THE NEW ZEALAND MEDICAL JOURNAL
Journal of the New Zealand Medical Association

Ethnic counts on mortality and census data (mostly) agree for 2001–2004: New Zealand Census-Mortality Study update

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Abstract

Background The New Zealand Census-Mortality Study (NZCMS) previously demonstrated substantial undercounting of Māori and Pacific deaths on mortality data relative to census data for the 1980s and 1990s. The recent linkage of 2001–04 mortality data to 2001 census data allows us to determine whether any such 'numerator-denominator' bias persists.

Methods 2001 census anonymously and probabilistically linked to 3 years of subsequent mortality data (82,404 eligible mortality records), allowing a comparison of ethnicity recording.

Results Using a 'total' definition of ethnicity, there was a close agreement of census and mortality counts: 7419 Māori on the 2001 census compared to 7536 Māori according to mortality data—a census to mortality ratio of 0.98; Pacific—2451 and 2493, ratio 0.98; Asian—1236 and 1215, ratio 1.02; non-Māori non-Pacific non-Asian—73,089 and 72,051, ratio 1.01.

Using a 'sole' definition of Māori ethnicity, census counts were only 86% of mortality counts, indicating that mortality data is not recording as many people with two or more ethnic groups as would be expected based on census data. This 'sole' bias was more pronounced in the South Island.

Conclusion There is now little bias in ethnic group counts between census and mortality data for a 'total' definition of ethnic group. Calculations of mortality rates by ethnicity using unlinked census and mortality data and a total definition of ethnicity should be unbiased. These results strongly support using the census definition of ethnicity on all health datasets.

The New Zealand Census-Mortality Study (NZCMS) previously quantified the gross undercount of Māori and Pacific deaths (and overcount of non-Māori non-Pacific (nMnP) on mortality data prior to 1995.[1,2] This meant that historic mortality trends in New Zealand by ethnicity were incorrect, and needed recalculation.[3–5]

With the advent in 1995 of an ethnicity question on the death registration form that approximated the self-defined question on the 1996 census, undercounting on 1996–99 mortality data was much less for Māori deaths (only 7% using the prioritised or total definitions of Māori ethnicity) and there was no apparent difference for Pacific deaths.[2] This highlights the importance of collecting ethnicity information on all administrative datasets in a manner as close as possible to that in the census.

In this paper, we use updated NZCMS data for the 2001 census linked to all deaths in the following three years to determine any discrepancy between mortality and census

data in ethnicity counts. We present ratios of census to mortality counts for total, prioritised and sole definitions of ethnicity.

Methods

Study design—The methodology has been described in detail in technical reports.[1,6–8] Briefly, 81.5% of eligible mortality records (all ages) for the 3 years following the 2001 census were anonymously and probabilistically linked to census records. For the purposes of determining numerator-denominator bias, the linked records were further restricted to highly probably links (HPL) where ethnicity had no effect on linkage probability. Ethnic groupings according to census and mortality data were then compared, using cross-classifications of the weighted HPL dataset. The weights were calculated to make the HPL dataset representative of all eligible mortality records, and are described in detail elsewhere.[8]

Ethnicity definitions—Since September 1995, the death register collected data on 'ethnic group' using an approximation to the 1996 census self-identified ethnicity question, with up to three ethnic groups coded per person. We use three definitions of ethnicity to examine discrepancies in counts between census and mortality data:

- *Total* ethnicity was assigned as Māori if any ethnic group the decedent was classified as on their census or mortality record was Māori. Likewise for Pacific, Asian, and nonMāori nonPacific nonAsian (nMnPnA). Note that sums of counts across ethnic groups in any total series will be greater than the actual number of decedents due to some decedents being assigned to two (or more) ethnic groups.
- *Prioritised* ethnicity. The prioritised Māori group was the same as the total Māori group. The prioritised Pacific group was the total Pacific group, minus any decedents who were also classified as Māori. The prioritised Asian group was the total Asian group, minus any decedents who were also classified as Māori or Pacific. The remainder were assigned as nMnPnA. Note that conceptually this nMnPnA group is like a 'sole nMnPnA' group—i.e. those with only a nMnPnA ethnic group.
- *Sole* ethnicity was assigned as Māori if only one category was identified, and that was Māori; likewise for Pacific and Asian. Those remaining were labelled as 'Remainder', and equate to the total nMnPnA group **plus** some extra decedents that, say, had both Māori and Pacific ethnic groups.

