry of Social Development for use in its Social Report [106]. This model describes 10 interrelated domains of social wellbeing, and while being of less utility in describing causal pathways, it is nevertheless useful for providing direction as to which elements should be included in the socioeconomic and cultural domains of any framework that was developed.

In adapting these models to produce a framework which could be used in the child and youth population, the Project Team were keen to reflect the concepts of health currently prevailing in the New Zealand health sector, yet at the same time not to leave out any features which were of utility in overseas models. On reviewing the available literature, it became apparent that the Public Health Commission's framework provided the best starting point, as it offered a well developed hierarchical model and in addition, offered continuity with the monitoring approaches used to date. The model however, failed to explicitly consider the role of policy in shaping health outcomes, an issue which had been included as a domain in its own right in the EU's CHILD framework. In addition, its importance in the local context was further highlighted by the number of publications exploring the impacts of changes in Government policy on the health of New Zealand children and young people in during the past decade. The greater level of detail provided by the MSD's 10 domains of social wellbeing was also seen as being of considerable utility in providing a structure to the socioeconomic and cultural domains. Inclusion of these 10 domains was also seen as being a useful way of linking the two monitoring frameworks, as well as creating a common platform for considering some of the determinants of child and youth health which were outside of health's traditional arenas of control. Before incorporating each of these elements into a final theoretical model however, it was felt that further consultation was necessary.

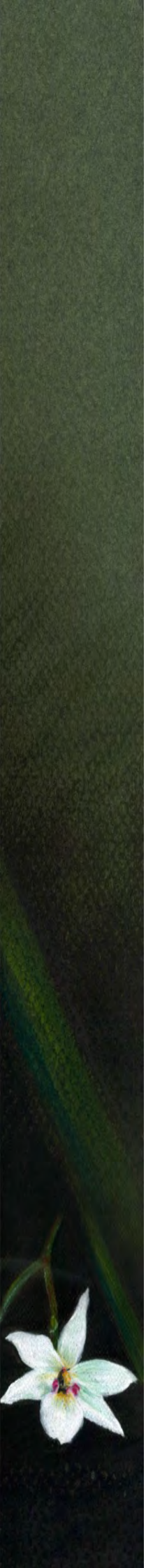
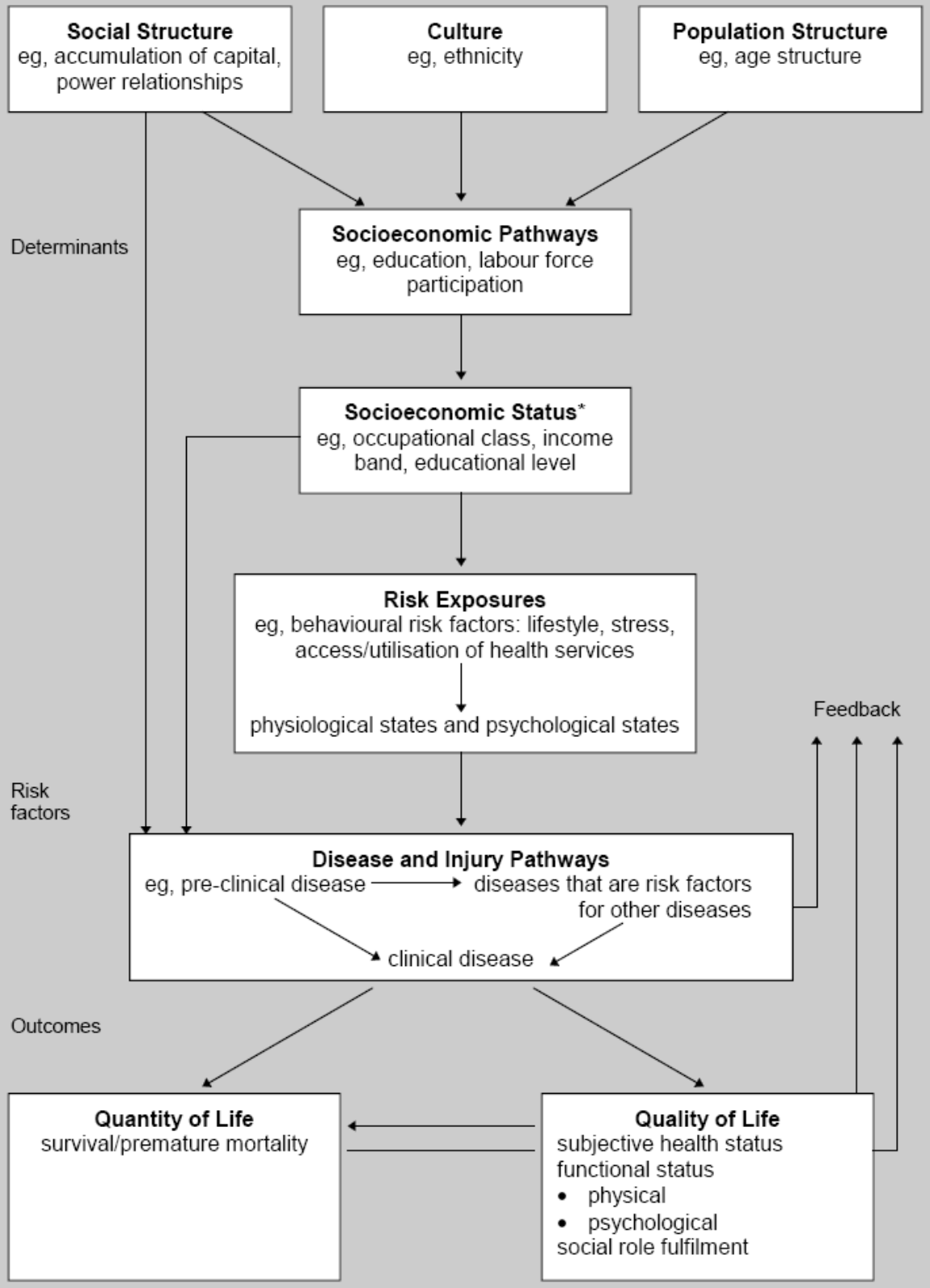


Figure 11. The Concept of Health Underpinning Population Health Monitoring



Source: Ministry of Health [54]

Consultation

Consultation on the development of a theoretical model to underpin framework development took place in two stages: early consultation and later, sector wide consultation. During the early phase of consultation, discussions took place between the Project Staff and Steering Committee members and staff from the Maori SIDS programme. Once a draft framework had been developed, wider consultation within the health sector also occurred. These three stages are outlined below:

1. **Discussions with Steering Committee Members**: Initial discussions with Steering Committee members, who collectively shared many years of experience in child and youth health, highlighted the need for a broadly based framework which considered the underlying determinants of health, as well as outcomes at a population level. Early discussions also suggested that each of the four domains of the EU's CHILD Project framework were essential, as was a life course approach which took into account key transition points as children progressed from birth →24 years.
2. **Discussions with the Maori SIDS Programme**: The Maori SIDS Programme became involved with the project during the early stages of framework development, in order to ensure that the framework was able to capture the health experiences of Maori children and young people. A number of meetings were held with staff from the Program, with these meeting ranging from formal presentations to small group discussions. In addition, a draft of the framework was presented at the National Mokopuna Ora Conference in Auckland, which was attended by >100 health professionals who worked with Maori children and young people.
3. **Wider Consultation Within the Health Sector:** Once a draft framework had been developed, it was formally circulated within the health sector, along with an example illustrating how the framework could be used to highlight causal pathways at a population level. Formal feedback was sought on the framework's overall structure, on each of the domains and indicators within it and on its overall balance. In total 41 responses were received from individuals, small groups and organisations, with respondents making a range of suggestions as to how the framework might be improved.

The following sections describe the early discussions which were held with staff from the Maori SIDS Programme, while the results of sector wide consultation are considered in under the sections describing Phase 4 and 5 of this project.

Discussions with the Maori SIDS Programme

The Maori SIDS Programme was established in 1994, with a view to addressing the increasingly large ethnic disparities in SIDS mortality which followed the implementation of the National Cot Death Prevention Campaign. The origins of the program are outlined in Figure 12. Programme members collectively share many years of experience working with Maori children and their whanau and in developing strategies and interventions aimed at improving their health. In developing a theoretical model that captured the experiences of Maori children and young people, the team suggested a number of elements would be essential:

1. Firstly, it was important not to portray Maori child and youth health issues in a negative frame, or to take a deficit approach to reporting. It was however, important to consider the wider social and economic contexts in which Maori children and young people lived and the role these played in the genesis of health outcomes.
2. It was particularly important to portray the accumulation of influences across the life course from birth → 24 years and to capture the fact that for many Maori

children it was the same child who is born low birth weight, who then went on to → have recurrent otitis media admissions during infancy → which in turn resulted in issues with school achievement due to hearing loss → which contributed to them leaving school early and without formal qualifications → which then influenced their appearance in justice statistics. In understanding this sequence it would be necessary to develop a two dimensional matrix which considered the serial impacts of the domains operating vertically (e.g. historical and policy factors, education, socioeconomic status), on health outcomes as children and young people progressed horizontally from birth → 24 years. In addition, underpinning the individual lifecourse was the influence of whanau, hapu and iwi, with the health of the individual children and young people being intimately intertwined with their whanau's wellbeing.

3. The development of indicators to assess issues such as "access to culturally appropriate services" was quite complex, as such services were provided in a variety of different contexts and training for non-Maori staff in the delivery of culturally appropriate services may not reflect real changes in practice. Thus, the development of culturally specific indicators in the area of health service delivery was seen as being something that required further development and was possibly outside of the scope of this project.

In addition to the contribution the Maori SIDS programme made at the early stages of framework development, a draft framework which incorporated these elements was presented at the National Mokopuna Ora Conference in August 2006. This conference was attended by >100 delegates, the majority of whom were health professionals working with Maori children and young people. After this presentation many conference delegates again reiterated the message that it was important not to portray Maori child and youth health issues within a negative frame, but that an approach was needed that portrayed key cultural strengths and the integral role whanau, hapu and iwi played in wellbeing. While there was support for the use of such an approach to inform the development a National Mokopuna Ora report, further work would be necessary to ensure that the information contained within it was interpreted within the context of a Maori world view.

Figure 12. The Origins of the Maori SIDS Program

In the early 1980s New Zealand had a higher rate of sudden infant death syndrome (SIDS) than other comparable Western countries with no evidence of decline [107]. This prompted the development of a three year national Cot Death Study that was conducted between 1987 and 1990. The study identified a number of risk factors, some considered modifiable and others non-modifiable [108], the former of which became the basis of a prevention programme. Although informal dissemination of one of the prevention messages began as early as 1989, the SIDS prevention effort culminated in the Ministry of Health national SIDS prevention campaign of 1991, the first of its kind internationally. This campaign comprised widespread and intensive media publicity of three main modifiable risk factors: prone sleeping, smoking and not breastfeeding [109]. In 1992 another risk factor was added to the profile: bed sharing [110], although this was later to be reclassified as a significant risk only if accompanied by smoking [111]. Following the campaign non-Maori SIDS rates decreased significantly but Maori SIDS rates decreased minimally by comparison. Although there was some controversy about definitions of Maori ethnicity, between 1986 and 1992 non-Maori SIDS rates decreased from 3.6 to 1.6 per 1000 live births, while Maori rates only decreased from 7.4 to 6.9 per 1000 live births [112]. Maori comprised a significant proportion of SIDS deaths and, with the greater reduction in non-Maori rates, this proportion increased. In response to this situation, in 1994 a team based in the University of Auckland School of Medicine received funding to initiate the Maori SIDS Prevention Programme. The Maori SIDS Prevention Programme began in 1994 as a national contract with the Public Health Commission, supporting a national co-ordinator and a programme to prevent SIDS in Maori communities. This had followed eight months of planning and development for the service and several years of advocacy to develop a programme that

would do something about the SIDS rates for Maori. At the time of commencing the programme the goal of the programme was to reduce Maori SIDS from 6.5 per 1000 live births to 4.5 per 1000 live births or less by 1997 and to 2.5 per 1000 or less by the year 2000. In 1996 the national team negotiated three regional co-ordinator contracts with two RHA's to cover Northland, South Auckland and the South Island. More recently, in 1998 and 1999 two further contracts were obtained for positions in the Midlands and Central regions. These separate RC contracts were linked via the national team. Specific strategies were developed to address Maori SIDS because of the failure of the National Cot Death Prevention Campaign to impact on the Maori SIDS rate. It has been documented by Lawson Te Aho & Rogers (1997) that the campaign failed with Maori because non-Maori designed it and the message and message bearer were inappropriate. The campaign also failed to address the multiple risk factors experienced by Maori families who often experienced social economic and political inequalities.

The Assembly of the Draft Theoretical Framework

Based on the literature review and preliminary consultation above, a two-dimensional child and youth heath framework was developed. The vertical dimension of this framework blended the four domains utilised by the Public Health Commission, with those of the EU's CHILD Project, while the horizontal lifecourse dimension provided a context for considering the cumulative effects as children progressed from birth → 24 years. As in the Public Health Commission's model, the four vertical domains were seen as being hierarchical in nature, with each exerting an influence on the tier below, (although the potential for feedback loops was acknowledged, as in the original model). These four domains comprised:

1. Historical, Policy and Economic Environment
2. Socioeconomic and Cultural Determinants
3. Risk and Protective Factors
4. Individual and Whanau Health and Wellbeing

While the overall structure was similar to the Public Health Commission's original model, the contents of each of the domains differed significantly. The changes made reflected both the evolution in public health thinking that had occurred in the years since the publication of the original model, as well the need to ensure that the framework was of direct relevance to children and young people. The contents of these four domains and the rationale for their selection are outlined in the sections which follow.

Historical, Policy and Economic Environment

While much research attention over the past decade 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 in recent years that attention has begun to focus on how the determinants themselves come to be inequitably distributed [11]. In the New Zealand context, it is likely that three factors play a significant role. These include:

1. **Historical Factors:** Understanding the large disparities in heath outcome experienced by Maori children and young people, cannot occur without a knowledge of the history of the colonisation of New Zealand and the declines in heath status which occurred as a result of the erosion of the economic and cultural base of Maori whanau from the early 1800s onwards [113]. The inclusion of a historical dimension in the higher levels of this framework serves to highlight the fact that initiatives aimed at reducing the currently marked disparities in health for Maori children and young people, may not succeed in the longer term unless broader policies and strategies can be put in place which improve the economic base for Maori whanau, hapu and iwi.
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 neo-liberal reform during the 1980s and early 1990s saw income inequalities rise rapidly [113], and large numbers of children, particularly in sole parent, or Maori, or Pacific households, falling below the poverty line (net-of-housing-cost-income <60%) [2, 5, 11, 12]. The downstream effects such policy shifts have on health outcomes was also recently highlighted in the Public Health Advisory Committee's *Guide to Heath Impact Assessment*, which specifically recommends that all new policies be assessed for their potential impacts on health and wellbeing [24].

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, immigration and the strength of the NZ dollar all may influence unemployment rates, which in turn shape the resources available to families with children). While many of these factors lie outside the control of the health sector, an understanding of their effects may be useful in predicting future health service demand (e.g. increasing unemployment rates → increase in the number of families living below the poverty line → increase in disparities in health outcome).

While using routinely collected data to monitor each of these dimensions was not considered feasible, a brief overview on progress in each of these areas, updated at least once every three years, was seen as being vital in assisting the health sector to understand how these higher level factors shaped the determinants of health at a population level and how, if they were left unaddressed, they might impair the health sector's ability to reduce disparities in health outcome.

Socioeconomic and Cultural Determinants

This domain was designed to provide a balanced coverage of the key determinants shaping the health and wellbeing of children and young people. In considering which issues should be included in this domain, the 10 domains of the Social Report were of considerable of utility, as collectively they represented several years of work aimed at developing a framework which captured the essential elements of social wellbeing [114]. In preserving the original names associated with each of these domains, it was hoped that a common terminology could begin to evolve across the sectors, which might provide a common basis for initiating dialogue on issues relating to children and young people. Thus the Social Report's Economic Standard of Living, Knowledge and Skills, and Cultural Identity domains were replicated in the framework's Socioeconomic and Cultural Domain, their Leisure and Recreation domain was replicated in the framework's Risk and Protective Factors Domain, and their Health and Safety domains were reflected in a number of streams within the framework's Individual and Whanau Health and Wellbeing Domain. In addition, a section on Service Provision, Access and Utilisation was added to this domain, in order to reflect the role access to health services played in child and youth wellbeing.

Risk and Protective Factors

While much effort has gone in to understanding how risk and protective factors shape health outcomes at a population level (e.g. exposure to second hand cigarette smoke → hospital admissions for respiratory tract infections), it is only in recent years that attention has also begun to be directed towards understanding the ways in which higher level social factors shape the distribution of these risk factors, and 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 the Socioeconomic and Cultural Determinants and the Health and Wellbeing Domains was thus intentional, and intended to reflect an intermediate step in the causal pathways linking higher level social and economic

factors with individual health outcomes. The selection of the risk and protective factors included in this domain was guided by the initial literature review and the results of stream based consultation.

Individual and Whanau Health and Wellbeing
The inclusion of a whanau dimension in the health outcomes domain arose following discussions with staff from the Maori 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. The inclusion of other topic based streams within this domain was governed by the findings of the early literature review and stream based consultation, although the overall balance of indicators selected was not finalised until after the last Steering Committee meeting.

The Lifecourse Dimension
A draft theoretical framework was thus assembled in which indicators in these four hierarchically arranged domains were cross tabulated with a lifecourse dimension spanning 0→24 years. While the de-identified nature of the data sources used to populate this framework with indicators meant that it was impossible to follow the trajectory of an individual child, as they progressed through this part of their lifecourse, it was nevertheless still possible to arrange each of these indicators across this lifecourse and to direct the reader to consider the consequences of latent effects or serial exposures had on child and youth health outcomes (e.g. the consequences low birth weight being followed by a lack of breastfeeding, being followed by exposure to second hand cigarette smoke during infancy might have on health outcomes during the preschool years).

Phase 3: The Narrowing Down of the Long List to a Medium List of Indicators

During this phase, the *Long List* (~115) of candidate indicators created during stream based consultation, was narrowed down to a *Medium List* (~90) using the selection criteria developed by the Steering Committee. In order to facilitate this process, a workshop was held in July 2006 and Steering Committee members and Stream Heads were invited to participate. During the morning session, Stream Heads and / or Project Team members presented feedback from each of the 22 streams, with this feedback highlighting the views of those consulted on the most important indicators in each stream, as well as other issues raised during consultation (e.g. the significant lack of data in areas such as disability and mental health, the need to ensure the project linked in ongoing work in other areas). Lengthily discussion followed each presentation and a number of additional indicators and measures were suggested for further exploration.

During the afternoon session, each indicator in the *Long List* was scored electronically (from 1 to 5) against the six Public Health Importance Criteria developed at the first Steering Committee meeting (max. score 30). The instructions given to workshop attendees, as well as a copy of the scoring tool are outlined in Figure 13. In total, 115 indicators were ranked by the Committee and Stream Heads, with these indicators being supported by a total of 156 measures (e.g. child oral health status was voted on during the prioritisation process, with its two suggested measures being % of children caries free at 5 years and mean DMFT scores at 12 years). Participants were asked to score each indicator on its public health importance and it was this ranking which determined whether an indicator would progress to the Medium List. They were also were asked to comment on the suitability of the proposed measures, with this information only being considered if the indicator was subsequently retained. At the end of the voting process, participants were asked to (electronically) total their

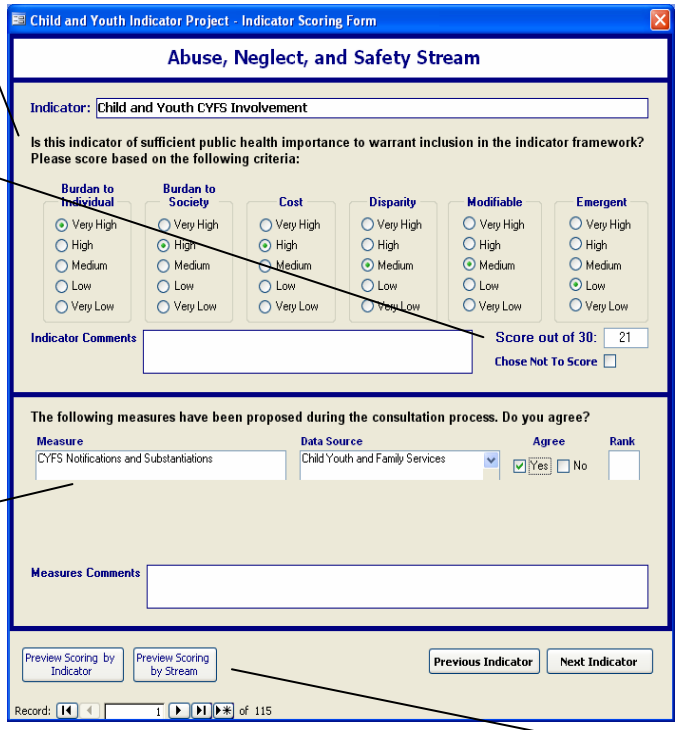
responses, review their overall balance, and then if an indicator had scored higher or lower than they had intended, to go back and rescore it against the original selection criteria. It was hoped that this additional step would serve to ensure balance across the indicators selected, as well as to highlight any unintentional shifts in voting style which may have occurred as voting progressed. In total 13 participants took part in this first round of prioritisation, with the group comprising a mixture of paediatricians, child health managers / nurses, representatives of non-Government organisations and epidemiologists. The results of this first round are listed in Appendix 2.

Figure 13. The Electronic Scoring System Used During the First Round of Prioritisation

Score each **indicator** according to the criteria determined at the last Steering Committee meeting

Once you score by each criterion the total score will appear in this box. If you chose not to score using all the criteria then you won't get a total, but your score for Disparity for example can still be included in the group ranking. The group ranking takes the average score for each criteria and adds them together to create a group total score

The suggested **measure** for each indicator is found here. Sometimes there will be more than one. You can indicate whether or not you agree with the measure, and if there is more than one measure, rank them in order of importance by typing a number in the rank box.



Previewing Your Ranking
You can preview your overall ranking or your ranking in stream at any time by clicking on these buttons. Any indicator not fully scored by criteria will appear at the bottom of the list because it will not receive a total score.

The electronic voting process took approximately 90 minutes, with the group's overall results being fed back to participants during the latter part of the afternoon. Participants then considered for elimination, the 20 indicators with the lowest overall scores, as well as the lowest ranked indicators in each stream. After discussions as to the most appropriate methodology, it was decided that, in order to ensure balance, it would be the bottom ranked indicator in each stream which would be considered for elimination. This allowed consideration to be given to whether the indicator in question represented the only potential measure in a particular area. This process resulted in 20 indicators being selected for elimination and a *Medium List* of 95 indicators progressing on to the next round of consultation.

Phase 4: Consultation on the Draft Indicator Framework, Medium List of Indicators and a "Top 12" Subset

The aims of the stream based consultation phase were to assemble a balanced *Long List* of indicators which included all of the major issues in child and youth health and to develop a draft theoretical framework which considered the relationships between them. While this phase of consultation took into account the views of ~60 individuals or representatives of organisations, it was felt that in order to ensure the indicator framework met the needs of those working in the health sector, the next consultation phase would require the input of a wider audience. The overall aims of this next phase were thus:

1. To assemble a draft indicator framework using the *Medium List* of indicators and the theoretical model developed to date and to circulate this framework as widely as possible within the health sector, by means of a consultation document.
2. To consult more widely before narrowing the *Medium List* of indicators down to the final indicator set, in order to ensure that no vital areas had been overlooked.
3. To determine whether the current theoretical model, with its four hierarchical domains and its lifecourse dimension was supported by the health sector, or whether alternative models might be more appropriate.
4. To select from the draft framework, a balanced subset of ~12 indicators, which could be used to represent child and youth health issues in the context of total population reporting.

In order to achieve these objectives, in the weeks following the second Steering Committee meeting, a consultation document was developed. This document outlined the rationale for the project, presented the framework developed to date, and requested feedback on its structure and the indicators contained within it. In addition, the framework was presented at a number of meetings of child and youth health professionals, and towards the end of this phase of consultation a voting document was circulated, which requested participants to recommend a subset of 12 child and youth heath indicators, which could be used to represent child and youth health in the context of total population reporting. The following sections discuss each of these steps in turn.

The Child and Youth Health Indicator Project Consultation Document

During this phase of the project, a consultation document was developed which could be used to facilitate consultation on the draft framework within the health sector. This document, which is reproduced in Appendix 3 was divided into two main parts:

1. **A Backgrounder** which briefly outlined the monitoring framework developed to date and the methodology used in its development.
2. **A Questionnaire** which posed a number of questions relating to the draft framework and the indicators in the *Medium List*. The questionnaire was divided into two sections, with **Section A** including questions relating to the structure of the framework and **Section B** including questions on individual indicators. In Section A, questions were asked about the domain, lifecourse and culture dimensions of the framework, with respondents being asked whether they generally agreed with the inclusion of these dimensions, and whether anything

needed to be added, deleted or changed. In Section B, respondents were asked to rate each indicator in the Medium List as to whether it was: (1) of no use; (2) optional; (3) essential and space was provided to comment on the individual measures proposed.

With a view to disseminating this document as widely as possible within the sector, it was sent to a range of individuals and organisations including:

1. The Paediatric Society of New Zealand List Server, which electronically links approximately 350 health professionals working with children and young people.
2. The National Child Health Manager's group
3. Non-Government Organisations with an interest in child and youth wellbeing.
4. A range of DHB child and youth advisory committees and funding and planning managers.
5. A range of Ministry of Health advisory committees.
6. Paediatric academic units and individual academics with an interest in child health.

In total 41 formal responses were received during this phase of consultation. These 41 responses reflected 30 individual responses, 4 small group responses and 7 responses on behalf of organisations. While the majority of responses were supportive of the process used to date, a number of suggestions were also put forward as to how the framework might be improved. These suggestions, which are discussed in more detail in the section on Phase 5 which follows, were presented to the Steering Committee at their third and final meeting, and were used to guide the Committee in the development of the final indicator framework.

