

6. Aboriginal¹ child mortality in Australia: Recent levels and covariates

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The subject of infant and child survival continues to be of great interest to policy makers, health planners, social and bio-medical researchers as well as communities and interest groups around the world. Overall, Australia is one of the healthiest and safest countries for young children to live with an infant mortality rate of less than six per thousand live births and an under-five mortality rate of some seven per thousand children (ABS 2004b). However, the same cannot be said with confidence for Australia's Indigenous population, where morbidity and mortality among young children remain excessive. Available evidence suggests that, at current rates, as many as one in fifty Aboriginal children will die before reaching age one, while an additional eight per thousand will have no chance of reaching their fifth birthday (Kinfu & Taylor 2005).

While the broad profiles of such excess mortality have been known for some time, far less is known about the precise levels and determinants of high mortality in this population. For instance little, if anything, is known about how socioeconomic factors influence child mortality or how child mortality risks vary according to household, spatial and residential patterns across the country (Gray 1988), information that is vital for public policy making. This dearth of information in part reflects the paucity of relevant health and mortality data on Indigenous Australians. Identification of Indigenous origin in death certificates in Australia did not begin in most jurisdictions until the mid-1980s, and was not introduced until much later in Queensland (1996), while hospital separation records in the country continue to suffer from inconsistency in the way they collect information on Indigenous status. The situation is no different with regard to the census, which provides the denominator for most health and mortality related studies: despite an early introduction, in 1971, of a direct question on Indigenous status, no two successive censuses in the country have yet produced consistent counts of the Indigenous population. The problem is further compounded by the fact that none of these data sources, with the exception of the census, provide detailed information on the social, economic and other background characteristics of the study population, which limit their utility for the study of differentials and determinants of mortality and ill-health in this population.

¹ The term Aboriginal is used in this chapter in a broader sense and includes both Aboriginal and Torres Strait Islander Australians.

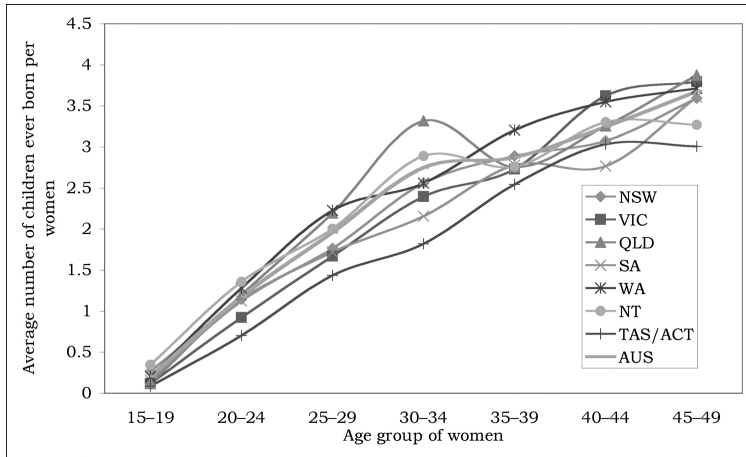
The 2002 NATSISS obtained, for the first time since the 1986 Census, data on the number and survival status of children born to women in and past reproductive age groups. While the 1994 NATSIS, which preceded the current survey, had obtained information on the number of children ever born, no data were collected regarding the survival status of children. The existence of both the number and survival status of children ever born in the recent survey, therefore, provides a rare opportunity for analysing child mortality among Indigenous Australians. Specifically, this set of data enables the estimation of independent child mortality measures and provides an opportunity to isolate the risk factors associated with child mortality in the population. Such analyses will not only help to identify underprivileged groups who experience higher mortality levels in the population, they will also improve our understanding of the determinants of mortality and their inter-relationships. This will form a basis on which proper policy measures for reducing mortality may be developed, selected and improved.

The balance of the chapter is set out as follows. The next section describes the source data, assesses its quality, and identifies issues of concern for the intended analysis. This is then followed by an examination of recent levels and trends in Aboriginal child mortality and the factors associated with it. The last part summarises key findings of the study and recommends strategies for future demographic data collection on Aboriginal Australians.