Results

Table 1 shows the key findings. There was close agreement between the ethnicity counts on the mortality and census data when either the 'total' or 'prioritised' definitions of ethnicity were used (i.e. census to mortality ratios all close to 1.0). However when a 'sole' definition is used the census count for Maori was less than the count in the mortality data (i.e. ratio of 0.86). This discrepancy arises because fewer mortality records were assigned two or more ethnic groups than expected compared to census data, and thus the sole Māori counts on the mortality data *exceed* those on the census.

Table 1 also shows the census to mortality ratios for 1996–99 as a comparison over time. The modest undercounting of Māori deaths in 1996–99 ('total' and 'prioritised' definitions of ethnicity, and as indicated by ratios greater than 1.0) is no longer present in 2001–04. However, the overcounting of Māori 'sole' deaths by mortality data relative to census data persists over time.

Ethnicity counts of census and mortality data, by sex, age, and deprivation, show no systematic variation in the census to mortality ratios by these demographic factors (see tables elsewhere [8]). The one exception was region, where census to mortality ratios in the South Island were 1.05 for 'total' Māori compared to 0.79 for sole Māori,

indicating that the under-reporting of multiple ethnic groups on mortality data (relative to that expected on census data) is most prominent in the south.

Table 2 shows the full cross-classification of census and mortality data for the prioritised definition of ethnicity. The marginal totals are as in Table 1. The full cross-classification shows the specific mismatches between files. Thus, the majority of mismatches were between Māori and nMnPnA groups.

Table 1. Census ethnicity and death registration form ethnicity totals and ratios for all ages in 2001–04 (n=82,404 deaths; for total, prioritised, and sole ethnicity definitions), and census to mortality ratios only for 1996–99

Ethnic group	2001–04			1996–99
	Census count	Death registration form count	Census to mortality ratio	Census to mortality ratio †
Total ethnicity				
Māori	7,419	7,539	0.98	1.07
Pacific People*	2,448	2,493	0.98	–
Asian People	1,236	1,215	1.02	–
nMnPnA ‡	73,089	72,051	1.01	1.03
Prioritized ethnicity				
Māori	7,419	7,539	0.98	1.07
Pacific People	2,373	2,439	0.97	0.99
Asian People	1,170	1,155	1.01	1.02
nMnPnA ‡	71,442	71,274	1.00	0.99
Sole ethnicity				
Māori	5,931	6,891	0.86	0.86
Pacific People	2,196	2,274	0.97	0.90
Asian People	1,098	1,086	1.01	1.01
Remainder #	73,179	72,153	1.01	0.99

All the numbers are weighted, and then random rounded to a multiple of three as per Statistics New Zealand protocol. The census to mortality ratio is the census count divided by the death registration form count. Note that the sum of observations for Prioritized and Sole series both add to 82,404, but the total ethnicity definition counts sums to more.

*Mostly of Samoan, Tongan, Niuean, or Cook Islands origin.

† The 1996-99 ratios are sourced from Table 12 of Ajwani et al (2002), except for the total ethnicity ratios for Pacific and Asian which were not previously calculated.

‡ The 'total nMnPnA' group was defined those people with one or more self-(undertaker-) defined ethnic groups, of which one was nMnPnA. The 'prioritised nMnPnA' is best thought of those remaining after all census respondents or decedents with any one of Māori, Pacific or Asian ethnicity have been 'prioritised out'. Put another way, one might think of the 'prioritised nMnPnA' group as actually being the 'sole nMnPnA' group.

The 'Remainder' group in the sole series includes those any people who reported nMnPnA ethnic group (i.e. the 'total nMnPnA' group) *plus* some extra decedents or census respondents who were recorded as, say, both Māori and Pacific and therefore not eligible to be either 'sole Māori' or 'sole Pacific'.