Oral Presentation of the Framework

In addition the proposed framework was presented orally at a number of different venues and formal responses were invited, by means of the consultation document. These venues included:

1. The National Child Health Managers Meeting (Wellington July 27th)
2. The National Mokopuna Ora Conference (Auckland, August 24th-25th)
3. Taranaki DHB (New Plymouth October 5th)
4. The National Child Health Summit (Christchurch October 11th)
5. A Workshop at the Ministry of Health (Wellington October 19th)
6. The Paediatric Society of NZ Annual Scientific Meeting (Nelson, November 1st-3rd)

The Top 12 Indicator Vote

Towards the end of this period, and once the child and youth health sector had become familiar with the project, a second consultation document, the *"Top 12" Voting Form*, was circulated via the Paediatric Society's list server. Copies were also given to all delegates attending the Paediatric Society's Annual Scientific Meeting in November (Appendix 4). The preamble on this voting form noted that while the proposed framework aimed to provide a comprehensive coverage of all of the major issues in child and youth health, the health sector would also require a subset of indicators, which could be used to represent child and youth health issues in the context of total

population health reports. In selecting a "Top 12", participants were advised to select the 12 indicators they felt best achieved balance between:

- All stages of the life course from birth → 24 years
- A broad range of health issues (e.g. chronic disease, respiratory, reproductive)
- Issues which are emerging, modifiable, inequitably distributed or under resourced
- Where possible, indicators needed to be based on routinely available data

The Top 12 voting process was also supported by a workshop at the Paediatric Society's Annual Scientific Meeting, at which time the rationale for the process was outlined and feedback was invited. In total 112 individuals participated in the Top 12 vote, with the majority of respondents being health professionals working with children and young people (e.g. paediatricians, child and youth health nurses, allied health professionals, clinical academics). The results of this vote were then fed back to the Steering Committee at their third and final meeting, at which time they were used to guide the selection of a final Top 20 Indicators of Child and Youth Health.

Phase 5: Integrating Consultation Feedback into the Final Monitoring Framework and Development of a "Top 20" Subset

A third and final meeting of the Steering Committee was held in January 2007, with the aim of incorporating the feedback from the sector wide consultation into a final monitoring framework. The objectives of this meeting were to:

1. Use the results of the "Top 12" vote to develop an indicator subset which could be used to represent child and youth heath issues in total population health reports.
2. Use the results of the sector wide consultation to pare the *Medium List* of indicators down to a final recommended set.
3. Use feedback relating to the overall structure of the framework to develop a final theoretical model which reflected the views of the heath sector.

During the course of their final meeting, the Steering Committee addressed each of these issues in turn, with the methodology used during each stage being outlined in the sections which follow.

The Development of a Top 20 Indicator Subset

In order to facilitate the development of a balanced subset of indicators, which collectively represented the key issues in child and youth health, the results of the "Top 12" vote were presented to Steering Committee members. The results reflected the views of 112 respondents, the vast majority of whom were health professionals working with children and young people. While it would have been relatively straight forward just to select the 12 most frequent responses, a brief perusal of the results suggested that in a number of cases the vote for similar issues may have been split (e.g. Immunisation was ranked 3rd and Vaccine Preventable Diseases 4th) and that in the majority of cases, the Top 12 Vote favoured health outcomes rather than determinants, although most of these determinants were ranked in the top 25. Thus, after a lengthy discussion it was decided that:

1. The Committee would consider for inclusion, each of the 25 highest ranked indicators.

2. A number of indicators could be merged to provide coverage of related issues e.g. the immunization indicator would include a sub-section on vaccine preventable diseases.
3. In order to achieve a more balanced indicator subset, and one which allowed the sector to consider some of the more important determinants of health, alongside traditional health outcomes, a "Top 20" indicator subset would be developed which comprised a "Top 12" *Outcomes*, a "Top 4" *Risk and Protective Factors* and a "Top 4" Socioeconomic and Cultural Determinants.

Having reached this consensus view, the Committee then reviewed each of the 25 highest ranked indicators arising from the "Top 12" vote and using the selection criteria developed at the beginning of the project, developed the "Top 20" subset outlined in Table 36.

Table 36. Final Top 20 Child and Youth Health Indicators

Individual and Whanau Health and Wellbeing	Socioeconomic and Cultural Determinants	Risk and Protective Factors
• Most Frequent Causes of Hospital Admission & Mortality • Low Birth Weight: Small for Gestational Age, Preterm Birth • Infant Mortality • Oral Health • Injuries Arising from Assault in Children • Total and Unintentional Injuries • Serious Bacterial Infections • Lower Respiratory Morbitidy and Mortality in Children • Selected Chronic Conditions: Diabetes and Epilepsy • Disability Prevalence • Self Harm and Suicide • Teenage Pregnancy	• Children in Families with Restricted Socioeconomic Resources • Household Crowding • Educational Attainment at School Leaving • Primary Health Care Provision and Utilisation	• Breastfeeding • Overweight & Obesity • Exposure to Cigarette Smoke in the Home • Immunisation

The Development of a Final Comprehensive Indicator Set

Having developed of a "Top 20" Indicators of Child and Youth Health, the Committee then turned its attention to the other end of the list and focused on to those indicators which had received the lowest rankings during the various stages of prioritisation. The Committee was advised that, due to resource constraints, it would be necessary to cull a number of indicators from the current *Medium* List of ~95 indicators in order to achieve a more manageable Final List of 70-75 indicators. To assist them in this task, the committee were provided with three lists:

1. The *Long List* of indicators, ranked according to the scores assigned during electronic voting at the 2nd Steering Committee meeting (n=13 participants)

2. The *Medium List* of indicators, ranked according to the votes received by the "Top 12" Vote (n=112 participants).
3. The *Medium List* of indicators, ranked according to the scores assigned by individuals, small groups and organisations responding to the consultation document (n=41 responses).

As each of these lists had been produced for a slightly different purpose (e.g. the Top 12 Vote considered which indicators should be included, rather than which should be left out; the prioritised *Long List*, while addressing which issues should be left out, was based on the views of only 13 participants), Committee members were advised to place a greater weight on the results of the formal consultation process (n=41), but to take each of these lists into consideration when deciding which indicators could be dropped from the framework.

In deciding which indicators to cull, the Steering Committee considered the 30 indicators which had received the lowest scores in the formal consultation feedback, as well as how this "bottom" 30 correlated with the "bottom 30" in the other two lists. Each "bottom 30" indicator was assessed by the Committee, with reference to how it measured up against the project's selection criteria, as well as whether other indicators within the framework could provide coverage of this particular area. In addition composite indicators, which had been suggested during the course of the consultation, but for which there was no developed methodology, were also considered for removal.

This process resulted in a total of 20 indicators being removed from the framework, although in the majority of cases, elements of these were retained in the context of other indicators (e.g. while contraception use amongst young people culled due to a lack of available data, a recommendation was made that contraception use be discussed in the contextual information accompanying the sexually transmitted infections indicator). Similarly, while a number of indicators were culled on the basis of a lack of a clearly developed methodology (e.g. housing costs vs. incomes for those in low income brackets), it was recommended that a number of these be highlighted in the Indicator Handbook as areas for future development. Figure 14 outlines the indicators eventually selected for inclusion in the *Final List*, arranged according to the domains and streams of the final monitoring framework.

Incorporating Other Feedback into the Final Monitoring Framework

In addition to feedback on which issues should be selected for monitoring over time, consultation within the sector raised a number of other issues which needed to be considered in the final stages of framework development. These included:

1. A number of comments reflected the paucity of indicators reflecting the emotional health of children, or the relational aspects of development i.e. the need to develop indicators which relate to attachment relationships, whanau relationships, and social connectedness to the wider community. While the paucity of routinely available data with which to derive such indicators precluded their inclusion as measures in their own right, it was decided that such issues needed to be highlighted the contextual information accompanying indicators which were relevant to this area (e.g. family composition), as well as when explaining some of the relational aspects of the lifecourse dimension.
2. Others suggested that the order of the framework should be reversed to reflect a greater emphasis on individual outcomes, with higher level historical and policy factors being included towards the back of future reports. The rationale for this suggestion was that moving downwards from the historical, policy and macroeconomic context focused on the pressures placed on the child and formed a negative causal framework, whereas the reverse order might better reflect a strengths-based approach. While this suggestion was considered

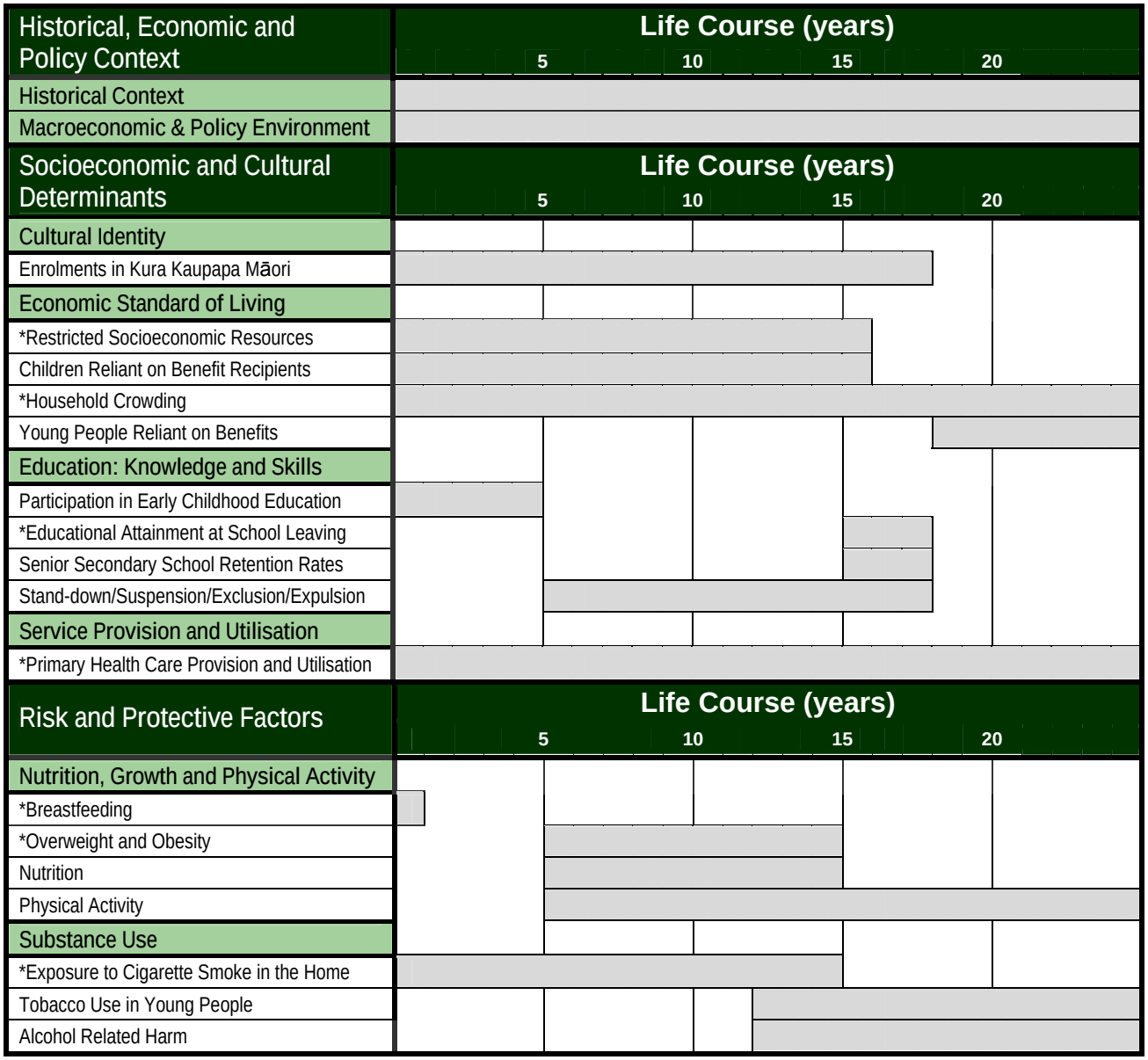
seriously by the Steering Committee, in the end it was felt that the for the time being the existing hierarchical structure served to re-emphasise the influences of the wider determinants of health, to a heath sector who were already very familiar with managing outcomes at the service delivery level.

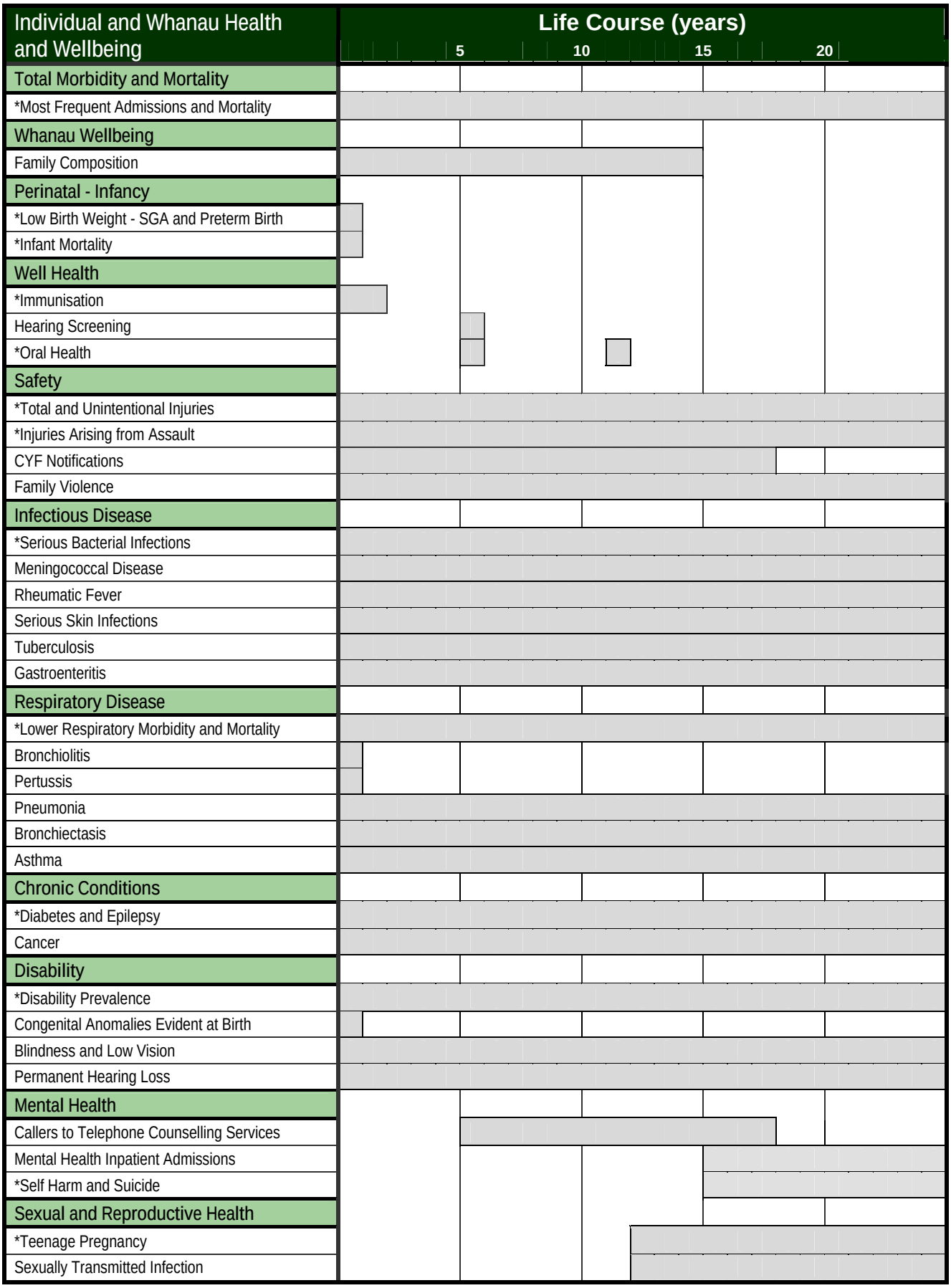
3. A number of comments also reflected the need to ensure that Pacific and Asian world views were taken into consideration when developing the framework, as well as the experiences of refugees and new migrants. Since the end of the consultation period, a Steering Group has been assembled by the Ministry of Health to oversee the production of a Pacific Child and Youth Health Report based on the indicators contained in this Framework. It is hoped that this project will serve to ensure that the framework can be used to meet the needs of Pacific children and young people. At the time writing however, no similar projects have been developed for Maori or Asian / Indian children and young people.
4. Feedback was also received that the framework placed too greater an emphasis on the social causes of health and did not cater enough for the needs of children with chronic conditions e.g. epilepsy. The Committee acknowledged the current paucity of information on chronic conditions in the framework (which was partly driven by the lack of available data), and recommended that a chronic conditions composite indicator be added to the “Top 12” outcomes list in order to ensure the needs of these children were given priority within the sector. In the absence of a routine ongoing data source, this composite “indicator” was to be derived from a review of available local data, with extrapolations from overseas work being used to fill in the gaps as necessary.

Conclusion

The sections above have outlined the methodology used by the Project Team to develop a child and youth health monitoring framework for New Zealand. While the final framework is outlined in Figure 14 below, details on each of the indicators contained within it, as well as recommendations as to the contextual information which should accompany each indicator are provided in the Indicator Handbook which accompanies this report. This Handbook also contains instructions on how this framework can be used to consider the relationships between indicators, as well as the most appropriate levels for intervention on issues of particular concern. Before reading this Handbook however, the reader is urged to consider the recommendations outlined in the fourth and final section which follows, which discuss the additional steps which may be required to ensure that the framework developed as a result of this project, will be used to achieve health gains for New Zealand’s children and young people.

Figure 14. The Final Child and Youth Health Monitoring Framework





Note: *Indicators included in the Top 20

Section 3: Summary and Final Recommendations

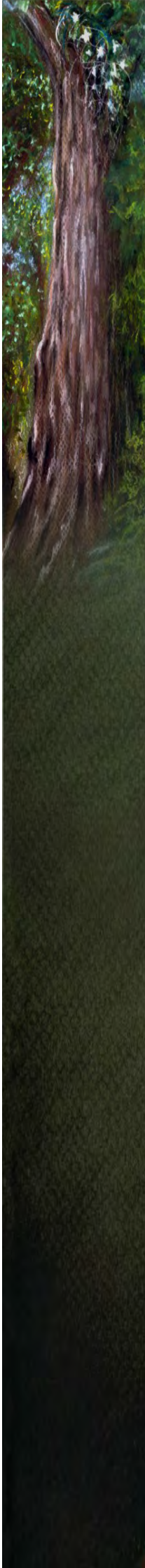
Summary and Recommendations

This report has explored New Zealand's recent approaches to monitoring the health status of its children and young people, as well as the work undertaken by other developed countries in this area. It has also outlined the methodology used by the Child and Youth Indicator Project Team to develop a monitoring framework for use by the New Zealand health sector. The final section of this report briefly reviews the main findings of the New Zealand and overseas literature reviews and the monitoring framework developed during the course of this project, before making a series of recommendations on action which may be required to ensure that this framework is used in a manner which achieves maximal health gains for New Zealand children and young people.

Main Findings of Literature Reviews

During the course of this project, two literature reviews were undertaken. The first explored New Zealand's recent approaches to monitoring the health of its children and young people, while the second explored the evolution of population health surveillance and the work other developed countries had undertaken in this area. These reviews revealed a number of findings which were of relevance to this project. These included:

1. In New Zealand at present, there are a large number of Government and non-Government agencies with an interest in child and youth health. There is also a wealth of routinely collected data on child and youth health outcomes (e.g. hospital admissions, mortality, births, oral health, hearing), as well as on their determinants at a population level (e.g. education, income, family composition). In some cases this information has been collected for more than a decade in a consistent format (e.g. mortality, hearing screening, oral health), making valid time series comparisons possible. As a consequence, many of the building blocks are already in place for developing a child and youth health monitoring framework for New Zealand.
2. New Zealand's monitoring approaches to date have been characterised by fragmentation and duplication of effort, with no child and youth focused reporting series going beyond a 3rd edition and longer term total population series being terminated as a result of health sector restructuring. Such fragmentation means population child and youth health in New Zealand remains in the early stages of its evolution, with the focus remaining on the collation of data and preparation of reports, rather than on developing methodologies via which the information thus produced, can be used to achieve maximal health gains for children and young people.
3. The lack of consistent selection criteria to govern which indicators are monitored over time, as well as a preference for indicators for which there are routine data sources, has meant that, despite the considerable investment to date, the health sector still does not have a comprehensive map of all of the important issues in child and youth health, which can be used to guide Health Needs Assessment and the prioritisation of resources. Similarly, the lack of a common theoretical model which governs the type of indicators included in monitoring, as well as how the relationships between them are portrayed, may have hindered the development of a common dialogue within and between sectors, on how disparities in child and youth health can be addressed.



4. Overseas, the field of population health monitoring is evolving rapidly, with attention now being paid to indicator definitions, appropriate selection criteria and the development of comprehensive theoretical frameworks which pictorially represent the complex interrelationships between the social and economic environment, risk and protective factors and health outcomes at a population level. While no country or group of countries have ever developed identical frameworks for monitoring the wellbeing of their children and young people, the methodologies used by many countries are similar, potentially providing guidance for New Zealand in this area.

The New Zealand Child & Youth Health Monitoring Framework

By combining the information contained in the reviews above, with feedback from those working with New Zealand children and young people, the Project Team developed a child and youth health monitoring framework which it felt best met the information needs of the health sector. This framework had a number of key features and functions as follows:

1. The framework blended the features of population health monitoring, with those of Health Needs Assessment, to provide a balanced map of all of the important issues in child and youth health. In order to ensure this map could be used for prioritisation and strategy development, a high priority was placed on selecting indicators on the basis of their public health importance, as well as on the use of non-traditional data sources to fill in gaps, when routine data was unavailable.

2. A high priority was also placed on developing a theoretical model which governed the types of indicators included in the framework (e.g. policy, socioeconomic, risk and protective factors), as well as the ways in which the relationships between them were portrayed. The framework's two-dimensional structure, which located each indicator's position on the causal pathway linking higher level historical and policy factors → individual health outcomes, as well as its influence across the lifecourse from birth → 24 years, also allowed for the identification of the most appropriate levels for intervention, which were based on an understanding of the pathways involved.

3. By bringing together elements of pre-existing frameworks utilised by the Ministries of Health and Social Development, as well as pre-existing indicators developed by the Ministry of Education, it was also hoped that a basis for common dialogue across sectors could be established, which would allow for intersectoral action to be planned with a shared understanding of the issues involved.

Recommendations

The development of this framework offers the health sector a new beginning, in terms of monitoring child and youth health in this country, as well as the potential for greater coordination of action within and across sectors. Its ultimate success however, will depend on a number of other processes and structures being put in place, which ensure that the information thus produced will actually be used to achieve health gains for New Zealand's children and young people. The following section presents a number of recommendations as to the type of action which may be required, to ensure that New Zealand achieves its objectives in this area. These include:

1. During the past decade there have been a large number of reports on the wellbeing of New Zealand children and young people. These reports have often been

released within 1-2 years of each other and frequently contain very similar content. Yet no one agency has been able to produce a comprehensive review of child and youth health that has run to more than two editions and the monitoring of more limited baskets of indicators has often been cut short by health service restructuring. If New Zealand is to develop a strategic approach to improving the health of its children and young people, this fragmentation and duplication of effort needs to stop. The New Zealand health sector needs to make a commitment to monitoring the health of its children and young people and to allocate resources to this end.

2. A single national agency needs to assume responsibility for monitoring child and youth health and for setting a timetable for reporting which meets the health sector's needs. This monitoring agency needs to be set up in such a way that it is resistant to health sector restructuring, yet at the same time is flexible, so that new indicators can be added as new issues emerge, or new data sources come on line. In addition, to ensure its ongoing relevance, the framework used by this monitoring agency needs to be updated at least once every 5 years.

3. Once an organisational structure for ongoing monitoring has been established and timelines put in place for its periodic review, the technical aspects of monitoring need to move into the background, with the focus being directed towards developing systems which ensure that the information thus produced is used to improve the health of children and young people. In achieving this aim, monitoring needs to be viewed as the first stage in Health Needs Assessment, with subsequent stages including the review of current strategies and health services and a formal assessment of where these are not meeting population health needs. Traditionally, this is followed by a round of prioritisation that determines which issues are to be awarded the highest priority in the short, medium and longer term. Implementation of strategies to address priority areas is then followed by an evaluation of their effectiveness. The cycle begins anew with another evaluation of the health status of the population. Unless processes can be put in place which integrate child and youth health monitoring with these prioritisation and planning cycles, it is unlikely that the information thus produced will be used to maximal advantage. Because the level of integration which currently occurs is different at a national and regional level, recommendations in each of these areas are addressed in turn.

4. At a regional level, health information is already integrated into DHBs prioritisation and planning processes, with DHBs having completed two full cycles of HNA. A review of the latest round of these HNAs however suggested that the child and youth health information contained within these reports is extremely variable, with the number of issues covered and the contextual information accompanying each indicator differing markedly from region to region. It is thus recommended that the "Top 20" indicator subset arising from this project should be considered by DHBs when planning their total population HNAs, and that more detailed reviews using the entire framework should be considered by regional Child and Youth Health Services, either on an ongoing basis or at a minimum, prior to embarking on child and youth health strategy development.

5. At a national level, no comparable infrastructure exists which allows for a regular cycle of population HNA and for the ongoing prioritisation of issues in child and youth health. As a consequence, the potential exists for strategy development to occur differently in 21 DHBs and for the MOH to have difficulties in coordinating action in this area. At a minimum, it is thus recommended that the MOH produces a national child and youth health report, based on this framework at least once every

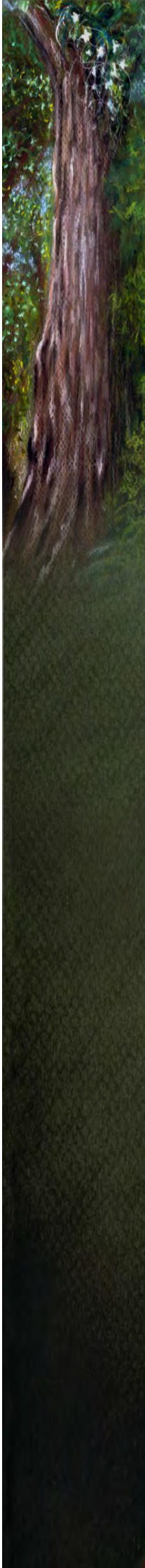
three years, with the reporting cycle coinciding with the DHBs HNAs. In addition, as is occurring at a DHB level, it is recommended that a process of ongoing evaluation and prioritisation be put in place nationally, so that at any given moment the health sector is aware of the current priorities in child and youth health, as well as interventions planned to achieve gains in key priority areas. While an infrastructure to facilitate this process would need to be developed, at bare minimum a series of annual prioritisation workshops would need to occur, so that regional and national level strategies could be developed in a coordinated manner. Such ongoing national prioritisation might also allow for the development of a series of evidence based reviews, which could assist those working within the sector to implement action in key priority areas (e.g. if youth smoking was identified by the sector as a key priority area, a review of the current evidence base for successful youth smoking programs could be commissioned, which outlined potential ways forward for DHBs and PHOs working in this area). Over time, the serial collation of these reviews (e.g. 1-2 per year) could form the basis of a "Living Child and Youth Health Toolkit", which provided the evidence base for implementing action across the sector. Having implemented strategies and interventions as a result of this prioritisation process, the framework could then be used to monitor progress in the same priority areas, allowing programs to be fine tuned, or to be re-evaluated if population health gains were not occurring as initially expected.