Data quality issues

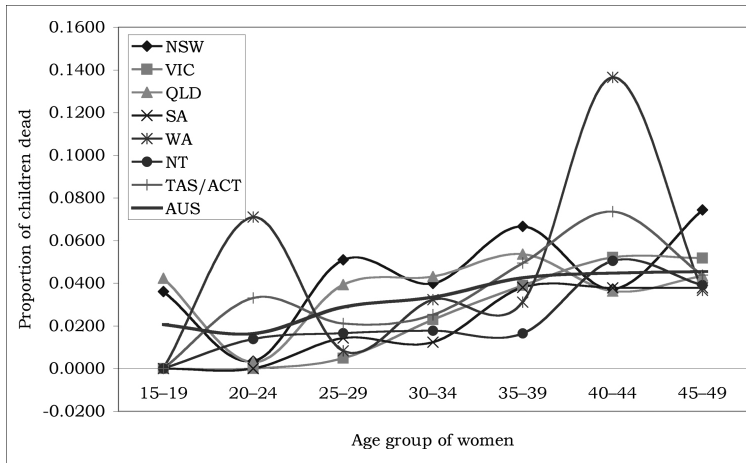
The starting point for any demographic analyses is a formal evaluation of the quality of the source data. One way of evaluating the quality of the child mortality data collected in the 2002 NATSISS is by computing the average number of children ever born and the proportion of children who have died by the age group of women. Unless there is significant and abrupt change in the scale and patterns of mortality and fertility schedules, both the average number of children ever born and the proportion of children who have died are expected to increase with the age of women. Fig. 6.1 and 6.2 provide the average number of children ever born and the proportion of children who have died by age group of women and jurisdiction obtained from the 2002 NATSISS, respectively.

Figure 6.1. Average number of children born per woman: Aboriginal Australians, 2002



Source: Author's calculations from the 2002 NATSISS RADL.

Figure 6.2. Proportion of children who have died by age of women: Aboriginal Australians, 2002



Source: Author's calculations from the 2002 NATSISS RADL.

As can be seen from Fig. 6.1, while for most States/Territories and age groups the average number of children increases with age, for some jurisdictions the reported number of children for some older women often falls short of that reported for younger women. For instance, for the age group 35–39 years in Queensland, 40–44 years in South Australia and 45–49 years in the Northern Territory, Tasmania and the ACT, the average number of children per woman reported in these age groups is lower than that reported for the immediate younger age groups in the respective jurisdictions. The data on the proportion of children who have died (reported in Fig. 6.2) reveals even more anomalies.

With the exception of the data for Victoria and for Australia as a whole, the proportion of children who have died, which is expected to increase linearly with age, depicts a more erratic pattern in all jurisdictions. While part of this unexpected picture could be attributed to sampling, the fact that the problem is also manifested in such jurisdictions as Queensland and New South Wales—where sample size is less of an issue—may point a more structural non-sampling-related quality problem in the data. At any rate, what these suggest is that some care needs to be exercised in using the data for mortality analysis beyond the national level. For this reason, the analyses in the subsequent section will focus on the national level.

Mortality estimates

Table 6.1 presents indirect estimates of early age mortality for the Aboriginal population as a whole. These are based on data on number of children ever born and children surviving collected from all women aged 25–39 years in the 2002 NATSISS survey (Preston & Palloni 1986; United Nations (UN) 1983). As mortality measures obtained through indirect procedures are sensitive to the assumptions on mortality patterns underlying the models—and, in some cases, to methods used in the estimation process—the mortality estimates were generated using three different estimation techniques—the Trussell method, the Preston–Palloni method, and the Palloni–Heligman method—and nine model mortality patterns. These patterns included four from the Coale–Demeny model life table system (north, east, south and west) and five from the UN pattern (Latin American, Chilean, South Asian, Far Eastern and general). For comparison purposes, also presented in the table are probabilities of dying extracted from existing life tables for Indigenous and non-Indigenous Australians.

Table 6.1. Estimates of early age mortality: Aboriginal Australians, comparison of existing estimates with 2002 NATSISS

	Probability of dying before reaching age x: (per thousand live births)		
	${}_3q_0$	${}_5q_0$	${}_{10}q_0$
Panel A: Indirect estimates based on 2002 NATSISS			
<i>Trussell method</i>			
West	27.0	32.0	42.0
East	27.0	32.0	42.0
North	25.0	31.0	42.0
South	27.0	32.0	42.0
<i>Preston–Palloni method</i>			
West	28.0	32.0	44.0
East	28.0	33.0	44.0
North	26.0	31.0	44.0
South	28.0	33.0	44.0
<i>Palloni–Heligman method</i>			
General	28.0	33.0	44.0
Latin American	28.0	33.0	44.0
Chilean	29.0	34.0	43.0
South Asian	28.0	34.0	44.0
Far East	28.0	33.0	43.0
Average	27.5 ^a	32.5 ^a	43.2 ^a
Panel B: Estimates based on registration data [1996–2001]			
ABS [Indigenous] ^b	15.0	16.4	18.4
Kinфу & Taylor [Indigenous] ^c	26.9	27.7	29.2
Kinфу & Taylor [Non-Indigenous] ^c	6.3	6.7	7.4

a. The reference period for the indirectly estimated ${}_3q_0$ values is approximately 1998, while the indirectly estimated ${}_5q_0$ and ${}_{10}q_0$ estimates approximately correspond to the period 1995 and 1992, respectively.

b. From the latest experimental Indigenous life table (ABS 2003a: 81–82).

c. From Kinфу & Taylor (2005). Note that the reference period for all three estimates from the registration data (i.e. ${}_3q_0$, ${}_5q_0$ and ${}_{10}q_0$) is around 1999.