Table 2. Cross-classification of census by death registration form ethnicity using the prioritised definition of ethnicity, 2001-04

		Death registration form ethnicity				
		Māori	Pacific	Asian	nMnPnA	
Census Ethnicity	Māori	6,621	21	6	774	7,419
	Pacific	36	2,250	6	81	2,373
	Asian	6	42	1,059	69	1,170
	nMnPnA	879	126	87	70,353	71,442
		7,539	2,439	1,155	71,274	

All the numbers are weighted, and then random rounded to a multiple of three as per Statistics New Zealand protocol. Minimum cell size is 6.

Discussion

Disagreements in ethnic group coding between mortality and census data still occurred in 2001–04. However, it was much improved compared to the early 1990s and even the late 1990s. Our results suggest that if analysts and researchers use the 'total' definition of ethnicity on both census and mortality data in the early 2000s, they should be able to generate ethnic mortality rates with little—if any—numerator-denominator bias. However, we do not recommend calculating 'sole' ethnic mortality rates with unlinked census and mortality data.

These results are reassuring. It appears that ensuring the death registration form ethnicity question is as close as possible to that on the census (albeit the 1996 census question) results in close agreement of 'total' ethnic group counts, at least. A key recommendation, therefore, is that all datasets in the health sector (and other sectors too) must use an ethnicity question that approximates the census question. Not doing so is likely to result in low quality ethnic group data, hampering analysis, planning and funding.

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Acknowledgements: The NZCMS is conducted in collaboration with Statistics New Zealand and within the confines of the Statistics Act 1975. The NZCMS was funded by the Health Research Council of New Zealand, and is now funded by the Ministry of Health.

Note: Access to the data used in this study was provided by Statistics New Zealand under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. The results presented in this study are the work of the authors, not Statistics New Zealand.

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References:

1. Ajwani S, Blakely T, Robson B, et al. Unlocking the numerator-denominator bias for the 1980s and 1990s. NZCMS Technical Report No. 4. ISBN 0-473-09111-9 (Also at http://www.wnmeds.ac.nz/nzcms-info.html). Wellington: Department of Public Health, Wellington School of Medicine and Health Sciences, University of Otago; 2002.
2. Ajwani S, Blakely T, Robson B, et al. Unlocking the numerator-denominator bias III: adjustment ratios by ethnicity for 1981-1999 mortality data. The New Zealand Census-Mortality Study. N Z Med J. 2004;116(1175):6. http://www.nzma.org.nz/journal/116-1175/456
3. Ajwani S, Blakely T, Robson B, et al. Decades of Disparity: Ethnic mortality trends in New Zealand 1980-1999 (also available at http://www.wnmeds.ac.nz/nzcms-info.html). Wellington: Ministry of Health; 2003.
4. Blakely T, Tobias M, Robson B, Ajwani S, Bonne M, Woodward A. Widening ethnic mortality disparities in New Zealand 1981-99. Soc Sci Med. 2005;61(10):2233–51.
5. Blakely T, Tobias M, Atkinson J, Yeh L-C, Huang K. Tracking Disparity: Trends in ethnic and socioeconomic inequalities in mortality, 1981-2004. Wellington: Ministry of Health; 2007.
6. Blakely T, Atkinson J. Unlocking the Numerator-Denominator Bias, 1991-94 Deaths. NZCMS Technical Report No. 2. (Also at http://www.wnmeds.ac.nz/nzcms-info.html). Wellington: Department of Public Health, Wellington School of Medicine, University of Otago; 2001.
7. Hill S, Atkinson J, Blakely T. Anonymous record linkage of census and mortality records: 1981, 1986, 1991, 1996 census cohorts. NZCMS Technical Report No. 3. ISBN 0-473-09110 (Also at http://www.wnmeds.ac.nz/nzcms-info.html). Wellington: Department of Public Health, Wellington School of Medicine and Health Sciences, University of Otago; 2002.
8. Fawcett J, Atkinson J, Blakely T. Record linkage of census and mortality 2001-04 records. New Zealand Census-Mortality Study Technical Report No. 6. Wellington: Health Inequalities Research Programme, University of Otago, Wellington; 2008.