6. Feedback following presentation of the draft framework at the National Mokopuna Ora conference would also suggest that separate national level reports may also be needed to assess the health of Maori (and Pacific) children and young people. While such reports might be based on a framework similar to that developed during this project, it is likely that additional resource would be required to ensure that the information thus produced was interpreted within the context of a Maori (or Pacific) world view. In addition, the marked health disparities experienced by Maori and Pacific children and young people, would also suggest that additional national level prioritisation processes may be necessary, in order to ensure that their health needs are addressed in a manner which reflects the priorities of the communities in which they are living.
7. In addition, a large number of other recommendations arose during the course of consultation. Many of these are issue specific and are included in the relevant sections of the Indicator Handbook. In general terms however, these related to the paucity of data on issues such as disability and child mental health and the need to further develop data collection systems which provided information in these key priority areas. A number of more specific recommendations also related to the need for more appropriate measures to assess particular aspects of child and youth health (e.g. the most appropriate measures to assess oral health outcomes).
8. Finally, while the "Top 20" indicator subset was developed to provide guidance on the most appropriate balance of indicators to represent child and youth issues in the context of total population reports, it was never intended that this subset should be used to determine which issues should receive the greatest priority in terms of resource allocation or strategy development. It is thus recommended that the "Top 20" subset be re-evaluated during the first round of national level prioritisation, and only after this has occurred, should the subset be used to reflect the health sector's key priorities in child and youth health.

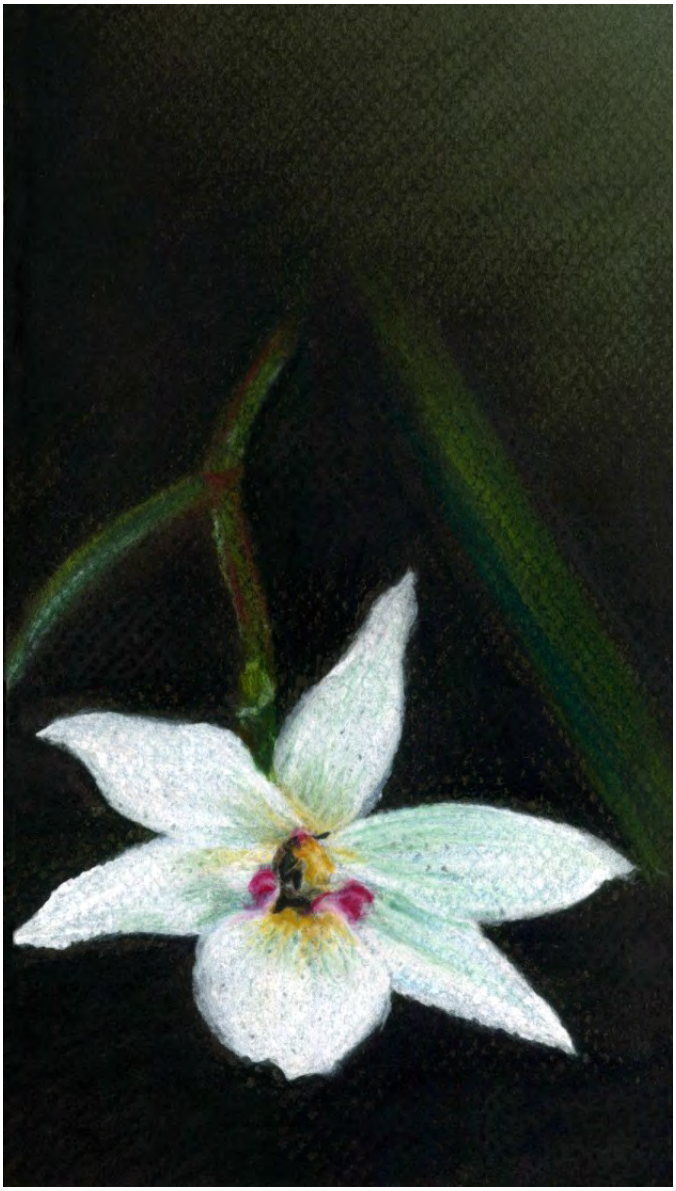
Conclusion

As the previous sections have indicated, New Zealand is in urgent need of a coordinated national approach to monitoring the health of its children and young people. While the health status of many of New Zealand's children and young people is

good, others experience a disproportionate burden of morbidity and mortality, which in many cases is intimately related to the socioeconomic environments in which they live. It is hoped that this monitoring framework will in some way contribute to the development of a coordinated plan of action to address some of the issues faced by the most vulnerable group in our population and to secure a healthy future for all New Zealanders.



Appendices and References



Appendix 1: Construction of the Long List of Potential Indicators

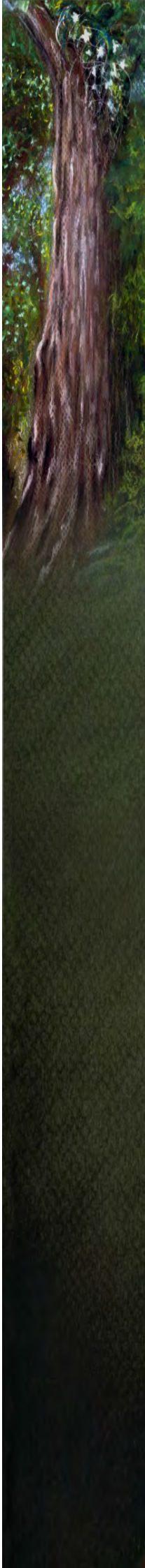
Results of the Literature Review for Construction of the Long List of Potential Indicators: Reports and Publications

Table 37. Reports and Publications used to Construct the Long List of Potential Indicators

1995	
Midland Health	The People of the Midland Health Region; Volume 2: Health Status; Part 1: Infants and Children
1997	
Ministry of Health	Progress on Health Outcome Targets 1997
1998	
Ministry of Health	Our Children's Health. Key Findings on the Health of New Zealand Children
Statistics NZ	New Zealand Now: Young New Zealanders
1999	
Ministry of Health	Taking the Pulse: The 1996/97 New Zealand Health Survey New Zealand
Statistics NZ	Now: Children
2000	
Howden-Chapman P, Tobias M	Social Inequalities in Health - New Zealand 1999
Ministry of Social Development	Children in New Zealand: Strengthening Families report on cross-sectoral outcome measures and targets 2000
Ministry of Social Development	New Zealand Living Standards 2000
Organisation for Economic Co-operation and Development	Literacy in the Information Age: Final Report of the International Adult Literacy Survey
Te Puni Kokiri	Progress Towards Closing Social and Economic Gaps Between Maori and non-Maori
Te Puni Kokiri	Whakapakiri - Tikanga Oranga Hauora
2001	
Alcohol and Public Health Research Unit	Drinking in New Zealand: National Surveys Comparison 1995 and 2000
ANZNN	Report of the Australian and New Zealand Neonatal Network
Graham D, Leversha A, Vogel A	The Top 10 Report
Ministry of Health	Fetal and Infant Deaths
New Zealand Government	Follow-up to the United National World Summit for Children 1990: New Zealand Government Report
Public Health Intelligence	Indicators of inequality: Classification and selection of ethnic health disparity indicators

2002	
Blaiklock A, Kiro C, Belgrave M, et al	When the Invisible Hand Rocks the Cradle: New Zealand Children in a Time of Change - UNICEF Innocenti Working Paper No. 93
Child Poverty Action Group	Backgrounder 20: Poverty, Primary Care, and Child and Youth Health
Treasury	Investing in Wellbeing: An analytical framework
Ministry of Education	PISA 2000: The New Zealand Context
Ministry of Health	New Zealand Youth Health Status Report
Ministry of Health	NZ Food NZ Children: National Children's Nutrition Survey 2002
Statistics NZ	Disability Counts 2001
Statistics NZ	Cultural Experiences Survey 2002
UNICEF	A League Table of Teenage Births in Rich Nations : Innocenti Report Card No 3. July 2001
Wilkins, Casswell, Bhatta, et al	Drugs in New Zealand National Survey: National Surveys Comparison 1998 & 2001
Adolescent Health Research Group	New Zealand Youth: A Profile of their Health and Wellbeing 2001
Child Poverty Action group	Our Children: The Priority for Policy
Barnados	Children and Young People in New Zealand: Key Statistical Indicators
Cosgrove R, Bishop F, Bennie N	Attendance and Absence in New Zealand Schools in 2002
2003	
International Association for the Evaluation of Educational Achievement	Trends in International Mathematics and Science Study (TIMSS)
Jellyman, T	Child and Youth Health Needs Assessment for Papakura and Franklin
Ministry of Justice	New Zealand National Survey of Crime Victims
National Audiology Centre	National Hearing Screening Statistics July 2001-June 2002
Clark, P	Integrated Effective Service Provision for Children and Young People with Disabilities: Database Project
Sports and Recreation New Zealand	SPARC Trends: Trends in Participation in Sport and Active Leisure
UNICEF	Making New Zealand Fit for Children: Promoting a national plan of action for a New Zealand children
2004	
Child and Youth Mortality Review Committee	Child and Youth Mortality Review Committee: First report to the Minister of Health: 1 January 2002 to 30 June 2003
CYFS	Department of Child Youth and Family Services, CYFS Annual Report 2004
Galgali, G and Jack, F	An Update: Dental Health Status of Children in the Auckland Region
Ministry of Education	Progress in International Reading Literacy Study (PIRLS): A Summary of New Zealand's Year 5 Student Achievement 2001
Ministry of Health	Report on Maternity
Ministry of Health	Indicators of DHB Performance 2003/2004
Ministry of Health	A Portrait of Health: Key Results of the 2002/2003 New Zealand Health Survey
Ministry of Health	Child and Youth Health Toolkit

2004	
Ministry of Health	Tupu Ola Moui Pacific Health Chart Book 2004
Ministry of Social Development	Children and Young People: Indicators of Wellbeing in New Zealand
Spier, P	Conviction and Sentencing of Offenders in New Zealand
2005	
Auckland City Council	Quality of Life in New Zealand's Largest Cities
Australian Council on Healthcare Standards	ACHS Clinical Indicator Results for Australia and New Zealand 1998-2004: Determining the potential to improve quality of care
Ministry of Education	Tertiary Education Strategy: Monitoring Report 2004
Ministry of Education	Education Counts - Indicators
Ministry of Health	Te Orau Ora Pacific Mental Health
Ministry of Health	Tobacco Facts
Ministry of Social Development	The Social Report 2005
Ministry of Social Development	The Statistical Report for the year ending June 2004
New Zealand Paediatric Surveillance Unit	New Zealand Paediatric Surveillance Unit Annual Report
NZ Child and Youth Epidemiology Service	The Health Status of Children and Young People in New Zealand DHB's
Public Health Intelligence	An Indication of New Zealander's Health 2004
2006	
Action on Smoking and Health	Report of the 1999-2005 National Year 10 Smoking Surveys
Asher, I and Byrnes, C	Trying to Catch Our Breath
Injury Prevention Research Unit	A Chart Book of the New Zealand Injury Prevention Strategy Serious Injury Outcome Indicators for Children: 1994-2004
Institute of Environmental Science and Research	Notifiable And Other Diseases In New Zealand Annual Report 2005
Institute of Environmental Science and Research	Sexually Transmitted Infections in New Zealand Annual Surveillance Report 2005
Ministry of Health	Asian Health Chart Book
Ministry of Health	Cancer: New Registrations and Deaths 2002
National Audiology Centre	New Zealand Vision and Hearing Screening Report July 2005 – June 2006
Public Health Intelligence	Tatau Kahukura Maori Health Chart Book

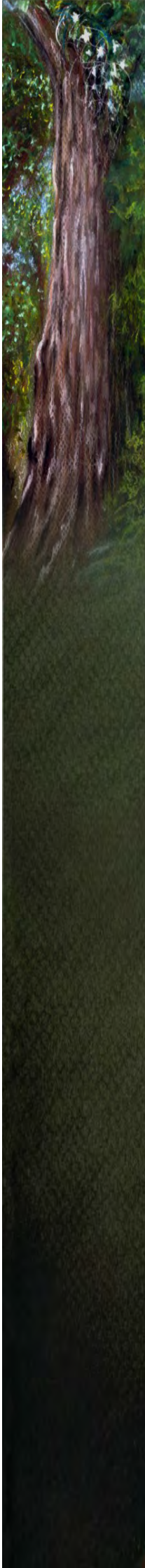


Long List of Potential Indicators constructed from a Literature Review and Suggestions received during Consultation

Indicators are highlighted in Bold
Measures are in plain text if derived from literature review
Measures are in italics if suggested during the course of consultation

Table 38. Long List of Potential Child and Youth Health Indicators Arranged by Stream

Abuse, Neglect, and Safety Stream	
Abuse and Neglect Hospital Admission Assault - Serious Fatal and Non-Fatal Injury Assault Admissions Assault, Neglect and Maltreatment Admissions Injury Hospitalisation - Intentional Intentional Injury (Assault and Self Harm) Serious Non-Fatal **Abuse and Neglect Mortality** Assault Mortality Assault, Neglect and Maltreatment Mortality Injury Mortality Rate - Intentional **Child and Youth CYFS Involvement** Barnardos supervised access service Child abuse and neglect as assessed following CYF notification CYFS Client Profile CYFS Notification Findings CYFS Notifications CYFS Notifications Requiring Further Investigation CYFS Number of Family Group Conferences CYFS Number of Family/Whanau Agreements CYFS Number of Unallocated Cases CYFS Out of Family Care and Protection Services CYFS Placements CYFS Re-notifications and Recurrences	**Criminal Justice System Involvement** Convictions for Child Related Violent Offences Convictions for Sexual Offences against Children Police Statistics on Offences against Children **Domestic Violence** Domestic Violence - Women's refuge use Police Attendance at family violence Witnessing violence in the home **Safety** Feel safe at school Households with Preschoolers - Access to safe fenced outdoor play area Internet Safety Neighbourhood Safety - Perceptions of individuals Neighbourhood Safety for Children - Perceptions of residents **Victim of Abuse / Crime** Child Prostitution Intimidation at School / Bullying Physical Abuse Prevalence Physical assault at school Sexual Abuse - Gonorrhoea in Children Aged < 14 Sexual Abuse Prevalence Sexual Assault - Crime Victim Sexual Assault - Harassment *Sexual assault in young people 16-24 years* Victim of Crime
Chronic Disease Stream	
Cancer Cancer - Brain Cancer Mortality Cancer - Cervical and Carcinoma in Situ Cancer - Leukaemia Mortality Cancer Hospitalisation Cancer Mortality Cancer Prevalence Cancer Registrations **Cardiac Disease** Heart Disease Prevalence Hypertension Prevalence **Chronic Disease Hospital Admissions** Chronic Conditions Causing Hospitalisation **Diabetes** Diabetes Complications Diabetes Hospitalisations Diabetes Incidence Diabetes Prevalence **Eczema and Allergy** Allergy Prevalence *Eczema - Admissions for Infection* Eczema Prevalence	**Metabolic Disorders** Inborn Errors of Metabolism *Congenital Adrenal Hypoplasia Incidence* *Metabolic disorder incidence* *Phenylketonuria Incidence* **Neurological Disease** Epilepsy - Admission to ICU *Epilepsy - Admissions in Status Epilepticus* Epilepsy Prevalence in Secondary School Children *First Specialist Assessment waiting time - tertiary neurology services* Migraine Prevalence in Secondary School Children Seizure Disorder Spinal Disorder Prevalence **Renal** *Dialysis Rates* Idiopathic Nephrotic Syndrome *Kidney Disorder - End Stage Renal Failure* Kidney Disorder Prevalence *Kidney Transplant - Months on dialysis pre transplant* *Kidney Transplant - Rates* *Micturating Cystourethrogram Rates*



Chronic Disease Stream Continued

Gastro-intestinal Disorders
Inflammatory Bowel Disease - Chron's / Ulcerative Colitis

Incontinence Problems
Urinary incontinence

Rheumatology
Arthritis Prevalence in Secondary School Children

Technology Dependant Children
Infants discharged on home oxygen
Technology Dependant Children

Culture Stream

Civic Participation
Library enrolment and usage
Youth Enrolled to Vote
Youth Voting in National Elections

Culture
Importance as being recognised as part of the ethnic group you identify with
Pride in Ethnicity

Iwi Identity
Number of Maori children and youth who report an Iwi

Maori
Maori - Place met extended whanau in the last year
Maori - Source of Education in Maori Culture
Maori Cultural Activities

Spirituality / Religion
Children and youth who report a religious affiliation
Students whose spiritual beliefs are important to them

Te Reo / Language
Children and youth able to speak their own language (Not English) by ethnicity
Languages Spoken
Main Language spoken at home
Maori children and youth who speak Te Reo Maori

Voluntary Work
Number of Youth who engage in voluntary work

Demography Stream

Family Composition
Adoptions by New Zealand Citizens
Children <18 with Divorced Parents
Dependant Children living with One Parent
Divorces
Families with dependent children
Living Arrangements
Marital Status in Youth
Marriages
Number of grandparents living in the same district
People living in extended families
Support - from Grandparents
Type of families (couple with/without children etc)

Household Composition
Children in shared households
Number of People in a Household

Life Expectancy
Independent Life Expectancy at Birth
Life Expectancy - Disability Adjusted (DALE) at birth
Life expectancy at birth
Years of Life Lost (YLL)

Population
Children/Youth as a Proportion of the Total Population
Children/Youth born Overseas
Deprivation of Areas of Residence
Duration of Residence
Ethnicity of Children/Youth
Gender of Children/Youth
Geographical Distribution of Children/Youth
Live Births
Multiple Births
Number of Children/Youth
Pacific Population
Parental Education
Population Fertility Rate
Population Total Births

Population Change
Arrivals of permanent and long term migrants
Five yearly changes in the number of Children/Youth
Net Migration of Children/Youth
Population Growth

Disability Stream

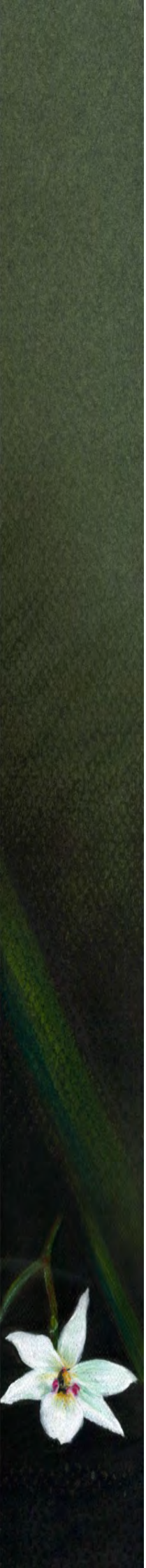
Autism
Autism

Developmental Delay
Developmental Delay Prevalence

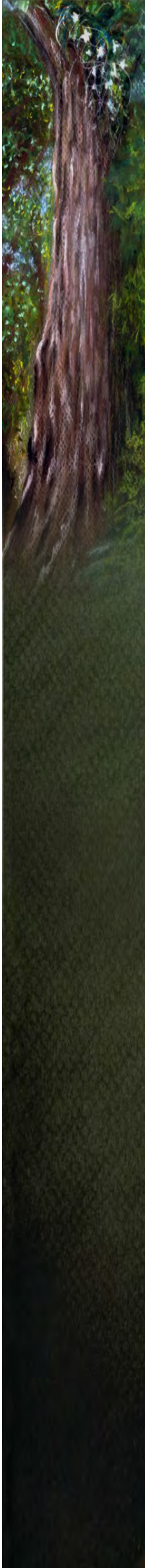
Disability Morbidity
Degenerative Disorders

Augmented communication systems
Femoral osteotomy rates for cerebral palsy
Funded home modifications
Intellectual Disability
Physical Disability
Psychiatric / Psychological Disability
Disability Related to Chronic Health Conditions
Sensory Disability
Disability by Severity of Limitation
Use of technical equipment
Wheelchair provision per capita
Total Disability Prevalence
Total Disability Rate

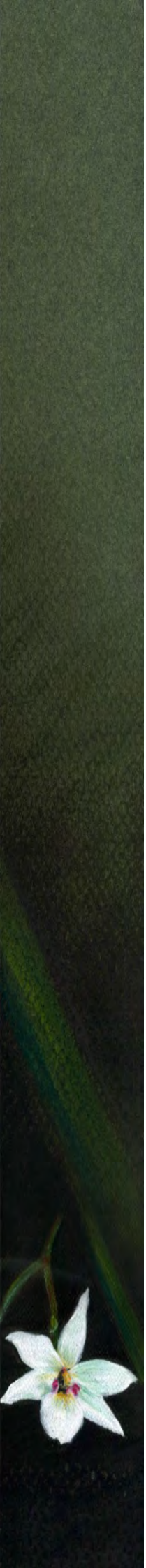
Disability Services / Resources
ACC Claimants - Children with a physical disability
ACC Claimants - Lump Sum or Independence Allowance
Access to needs assessment services
Child Disability Allowance
Disability Allowance
Number of children receiving therapy via the Moderates Needs Contracts
Ongoing and Reviewable Resourcing Schemes (ORRS)
ORRS - Application Success Rates
ORRS - Children with a physical disability
ORRS - Fund holders spending on teachers aides



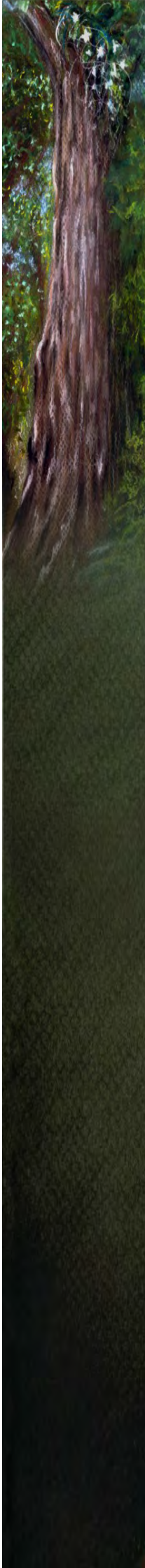
Disability Stream Continued	
Disability Services / Resources Cont… ORRS - Fund holders spending on therapists Taikura Trust Access Type of Health Service Used in the last 12 months Unmet Need for Health Service *Use of Group Special Education*	*Disability support social work services* *Neurodevelopmental Therapists FTE per capita* *Occupational Therapist FTE per capita* *Out of home respite care beds per capita* *Physiotherapy FTE per capita* *Strengthening families meeting called for disability issues*
Education Stream	
Achievement in Education Adults with no formal educational qualification Cross-Curricula Achievement Enrolled in secondary school qualifications Grade distribution for secondary school qualifications Qualification at School Leaving School Leavers with no Qualifications Tertiary Qualification Completion Rate **Attitudes to Education** Importance of being at school every day Students' feelings about School Students for whom it is very or somewhat important to be proud of their school Students who report it is important to their parents/caregivers that they do well at school Students who report it is important to their parents/caregivers that they go to school every day Students who report that people at their school expect them to do well Students who usually do 1 hour or more homework after school Students who usually try as hard as they can to do their best at school Things students enjoy about School **Curriculum** Age to which health curriculum is formally taught **Literacy** Adult Illiteracy Adult Literacy *Maternal Literacy* *Imprisoned youth literacy rate* Literacy – Presence of Books in the home Literacy - Early Home Literacy Activities Literacy - Home Educational Resources *Literacy - Pre-literacy Standards at School Entry* Literacy in Mathematics Literacy in Reading Literacy in Science **School Demographics / Resources** School Demographics - Geographical Distribution of Students School Demographics - School Decile School Demographics - School Roll School Demographics - Students from homes where English is not the predominant language Technology in Schools *Educational Psychologists FTE - education funded* *Resource Teacher Learning and Behaviour (RTLB) Referrals* *Special Education Service Referral* *Speech Language Therapist FTE - education funded* *Teacher aid hours funded per capita*	**Participation in Education** Educational Life Expectancy *Enrolment in health studies* Participation in Community Education Participation in Formal Education Participation in Industry Training Primary School - Children Reaching Grade 5 Primary School - Net Attendance Rate Primary School - Net Enrolment Rate Secondary School - Average length of stay Secondary School - Early Leaving Exemption Secondary School - Progression to further education/training Secondary School - School Retention Rates Participation in Tertiary Education Tertiary Education - Enrolment in Foundation Courses Tertiary Education - Five Year Completion Tertiary Education - Full-time Student Loan Clients Tertiary Education - Progression of tertiary students to further study Tertiary Education - Retention Tertiary Education - Students with a disability Tertiary Education - Te reo and tikanga Maori courses Tertiary Education - Wananga *Participation in Training Programmes* **Participation on Early Childhood Education** Participation in Early Childhood Education Participation in Early Childhood Education - of Year 1 Students **School Absenteeism** Absenteeism for Any Reason Distribution of Absence Rates Across Schools Truancy Characteristics of Truant Students District Truancy Service Use Non Enrolment Truancy Services Exclusion and Expulsion Suspension and Stand-downs **School Roll Turnover** *Proportion of the school roll turned over each school year, by school decile* **Te Kohanga Reo and Kura Kaupapa Maori Schools** *Number of children attending Te Kohanga Reo and Kura Kaupapa Maori Schools* Number of Te Kohanga Reo and Kura Kaupapa Schools