Source: Author's calculations from the 2002 NATSISS RADL

The results in Table 6.1 show that the estimated probabilities of dying, generated using alternative assumptions and estimation procedures, fall within a narrow range, which provide confidence on these estimates. These estimates also display a good deal of consistency with the estimates from conventional life tables that are derived from registration data. The probabilities of dying obtained by averaging the results from the different methods and model life table families indicate that the probability of dying before reaching age three was 27.5 children per thousand around 1998, which is fairly comparable with the estimate based on registration data reported by Kinфу and Taylor for the period 1996–2001 (2002, 2005). The estimated under-five mortality rate stood at around 33 per thousand children in 1995, while the probability of dying before age 10 was around 43 per thousand children in 1992. Both of these estimates are higher than the respective estimates for 1999 obtained by Kinфу and Taylor from the registration data, providing some evidence of possible recent decline in child

mortality in the population. However, despite this promising trend, there are still significant differences in survival between Indigenous and non-Indigenous children. As can be seen from the table, early age mortality among Indigenous children is three to four times higher than their non-Indigenous counterparts. To reduce—and eventually eliminate—this inequality, it is important to identify the most vulnerable group of the population or isolate the factors to which Aboriginal child mortality is highly responsive. This is the subject of the next section.

Covariates of child mortality

A regression model is used to analyse the determinants of excess child mortality among Aboriginal Australians. The independent variables examined in this study are:

- individual characteristics describing the educational and employment status of the mother
- the geographical context of residence (degree of urbanisation and location)
- household level characteristics reflecting the family's emotional and material wellbeing (home ownership, marital status of the mother, presence of stressor, smoking and alcohol consumption)
- the characteristics of the dwelling and the neighbourhood, reflecting the family's material and social living conditions (quality of sanitary facilities and existence of problems in the neighbourhood), and
- cultural factors (Indigenous composition of the household, difficulty in communicating with service providers, whether they recognise and live on their homeland).

The age of the mother is also introduced as a control variable to indirectly capture the effect of duration of exposure on mortality of children. In the regression, with the exception of maternal age (which is treated as continuous), for each of the remaining explanatory variables, one of the categories is taken as a reference category.

The model was fitted using the Poisson regression technique with the number of children who have died as the dependent variable and the number of live births to the mother as the exposure variable. This method is appropriate for the available data given the fact that the dependent variable has only non-negative integers (Cameron & Trivedi 2001; Gurmu & Trivedi 1996; Long 1997). In the course of the analysis, other variants of the count data model (such as the negative binomial regression model and the zero and hurdle variants of Poisson and negative binomial regression) were also tested, but as these did not produce a statistically superior outcome, the results are not reproduced here.

Table 6.2 presents the effects of socioeconomic and other background variables on child mortality estimated using the Poisson model. While interpreting these

results, it is important to note that as death is a biological process, factors affecting child mortality in the most direct manner are bio-medical in nature; background variables such as those identified in the present study impact on child mortality only in an indirect manner. Another important limitation of the present analysis is that almost all the explanatory variables are contemporary variables relating to the time of the survey and these are used to 'predict' an event (the loss of a child) that happened in some distant past. In addition, some of the variables (such as drinking, smoking, labour force status, marital status and presence of stress) may indeed have been shaped by the negative shock to one's life that can occur through the death of a child. Ideally, these processes entail a dynamic analysis, but this is limited in the present study due to the nature of the data. However, from the point of view of future data collection, one way of addressing this problem in a cross-sectional survey such as the NATSISS is by collecting birth history data. This enables tracing the timing of the death of children which could then be linked with the characteristics of the mother at the time of the event.

The multi-variate regression presented in Table 6.2 shows that better environmental quality and home ownership have positive and statistically significant association with the risk of dying in childhood. The result shows that the odds of child mortality increase by almost 53 per cent for children in community housing and by some 72 per cent for children in private rentals. These differentials, which persist when the effects of other factors are controlled, underscore the importance of a family's economic standing in determining the probability of survival of its children. Moreover, as both size and quality of housing facilities are often correlated with household income/wealth level, those in privately-owned premises are likely to enjoy better and well maintained facilities, and hence be able to minimise or eliminate the chance of environmental exposure of their children to infectious agents. This is also confirmed by the result of the regression result which shows a statistically significant association between child mortality and adequacy of lavatory facilities. These results are consistent with the UN (1985) study which showed that, in general, old housing and deficient sanitary conditions constitute risk factors for child survival.