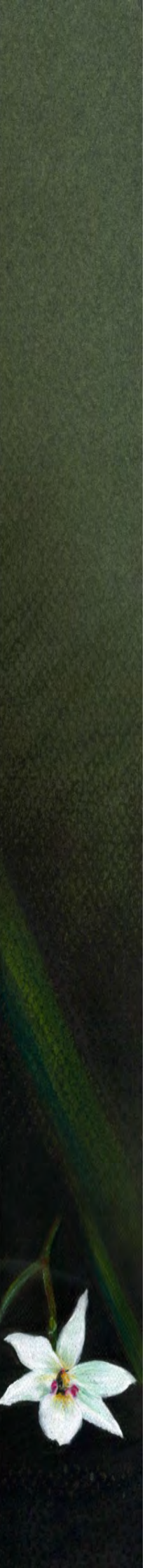
Environmental Stream	
Exposure *Air Pollution - Number of days PM10 exceeds recommended levels* *Lead Poisoning* Tobacco Smoke Exposure *Water quality*	**Sanitation** Use of Safe Drinking Water Use of Sanitary Means of Excreta Disposal
Historical, Economic and Policy Context Stream	
National Unemployment Rate National adult unemployment rate **Policy Changes Impact on Children and Youth** *Policy changes in the last 3 years which impact on children and youth*	**Policy Impact on Maori Economic Development** *Changes in policy which impact on Maori economic development* **Treaty of Waitangi Claims** *Treaty of Waitangi claims settled and outstanding*
Infectious Disease Stream	
Communicable Diseases Communicable Disease Hospitalisation Communicable Disease Mortality Communicable Disease Notifications Communicable Disease Rate **Food Bourne Illnesses** Food Bourne Illnesses **Gastroenteritis** Gastroenteritis - Hospitalisation Gastroenteritis Incidence Gastroenteritis Mortality **Haemophilus Influenzae Type B** Haemophilus influenzae Type b Hospitalisation Haemophilus influenzae Type b Notifications **Hepatitis B** Hepatitis B Notifications *Infants born to Hepatitis B Positive Mothers* **HIV/AIDS** AIDS Incidence HIV Prevalence Perinatal Exposure to HIV **Measles** Measles Hospitalisations Measles Mortality Measles Notifications *Measles Notifications Confirmed on Serology* **Meningitis** *Meningitis admissions and deaths by cause* Pneumococcal Meningitis	**Meningococcal Disease** Meningococcal Disease Hospitalisations Meningococcal Disease Mortality Meningococcal Disease Notifications **Osteomyelitis** *Bone and Joint Infection Admission* *Osteomyelitis hospital admissions* **Otitis Media** *Admissions for mastoiditis / mastoidectomy* *Otitis Media Prevalence* **Rheumatic Fever** Acute Rheumatic Fever Hospitalisation Rheumatic Heart Disease Hospitalisation Rheumatic Fever Notifications Rheumatic Heart Disease Mortality **Skin Infection** *Serious Skin Infection - eczema related* *Serious Skin Infection - wound related* Serious Skin Infection Hospitalisations **Tuberculosis** Tuberculosis Admissions Tuberculosis Notifications **Vaccine Preventable Disease** Acute Flaccid Paralysis - polio surveillance Congenital Rubella Syndrome Vaccine Preventable Disease Hospitalisations Vaccine Preventable Disease Notifications Vaccine Preventable Disease Rate
Injury Stream	
Unintentional Injury Hospital Admission Injury Hospitalisation - Preventable Injury Hospitalisation - Unintentional Injury Hospitalisation - Unintentional, Non Fatal **Unintentional Injury Mortality** Injury Mortality - All including intentional Injury Mortality Rate - Unintentional **Injury Prevalence** *Injury in the community - ACC data* **Burns** Burn-related Hospitalisations **Drowning** Drowning in private swimming pools Drowning Mortality *Near Drowning Hospitalisations*	**Fall Injuries** Fall-related Hospitalisations Falls - Serious Non-Fatal and Fatal Injury Falls - Serious Non-Fatal Injury **Long Bone Fracture** Long Bone Fracture Incidence **Poisoning** *Child resistant closure usage rate* Poisoning-related Hospitalisations *Poisoning-related hospitalisations - accidental ingestion* **Land Transport Injury** Land Transport Accident Deaths Land Transport Accident Hospitalisations Motor Vehicle - Restraint of Children



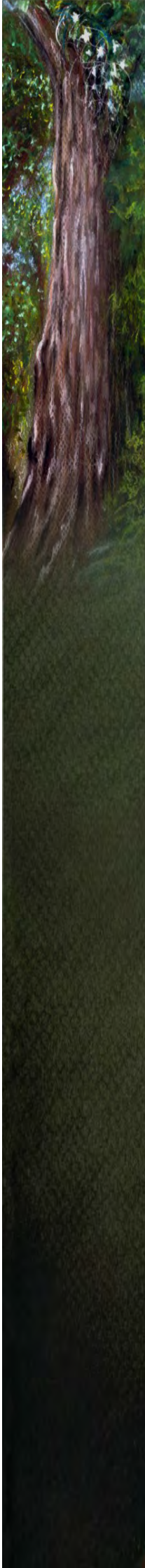
Injury Stream Continued	
Land Transport Injury Continued Motor Vehicle - Use of child seats Motor Vehicle Crash - Car Occupant Serious Injury (Fatal and Non-fatal) Motor Vehicle Crash - Pedestrian Deaths Motor Vehicle Crash - Pedestrian Injury Hospitalisations Motor Vehicle Crash - Pedestrian Serious Injury (Fatal and Non-fatal) Motor Vehicle Crash - Percent of drivers killed who had an excess blood alcohol Motor Vehicle Crash - Serious Non-Fatal and Fatal Injury Motor Vehicle Crash Hospitalisations Motor Vehicle Crash Mortality Motor Vehicle Crash Serious Non-Fatal Injury	Pedal Cyclist - Weekday use of cycle helmets Pedal Cyclist Injury Hospitalisations *Pedestrian Injury in Driveways* Seatbelt Use in a car **Traumatic Head Injury** Subdural Haemorrhage *Traumatic Head Injury Hospital Admissions and Deaths* **Unintentional Injury** Injury - Serious Fatal and Non-Fatal - All including unintentional Injury - Serious Non-Fatal - All including unintentional Injury prevalence **Workplace Injury** Workplace Injury Claims
Justice Stream	
Convictions Convictions Custodial Sentences Prosecution of Children and Youth *Re-offending rates* **Mentoring** *Provision of Mentoring Services e.g. Big Brothers*	**Apprehensions** Police Apprehension - excluding non-imprisonable traffic offences **Youth Court** Youth Court Orders Youth Court Proved Cases - excluding non-imprisonable traffic offences Youth Justice Family Group Conferences
Lifestyle Stream	
Alcohol Use Age at first taste Age at first use (other than just a taste) Attitudes to drinking Binge Drinking Changes in drinking behaviour Consumption on a typical occasion Consumption in the past 12 months Consumption at least weekly Drink driving offences Drinking enough to feel drunk Drivers involved in crashes with alcohol as a contributing factor Ever consumed Frequency of drinking Hazardous Drinking Heavy drinking at least once a week Hospitalisations with primary diagnosis alcohol related Mean Volume Consumed Alcohol related Mortality *Alcohol - Rate of purchase in health protection controlled purchase operations* Riding in a car with driver who had consumed alcohol or was potentially drunk Self reported alcohol-related problems Self reported problems associated with other peoples drinking Source of alcohol consumed **Recreation** Book purchase in the last 4 weeks *Broadband internet access in the home* *Cell phone access* Cinema Attendance in the last 4 weeks Music Purchase in the last 4 weeks	Participation in Cultural and Arts Activities Public Library Use in the last 4 weeks Recreation - Satisfaction with leisure time Recreation - Time spent each day doing arts (crafts, music, dance, drama etc) Recreation - Time spent each day reading for fun Video watching in the last 4 weeks **Substance Use** Marijuana - Age at first use Marijuana - Average number of joints on a typical occasion Marijuana - Changes in use Marijuana - Prevalence of Regular Use Marijuana - Self identified harmful effects Marijuana - Use of skunk Marijuana Related Hospitalisations Marijuana Use - Current User Marijuana Use - Ever Used Marijuana Use - Last 12 months Drug Use other than alcohol, tobacco, or marijuana Use of multiple drugs (including alcohol and tobacco) Use of multiple illegal drugs Perceived seriousness of substance use as a community problem **Tobacco Use** *Access to cessation services* Age at first use Perceptions of risk Tobacco products released for consumption per adult Tobacco Use Tobacco Use - Duration of smoking Tobacco Use - Quitting Status **Gambling** Gambling



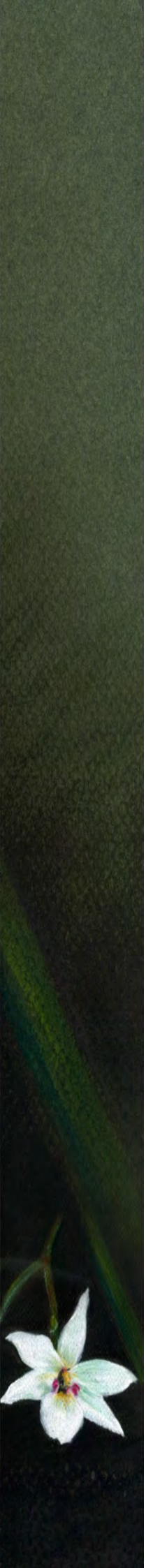
Mental Health Stream	
ADHD ADHD - presence of symptoms *Ritalin Prescriptions* *Ritalin Special Authority Applications* **Anxiety Disorder** Anxiety Disorder - presence of symptoms **Behavioural Problems** *Behavioural Problems* **Conduct Disorder** *Conduct disorder - Access to services - RIDCA / CYF secure facility usage* Conduct Disorder - presence of symptoms **Depression** Depression - Prevalence of significant symptoms of Depression - Significant number of depressive symptoms **Dual Diagnosis** Alcohol or Drug abuse and Mental Health Disorder **Eating Disorders** *Eating Disorder Prevalence* **Mental Health Disorder** Prevalence of Mental Health Disorders **Mental Health Hospital Admissions** Mental Health Hospitalisations **Mental Health Services / Resources** *Child and Adolescent Mental Health Services - % of Blueprint funding* *Child and Adolescent Mental Health Services - Access* Mental Health Clients - Number *Mental Health Services - First Specialist Assessment waiting times* Mental Health Services Use *Mental Health Staff FTE per capita* Youthline - Calls to Helpline by reason **Mental Wellbeing** Feel tired and worn out General Mood Loneliness Satisfaction with life Strain, stress, or pressure Support - Contact between young people and their parents	Support - Family Expectations Support - Family participation in family/whanau activities and regular contact with family/friends Support - Family Relationships Support - Have a close friend they would feel okay about talking to about a serious problem Support - Have an adult (not in their family) they could talk to about a serious problem Support - Know people in their neighbourhood Support - Most of the time I feel close to mum and/or dad Support - Most weeks I get enough time to spend with mum and/or dad Support - Positive relationship with parents Support - Praise from family Support - Students that feel that teachers treat them fairly Support - Students think mum and/or dad care about them a lot Support - Students who have 4 or more friends at school Support - Students who have talked with someone in their family about how things are going at school Support - Students who report that adults at school care about them Support - Students who this year feel like they are a part of their school Support - Youth Trust in Others **Suicide / Self Harm** Mental Health - Students thoughts on their chance of living to be 25 years old *Poisoning-related hospitalisations - deliberate self harm* Self Inflicted Injury Hospitalisations Suicide *Suicide - After previous admissions for attempts* Suicide - attempts in last 12 months Suicide - ED Presentations following attempted suicide Suicide - Hospitalisation for Attempts Suicide - Thoughts of killing self in the last 12 months *Suicide - While under the care of mental health services*
Morbidity and Mortality Stream	
Admission to Hospital Hospital Admission - Ambulatory Sensitive Hospital Admission - Avoidable Hospital Admission - Population Preventable Hospital Admission - Standardised Discharge Ratio (SDR) Hospital Admissions - From the Emergency Department Hospitalisation - Any	**Mortality** Mortality - Potentially Avoidable Mortality - Total Mortality - Unavoidable Mortality in Children under Five Probability of Death in Childhood (0-14)
Nutrition, Physical Activity, and Growth Stream	
Activity Physical Activity Active travel to and from school Participation in Sport and Active Leisure Time Profile - PE, Morning Tea, Lunch, After School, Evenings, Weekends	Sedentary Time spent each day using the computer or the internet (not playing games) Time Spent Playing Computer or Video Games Time Spent Television or Video Watching



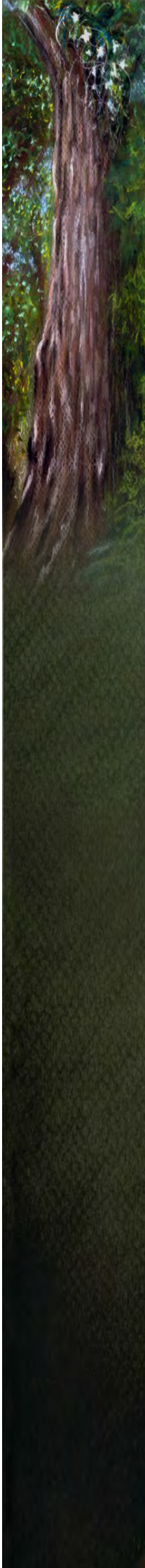
Nutrition, Physical Activity, and Growth Stream Continued	
Failure to Thrive/Underweight Stunting Prevalence Underweight Prevalence Wasting Prevalence **Obesity/Overweight** BMI 10th Percentile BMI 50th percentile BMI 90th Percentile Obesity - Abdominal Obesity - Prevalence Overweight - Prevalence Students who are unhappy/very unhappy about their weight Students who have tried to lose weight Weight Gain **Nutrition** Iron Deficiency Iron Deficiency Anaemia Biscuit, Cake, Sweets, Snack consumption	Bread, Cereal and Rice Consumption Calcium Intake Consumption of drinks other than milk NutriDiet Types NutritDietary Supplement Use Energy Intake Fat Intake Food Avoidance including meat, dairy, eggs Fruit and Vegetable Consumption Iodine Consumption/Urinary iodine Meat, Fish, Poultry and Egg Consumption Milk and Other Dairy Consumption Protein, Fat, Carbohydrate, Sugar, Fibre, Vitamin, Nutrient Intake Salt Additions to Food School Day Food Consumption Serum Zinc and Cholesterol and Urinary Iodine Sodium intake Vitamin A Supplementation
Perinatal - Infancy Stream	
Antenatal Alcohol - Use during Pregnancy Antenatal Steroid Use Folic Acid in Pregnancy *IVF Rate* *Substance abuse in pregnancy* Tobacco Smoking in Pregnancy *Tobacco Smoking in Pregnancy - Rate of cessation after conception* **Antenatal - Perinatal - Infancy Services** *Antenatal/Obstetric/Childbirth Care* Baby Friendly Facilities *Beds for mothers in Neonatal Units per Infant Cot* *Home births* *In-utero Transfer* Neonatal care level of hospital of birth *Transfer to Tertiary Centre Out of Area* *Water births* **At Risk Infants** *CYFS referrals in infants less than 6 weeks of age* **Conditions in the Neonatal Period** *Group B Streptococcal Sepsis* Neonatal Intraventricular Haemorrhage Neonatal Seizures Incidence Prolonged Infant Cholestasis Retinopathy of Prematurity in those born <31/52 or 1250g Vitamin K Deficiency Bleeding **Congenital Anomalies** Congenital Anomalies Congenital anomalies - Spina bifida prevalence **Fetal Growth** Intra-uterine Growth Retardation *Large for Gestational Age* Low Birth Weight Small for Gestational Age	**Hospitalisation in Infants** Infant Hospitalisations Re-admission within 6 weeks of birth *Term Infant Admissions to Neonatal Units* Term infants admitted to NICU for disorders which are not congenital **Hypoxic Ischaemic Encephalopathy** APGAR Score <5 at 5 Minutes Hypoxic Ischaemic Encephalopathy Incidence **Perinatal - Infant Mortality** Early Neonatal Mortality Infant Mortality Late Fetal Mortality Late Neonatal Mortality Maternal Mortality Ratio Neonatal Mortality Perinatal Mortality Post Neonatal Mortality Ratio of Neonatal to Post Natal Deaths **Prematurity** Prematurity **Respiratory Disease** Exogenous Surfactant Use *Meconium Aspiration* Neonatal Respiratory Disease Newborns requiring assisted ventilation Supplemental oxygen dependency **Sudden Infant Death Syndrome** SIDS Risk Factors - Percentage of infants sleeping prone SIDS Risk Factors - Sleeping Position and Bed Sharing Sudden Infant Death Syndrome Incidence **Survival** Infants Admitted to NICU Survival to Discharge
Respiratory Stream	
Asthma Asthma - Deaths Asthma - Hospitalisation Asthma - Length of hospital stay	Asthma - Prevalence Asthma - Readmissions within 28 days Asthma Control Asthma Control - preventer to reliever ratios



Respiratory Stream Continued	
Bronchiectasis Bronchiectasis Hospitalisations Bronchiectasis Prevalence **Bronchiolitis** Bronchiolitis Hospitalisation *Bronchiolitis Hospitalisation - Duration of stay* Bronchiolitis Mortality *Obliterative bronchiolitis admissions* **Cystic Fibrosis** *Cystic Fibrosis - Life Expectancy* Cystic Fibrosis Prevalence **Interstitial Lung Disease** *Interstitial Lung Disease* **Obstructive Sleep Apnoea** Obstructive Sleep Apnoea Prevalence	**Pertussis** Pertussis Hospitalisations Pertussis Mortality Pertussis Notifications *Pertussis Notifications - Number culture positive* **Pneumonia** *Empyema admissions* Pneumonia Hospitalisation Pneumonia Mortality **Respiratory Disease Hospital Admission** Lower Respiratory Tract Infection - Hospitalisation **Respiratory Disease Mortality** Acute Respiratory Infection Mortality
Sexual and Reproductive Health Stream	
Fertility Hospitalisation for Ectopic Pregnancy Percentage of 20 year olds who had a child in their teens Teenage Births Teenage Fertility Teenage Miscarriage - Hospitalisations only *Teenage Parents - Demographics (education etc)* Teenage Terminations **Puberty** Age at Menarche **Sexual and Reproductive Health Services for Youth** *Sexual/Reproductive Health Services Access to free services* *Sexual/Reproductive Health Services Access to school based clinics*	**Sexual Health Behaviour** Sexual Health - Age at first intercourse Sexual Health - Contraception - Condom use last time had sex as protection from STI Sexual Health - Contraception Use *Sexual Health - Contraception use post coital* Sexual Health - Number of partners Sexual Health - Sexual Attraction Sexual Health - Sexual Health Information Sources Sexual Health - Sexually Active - Ever Sexual Health - Sexually Active in the last 3 months **Sexually Transmitted Infection** Sexually Transmitted Infection - Laboratory Notifications Sexually Transmitted Infection - Sexual Health / Family Planning Clinic Data Sexually Transmitted Infection Data Source Unspecified
Surgical Stream	
Appendicitis Appendectomy with normal histology Appendectomy with normal histology but other intra-abdominal pathology **Otitis Media** Grommet Insertion Rate Tonsillectomy and Adenoidectomy Rate **Gastroschiesis** *Gastroschiesis diagnosed at birth*	**Neurosurgical** *Head Injury Requiring Surgical intervention* **Orthopaedic Surgery** *Acquired Dislocation of the Hips requiring surgery* *Congenital Dislocation of the Hips requiring surgery* *Late surgery for Congenital Dislocation of the Hips* *Slipped Upper Femoral Epiphysis* **Pyloric Stenosis** Pyloric stenosis surgery with mucosal perforation
Socio-Economic Determinants Stream	
Children Dependant on Benefit Recipients Children dependant on Core Benefit Recipients by type Children dependant on Registered Job Seekers Parental Income from a Benefit **Children Living in Poverty** Child Poverty Rates - MSD definition Child Poverty Rates - UNICEF definition Poverty **Children with Restricted Living Standards** Living Standard Distribution Living Standard Score Living Standards of Families with Dependant Children	Children living with very restricted living standards Restriction in Consumer Consumption **Communication** Children/Youth in a Household with telephone access Dependant children with Internet Access Dependant children with Telephone Access Families with Internet Access Families with Telephone Access *Households with an English speaking member and a telephone*



Socio-Economic Determinants Stream Continued	
Food Security Food Security - Individual Household Food Security Feel stressed because of not having enough money for food Food runs out due to lack of money Stressed because can't provide the food we want for social occasions Use of food grants or food banks We can afford to eat properly We eat less due to lack of money We eat less variety due to lack of money We rely on others to provide food or money for food Weekly spending on food **Household Crowding** Household Crowding **Housing Costs relative to Low Income** *Housing costs relative to low income* **Housing** Homelessness involving Dependant Children Housing Affordability Housing Tenure Rent ratio - % income for rent Space in house for doing homework **Income** Children in households with no heating Children receiving a childcare/OSCAR subsidy Dependant Children <18 in low income families Disposable Household Income % change in average Disposable Household Income for households with children / youth	Families with low income Household Income - weekly Household Income for children / youth Income Distribution in households with children Median Family Income of families with Dependant Children Median hourly income Median weekly income Parental Employment Status Proportion of children <5 covered by a Childcare Subsidy Recipients of orphans/unsupported child benefit Sole Parent Families on Low Income **Transport** Children/Youth in Household with Access to Transport **Youth Dependent on a Benefit** Youth dependant on a core benefit by type **Youth Employment** Youth Employment - 5+ hours a week Youth Employment - Any Median Youth Hourly Wage and Salary Earnings Youth Student Loan Drawings **Youth Income** Youth Income from a Student Allowance Youth receiving the independent youth benefit **Youth Unemployment** Youth neither employed nor in training Youth Registered Job Seekers Youth Unemployment
Well Health Stream	
Breastfeeding Breastfeeding not otherwise specified *Access to Lactation Consultant, FTE per 1000 live births* *Breastfeeding Initiation Rate - any attempt at breastfeeding* Breastfeeding at transfer to well child providers Any breast feeding at 6 weeks Full and Exclusive Breastfeeding at 6 weeks Full and Exclusive Breastfeeding at 3 months Full and Exclusive Breastfeeding at 6 months Fully or partially Breastfeeding at 6 months Breastfeeding continued into the second year of life *Timely Introduction of Complimentary Feeding* **General Healthcare Access / Utilisation** *Costs of after hours GP services* Health Service Utilisation Medical Insurance **General Practitioner Visits Forgone** Children and youth who have forgone a GP visit by reason **Immunisation** Children admitted to hospital with documented immunisation status Children in hospital not up to date with immunisations offered immunisation or immunised Immunisation Coverage - Received DTPH1 Immunisation Coverage - Received DTPH2 Immunisation Coverage - Received DTPH3 Immunisation Coverage - Received HepB1	Immunisation Coverage - Received HepB2 Immunisation Coverage - Received HepB3 Immunisation Coverage - Received MMR1 Immunisation Coverage - Received OPV1 Immunisation Coverage - Received OPV2 Immunisation Coverage - Received OPV3 Immunisation Coverage at 15 months Immunisation Coverage at 2 years Immunisation Coverage at 3 months Immunisation Coverage at 5 months Immunisation Coverage at 6 weeks Immunisation not otherwise specified *Immunisation Coverage by Schedule Times* *Timeliness of Immunisation by Schedule* **Maternal Wellbeing** *Maternal Mental Health* **Maori Providers** Number of Maori providers **Oral Health** % Caries free in preschoolers % Toothpastes sold containing fluoride %Completed treatment of those enrolled Oral Health at school entry NOS Brushed teeth at least once the day before Decay free at 12 years Decay free at school entry Dental clinic / dentist attendance Distribution/burden of dental caries DMFT at 12 yrs dmft at school entry



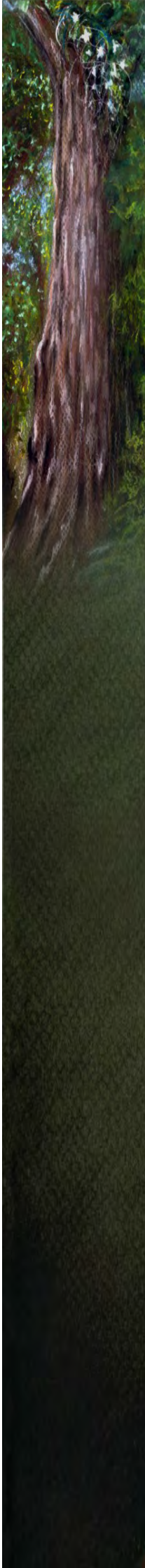
Well Health Stream Continued	
Oral Health Continued dmft in preschoolers Fluoridation of reticulated water *Hospitalisation for dental abscess / pulpitis* Mean age at enrolment in school dental services MFT at 12 years (Missing or Filled Teeth) MFT at School Entry) Number of preschoolers enrolled with the dental service Significant caries index at 12 years Significant caries index at school entry *Tooth surfaces DMF* *Youth dental services rate* Oral Health Hospitalisations Visit to a dentist in the last 12 months **Parenting** *Attachment* *Parenting Style* **Prescriptions** *Antibiotic syrup dispensing mls/capita in children < 9 yo* Average number, Ave cost per item, Ave cost per person Prescription items foregone Prescription Items in the last 12 months **Primary Health Care Access / Utilisation** *% < 1 attending Well Child Tamariki Ora scheduled visits* *% < 5 attending Well Child Tamariki Ora scheduled visits* *Care Plus Registration* Emergency Department Attendance GP Claims Data - Visits per year per person People who report having a usual health care provider Private A&E Clinic use in the last 12 months Students' barriers to obtaining health care Usual health care provider is a GP or family doctor	Usual place students get health care Visits to a Doctor in the last 12 months *Well child framework - DHB Implementation* *Well Child Provider - Age when first seen* *Well Child Provider - Service coverage* **Primary Health Organisation Enrolment** *Proportion of children and youth enrolled with a PHO* **Secondary Health Care Access / Utilisation** Availability of Child Health Services *First Specialist Assessment Waiting Times* Homecare Nursing Service Utilisation Outpatient Clinic Utilisation *Outpatient Clinic Utilisation - Standardised Intervention Rates* Public hospital use in the last 12 months - Outpatient or Inpatient *Radiology Service Use - CXR, MRI, CT, MCU* **Self-reported health** Self rated health Self reported health - Bodily Pain Self reported health - General Health Self reported health - Mental Health Self reported health - Physical Functioning Self reported health - Role Emotional Self reported health - Role Physical Self reported health - Social Functioning Self reported health - Vitality **Social Capital** *How well parents are connected to their community* **Well Health Screening** Hearing Loss - Age at diagnosis *Hearing Loss - Mean age for first hearing age placement* Hearing Loss Notifications Hearing Screening Coverage at 3 Years Hearing Screening Coverage at School Entry Hearing Screening Failure Rate at 3 years old Hearing Screening Failure Rate at School Entry Vision Impairment Vision Screening Failure at 3 Years Vision Screening Failure at School Entry Well Child Check Completion

Appendix 2: Results of First Prioritisation Round Vote

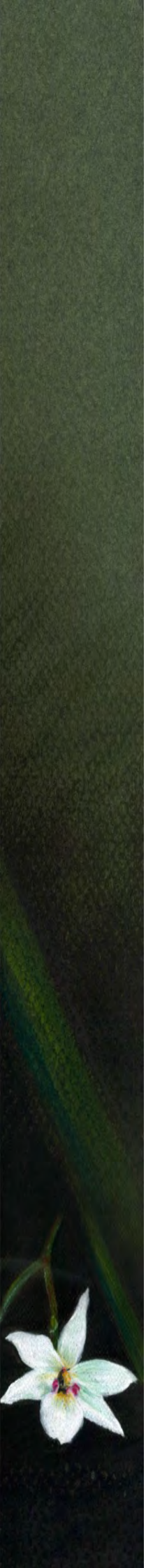
Ranking After First Prioritisation Round Vote
(13 Participants)

Rank	Indicator	Average Score
1	Overweight and Obesity	**26.2**
2	Children Living in Poverty	**25.9**
3	Household Crowding	**25.3**
4	Policy changes impact on child and youth	**25.0**
5	Domestic Violence	**24.9**
6	Land Transport Injury	**24.9**
7	Children dependant on benefit recipients	**24.5**
8	Total Respiratory Disease Admissions and Deaths	**24.4**
9	Abuse and Neglect Admissions and Deaths	**24.3**
10	Qualification at school leaving	**24.3**
11	Bronchiolitis	**24.3**
12	Vaccine Preventable Disease	**24.2**
13	Total Injury Admissions and Deaths	**24.0**
14	Teenage Pregnancy	**24.0**
15	Literacy	**23.9**
16	Children with Restricted Living Standards	**23.9**
17	Tobacco Exposure in Utero	**23.9**
18	Tobacco Use	**23.8**
19	Meningococcal Disease	**23.7**
20	Housing Costs Relative to Low Income	**23.7**
21	Immunisation	**23.6**
22	Repeat Acute Admissions in Children < 1 Year	**23.5**
23	School Absenteeism - Suspension/Stand down/Truancy	**23.4**
24	Rheumatic Fever	**23.4**
25	Physical Activity	**23.4**
26	Self Harm and Suicide	**23.3**
27	CFYS Notifications and Substantiations	**23.2**
28	Tobacco Exposure at Home	**23.0**
29	Disability prevalence	**22.7**
30	Traumatic Head Injury	**22.6**
31	Nutrition	**22.6**
32	Oral Health	**22.6**
33	School Retention Rates	**22.5**
34	Fire, Flames and Hot Substances Related Injuries	**22.5**
35	Bronchiectasis (Non cystic fibrosis)	**22.5**
36	Diabetes	**22.3**
37	Sudden Infant Death Syndrome / Sudden Unexpected Death in Infancy	**22.3**
38	Perinatal and Infant Mortality	**22.2**
39	Youth dependant on a benefit	**22.2**
40	Primary Health Organisation (PHO) enrolment	**22.1**

Rank	Indicator	Average Score
41	Family Breakdown	**22.0**
42	Alcohol Consumption (Consumption and alcohol related admissions)	**21.9**
43	Youth Assault	**21.7**
44	Sexual offences against children (0-15)	**21.7**
45	Serious Skin Infection	**21.7**
46	Pertussis	**21.6**
47	Breastfeeding	**21.6**
48	School Roll Turnover	**21.4**
49	Participation in Early Childhood Education	**21.3**
50	Youth Connectedness	**21.3**
51	National Adult Unemployment Rate	**21.3**
52	Antenatal Care	**21.3**
53	Asthma	**21.3**
54	Technology dependant children	**21.1**
55	GP visits forgone	**21.1**
56	Police apprehensions	**21.0**
57	Attendance at Tamariki Ora Well Child scheduled visits	**21.0**
58	Prevalence of Mental Health Disorders	**20.8**
59	Prematurity	**20.8**
60	Tuberculosis	**20.8**
61	Sexually Transmitted Infection	**20.7**
62	Utilisation of Needs Assessment Service Coordination Services	**20.6**
63	Fall Related Injury	**20.5**
64	Contraception Use	**20.5**
65	Hearing Screening	**20.5**
66	End Stage Renal Failure	**20.4**
67	Youth Court Proved Cases	**20.4**
68	Drowning	**20.3**
69	Re-admission to hospital within 6 weeks of birth	**20.3**
70	Marijuana Use	**20.2**
71	Pneumonia	**20.1**
72	Infants born to Hepatitis B positive mothers	**20.0**
73	Osteomyelitis	**19.8**
74	Suffocation Related Injuries	**19.8**
75	Gastroenteritis	**19.7**
76	Fertility	**19.6**
77	Small for Gestational Age	**19.6**
78	Distribution of children and youth population by demographic factors	**19.6**
79	Permanent Hearing Loss	**19.6**
80	Struck By and Against Related Injuries	**19.1**
81	Mastoiditis	**19.1**
82	Cancer	**19.0**
83	Te Reo / Language	**18.9**
84	Household Composition	**18.7**
85	Historical Context - Treaty of Waitangi Claims / Policy Impact on Maori Economic Development	**18.4**
86	Kohanga Reo and Kura Kaupapa Maori Attendance	**18.0**
87	Hospital Admission for Mental Disorder	**18.0**
88	Use of Mental Health Services	**18.0**

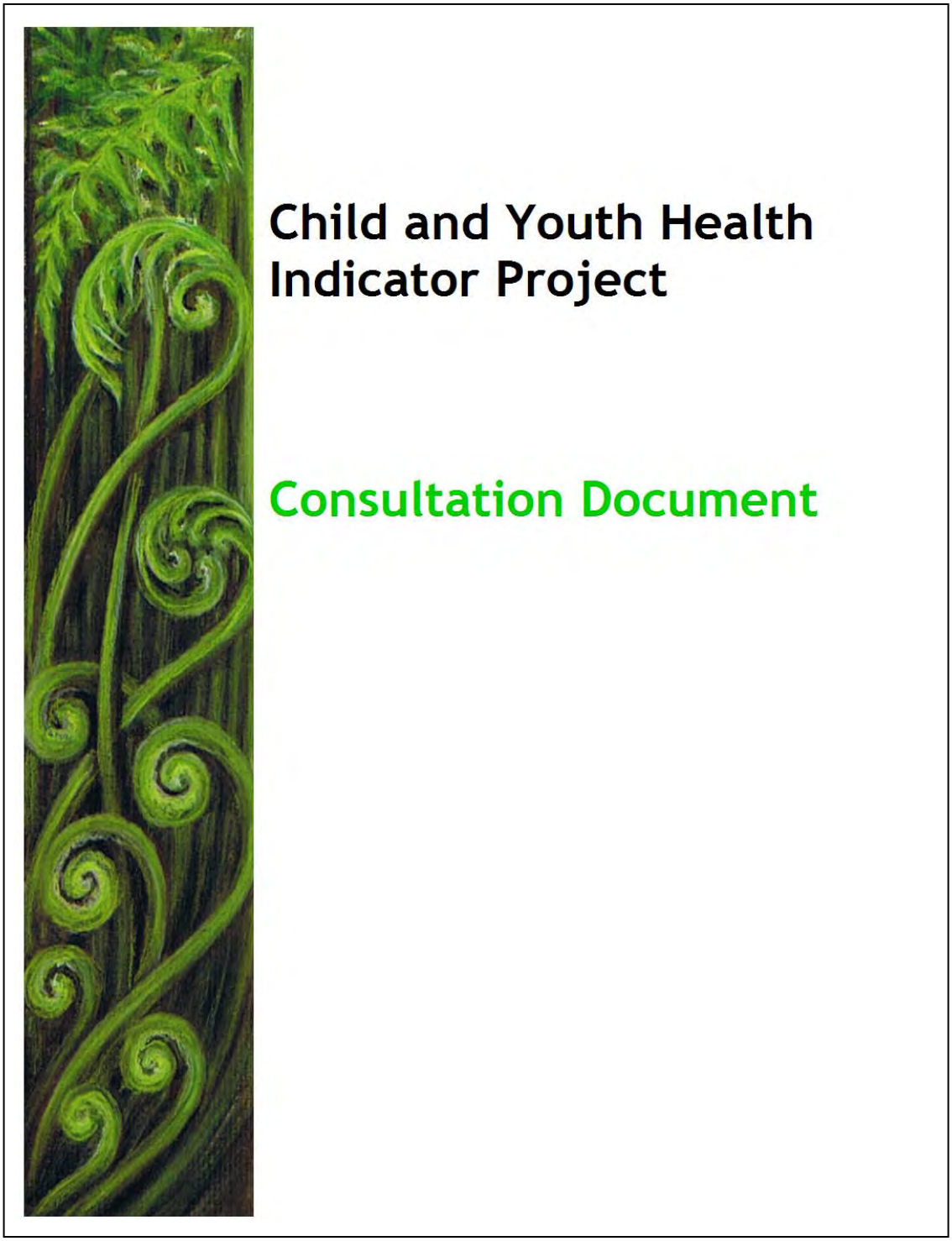


89	Blindness	**17.7**
Rank	**Indicator**	**Average Score**
90	APGAR <5 at 5 minutes	**17.5**
91	Number of Maori Providers	**17.4**
92	Iwi Identity	**16.5**
93	Surgery for late presentation of DDH (CDH)	**16.3**
	Total Mortality by Cause, Total Admissions by Cause	**Not scored**
	Participation in sport and active leisure, Religious Affiliation, Voluntary Work	**Not scored**



Appendix 3: Child and Youth Health Indicator Project Consultation Document and Voting Results

Child & Youth Health Indicator Project Consultation Document



A Ministry of Health contract being undertaken by the Paediatric Society of New Zealand in conjunction with the New Zealand Child and Youth Epidemiology Service (NZCYES).

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Table of Contents

Child and Youth Health Indicator Project

In New Zealand at present, there is a large amount of routinely collected data on child and youth health, spread across a variety of Government and non-Government agencies. Yet successfully collating all of the available information, prioritising it, arranging it into a logical framework and then using this framework to monitor child and youth health consistently over time has proved difficult. As a result, it remains unclear whether many working in the health sector at present can answer the following simple questions:

1. What is the current health status of New Zealand's children and young people?
2. What are the underlying determinants that shape child and youth health in New Zealand and is there any evidence that there are disparities in their distribution?
3. Are issues highlighted in recent New Zealand publications selected because of their relative public health importance, or merely because routine data was available with which to track their prevalence over time?
4. Is there within the sector at present, sufficient information with which to undertake evidence based planning, or to guide the purchasing of services?
5. Is there evidence that the Government is meeting its obligations under the Treaty of Waitangi with respect to health outcomes for Maori children and young people?

The Paediatric Society of New Zealand currently holds a contract with the Ministry of Health to scope the development of a child and youth health monitoring framework for the NZ health sector. This is being achieved via the Child and Youth Health Indicator Project, managed by the NZ Child and Youth Epidemiology Service (NZCYES). In addition, the Maori SIDS Program is working in partnership with the NZCYES to ensure that the proposed framework meets the needs of Maori children and young people. The end result of this contract will be publication of the monitoring framework as an Occasional Bulletin in conjunction with Public Health Intelligence (mid-2007) and a series of recommendations being made available to the Minister / Ministry of Health.

The Indicator Project Consultation Document

This Consultation Document has been designed as a tool for consulting on the monitoring framework developed to date. We would be grateful for your / your organisation's opinions on the proposed framework and in particular, your views on:

1. Whether the indicators included in the draft framework are the most appropriate ones with which to monitor the health status of New Zealand's children and young people.
2. Whether the draft framework provides an appropriate template for considering how the underlying determinants of child and youth health (e.g. historical factors, policy environment, socioeconomic and cultural factors, and risk and protective factors) shape the health of our children and young people.
3. Whether the framework, in its current form, would be of use to those developing strategies and interventions to address many of the issues faced by our children and young people, or whether further modifications are required.

This document is broken down into two main parts:

1. **A Backgrounder** which briefly outlines the monitoring framework developed to date and the methodology used in its development.

2. **A Questionnaire** which poses a number of questions relating to the draft framework and the indicators selected to date. The questionnaire is divided into two main sections, with Section A covering questions relating to the structure of the framework and Section B covering questions regarding individual indicators. While the questionnaire has been designed to permit feedback on every aspect of the monitoring framework, time constraints may mean that individual readers / organisations may wish to comment only on those aspects of the framework which relate to their particular scope of work.

   For those working in a DHB setting, the questionnaire also contains a section on "Indicators of DHB Performance". While this project is unable to influence the current subset of DHB Performance Indicators relating to child and youth health, it is hoped that feedback received from this process will be passed on to the Ministry of Health's DHB Monitoring Section (in an aggregated and anonymous form), with the view to possibly influencing their indicator selection in future years. Thus those answering this particular section may need to bear this in mind when providing feedback on this part of the questionnaire.

Completion Date

We would be grateful for any feedback, on any aspect of this project, whether it be by means of completing the entire questionnaire, or only commenting on particular aspects.

Completed submissions should be returned to the NZ Child and Youth Epidemiology Service by **Monday October 30th, 2006**. The information received will then be compiled and reviewed by the Project's Steering Committee.

Note: While the themes arising from this consultation process will be highlighted in the final report to the Ministry of Health / published in an Occasional Bulletin in conjunction with Public Health Intelligence, it is intended that any quotes taken directly from this consultation phase will only be published in an anonymous form (unless directed otherwise by their author).

Indicator Project Backgrounder

Section A of the Backgrounder outlines the indicator framework developed to date, while Section B outlines the methodology used in its development.

Section A - The Proposed Indicator Framework

The aims of this framework are twofold:

1. To provide a map all of the issues which need to be taken into account when planning child and youth health strategies, programmes and services at a population level.

2. To allow the reader to locate where each indicator in the framework sits, on the causal pathway linking higher level historical and policy contexts → health outcomes at the individual level.

In addition, the proposed framework must be viewed with the following in mind:

1. That at present, it is possible to include within the monitoring framework only those indicators for which data is routinely available i.e. it is beyond the scope of this project to create new modes of data collection, or measures to assess child and youth health status. This limitation also affects some of the age groups proposed for monitoring (below) e.g. while oral health is important across the entire age spectrum 0 → 24 years, data is currently only routinely available in preschoolers and at school entry and 12 years of age.

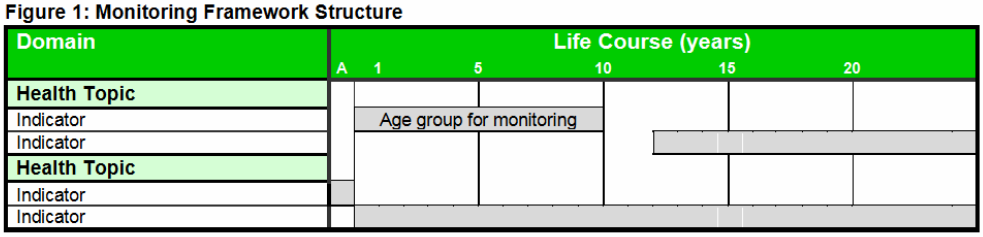
2. Where there are clearly gaps, a series of recommendations will be made, so that key areas can be highlighted for future development.

3. Prior to the implementation of 2) above, where an issue is seen as being essential for inclusion in the framework, but is not supported by an ongoing data collection system (e.g. disability, obesity), the issue may retain its position within the framework by means of a brief review of the NZ literature. Thus the issue still appears on the population health radar, but has a regularly updated literature review standing in place of a formal monitoring system, until such time as the required system can be developed (a number of indicators in the proposed framework have this as the only potential form of monitoring at present).

Structure of the Framework

The monitoring framework has been constructed from three elements; Culture, Domain and Life Course. Domain and Life Course form a two dimensional map, with a Cultural dimension woven through all levels of the framework (Figure 1).

Figure 1: Monitoring Framework Structure



Culture

The Maori SIDS team has been working in partnership with the NZCYES to ensure that the proposed monitoring framework adequately meets the needs of Maori children and young people. As a result, aspects of culture have been woven into all levels of the framework, highlighting both those aspects which support and strengthen Maori children and their whanau (e.g. Iwi identity, Te Reo), as well as those aspects which assist in understanding the current disparities in health outcome that exist between Maori and non-Maori children and young people (e.g. historical and policy context). Work in this area is ongoing, with further modifications in this area likely over the next few months.

Domain

The framework is divided into four key domains, which are arranged in a hierarchical structure. (Figure 2) This structure reflects the pathways via which child and youth outcomes are shaped, from the higher level historical and policy context ↔ socioeconomic and cultural determinants ↔ behavioural and other risk factors ↔ individual level outcomes. The domains included in this framework were adapted from the European Union's Child Health Indicators of Life and Development (CHILD) project and are as follows:

1. **Historical, Economic and Policy Context:** This domain reflects the fact that the current distribution of health determinants (e.g. income, education, degree of deprivation of neighbourhoods in which children live) have arisen as a result of a combination of historical, policy and economic factors (e.g. for Maori whanau, disparities may reflect historical factors which have led to the erosion of the cultural and economic base for hapu and iwi (e.g. loss of land and fisheries, early policies on the use of Te Reo Maori in schools)). Past and current economic policy (e.g. market rents for State Housing, reductions in income support for beneficiaries, absence of "in-work-payments" for benefit dependant families) also shape the availability of socioeconomic resources for families with young children. Finally, wider economic conditions (e.g. falling unemployment rates as a result of prevailing economic conditions) may result in reductions in the number of families living below the poverty line.

2. **Socioeconomic and Cultural Determinants:** While the distribution of the socioeconomic determinants of health (e.g. proportion of children living in the most deprived areas, with low family incomes, with parents with no formal qualifications) is to some extent determined by the factors in the domain above, these determinants also have a powerful effects on domains below, either directly (e.g. insufficient income to purchase low-fat cuts of meat, doubling up of families to save on housing costs), or indirectly (e.g. socioeconomic gradients in stress → socioeconomic gradients in cigarette smoking). In addition, a number of positive factors (e.g. Free Access to Healthcare Services for children < 6 years, the emergence of Kura Kaupapa Maori) may potentially buffer the effects these more negative determinants have on child and youth health.

3. **Risk and Protective Factors:** A number of social and behavioural risk factors impact negatively on child and youth health (e.g. parental cigarette smoking, household crowding, lack of exercise, high fat diets). While it is important to highlight these traditional risk factors, because health outcomes are unlikely to be improved unless these factors are addressed, the distribution of these risk factors must be seen within the context of the socioeconomic and cultural environment in which they arose (e.g. overcrowded housing resulting from reduced socioeconomic resources, coupled with experiences of racism experienced by some families trying to secure accommodation in the private rental market). Similarly, a number of protective factors (e.g. breastfeeding, participation in regular physical activity) may enhance the health and wellbeing of children and young people.

4. **Individual and Whanau Health and Wellbeing**: This domain's name reflects the close relationship that exists between individual health outcomes and those of the whanau in which a child or young person is growing up. While it is important to monitor the individual health outcomes of children and young people at a population level, it is also important to

highlight those aspects of whanau strength and wellbeing which support children and young people and enhance their resilience and ability to attain optimal health and wellbeing within the context of the domains above.

Life course

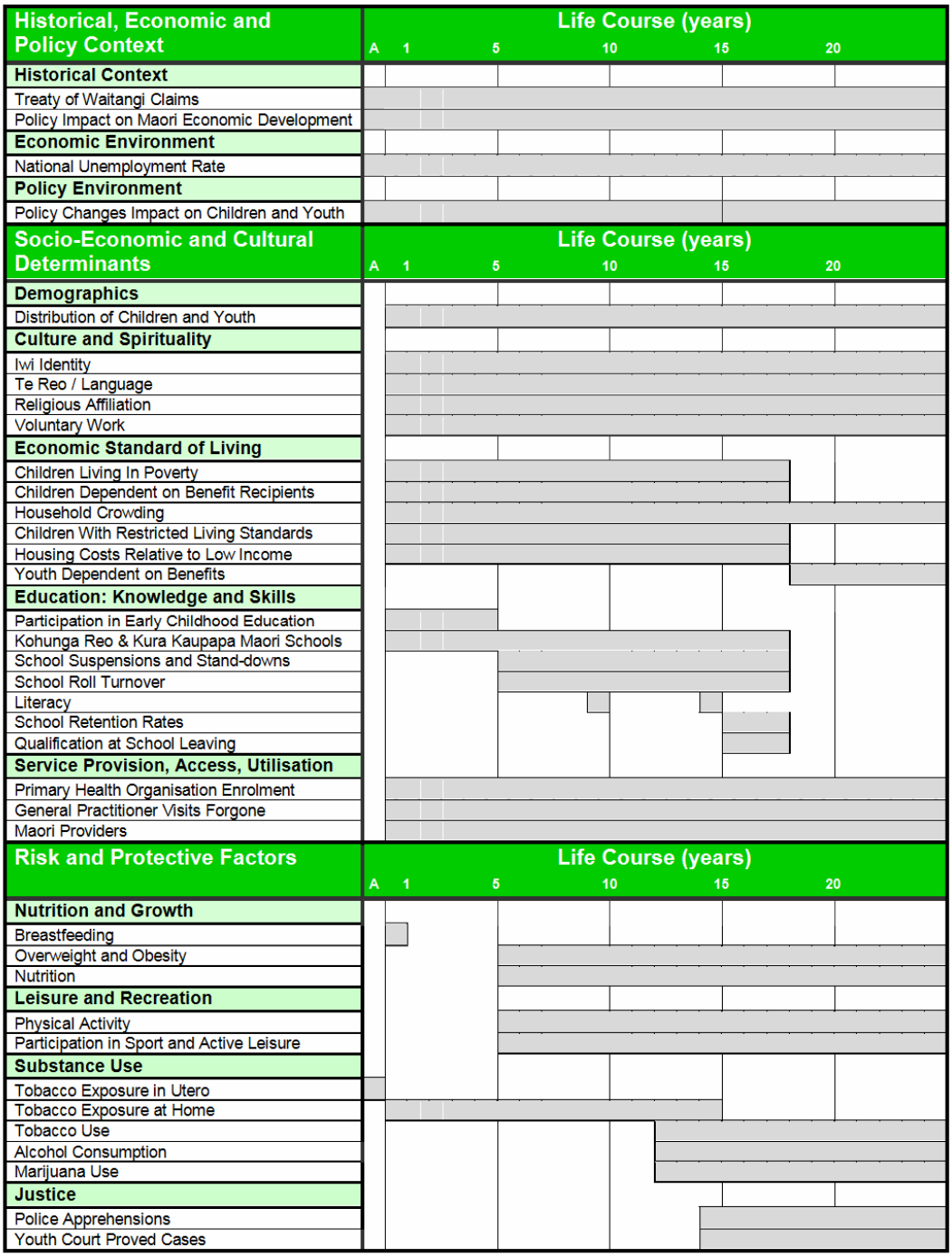
In addition to these 4 vertically arranged domains, the concept of a life course approach to health and wellbeing is woven throughout the framework. A life course approach allows for changes in individual and whanau health across each domain to be displayed in a way which reflects the natural transitioning from pregnancy → birth → infancy → childhood → adolescence → early adulthood. It also serves to highlight the cumulative impact factors in each of these domains have on individual and whanau wellbeing as children and young people transition from birth →24 years. Finally, the life course element allows stakeholders to identify only those indicators which apply to the populations they serve e.g. paediatric services, adolescent services.

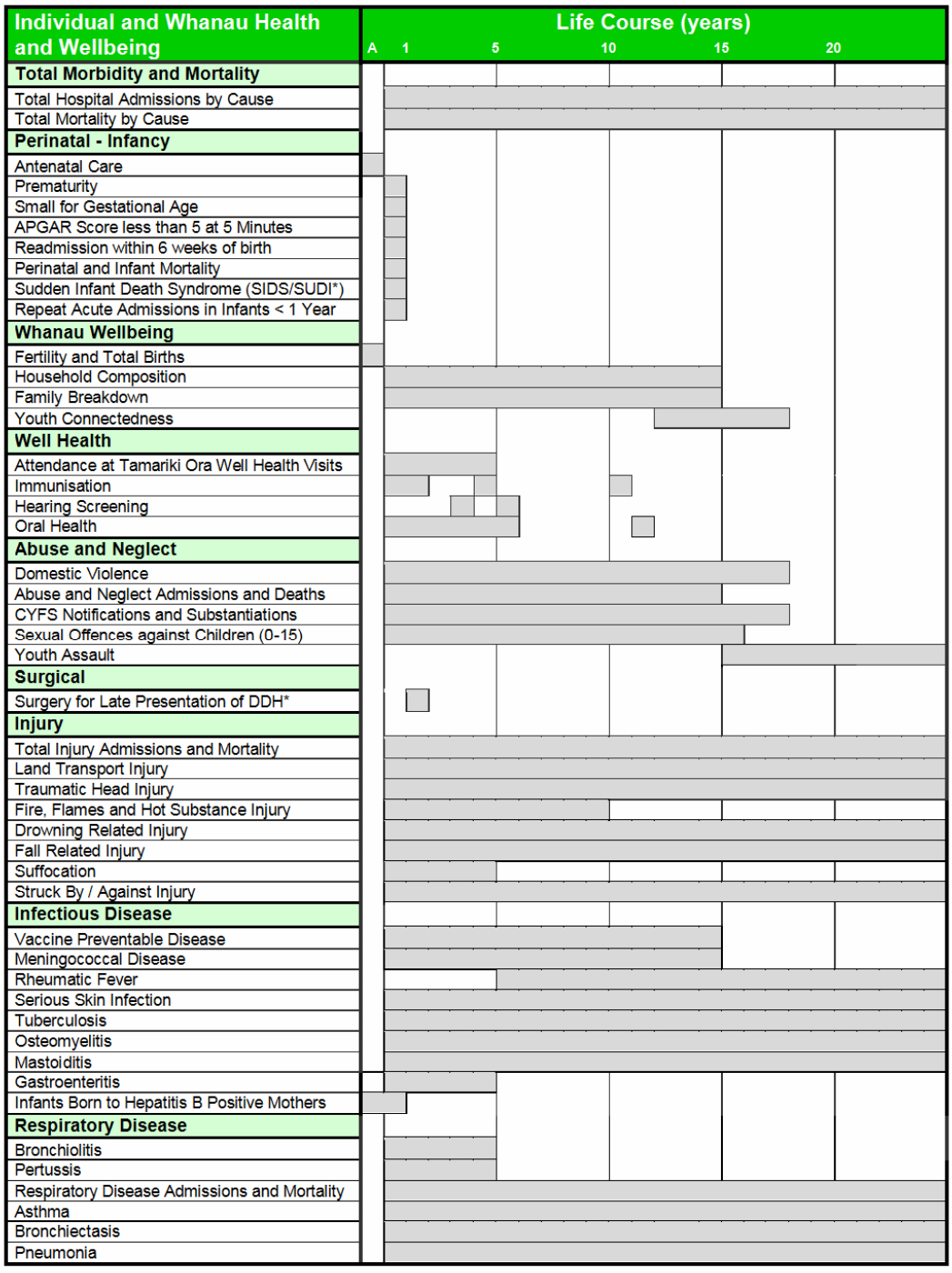
Arrangement of Indicators within the Monitoring Framework

Within each domain, health topics have been identified (e.g. respiratory Infections) which encompass a range of related indicators, each with a short name (e.g. bronchiolitis) and at least one measure (e.g. hospital admissions with bronchiolitis during the first year of life).