Table 6.2. Estimated effects of socioeconomic, spatial and household characteristics on Aboriginal child mortality: results of Poisson regression model, 2002 NATSISS

Determinants of child mortality	Regression coefficients ^a	Incidence rate ratios ^a	P values
Age (continuous)	0.320		0.000
Marital status			
Married	[R]	[R]	
Not married	0.301	1.352	0.088
Household composition			
All Indigenous	[R]	[R]	
Mixed household	-0.071	0.931	0.730
Difficulty with service providers			
Does not have difficulty	[R]	[R]	
Has difficulty	0.116	1.123	0.082
Attachment to homeland			
Identifies with homeland	[R]	[R]	
Does not know or identify with homeland	0.148	1.160	0.442
Residence on homeland			
Lives on homeland	[R]	[R]	
Does not know homeland or does not live on homeland	0.244	1.277	0.034
Place of residence			
Major cities	[R]	[R]	
Inner regional	0.330	1.390	0.182
Outer regional	0.195	1.215	0.357
Remote or very remote	0.091	1.095	0.694
Labour force status			
Employed	[R]	[R]	
Unemployed	0.441	1.555	0.162
Not in the labour force	-0.089	0.915	0.609
Educational status			
Diploma or higher	[R]	[R]	
Year 11 and 12	-0.203	0.816	0.543
Year 10	-0.313	0.731	0.231
9 years or below	-0.099	0.906	0.668
Tenure status			
Owner	[R]	[R]	
Private rental	0.543	1.721	0.041
Public or community rental	0.423	1.527	0.049
Toilet facility			
Adequate	[R]	[R]	
Inadequate	0.588	1.801	0.081
Neighbourhood problem			
Neighbourhood does not have problem	[R]	[R]	
Neighbourhood has problem	0.478	1.614	0.002
Household stress			
Stressor reported	[R]	[R]	
Stressor not reported	-0.465	0.628	0.050

Table 6.2. (continued)

Determinants of child mortality	Regression coefficients ^a	Incidence rate ratios ^a	P values
Smoking status			
Ever smoked or currently smoking	[R]	[R]	
Never smoked	-0.131	0.877	0.425
Alcohol consumption			
Never	[R]	[R]	
Low risk	0.128	1.136	0.461
Medium risk	0.139	1.149	0.565
High risk	0.534	1.706	0.032
Constant	-5.844		0.000
Number of observations		3 798	

a. The model includes children ever-born as an exposure variable. R refers to reference category.
Source: Author's calculations from the 2002 NATSISS MURF conducted at the ABS

Neighbourhood problems, existence of stress and high-risk drinking problems among parents increase the likelihood of child mortality. The odds of child mortality are 61 percent higher for children born and raised in a neighbourhood that has problems, while a high-risk drinking problem and the existence of stress within a household each increase the odds of child mortality by some 70 per cent. Similarly, children of never-married mothers and mothers who have difficulty in dealing with service providers show respectively a 35 and 12 per cent elevated risk of mortality compared to their counterparts who live with both parents or live with a mother who has no difficulty in accessing services. A strong and statistically significant association is also evident between maternal age, child mortality and degree of attachment to and residence on their homeland.

However, maternal education, place of residence and labour force participation, which are known to have a strong association with mortality in the literature do not show significant association with child mortality in the present analysis. Other factors that were also found to be not significant were composition of household and smoking behaviour of the mother. These findings may suggest that the relationships between residential pattern and socio-occupational status and child mortality are not direct but operate through other variables.

Concluding remarks

Using the 2002 NATSISS, this study has attempted to generate an alternative estimate of child mortality and identify its determinants among Indigenous Australians. The results of the analysis showed that while there is some evidence of a decline in child mortality in recent years, mortality among young Indigenous Australians still remains three to four times higher than their non-Indigenous counterparts. It is observed that home ownership, quality of dwelling, better neighbourhood environment and absence of stress in the household have a positive influence on child health. On the other hand, other maternal factors

such as high-risk drinking behaviour and lone parenthood increase the probability of child mortality, while degree of urbanisation has no effect. However, part of the explanation for the latter may lie in data quality which, as demonstrated in the paper, appears to be highly volatile and deviates sufficiently from known patterns to cast doubt on its quality, particularly at the level of jurisdiction. There is, therefore, a need to explore the causes of these problems and find ways to avoid the shortcomings in future data collections. As the 2002 NATSISS data also only permit analysis of child mortality, it is important to explore the feasibility of collecting information on adult mortality so that the results from these data could be used to counter-check existing estimates that are based on conventional methods. The NATSISS data also provide no information on current fertility, which is a useful input for population projection. This information can be obtained by asking all women in the reproductive age group one simple question on whether or not they had a live birth in the 12 months preceding the survey.