Appendix 1 uses the example of hospital admissions for bronchiolitis during the first year of life to illustrate the use of this framework, not only to provide information on the distribution and determinants of bronchiolitis, but also to highlight the potential pathways which link bronchiolitis admissions ↔ risk factors ↔ socioeconomic determinants ↔ policy and historical factors at a national level. Readers are strongly urged to review this case study, as it serves to illustrate the links between the various domains and highlights the fact that individual health outcomes should not be viewed in isolation, but rather as the final step in a complex causal pathway, leading from higher level historical and policy factors to outcomes at the individual level.

Figure 2: Child and Youth Health Monitoring Framework




Individual and Whanau Health and Wellbeing
Life Course (years)
A
1
5
10
15
20
Total Morbidity and Mortality
Total Hospital Admissions by Cause
Total Mortality by Cause
Perinatal - Infancy
Antenatal Care
Prematurity
Small for Gestational Age
APGAR Score less than 5 at 5 Minutes
Readmission within 6 weeks of birth
Perinatal and Infant Mortality
Sudden Infant Death Syndrome (SIDS/SUDI*)
Repeat Acute Admissions in Infants < 1 Year
Whanau Wellbeing
Fertility and Total Births
Household Composition
Family Breakdown
Youth Connectedness
Well Health
Attendance at Tamariki Ora Well Health Visits
Immunisation
Hearing Screening
Oral Health
Abuse and Neglect
Domestic Violence
Abuse and Neglect Admissions and Deaths
CYFS Notifications and Substantiations
Sexual Offences against Children (0-15)
Youth Assault
Surgical
Surgery for Late Presentation of DDH*
Injury
Total Injury Admissions and Mortality
Land Transport Injury
Traumatic Head Injury
Fire, Flames and Hot Substance Injury
Drowning Related Injury
Fall Related Injury
Suffocation
Struck By / Against Injury
Infectious Disease
Vaccine Preventable Disease
Meningococcal Disease
Rheumatic Fever
Serious Skin Infection
Tuberculosis
Osteomyelitis
Mastoiditis
Gastroenteritis
Infants Born to Hepatitis B Positive Mothers
Respiratory Disease
Bronchiolitis
Pertussis
Respiratory Disease Admissions and Mortality
Asthma
Bronchiectasis
Pneumonia

Individual and Whanau Health and Wellbeing	Life Course (years) A	1	5	10	15	20
Chronic Disease						
Cancer						
Diabetes						
End Stage Renal Failure						
Technology Dependent Children						
Disability						
Disability Prevalence						
Blindness						
Deafness						
Utilisation of NASC Services*						
Mental Health						
Prevalence of Mental Disorder						
Hospital Admissions for Mental Disorder						
Self Harm and Suicide						
Mental Health Service Utilisation						
Sexual and Reproductive Health						
Teenage Pregnancy						
Sexually Transmitted Infection						
Contraception Use						

***Notes:**
A: Antenatal - refers only to those antenatal factors which impact on child health outcomes
SUDI: Sudden unexplained death in an infant
DDH: Developmental Dysplasia of the Hips (formally Congenital Dislocation of the Hips (CDH))
NASC: Needs Assessment Service Co-ordination

Section B - Development of the Monitoring Framework

The Child and Youth Health Indicator Project commenced in February 2006, following the signing of a contract between the Paediatric Society of New Zealand and the Ministry of Health (Public Health Intelligence). To date work has progressed in a number of distinct phases:

1. The formation of a project steering committee, based on the current membership of the NZ Child and Youth Epidemiology Service's Steering Committee, with a number of additional members with experience relevant to the project.

2. The hiring of a Project Manager with experience in child and youth health.

3. A review of the national and international literature for current models upon which to base the process of indicator framework development. The process used by the European Union in developing its Child Health Indicators of Life and Development (CHILD), with a number of modifications to suit the New Zealand context, was seen as the most appropriate.[1]

4. The development of selection criteria to guide which indicators should be included within the monitoring framework. While it was thought that inclusion principally needed to be governed by *public health importance* (e.g. prevalence, severity, evidence of disparities), issues of *data quality* (e.g. availability of accurate national data sources, ability to track indicators over time) also needed to be taken into consideration. The final selection criteria decided on by the Steering Committee, following a review of the international literature in this area, are shown in **Table 1** and **Table 2**.

5. The formation of a long list of potential indicators based on a review of New Zealand publications over the past 10 years which contained significant child and youth health content (approx. 60 documents were reviewed and 130+ different indicators (e.g. obesity) and >800 different measures (e.g. BMI, waist–hip circumference) were identified). This long list was then broken down into topic based streams and consultation was undertaken with experts in each of these streams, in order to determine which indicators were most appropriate to monitor in each particular area (**Table 3**).

6. The results of the topic based consultation were then fed back to the Steering Committee at a meeting in July 2006, with the view to reducing the large number of potential indicators to a more manageable list. NZCYES Steering Committee Members and those involved in the initial consultation process were invited to participate. After reviewing the feedback from this preliminary consultation, each indicator in the draft long list was scored from one to five against the Public Health Importance selection criteria previously agreed on by the Steering Committee and indicators which received the lowest score in each Stream were considered for removal, (with the aim of creating a Medium List of approximately 95 indicators). It is the indicators from this Medium List that form the basis of the draft monitoring framework presented in this consultation document.

7. In parallel with this consultation process, NZCYES staff worked in partnership with the Maori SIDS Program to ensure that the monitoring framework met the needs of Maori children and young people. This process led to the inclusion of a number of additional indicators in the monitoring framework, as well as alterations to the way in which each of the 4 domains was conceptualised (e.g. inclusion of historical context in higher level domains, better integration between health outcomes and whanau wellbeing at the individual level, a greater emphasis being placed on life course elements of the framework).

In addition to the above, a number of other phases are planned over the next 6 months. These include:

1. Further consultation on this draft framework within the health sector, so that modifications can be made which will enhance the framework's usefulness for those working with NZ children and young people. As a result of this consultation, it is hoped that the number of indicators will be narrowed down to a more manageable list (e.g. 60-70 indicators).

2. Further partnerships also need be developed with those working with Pacific and Asian children and young people, so that the needs of these children and young people can also be considered within this monitoring framework.

3. The selection of the "Top 12" child and youth health indicators, which could then be used to represent child and youth health issues in the context of total population (i.e. all age groups) health status reports. It is hoped that this "Top 12" will be selected following a vote at the upcoming Paediatric Society of NZ Annual Conference in Nelson in November.

4. Further consultation also needs to be undertaken on the utility of the current "Indicators of DHB Performance" that directly relate to children and young people, so that the most appropriate indicators can be selected to monitor DHB Performance over time.

Table 1: Public Health Importance Selection Criteria

Public Health Importance Selection Criteria	
Significant Health Impact	Burden to individual - in terms of mortality, morbidity or function Burden to society - in terms of how common the condition is Cost, both direct and indirect (e.g. to health sector)
Modifiable	Potential exists to reduce health impact by prevention, early intervention or treatment (including issues of cost effectiveness)
Treaty of Waitangi / Inequalities	Disparity exists in subgroups within the population e.g. in terms of ethnicity, or socio-economic status.
Emergent	An emerging burden or a deteriorating trend is exhibited

Table 2: Data Quality Selection Criteria

Data Quality Selection Criteria	
Essential Criteria	
Face Validity	The indicator measures what it is intended to measure and is consistently sensitive in assessing this
Available	Data is routinely collected at a national level
Consistent	The method of data collection is clear and consistent over time, or any inconsistencies are well described
Disaggregatable	Data is capable of finer breakdown e.g. by age, gender, ethnicity, NZDep score, and region/DHB allowing comparison of different subgroups of the population.
Desirable Criteria	
Regionally Comparable	The definition of the measure is the same irrespective of region. The indicator is insensitive to regional variation in practice.
High Quality Data	Highly complete and accurate data

Table 3: Topic Based Streams Used During the Preliminary Consultation Phase and the Questions Asked During this Process

Streams	
• Abuse and Neglect • Civic Rights and Responsibilities / Justice • Chronic Disease • Culture • Demography • Disability • Education • Environment • Historical, Economic, and Policy Context • Infectious Diseases • Injury	• Lifestyle • Mental Health • Mortality and Morbidity • Nutrition, Physical Activity and Growth • Perinatal – Infancy • Respiratory • Sexual and Reproductive Health • Socio-economic Determinants • Surgical • Well Health • Whanau Wellbeing
Questions Asked During the Stream Based Consultation Phase	
• Are there any issues within this Stream which are not already covered by this draft list (i.e. are there other indicators we should potentially be considering)? For each additional indicator / issue suggested, please outline ◦ How this particular indicator should be defined and measured ◦ The best data source for the proposed indicator • Within this Stream, which indicators do you consider to be essential, and which do you consider to be optional (this will help with later prioritisation, as it is likely that to achieve balance only 2-3 indicators may be included for each particular stream)? • Where a number of different measurement options are listed for a particular indicator, which ones do you feel are the most appropriate for routine use? • Do you consider the balance of the attached framework to be adequate / are there any other issues you would like to raise at this point.	

Indicator Project Questionnaire

We would be grateful for your / your organisation's opinions on the draft framework, the indicators it contains and whether further modifications are required to ensure that it is able to meet the needs of New Zealand's children and young people.

In order to facilitate this process, the following questionnaire is broken down as follows:

1. **Respondent Demographics**: This section asks a few basic questions which will assist the project team in assessing whether a sufficiently broad cross section of the health sector has been consulted.

2. **Section A - Monitoring Framework**: This section asks questions related to the structure of the indicator framework, the conceptualisation of its domains, the way in which the cultural and life course elements have been woven in and the scope of the topic based streams. In addition, the section concludes with a number of questions on who should be monitoring child and youth health status in NZ.

3. **Section B- Specific Indicators Arranged by Domain and Stream**: This section asks for feedback on each of the indicators included in the draft monitoring framework. You may chose to provide feedback on all of the indicators, or only those for which you have some knowledge or interest.

4. **Section C- Indicators of DHB Performance**: This section is optional and is aimed at those working in a DHB context. It seeks feedback on whether the current "MOH Indicators of DHB Performance" which relate to child and youth health are appropriate, or whether others should be considered. It also discusses whether different selection criteria are needed when selecting "Indicators of DHB Performance".

5. **Section D** – Comments: This section provides space for additional feedback.

Contact Details

If you have any questions about completing this questionnaire please do not hesitate to contact the NZ Child and Youth Epidemiology Service:

NZ CYES Director
Dr Liz Craig
E: e.craig@auckland.ac.nz
P: 09 373 7599 ext 82012

Indicator Project Manager
Dr Catherine Jackson
E: c.jackson@uniservices.co.nz
P: 09 373 7599 ext 87675

Instructions

There are two ways to complete this questionnaire:

Manual Method (This Version)

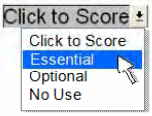
To complete the questionnaire on paper please print out the **Consultation Document PRINT Version.** Once the questionnaire section has been completed please mail to:

NZCYES
ATTN: Catherine Jackson
PO Box 17 360
Greenlane
Auckland

Electronic Method (Electronic Version)

This **Consultation Document ELECTRONIC Version** includes a questionnaire which can be completed in Microsoft Word. It has been formatted as a form with the areas where text can be inserted highlighted.

- Free text sections ( ) can be clicked on to type comments.
- Check boxes (☐) can be clicked on to mark.
- Drop down boxes (Click to Score) can be clicked on to select a choice. The options will appear below and one option can be selected e.g. Click to Score



Once you have finished filling in the consultation document, please **SAVE** it and send it as an **ATTACHMENT** to c.jackson@uniservices.co.nz

NOTE: The electronic version should not be printed out for completing on paper (see below).

Completion Date

As a Project Team we would be grateful for any feedback, on any aspect of this project, whether it is by means of completing the entire questionnaire, or only commenting on particular aspects.

Completed submissions should be returned to the NZ Child and Youth Epidemiology Service by **Monday October 30th, 2006**.

Respondent Demographics

Are you completing this questionnaire…

- ☐ as an Individual?
- ☐ on behalf of an Organisation?

If you are completing this questionnaire as an **INDIVIDUAL** please indicate:

your qualification(s)

- ☐ Doctor *Please specify:*
  - ☐ Specialist Paediatrician
  - ☐ General Paediatrician
  - ☐ Public Health Physician
  - ☐ Paediatric Surgeon
  - ☐ Other Surgeon
  - ☐ Paediatric Registrar
  - ☐ Public Health Registrar
  - ☐ Other Registrar
  - ☐ General Practitioner
  - ☐ Other Medical Professional
- ☐ Nurse *Please specify:*
  - ☐ Child and Youth Health Nurse
  - ☐ Public Health Nurse
  - ☐ Other Nursing Professional
- ☐ Allied Health Professional
  Please Specify:
  - ☐ Occupational Therapist
  - ☐ Speech Language Therapist
  - ☐ Physiotherapist
  - ☐ Play Specialist
  - ☐ Other
- ☐ Epidemiologist
- ☐ Child Health Manager
- ☐ Policy Analyst
- ☐ Researcher
- ☐ Other *Please specify:*

your employer(s)

- ☐ Ministry of Health
- ☐ Ministry of Education
- ☐ Ministry of Justice
- ☐ Ministry of Social Development
- ☐ District Health Board
- ☐ Non Government Organisation
- ☐ Primary Healthcare Organisation
- ☐ Academic Institution/University
- ☐ Other *Please specify:*

If you are completing this questionnaire on behalf of an **ORGANISATION** please indicate the (type of) organisation:

- ☐ Ministry of Health
- ☐ Ministry of Education
- ☐ Ministry of Justice
- ☐ Ministry of Social Development
- ☐ District Health Board
- ☐ Non Government Organisation
- ☐ Primary Healthcare Organisation
- ☐ Academic Institution/University Department
- ☐ Other *Please specify:*

Section A - Monitoring Framework

1. Framework Structure

a. Domain Dimension

Do you generally agree with the structure of the domain dimension in this framework?

☐ Yes ☐ No

In your opinion, should something in the description of the domain dimension be…

Added: _____

Deleted: _____

Changed: _____

b. Life Course Dimension

Do you generally agree with the life course dimension of this framework?

☐ Yes ☐ No

In your opinion, should something in the description of the life course dimension be…

Added: _____

Deleted: _____

Changed: _____

c. Culture Dimension

Do you agree with the way in which culture has been woven through this framework?

☐ Yes ☐ No

In your opinion, should something about the way in which culture has been woven through the framework be…

Added: _____

Deleted: _____

Changed: _____

In your opinion, should something in the description of the culture dimension be…

Added: _____

Deleted: _____

Changed: _____

d. Scope of the Health Topics

Do you generally agree with the scope of the Health Topics included within this framework?

☐ Yes ☐ No

In your opinion, are there any Health Topics which should be…

Added: _____

Deleted: _____

Changed: _____

Do you think that the balance between the Health Topics within this framework is appropriate?

☐ Yes ☐ No

If you answer **NO** please comment:

2. Monitoring

In your opinion, should there be national monitoring of child and youth health and wellbeing?

☐ Yes ☐ No

If YES, who do you think should be undertaking this task?

If YES, how frequently do you think this should occur?

☐ Annually
☐ 3 Yearly
☐ 5 Yearly
☐ Other *Please specify:*

3. Accountability

In your opinion, who is accountable for the current state of child and youth health and wellbeing in New Zealand?

Section B - Indicators and Measures

The following section seeks feedback on each of the indicators included within the draft monitoring framework. We would be grateful for your opinions as to whether you consider each of these indicators as essential, optional, or of no use and also, if there are any other comments you may wish to make. Feedback received during this phase of consultation will be used to refine the draft Medium List of indicators to a more manageable short list (60-70 indicators).

It is intended, where possible, that each indicator will be reported on by age, ethnicity, gender, NZDep, and Rural/Urban Status.

This section follows the Domain and Health Topic structure of the monitoring framework (Figure 3).

Figure 3: Structure of Section B - Indicators and Measures

1. Domain

Health Topic

Indicator	**Score:** Click to Score
Measure *Data Source*	**Comments:** Space to type comments
Indicator	**Score:** Click to Score
Measure *Data Source*	**Comments:** Space to type comments

1. Historical, Economic and Policy Context

Historic Context Health

(circle score)

Treaty of Waitangi Claims	Score: 1(no use) 2(optional) 3(essential)
Treaty of Waitangi Claims which are settled and outstanding *Waitangi Tribunal*	Comments:
Policy Impact on Maori Economic Development	**Score: 1(no use) 2(optional) 3(essential)**
Changes in policy which impact on Maori Economic Development *Literature Review*	Comments:

Economic Environment

National Unemployment Rate	Score: 1(no use) 2(optional) 3(essential)
National adult unemployment rate *Statistics NZ Household Labour Force Survey*	Comments:

Policy Environment

Policy Changes Impact on Children and Youth	Score: 1(no use) 2(optional) 3(essential)
Policy changes in the last 3 years which impact on children and youth *Literature review*	Comments:

a. In your opinion, are there indicators in this domain which should be…

Added: _____

Deleted: _____

Changed: _____

b. Do you have any comments regarding the proposed measures or data sources for these indicators?

2. Socioeconomic and Cultural Determinants

Demographics

(circle score)

Distribution of Children and Youth	Score: 1(no use) 2(optional) 3(essential)
Distribution of Children/Youth by age, ethnicity, NZDep, gender, rurality, District Health Board, and as a percentage of the population *NZ Census*	Comments:

Culture and Spirituality

Iwi Identity	Score: 1(no use) 2(optional) 3(essential)
Number of Maori children and youth who report an iwi *NZ Census*	Comments:
Te Reo / Language	**Score: 1(no use) 2(optional) 3(essential)**
Maori children and youth who speak Te Reo Maori *NZ Census*	Comments:
Children and youth able to speak in their own language (not English) by ethnicity *NZ Census*	Comments:
Religious Affiliation	**Score: 1(no use) 2(optional) 3(essential)**
Religious affiliation *NZ Census*	Comments:
Voluntary Work	**Score: 1(no use) 2(optional) 3(essential)**
Number of youth who engage in voluntary work *NZ Census*	Comments:

Economic Standard of Living

Children Living in Poverty	Score: 1(no use) 2(optional) 3(essential)
Children living in households where the household income is less than 60 percent of the median equivalent disposable family income net of housing costs *Statistics NZ Household Economic Survey*	Comments:
Children Dependent on Benefit Recipients	**Score: 1(no use) 2(optional) 3(essential)**
Children dependant on core benefit recipients by type *Ministry of Social Development*	Comments:
Household Crowding	**Score: 1(no use) 2(optional) 3(essential)**
Household Crowding using the Canadian Household Occupancy Index *NZ Census*	Comments:
Children With Restricted Living Standards	**Score: 1(no use) 2(optional) 3(essential)**
Proportion of children living with very restricted living standards *NZ Living Standards Survey*	Comments:
Housing Costs Relative to Low Income	**Score: 1(no use) 2(optional) 3(essential)**
Housing costs relative to low income *Statistics NZ Household Labour Force Survey and Tenancy Bonds Data. Requires further definition.*	Comments:
Youth Dependent on Benefits	**Score: 1(no use) 2(optional) 3(essential)**
Youth dependant on a core benefit by type *Ministry of Social Development*	Comments:

Education, Skills and Knowledge

Participation in Early Childhood Education	Score: 1(no use) 2(optional) 3(essential)
Year one students who participated in Early Childhood Education *Ministry of Education*	Comments:
Te Kohunga Reo and Kura Kaupapa Maori Schools	**Score: 1(no use) 2(optional) 3(essential)**
Number children attending Te Kohunga Reo and Kura Kaupapa Maori Schools *Ministry of Education*	Comments:

Suspensions and Stand-downs	**Score:** **1**(no use) **2**(optional) **3**(essential)
Suspensions and Stand-downs by school level *Ministry of Education*	**Comments:**
School Roll Turnover	**Score:** **1**(no use) **2**(optional) **3**(essential)
Proportion of the school roll which is turned over each school year *Data source to be confirmed*	**Comments:**
Literacy	**Score:** **1**(no use) **2**(optional) **3**(essential)
Reading, Mathematical and Scientific Literacy *Progress in International Reading Literacy Study (PIRLS), Trends in International Mathematics and Science Study (TIMSS) Programme for International Student Assessment (PISA)*	**Comments:**
School Retention Rates	**Score:** **1**(no use) **2**(optional) **3**(essential)
Retention of youth aged 15 and over in secondary school *Ministry of Education*	**Comments:**
Qualification at School Leaving	**Score:** **1**(no use) **2**(optional) **3**(essential)
Qualification at school leaving by level *Ministry of Education*	**Comments:**

Service Provision, Access and Utilisation

Primary Health Organisation Enrolment	**Score:** **1**(no use) **2**(optional) **3**(essential)
Proportion of children and youth enrolled with a Primary Health Organisation *NZHIS PHO Enrolment Collection*	**Comments:**
General Practitioner Visits Forgone	**Score:** **1**(no use) **2**(optional) **3**(essential)
Children and youth who have forgone a General Practitioner visit by reason (e.g. because of cost) *Youth Health Survey, NZ Health Survey, Living Standards Survey*	**Comments:**
Maori Providers	**Score:** **1**(no use) **2**(optional) **3**(essential)
Number of Maori Providers *Data source to be established*	**Comments:**

a. In your opinion, are there indicators in this domain which should be…

Added: _____

Deleted: _____

Changed: _____

b. Do you have any comments regarding the proposed measures or data sources for these indicators?

3. Risk and Protective Factors

Nutrition and Growth

(circle score)

Breastfeeding	**Score: 1**(no use) **2**(optional) **3**(essential)
Breastfeeding at discharge from hospital and full and exclusive breastfeeding at 3 and 6 months *Maternity and Newborn Information System / Plunket*	**Comments:**
Overweight and Obesity	**Score: 1**(no use) **2**(optional) **3**(essential)
Proportion of overweight or obese children and youth (Cole BMI chart for children) *Literature review including the NZ National Children's Nutrition Survey, the NZ Health Survey, and Regional Surveys*	**Comments:**
Hospital Admissions for Slipped Upper Femoral Epiphyses *NZHIS Admissions data*	**Comments:**
Nutrition	**Score: 1**(no use) **2**(optional) **3**(essential)
Proportion of children and youth who eat 2+ serves of fruit a day *Literature review including the NZ National Children's Nutrition Survey, the NZ Health Survey, and Regional Surveys*	**Comments:**
Proportion of children and youth who eat 3+ serves of vegetables a day *Literature review including the NZ National Children's Nutrition Survey, the NZ Health Survey, and Regional Surveys*	**Comments:**
Children with iron deficiency *Literature review including the NZ National Children's Nutrition Survey*	**Comments:**

Leisure and Recreation

Physical Activity	**Score: 1**(no use) **2**(optional) **3**(essential)
Children and youth by level of activity (active, sedentary) *SPARC*	**Comments:**
Time spent playing computer or video games *Literature review including the Youth Health Survey and Regional Surveys*	**Comments:**
Time spent watching television or videos *Literature review including the Youth Health Survey and Regional Surveys*	**Comments:**
Participation in Sport and Active Leisure	**Score: 1**(no use) **2**(optional) **3**(essential)
Children and Youth participating in sport and active leisure *SPARC*	**Comments:**

Substance Use

Tobacco Exposure in Utero	**Score: 1**(no use) **2**(optional) **3**(essential)
Proportion of mothers who smoke tobacco during pregnancy *Data source to be confirmed*	**Comments:**
Tobacco Exposure at Home	**Score: 1**(no use) **2**(optional) **3**(essential)
Number of children under 16 years old living in a household with a tobacco smoker *NZ Census and ASH Survey*	**Comments:**
Tobacco Use	**Score: 1**(no use) **2**(optional) **3**(essential)
Current tobacco use *NZ Census and ASH Survey*	**Comments:**
Alcohol Consumption	**Score: 1**(no use) **2**(optional) **3**(essential)
Review of the literature on alcohol consumption highlighting binge drinking, frequency, and consumption on a typical occasion *Literature review including Youth Health Survey, ALAC data, NZ Health Survey*	**Comments:**
Hospital admissions with alcohol listed in the first 15 diagnostic codes *NZHIS Admissions data*	**Comments:**

Marijuana Use	Score: 1(no use) 2(optional) 3(essential)
Marijuana use weekly or more often *Youth Health Survey*	Comments:

Justice

Police Apprehensions	Score: 1(no use) 2(optional) 3(essential)
Police apprehensions of 14 - 24 year olds excluding non-imprisonable traffic offences by resolution type (e.g. Family Group Conference, Youth Court, Warning etc.) Police Crime Statistics	Comments:
Youth Court Proved Cases	**Score: 1(no use) 2(optional) 3(essential)**
Youth Court Proved Cases by offence, excluding non-imprisonable traffic offences Ministry of Justice	Comments:

a. In your opinion, are there indicators in this domain which should be…

Added: _____

Deleted: _____

Changed: _____

b. Do you have any comments regarding the proposed measures or data sources for these indicators?

4. Individual and Whanau Health and Wellbeing

Total Morbidity and Mortality

(circle score)

Total Hospital Admissions by Cause	**Score: 1**(no use) **2**(optional) **3**(essential)
Hospital admissions by cause *NZHIS Admissions Data*	**Comments:**
Total Mortality by Cause	**Score: 1**(no use) **2**(optional) **3**(essential)
Mortality by cause *NZHIS Mortality Data*	**Comments:**

Perinatal - Infancy Stream

Antenatal Care	**Score: 1**(no use) **2**(optional) **3**(essential)
Proportion of deliveries which are unregistered with a LMC *Maternity and Newborn Information System*	**Comments:**
Prematurity	**Score: 1**(no use) **2**(optional) **3**(essential)
Prematurity by gestation *NZHIS Birth Data*	**Comments:**
Small for Gestational Age	**Score: 1**(no use) **2**(optional) **3**(essential)
Proportion of infants who are born small for their gestational age *NZHIS Birth Data. NOTE: This measure requires update of the New Zealand birth centile charts.*	**Comments:**
APGAR Score less than 5 at 5 Minutes	**Score: 1**(no use) **2**(optional) **3**(essential)
Term infants with an APGAR Score <5 at 5 Minutes *Maternity and Newborn Information System*	**Comments:**
Readmission Within 6 Weeks of Birth	**Score: 1**(no use) **2**(optional) **3**(essential)
Rate of infants re-admitted to hospital within 6 weeks of birth by cause *NZHIS Admissions Data. NOTE: Methodology needs to be developed.*	**Comments:**
Perinatal and Infant Mortality	**Score: 1**(no use) **2**(optional) **3**(essential)
Late Fetal Mortality, Neonatal Mortality, and Post Neonatal Mortality *NZHIS Mortality Data*	**Comments:**
Sudden Infant Death Syndrome (SIDS/SUDI)	**Score: 1**(no use) **2**(optional) **3**(essential)
Neonatal mortality due to Sudden Infant Death Syndrome (Sudden Unexpected Death in Infancy) *NZHIS Mortality Data*	**Comments:**
Repeat Acute Admissions in Infants <1 Year	**Score: 1**(no use) **2**(optional) **3**(essential)
Proportion of infants with under 1 year of age with repeat acute admissions by cause *NZHIS Admissions Data. NOTE: Methodology needs to be developed*	**Comments:**

Whanau Wellbeing

Fertility	**Score: 1**(no use) **2**(optional) **3**(essential)
Total births and fertility rate *NZHIS Birth Data*	**Comments:**
Household Composition	**Score: 1**(no use) **2**(optional) **3**(essential)
Household Composition of families with dependant children *NZ Census*	**Comments:**
Children and Youth living in extended families *Statistics NZ*	**Comments:**
Family Breakdown	**Score: 1**(no use) **2**(optional) **3**(essential)
Divorce Rates *Statistics NZ*	**Comments:**
Youth Connectedness	**Score: 1**(no use) **2**(optional) **3**(essential)
Youth who report a positive relationship with their parents, belonging to a group or club including sports clubs, and who feel they are a part of their school *Literature review including the Youth Health Survey*	**Comments:**

Traumatic Head Injury	**Score: 1**(no use) **2**(optional) **3**(essential)
Total traumatic head injury admissions and deaths, and those occurring in infants less than 1 year of age *NZHIS Admissions and Mortality data*	**Comments:**
Fire, Flames and Hot Substance Injury	**Score: 1**(no use) **2**(optional) **3**(essential)
Fire, flame and hot substances related admissions and deaths *NZHIS Admissions and Mortality data*	**Comments:**
Drowning Related Injury	**Score: 1**(no use) **2**(optional) **3**(essential)
Drowning related admissions and deaths *NZHIS Admissions and Mortality data*	**Comments:**
Fall Related Injury	**Score: 1**(no use) **2**(optional) **3**(essential)
Fall-related Admissions and Deaths *NZHIS Admissions and Mortality data*	**Comments:**
Suffocation	**Score: 1**(no use) **2**(optional) **3**(essential)
Suffocation related admissions and deaths *NZHIS Admissions and Mortality data*	**Comments:**
Struck By or Against Injury	**Score: 1**(no use) **2**(optional) **3**(essential)
Struck by or against-related admissions and deaths *NZHIS Admissions and Mortality data*	**Comments:**

Infectious Disease

Vaccine Preventable Disease	**Score: 1**(no use) **2**(optional) **3**(essential)
Vaccine preventable disease admissions, deaths and notifications by cause *NZHIS Admissions and Mortality data / ESR - Definition would need to be developed*	**Comments:**
Meningococcal Disease	**Score: 1**(no use) **2**(optional) **3**(essential)
Meningococcal disease admissions, deaths, and notifications *NZHIS Admissions and Mortality data / ESR*	**Comments:**
Rheumatic Fever	**Score: 1**(no use) **2**(optional) **3**(essential)
Acute rheumatic fever and rheumatic heart disease admissions and deaths *NZHIS Admissions and Mortality data*	**Comments:**
Serious Skin Infection	**Score: 1**(no use) **2**(optional) **3**(essential)
Serious skin infection admissions and deaths *NZHIS Admissions and Mortality data*	**Comments:**
Tuberculosis	**Score: 1**(no use) **2**(optional) **3**(essential)
Tuberculosis admissions, deaths, and notifications *NZHIS Admissions and Mortality data / ESR*	**Comments:**
Osteomyelitis	**Score: 1**(no use) **2**(optional) **3**(essential)
Osteomyelitis admissions and deaths *NZHIS Admissions and Mortality data*	**Comments:**
Mastoiditis	**Score: 1**(no use) **2**(optional) **3**(essential)
Hospital admission for mastoiditis and mastoidectomy *NZHIS Admissions data*	**Comments:**
Gastroenteritis	**Score: 1**(no use) **2**(optional) **3**(essential)
Gastroenteritis admissions and deaths *NZHIS Admissions and Mortality data*	**Comments:**
Infants Born to Hepatitis B Positive Mothers	**Score: 1**(no use) **2**(optional) **3**(essential)
Infants born to hepatitis B positive mothers *Data source not yet established*	**Comments:**

Respiratory Disease

Bronchiolitis	**Score: 1**(no use) **2**(optional) **3**(essential)
Bronchiolitis admissions and deaths in children under 1 year old *NZHIS Admissions and Mortality data*	**Comments:**
Pertussis	**Score: 1**(no use) **2**(optional) **3**(essential)
Pertussis admissions, deaths, and notifications *NZHIS Admissions and mortality data / ESR*	**Comments:**

Respiratory Disease Admissions and Mortality	Score: 1(no use) 2(optional) 3(essential)
Composite measure of respiratory disease admissions and deaths *NZHIS Admissions and Mortality data*	Comments:
Asthma	**Score: 1**(no use) **2**(optional) **3**(essential)
Asthma Admissions and Deaths, and readmissions within 28 days *NZHIS Admissions and mortality data*	Comments:
Bronchiectasis	**Score: 1**(no use) **2**(optional) **3**(essential)
Non cystic fibrosis bronchiectasis admissions *NZHIS Admissions data*	Comments:
Pneumonia	**Score: 1**(no use) **2**(optional) **3**(essential)
Pneumonia Admissions and Deaths *NZHIS Admissions and Mortality data*	Comments:

Chronic Disease

Cancer	Score: 1(no use) 2(optional) 3(essential)
Cancer Deaths and Registrations *NZHIS Mortality Data / NZ Cancer Registry*	Comments:
Diabetes	**Score: 1**(no use) **2**(optional) **3**(essential)
Diabetes Incidence and Hospitalisations *Literature Review / NZHIS Admissions data*	Comments:
End Stage Renal Failure	**Score: 1**(no use) **2**(optional) **3**(essential)
Prevalence of End Stage Renal Failure by those who have had transplantation and those on dialysis *None as yet established*	Comments:
Technology dependant children	**Score: 1**(no use) **2**(optional) **3**(essential)
Number of technology dependant children *None as yet established*	Comments:

Disability

Disability prevalence	Score: 1(no use) 2(optional) 3(essential)
Prevalence of disability by type (e.g. intellectual, physical, etc.) *Literature Review including Statistics NZ Disability Survey*	Comments:
Blindness	**Score: 1**(no use) **2**(optional) **3**(essential)
Blindness incidence *Database of children registered as blind*	Comments:
Permanent Hearing Loss	**Score: 1**(no use) **2**(optional) **3**(essential)
Permanent Hearing Loss incidence, and mean age at first hearing aid placement *National Audiology Centre*	Comments:
Utilisation of Needs Assessment Service Coordination Services	**Score: 1**(no use) **2**(optional) **3**(essential)
Children and youth utilising Needs Assessment Service Coordination (NASC) services *NASC Services Database - due to start December 2006*	Comments:

Mental Health

Prevalence of Mental Health Disorders	Score: 1(no use) 2(optional) 3(essential)
Prevalence of mental health disorders in children and youth Literature Review	Comments:
Hospital Admission for Mental Disorder	**Score: 1**(no use) **2**(optional) **3**(essential)
Hospital Admissions for Mental disorder by disorder NZHIS Admissions data	Comments:
Mental Health Service Utilisation	**Score: 1**(no use) **2**(optional) **3**(essential)
Use of Child and Adolescent Mental Health Services by diagnosis and HoNOSCA scale Mental Health Information National Collection	Comments:
Suicide and Self Harm	**Score: 1**(no use) **2**(optional) **3**(essential)
Suicide and self harm admissions and deaths NZHIS Admissions and Mortality data	Comments:

Sexual and Reproductive Health

Teenage Pregnancy	**Score:** **1**(no use) **2**(optional) **3**(essential)
Births and termination of pregnancy in teenagers *NZHIS Birth Data / Abortion Data*	**Comments:**
Contraception Use	**Score:** **1**(no use) **2**(optional) **3**(essential)
Contraception use in youth *Literature review including the Youth Health Survey and Regional Surveys*	**Comments:**
Sexually Transmitted Infection	**Score:** **1**(no use) **2**(optional) **3**(essential)
Prevalence of sexually transmitted infection *ESR sexual health and family planning clinic statistics on sexually / Literature review for local data*	**Comments:**

a. In your opinion, are there indicators in this domain which should be…

Added: _____

Deleted: _____

Changed: _____

b. Do you have any comments regarding the proposed measures or data sources for these indicators?

Section C - Indicators of DHB Performance

The Indicators of DHB Performance are a set of annual accountability indicators introduced in 2001 and are one basis upon which DHBs are required to report to the Ministry of Health. The indicators allow the Ministry to gauge how individual DHB's are performing in relation to progressing the New Zealand Health Strategy, as well as the key Ministerial expectations outlined in any given year [2]. A summary of previous child and youth health related Indicators of DHB Performance is shown in Table 4.

Table 4: Child and Youth Health Related Indicators of DHB Performance

Indicator	2001/2	2002/3	2003/4	2004/5	2005/6
Oral health: Mean MF Score at Year 8	●	●	●	●	●
Oral health: % of children caries free at 5 years	●	●	●	●	●
Hearing: % of children passing school entry hearing screening test	●	●	●		
Asthma: Repeat admissions for asthma in children aged < 5 and 5-14 years within 30 days	●	●			
Asthma: Discharge rates for paediatric asthma in children under 5 and 5-14 years			●		
LBW: Babies born in public hospital with low birth weight	●	●	●	●	●
Breastfeeding: Full breastfeeding rate at 6 weeks and three months	●	●			
Ambulatory sensitive admissions: In 0-4, 5-14 and 15-25 year olds		●	●	●	●
Immunisation: Children fully vaccinated at 2 years	●	●	●	●	●
Immunistion: % under 20 years old immunised with MeNZB					●
BFHI: Progress in implementing the Baby Friendly Hospital Initiative in maternity facilities	●	●	●	●	●
Teenage Pregnancy: Births and termination of pregnancy in mothers aged 13-17 years				●	
Healthy Eating Healthy Action: % of active Health Promoting Schools					●

a. In your opinion, do the 2005/6 "Indicators of DHB Performance" accurately assess a DHB's performance in the area of child and youth health?

☐ Yes ☐ No

If NO, please comment

b. Are there any "Indicators of DHB Performance" you feel should be…

Added: _____

Deleted: _____

Changed: _____

c. Do you think there should be different criteria for assessing DHB performance than there should be for assessing child and youth health status? (E.g. factors that should be directly under the DHB's control, factors that are modified by service delivery rather than the wider determinants of health, factors that can realistically be changed in the short to medium term).

☐ Yes ☐ No

If YES, what criteria would you suggest?

Section D - Comments

Do you have any further comments regarding the Child and Youth Health Indicator Project?

References

1. Rigby MJ, Kohler LI, Blair ME, Metchler R. Child health indicators for Europe: a priority for a caring society. *European Journal of Public Health.* Sep 2003;13((3 Suppl)):38-46.
2. Ministry of Health. Advice to the Incoming Minister of Health 3. Available at: http://www.newhealth.govt.nz/aim. Accessed 15 August, 2006.

Appendix

Bronchiolitis in the First Year of Life: Applying the Framework

The following section highlights how the proposed monitoring framework can be used to explore a single health outcome: hospital admissions for bronchiolitis in the first year of life. The section tracks the indicator and its determinants up through the various levels of the framework, in an attempt to understand the reasons for the current socioeconomic and ethnic disparities in bronchiolitis in New Zealand today. While the example used is simplistic and only considers at most, one or two issues at each level, it nevertheless provides the reader with an overview of the way in which it is hoped the framework will be used to understand and then attempt to address the current disparities in child and youth health that exist amongst New Zealand children and young people.

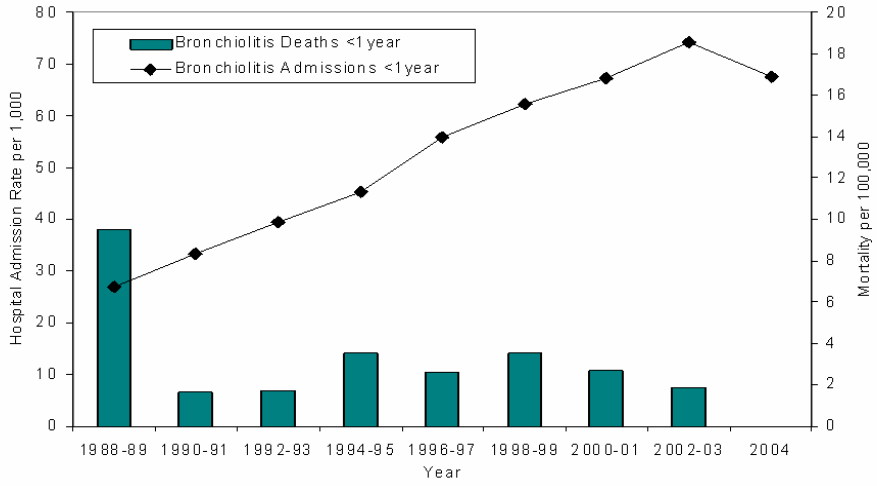
Domain 4: Individual and Whanau Health and Wellbeing

Bronchiolitis Hospital Admissions and Deaths in Infants <1 Year Old

Bronchiolitis is a viral infection of the respiratory tract which commonly affects babies in their first year of life. Symptoms include coughing, wheezing, rapid breathing and difficulty in feeding and babies are often admitted to hospital for supplementation of oxygen and fluids. Factors which increase the likelihood that a baby will suffer from bronchiolitis include young age (<6 months), crowding, older brothers and sisters attending day care, socioeconomic disadvantage, maternal smoking and a lack of breastfeeding.

Figure 4 shows hospital admissions and deaths due to bronchiolitis amongst New Zealand infants between 1988 and 2004. While hospital admissions increased progressively, up to a peak in 2002-03, the number of deaths remained fairly constant during the 1990s and early 2000s.

Figure 4: Hospital Admissions and Deaths due to Bronchiolitis, NZ Children Aged <1 Year



Source: NZHIS Hospital Admissions Dataset

Table 5 shows the distribution of hospital admissions for bronchiolitis by ethnicity and NZ Deprivation Index Decile during 2000-2004. During this period on average, 33 infants per 1,000 in the least deprived areas were admitted to hospital for bronchiolitis, as compared to 150 per 1,000 in the most deprived areas i.e. hospital admission rates were nearly 4.5 times higher amongst those in the most deprived areas. Similarly, on average 190 Pacific and 123 Maori infants per 1,000 were admitted to hospital for bronchiolitis, as compared to 38 per 1,000 for European infants. Thus hospital admission rates for bronchiolitis were 5.0 times higher for Pacific infants and 3.2 times higher for Maori infants, than for European infants during this period.

Table 5: Ethnicity, NZDep Index Decile and Risk of Hospital Admission for Bronchiolitis in NZ Children < 1 Year Old, 2000-2004

Variable	Rate*	RR	95% CI	Variable	Rate*	RR	95% CI
NZDep Index Decile				NZDep Index Quintile			
1	33.4	1.00		1-2	34.2	1.00	
2	35.0	1.05	0.95-1.16	3-4	41.6	1.21	1.13-1.30
3	34.5	1.04	0.93-1.15	5-6	51.9	1.52	1.42-1.61
4	47.8	1.43	1.30-1.57	7-8	72.2	2.11	1.99-2.24
5	48.9	1.47	1.34-1.61	9-10	127.2	3.72	3.52-3.93
6	54.4	1.63	1.49-1.78	Ethnicity			
7	70.3	2.11	1.93-2.30	Maori	122.6	3.23	3.13-3.34
8	73.8	2.21	2.03-2.41	Pacific	190.4	5.02	4.84-5.20
9	102.3	3.07	2.83-3.33	European	37.9	1.00	
10	149.7	4.49	4.15-4.85	Asian / Indian	21.3	0.56	0.51-0.62

Source: NZHIS Hospital Admission Dataset; * rate per 1,000 per year, relative risks are unadjusted

Conclusion

The above figures suggest that bronchiolitis is a significant problem for New Zealand infants and that hospital admission rates have increased in recent years, although this increase may be beginning to taper off. In addition, bronchiolitis admission rates are of particular concern for Maori and Pacific infants, who appear to experience a disproportionately higher burden of disease. In order to understand the reasons for these disparities however, it is necessary to consider some of the determinants of bronchiolitis, which appear in the higher levels of this framework.

Domain 3: Risk and Protective Factors

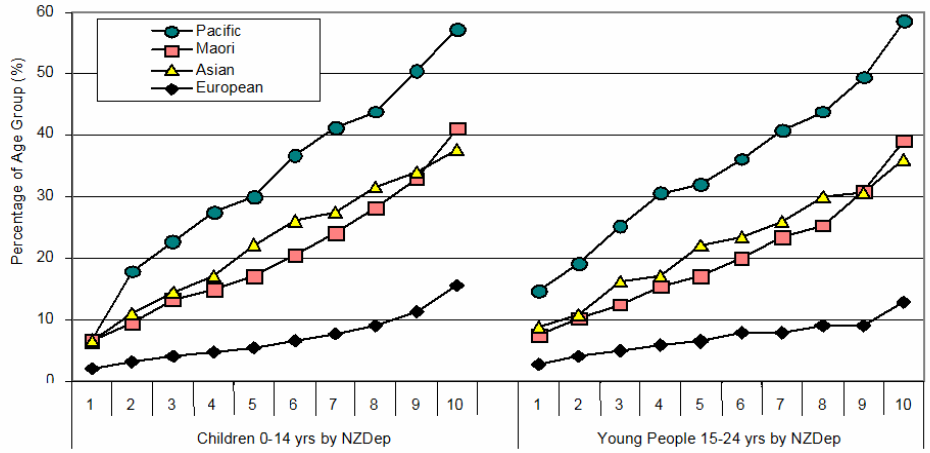
Household crowding and exposure to second hand cigarette smoke are two key risk factors for admission to hospital with bronchiolitis. The following sections explore their distribution at a population level during the past 10 years.

Household Crowding

Figure 5 shows the proportion of New Zealand children and young people living in crowded housing at the 2001 Census by ethnicity and NZDep Index decile. It is based on the Canadian Crowding Index and reflects the proportion of families with children and young people who needed 1 or more additional bedrooms, based on their family size and number of rooms in their house.

The figure suggests that, for all ethnic groups, with every increase in the level of socioeconomic deprivation (1 least deprived → 10 most deprived), the proportion of children and young people in crowded housing increased, but that for any given level of socioeconomic deprivation, crowding rates were higher for Pacific > Asian / Indian ≥ Maori > European families. Thus nearly 60% of Pacific and 40% of Maori children and young people in the most deprived (Decile 10) areas lived in crowded housing. This finding is particularly significant given the higher proportion of Maori and Pacific children and young people living in the most deprived areas.

Figure 5: Proportion of NZ Children and Young People 0-24 Years Living in Crowded Households by Ethnicity and NZ Deprivation Index Decile at the 2001 Census.

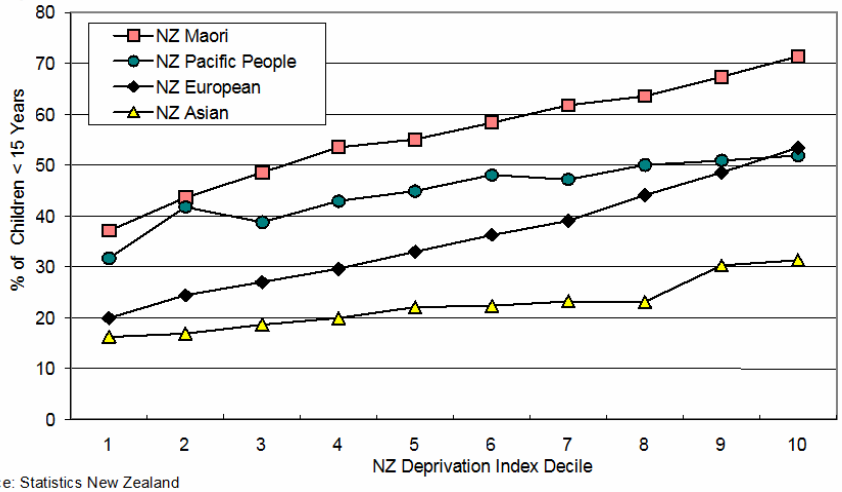


Source: Statistics New Zealand

Exposure to Second Hand Cigarette Smoke in the Home

Figure 6 shows the percentage of New Zealand children and young people who lived in a home with a smoker by ethnicity and NZ Deprivation Index decile at the 1996 Census. As with household crowding, for all ethnic groups, with every increase in the level of socioeconomic deprivation (1 least deprived → 10 most deprived), the proportion of children and young people living in a household with a smoker increased, but that for any given level of socioeconomic deprivation, household smoking rates were higher for Maori > Pacific > European > Asian / Indian children and young people. Thus just over 70% of Maori and 50% of Pacific children and young people in the most deprived (Decile 10) areas lived in a household with a smoker. Again, these findings are particularly significant, given the higher number of Maori and Pacific children and young people living in the most deprived areas.

Figure 6: Percentage of Children < 15 Years who Live in a Household with a Smoker by Ethnicity and NZ Deprivation Index Decile, New Zealand at the 1996 Census



Source: Statistics New Zealand

Conclusion

What these two figures suggest is that some of the disparities seen in hospital admission rates for bronchiolitis amongst Maori and Pacific infants may be the result of disparities in common risk factors such as exposure to household crowding and second hand cigarette smoke. Thus addressing these issues may be necessary before disparities in hospital admissions for bronchiolitis are to be improved. In addition however, the ways in which these risk factors themselves are distributed by socioeconomic status may need to be considered, if strategies to address bronchiolitis are to result in any real change.

Domain 2: Socioeconomic and Cultural Determinants

While the previous section illustrated that some of the differences in hospital admission rates for bronchiolitis might be related to corresponding differences in exposure to second hand cigarette smoke and crowding, the graphs also illustrated two other key points:

1. That ethnic differences existed for crowding and exposure to second hand cigarette smoke, even when differences in socioeconomic deprivation were 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 simplicity only Point 2, the role socioeconomic deprivation plays in the genesis of ethnic disparities in bronchiolitis admissions has been selected for further review. The following section thus explores the potential role socioeconomic disadvantage has in shaping the exposures of infants to cigarette smoke and crowding in their home environments.

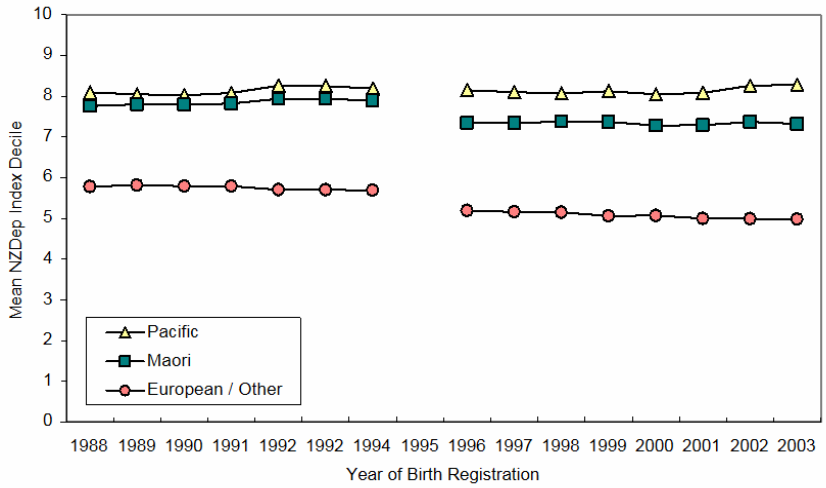
Distribution of Births by NZ Deprivation Index Decile

In New Zealand all births are assigned a domicile code, which is based on the usual residential address of the mother at the time of her baby's birth registration. This allows all births in NZ to be linked to the NZ Deprivation Index, an index which assigns each area in NZ (suburb level or smaller) a measure of socioeconomic deprivation (1 (least deprived) →10 (most deprived). **Figure 7** shows the average NZ Deprivation Index decile of mothers giving birth in New Zealand during 1988-2003 i.e. it thus reflects the average socioeconomic environment into which infants of different ethnic groups were born during this period. The graph highlights two main points:

1. That on average Pacific, then Maori babies were born into significantly more deprived areas than were European / Other babies.

2. That in relative terms the socioeconomic position of Pacific and Maori babies did not improve during this 16 year period. (Note: the NZDep Index is a relative scale, comparing outcomes for those living in the 10% most and least deprived areas. It cannot provide any comment on absolute differences e.g. incomes in the most deprived areas may have increased during this period, but if they did not increase faster than for those in the least deprived areas, then their ranking will stay the same, even though absolute improvements in income may have led to some improvement in health outcome for those in the most deprived areas).

Figure 7: Mean NZ Deprivation Index Decile of Births by Ethnicity*, New Zealand 1988-2003.



Sources: NZHIS Birth Registration Dataset; *Note: Prior to 1995 ethnicity was defined by ancestry, while after 1995 ethnicity was self identified. European / Other prior to 1995 included Asian, Indian and Other babies while after 1995 includes only European babies.

These findings are particularly relevant to understanding ethnic differences in the distribution of exposure to second hand cigarette smoke and crowding. As the previous section has suggested, for every increase in socioeconomic deprivation, exposure to second hand cigarette smoke and crowding increases across all ethnic groups. Thus the disproportionate over representation of Maori and Pacific infants in the most deprived areas may well account for a large proportion of their disproportionate exposure to these factors during infancy. The fact that all of the ethnic differences were not accounted for by relative socioeconomic disadvantage however, suggests that the pathways in addition to the one highlighted are in operation and thus that factors (not explored for reasons of simplicity) need also to be explored within the higher levels of this framework.

While many commentators would take the above analysis as the starting point for understanding the social determinants of health and accept the socioeconomic differences shown in Figure 7 as the non-modifiable starting point in a cascade which ultimately results in poorer health outcomes, what this monitoring framework suggests is that, like any other indicator in this framework, the relative socioeconomic position of New Zealand's largest ethnic groups is determined by other factors operating at higher levels in the framework.

Domain 1: Historical, Economic and Policy Context

As the previous section has indicated, the average socioeconomic position into which Maori, Pacific Island and European / Other babies are born into has changed little in the past 16 years has, with large disparities remaining for Maori and Pacific families. While it is beyond the scope of this overview document to explore fully the relative contributions historical, political and wider economic factors have had in creating these disparities, the way in which this framework is set out highlights the fact that such disparities are not "non-modifiable" but are the result of a the complex interplay of factors, many of which are modifiable (e.g. changes in social policy, policies which enhance Maori economic development) over the medium to longer term. In particular this framework serves to highlight the need to briefly review the influence of the following factors for any indicator under consideration:

1. **Historical Factors**: those policies and practices which in the past have served to undermine the economic and cultural base for Maori whanau, hapu and iwi. In addition it is

necessary to highlight factors in the current policy environment which serve to enhance / further undermine Maori economic and cultural development.

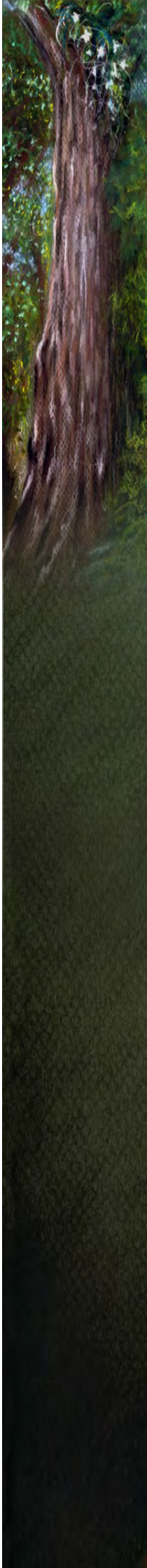
2. **Policy Factors**: those policies which in the past that have altered the social and economic resources available to families with children and young people (e.g. 1991 benefit cuts, market rates for State houses, flat tax structure and introduction of GST on food and clothing) as well as those policies currently being implemented (e.g. no "in-work-payments" for benefit dependant families in the current Working for Families Package) that may further alter the economic resources available to families in the current context.

3. **Wider Economic Environment**: the current economic environment (e.g. unemployment rates) and the impact this may have in shifting large numbers of children in and out of poverty (e.g. large shifts in the number of children and young people dependant on recipients of the unemployment benefit).

While each of these factors may not directly impact on hospital admission rates for bronchiolitis in the short term, these factors may well determine the underlying distribution of socioeconomic resources available to families caring for children and young people and as a result set in place a cascade of events which ultimately leads to the distribution of adverse health outcomes at a population level.

Conclusion

While this brief review is necessarily simplistic and does not take into account many of the complexities which operate 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 brief overview will nevertheless serve to highlight how it this framework can be used, not only as a way of beginning to untangle some of the complex causal pathways which operate in the genesis of adverse health outcomes, but also as a way for selecting the most appropriate level for intervention into issues affecting children and young people in New Zealand today.



Consultation Document Indicator Scores Ranked by Vote
(41 Participants)

Rank	Indicator	Average Score	Responses n (%)	Essential n (%)
1	Teenage Pregnancy	**3.00**	**28** (68%)	**28** (100.0%)
2	Sexually Transmitted Infection	**3.00**	**28** (68%)	**28** (100.0%)
3	Abuse and Neglect Admissions and Deaths	**3.00**	**28** (68%)	**28** (100.0%)
4	Total Mortality by Cause	**3.00**	**28** (68%)	**28** (100.0%)
5	Total Admissions by Cause	**3.00**	**29** (71%)	**29** (100.0%)
6	Children Living in Poverty	**3.00**	**29** (71%)	**29** (100.0%)
7	Self Harm and Suicide	**3.00**	**27** (66%)	**27** (100.0%)
8	Tobacco Use	**3.00**	**30** (73%)	**30** (100.0%)
9	Distribution of Children and Youth	**3.00**	**31** (76%)	**31** (100.0%)
10	Oral Health	**2.97**	**30** (73%)	**29** (96.7%)
11	Permanent Hearing Loss	**2.97**	**30** (73%)	**29** (96.7%)
12	Children Dependant On Benefit Recipients	**2.97**	**29** (71%)	**28** (96.6%)
13	Immunisation	**2.97**	**29** (71%)	**28** (96.6%)
14	CYFS Notifications and Substantiations	**2.97**	**29** (71%)	**28** (96.6%)
15	Prematurity	**2.97**	**29** (71%)	**28** (96.6%)
16	Sexual Offences Against Children	**2.96**	**28** (68%)	**27** (96.4%)
17	Vaccine Preventable Disease	**2.96**	**28** (68%)	**27** (96.4%)
18	Literacy	**2.96**	**27** (66%)	**26** (96.3%)
19	Perinatal and Infant Mortality	**2.93**	**30** (73%)	**28** (93.3%)
20	SIDS / SUDI	**2.93**	**30** (73%)	**28** (93.3%)
21	Tobacco Exposure in Utero	**2.93**	**30** (73%)	**28** (93.3%)
22	Tobacco Exposure at Home	**2.93**	**30** (73%)	**28** (93.3%)
23	Hearing Screening	**2.93**	**29** (71%)	**28** (96.6%)
24	National adult unemployment rate	**2.93**	**29** (71%)	**27** (93.1%)
25	Household Crowding	**2.93**	**29** (71%)	**27** (93.1%)
26	Fire, Flames and Hot Substance Injury	**2.93**	**28** (68%)	**26** (92.9%)
27	Meningococcal Disease	**2.93**	**28** (68%)	**26** (92.9%)
28	Total Injury Admissions and Deaths	**2.93**	**28** (68%)	**26** (92.9%)
29	Fertility	**2.93**	**28** (68%)	**26** (92.9%)
30	Youth Assault	**2.93**	**28** (68%)	**26** (92.9%)
31	Asthma	**2.93**	**28** (68%)	**26** (92.9%)
32	Drowning Related Injury	**2.93**	**28** (68%)	**26** (92.9%)
33	Police Apprehensions	**2.93**	**27** (66%)	**25** (92.6%)
34	Qualification at School Leaving	**2.93**	**27** (66%)	**25** (92.6%)
35	Gastroenteritis	**2.93**	**27** (66%)	**25** (92.6%)
36	Blindness	**2.90**	**30** (73%)	**27** (90.0%)
37	Bronchiolitis	**2.90**	**29** (71%)	**26** (89.7%)
38	Youth Dependant on Benefits	**2.90**	**29** (71%)	**26** (89.7%)
39	Traumatic Head Injury	**2.89**	**28** (68%)	**25** (89.3%)
40	Diabetes	**2.89**	**28** (68%)	**25** (89.3%)
41	Prevalence of Mental Health Disorders	**2.89**	**28** (68%)	**25** (89.3%)
42	Household Composition	**2.89**	**28** (68%)	**25** (89.3%)
43	Rheumatic Fever	**2.89**	**28** (68%)	**25** (89.3%)
44	Tuberculosis	**2.89**	**27** (66%)	**24** (88.9%)
45	Breastfeeding	**2.87**	**31** (76%)	**27** (87.1%)
46	Disability Prevalence by Type	**2.87**	**30** (73%)	**26** (86.7%)
47	Attendance at Tamariki Ora Well Child Scheduled visits	**2.87**	**30** (73%)	**26** (86.7%)
48	Land Transport Injury	**2.86**	**29** (71%)	**25** (86.2%)
49	Overweight and Obesity	**2.86**	**29** (71%)	**25** (86.2%)
50	Use of Mental Health Services	**2.86**	**28** (68%)	**25** (89.3%)
51	Suffocation Related Injuries	**2.86**	**28** (68%)	**24** (85.7%)
52	Cancer	**2.86**	**28** (68%)	**24** (85.7%)
53	Policy changes impact on children and youth	**2.85**	**27** (66%)	**23** (85.2%)
54	Struck By and Against Injuries	**2.85**	**27** (66%)	**23** (85.2%)
55	Alcohol Consumption	**2.83**	**29** (71%)	**25** (86.2%)
56	Fall Related Injury	**2.83**	**29** (71%)	**24** (82.8%)

Rank	Indicator	Average Score	Responses n (%)	Essential n (%)
57	Children with Restricted Living Standards	**2.83**	**29** (71%)	**24** (82.8%)
58	Antenatal Care	**2.83**	**29** (71%)	**24** (82.8%)
59	Hospital Admission for Mental Disorder	**2.82**	**28** (68%)	**24** (85.7%)
60	Infants born to Hepatitis B positive mothers	**2.82**	**28** (68%)	**23** (82.1%)
61	Total Respiratory Disease Admissions and Deaths	**2.82**	**28** (68%)	**23** (82.1%)
62	Primary Health Organisation Enrolment	**2.82**	**28** (68%)	**23** (82.1%)
63	Serious Skin Infection	**2.82**	**28** (68%)	**23** (82.1%)
64	Domestic Violence	**2.82**	**28** (68%)	**23** (82.1%)
65	School Retention Rates	**2.81**	**27** (66%)	**22** (81.5%)
66	Marijuana Use	**2.81**	**27** (66%)	**22** (81.5%)
67	Re-admission within 6 weeks of birth	**2.79**	**28** (68%)	**23** (82.1%)
68	Pertussis	**2.79**	**28** (68%)	**23** (82.1%)
69	Policy impact on Maori economic development	**2.79**	**28** (68%)	**22** (78.6%)
70	Pneumonia	**2.78**	**27** (66%)	**21** (77.8%)
71	Repeat Acute Admissions in Children < 1 Year	**2.77**	**30** (73%)	**23** (76.7%)
72	Youth Court Proved Cases	**2.76**	**25** (61%)	**19** (76.0%)
73	Physical Activity	**2.76**	**29** (71%)	**22** (75.9%)
74	School Suspensions and Stand-downs	**2.74**	**27** (66%)	**21** (77.8%)
75	Small for Gestational Age	**2.73**	**30** (73%)	**22** (73.3%)
76	Participation in Sport and Active Leisure	**2.71**	**28** (68%)	**21** (75.0%)
77	Participation in Early Childhood Education	**2.71**	**28** (68%)	**20** (71.4%)
78	Contraception Use	**2.71**	**28** (68%)	**20** (71.4%)
79	Bronchiectasis (Non cystic fibrosis)	**2.70**	**27** (66%)	**19** (70.4%)
80	Nutrition	**2.70**	**30** (73%)	**21** (70.0%)
81	General Practitioner Visits Forgone	**2.67**	**27** (66%)	**21** (77.8%)
82	Utilisation of NASC Services	**2.67**	**30** (73%)	**21** (70.0%)
83	Te Reo / Language	**2.66**	**29** (71%)	**21** (72.4%)
84	Mastoiditis	**2.63**	**27** (66%)	**17** (63.0%)
85	Kohanga Reo and Kura Kaupapa Maori Attendance	**2.63**	**27** (66%)	**17** (63.0%)
86	Housing Costs Relative to Low Income	**2.62**	**29** (71%)	**18** (62.1%)
87	Youth Connectedness	**2.61**	**28** (68%)	**18** (64.3%)
88	Family Breakdown	**2.57**	**28** (68%)	**17** (60.7%)
89	Iwi Identity	**2.54**	**26** (63%)	**16** (61.5%)
90	Osteomyelitis	**2.54**	**28** (68%)	**16** (57.1%)
91	APGAR <5 at 5 minutes	**2.53**	**30** (73%)	**20** (66.7%)
92	End Stage Renal Failure	**2.52**	**27** (66%)	**15** (55.6%)
93	Number of Maori Providers	**2.48**	**25** (61%)	**12** (48.0%)
94	Treaty of Waitangi Claims	**2.43**	**28** (68%)	**14** (50.0%)
95	Surgery for Late Presentation of DDH	**2.33**	**30** (73%)	**14** (46.7%)
96	School Roll Turnover	**2.33**	**27** (66%)	**10** (37.0%)
97	Technology Dependant Children	**2.16**	**25** (61%)	**9** (36.0%)
98	Religious Affiliation	**2.04**	**28** (68%)	**8** (28.6%)
99	Voluntary Work	**1.93**	**27** (66%)	**5** (18.5%)

Appendix 4: The Top 12 Voting Document and Results

Child & Youth Health Indicator Project Top 12 Voting Document

Voting on the Top 12 Indicators to represent Child & Youth Health

The Child and Youth Health Indicator Project has developed a draft framework to monitor child and youth health. While the framework provides comprehensive coverage of major issues, DHBs and the MOH will also need a subset of indicators which can represent child and youth health issues in total population health status reports, a Top 12.

In selecting a Top 12 there needs to be sufficient balance between:

- All stages of the life course from birth → 24 years
- A broad range of health issues (e.g. chronic disease, respiratory, reproductive etc.)
- Issues which are emerging, modifiable, inequitably distributed or under resourced
- Where possible, indicators need to be based on routinely available data

Please select a set of 12 indicators you feel best achieves this balance.

Please select your Top 12 by crossing boxes ☒

Culture and Spirituality	
☐ Iwi Identity	C
☐ Te Reo / Language	C
☐ Religious Affiliation	C
☐ Voluntary Work	C
Economic Standard of Living	
☐ Children Dependent on Benefit Recipients	R
☐ **Youth Dependent on Benefits**	R
☐ Household Crowding	C
☐ Children Living In Poverty	S
☐ Children With Restricted Living Standards	S
☐ Housing Costs Relative to Low Income	S
Education: Knowledge and Skills	
☐ Participation in Early Childhood Education	R
☐ Kohunga Reo & Kura Kaupapa Maori School Attendance	R
☐ Qualification at School Leaving	R
☐ School Retention Rates	R
☐ Suspensions & Stand-downs	R
☐ Literacy	S
☐ School Roll Turnover	T
Service Provision, Access, and Utilisation	
☐ PHO Enrolment*	R
☐ GP Visits Forgone	S
☐ Number of Maori Providers	T
Nutrition, Activity, and Growth	
☐ *Breastfeeding*	R
☐ Overweight and Obesity	S,L
☐ Nutrition	S,L
Leisure and Recreation	
☐ Physical Activity	S,L
☐ Participation in Sport and Active Leisure	S
Substance Use	
☐ Tobacco Exposure at Home	C,S
☐ **Tobacco Use**	C,S
☐ **Alcohol Consumption**	S
☐ **Marijuana Use**	S
☐ *Tobacco Exposure in Utero*	T
Justice	
☐ **Police Apprehensions**	R
☐ **Youth Court Proved Cases**	R
Total Morbidity & Mortality	
☐ Total Admissions by Cause	R
☐ Total Mortality by Cause	R
☐ Potentially Avoidable Hospital Admissions[1]	R
Perinatal-Infancy	
☐ *Infant Mortality*	R
☐ *Perinatal Mortality*	R
☐ *Prematurity*	R
☐ *Small for Gestational Age*	R
☐ *Sudden Infant Death Syndrome / SUDI**	R
☐ *Antenatal Care*	R
☐ *Readmission <6 weeks of birth*	R
☐ *APGAR Score <5 at 5 Minutes*	R
☐ *Repeat Acute Admissions in Infants < 1 Year*	R
Whanau Wellbeing	
☐ Family Breakdown	R
☐ Household Composition	C
☐ **Youth Connectedness**	S,L

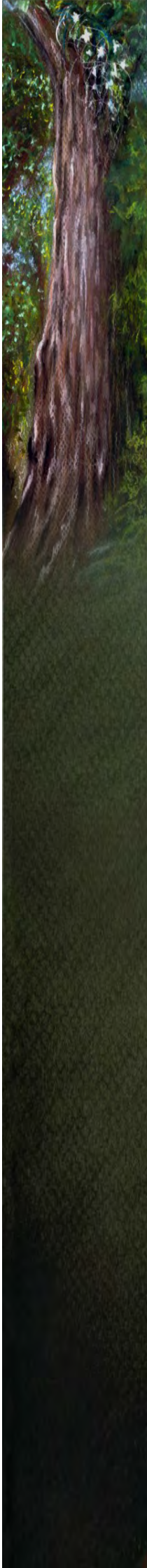
R: Annual Routine Data C: Census S: Survey Data
L: Literature Review T: To be determined

Bold = Youth Only Indicators *Italics = Infant Only Indicators*

Well Health		Respiratory	
☐ Attendance at Tamariki Ora Well Child Health Visits	R	☐ Total Respiratory Disease Admissions & Death	R
☐ Immunisation	R	☐ Pneumonia	R
☐ Hearing Screening	R	☐ Asthma	R
☐ Oral Health	R	☐ Bronchiectasis	R
Abuse and Neglect		☐ *Pertussis*	R
☐ Abuse and Neglect Admissions and Deaths	R	☐ *Bronchiolitis*	R
☐ CYFS Notifications and Substantiations	R	**Chronic Disease**	
☐ Sexual Offences against Children	R	☐ Cancer	R
☐ Domestic Violence	R	☐ Diabetes	R,L
☐ **Youth Assault**	R	☐ End Stage Renal Failure	T
Surgical		☐ Technology Dependent	T
☐ *Surgery for Late Presentation of DDH**	R	**Disability**	
Injury		☐ Disability Prevalence by Type	R,S
☐ Total Injury Admissions / Deaths	R	☐ Blindness	R
☐ Land Transport Injury	R	☐ Deafness	R
☐ Traumatic Head Injury	R	☐ Utilisation of NASC Services*	T
☐ Drowning Related Injury	R	**Mental Health**	
☐ Fall Related Injury	R	☐ Use of Mental Health Services	R
☐ Struck by / against Injury	R	☐ **Hospital Admissions for Mental Disorder**	R
☐ Fire, Flames & Hot Substance Injury	R	☐ **Self Harm and Suicide**	R
☐ Suffocation	R	☐ Prevalence of Mental Disorder	L
Infectious Disease		**Sexual and Reproductive Health**	
☐ Vaccine Preventable Disease	R	☐ **Teenage Pregnancy**	R
☐ Rheumatic Fever	R	☐ **Sexually Transmitted Infection**	R
☐ Tuberculosis	R	☐ **Contraception Use**	S,L
☐ Gastroenteritis	R	**Additional Indicators** Any others in your Top 12	
☐ Meningococcal Disease	R	☐	
☐ Serious Skin Infection	R	☐	
☐ Osteomyelitis	R		
☐ Mastoiditis	R		
☐ *Infants born to Hep B Positive Mothers*	T		

Notes
*Being developed for a Child/Youth Population
*DDH: Developmental Dysplasia of the Hips
*NASC: Needs Assessment Service Coordination
*PHO: Primary Healthcare Organisation
*SUDI: Sudden Unexplained Death in an Infant

☺ Thank you for your contribution ☺



Respondent Demographics

Position(s)

- ☐ Doctor
- ☐ Nurse
- ☐ Allied Health Professional
- ☐ Epidemiologist
- ☐ Child Health Manager
- ☐ Policy Analyst
- ☐ Researcher
- ☐ Other *(Specify Below)*

_____

☺ Thank you for your contribution ☺

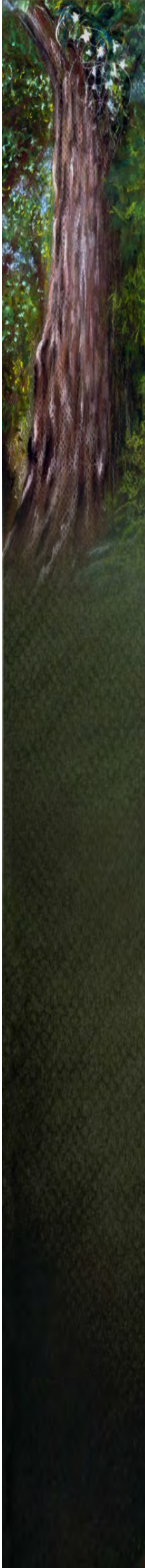
Returning Forms

Forms can be completed electronically by clicking on the boxes.
To return the form **SAVE** it and then send it as an **ATTACHMENT** by e-mail to: c.jackson@uniservices.co.nz

OR forms can be printed out, completed and posted to:

NZCYES Top 12
PO Box 17 360
Greenlane
Auckland

Paediatric Society New Zealand



Top 12 Indicators As Ranked by Voting
(112 Responses)

Rank	Indicator	Number	%
1	Total Injury Admissions and Deaths	60	53.57
2	Children Living in Poverty	54	48.21
3	Immunisation	53	47.32
4	Vaccine Preventable Disease	53	47.32
5	Abuse and Neglect Admissions and Deaths	52	46.43
6	Overweight and Obesity	48	42.86
7	Total Respiratory Disease Admissions and Deaths	41	36.61
8	Disability Prevalence by Type	40	35.71
9	Teenage Pregnancy	39	34.82
10	Self Harm and Suicide	39	34.82
11	Infant Mortality	38	33.93
12	Attendance at Tamariki Ora Well Child Scheduled visits	32	28.57
13	Breastfeeding	31	27.68
14	Tobacco Exposure at Home	28	25.00
15	Total Admissions by Cause	28	25.00
16	Total Mortality by Cause	28	25.00
17	Perinatal Mortality	26	23.21
18	Potentially Avoidable Hospital Admissions	26	23.21
19	CYFS Notifications and Substantiations	25	22.32
20	Participation in Early Childhood Education	23	20.54
21	Children Dependant On Benefit Recipients	23	20.54
22	Qualification at School Leaving	22	19.64
23	Household Crowding	21	18.75
24	Physical Activity	20	17.86
25	Domestic Violence	20	17.86
26	Oral Health	19	16.96
27	Diabetes	19	16.96
28	Primary Health Organisation Enrolment	19	16.96
29	Sexually Transmitted Infection	18	16.07
30	Use of Mental Health Services	17	15.18
31	Tobacco Use	17	15.18
32	Participation in Sport and Active Leisure	16	14.29
33	Repeat Acute Admissions in Children < 1 Year	16	14.29
34	Youth Connectedness	15	13.39
35	Alcohol Consumption	15	13.39
36	Prevalence of Mental Health Disorders	14	12.50
37	Bronchiolitis	14	12.50
38	Traumatic Head Injury	13	11.61
39	Literacy	13	11.61
40	Sudden Infant Death Syndrome / Sudden Unexpected Death in Infancy	12	10.71
41	Family Breakdown	12	10.71
42	Prematurity	11	9.82
43	Land Transport Injury	11	9.82
44	Household Composition	11	9.82
45	Drowning Related Injury	11	9.82
46	School Retention Rates	10	8.93

Rank	Indicator	Number	%
47	Rheumatic Fever	10	8.93
48	Youth Dependant on Benefits	9	8.04
49	Antenatal Care	9	8.04
50	Hearing Screening	8	7.14
51	Youth Court Proved Cases	8	7.14
52	Tobacco Exposure in Utero	8	7.14
53	Fall Related Injury	8	7.14
54	Fire, Flames and Hot Substance Injury	8	7.14
55	Iwi Identity	8	7.14
56	Nutrition	8	7.14
57	Utilisation of Needs Assessment Service Coordination Services	8	7.14
58	Te Reo / Language	8	7.14
59	School Suspensions and Stand-downs	7	6.25
60	Sexual Offences Against Children	7	6.25
61	Pneumonia	7	6.25
62	Hospital Admission for Mental Disorder	7	6.25
63	Re-admission within 6 weeks of birth	7	6.25
64	Suffocation Related Injuries	7	6.25
65	Struck By and Against Injuries	7	6.25
66	Small for Gestational Age	7	6.25
67	Serious Skin Infection	6	5.36
68	Bronchiectasis (Non cystic fibrosis)	6	5.36
69	General Practitioner Visits Forgone	6	5.36
70	Technology Dependant Children	6	5.36
71	Asthma	5	4.46
72	Children with Restricted Living Standards	5	4.46
73	Police Apprehensions	5	4.46
74	Cancer	5	4.46
75	Housing Costs Relative to Low Income	4	3.57
76	Tuberculosis	4	3.57
77	Number of Maori Providers	3	2.68
78	Marijuana Use	3	2.68
79	Contraception Use	3	2.68
80	Meningococcal Disease	3	2.68
81	Youth Assault	3	2.68
82	APGAR <5 at 5 minutes	3	2.68
83	Osteomyelitis	3	2.68
84	Gastroenteritis	2	1.79
85	Pertussis	2	1.79
86	Infants born to Hepatitis B positive mothers	2	1.79
87	Permanent Hearing Loss	2	1.79
88	School Roll Turnover	2	1.79
89	Surgery for Late Presentation of DDH	1	0.89
90	Mastoiditis	1	0.89
91	End Stage Renal Failure	1	0.89
92	Kohanga Reo and Kura Kaupapa Maori School Attendance	0	0.00
93	Religious Affiliation	0	0.00
94	Voluntary Work	0	0.00
95	Blindness	0	0.00

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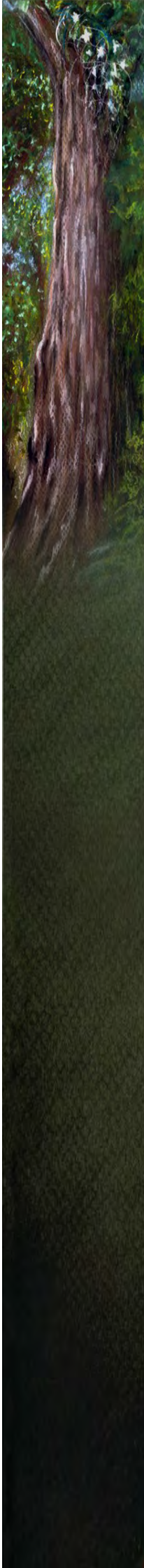

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