

INFANT MORTALITY

Introduction

Infant mortality is often used as a barometer of the social wellbeing of a country [1]. New Zealand's infant mortality rates are middling by international standards, being lower than those of the USA and some Eastern European countries, but higher than those of Central and Northern Europe [2]. Despite this, mortality during the first year of life in New Zealand remains much higher than at any other point during childhood or adolescence. During 2009, a total of 308 New Zealand infants were registered as dying prior to their first birthday [3].

Despite these relatively high numbers, New Zealand's infant mortality rates have declined during the past 40 years, with rates falling from 16.9 per 1,000 in 1969, to 4.9 per 1,000 in March 2009 [3]. While infant mortality rates are generally higher for Pacific > Māori > European / Other babies, males, and those in the most deprived areas [4], total infant mortality rates are of limited utility in guiding population health interventions, as the causes of mortality differ markedly with the age of the infant. During the neonatal period (birth–28 days) extreme prematurity, congenital anomalies and intrauterine / birth asphyxia are the leading causes of mortality, while in the post neonatal period (29–364 days) sudden unexpected death in infancy (SUDI) and congenital anomalies make the greatest contribution [5]. Thus any interventions aimed at reducing New Zealand's infant mortality rates must, in the first instance, be based on an understanding of their component causes.

The following section uses information from the National Mortality Collection to review neonatal, post neonatal and total infant mortality since 1990.

Data Source and Methods

Definition

1. *Total Infant Mortality: Death of a live born infant prior to 365 days of life*
2. *Neonatal Mortality: Death of a live born infant in the first 28 days of life*
3. *Post Neonatal Mortality: Death of a live born infant after 28 days but prior to 365 days of life*
4. *Sudden Unexpected Death in Infancy (SUDI): Death of a live born infant <365 days of life, where the cause of death is attributed to SIDS, Accidental Suffocation / Strangulation in Bed or Ill-Defined/Unspecified Causes*

Data Sources

Numerator: National Mortality Collection: All deaths in the first year of life, using the definitions for total infant, neonatal and post neonatal mortality outlined above. Cause of death was derived from the main underlying cause of death as follows: Extreme Prematurity (ICD-10 P072), Congenital Anomalies (ICD-10 Q00–Q99), Perinatal Conditions (ICD-10 P00–P96); SIDS (ICD-10 R95); SUDI (ICD-10 R95, R96, R98, R99, W75).

Denominator: Birth Registration Dataset: All live births 20+ weeks gestation.

Notes on Interpretation

Note 1: See **Appendix 3** for an overview of the dataset used.

Note 2: 95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms significant or not significant have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section, and thus (unless the terms *significant* or *non-significant* are specifically used) the associations described do not imply statistical significance or non-significance (see **Appendix 1** for further discussion of this issue).

Indicator Category Ideal B

New Zealand Distribution and Trends

New Zealand Trends

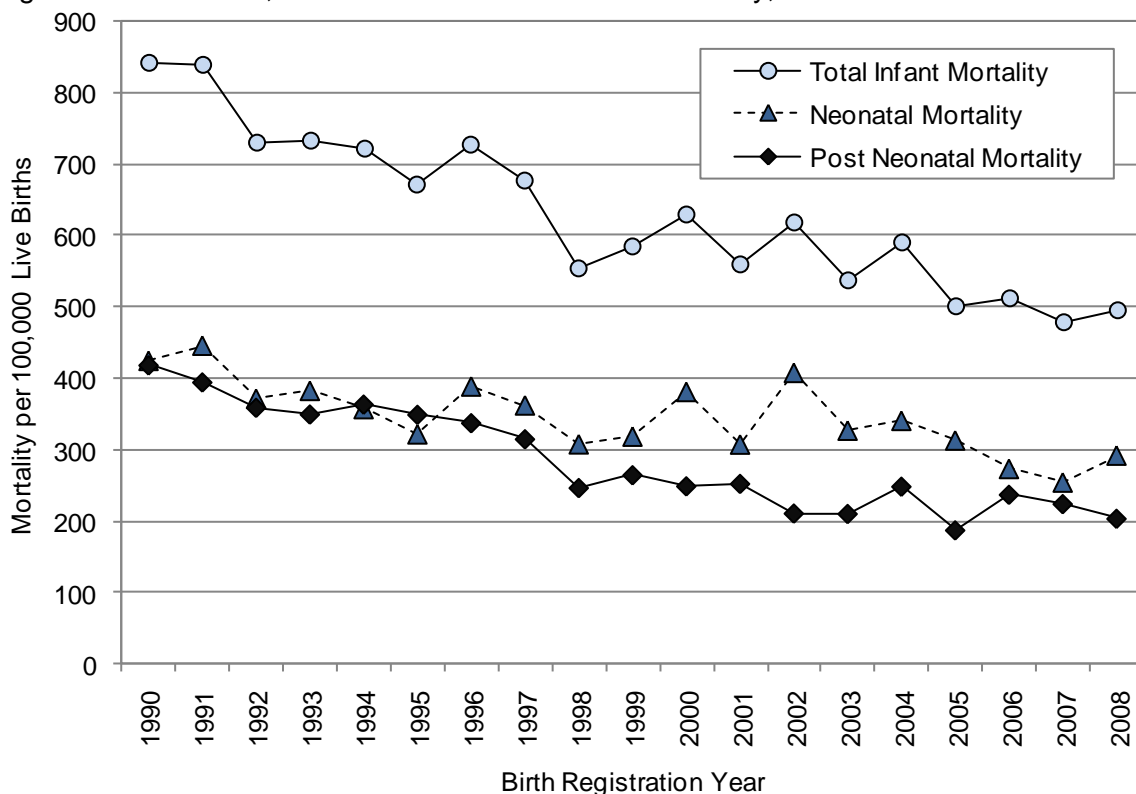
In New Zealand during 1990–2008, neonatal and post neonatal mortality both declined, with neonatal mortality exceeding post neonatal mortality during 1996–2008 (**Figure 1**).

New Zealand Trends by Ethnicity

In New Zealand during the late 1990s, neonatal mortality was generally higher for Pacific and Māori > European > Asian infants, although ethnic differences were less consistent during the 2000s. In contrast, post neonatal mortality was higher for Māori > Pacific > European and Asian infants throughout 1996–2008 (**Figure 2**).

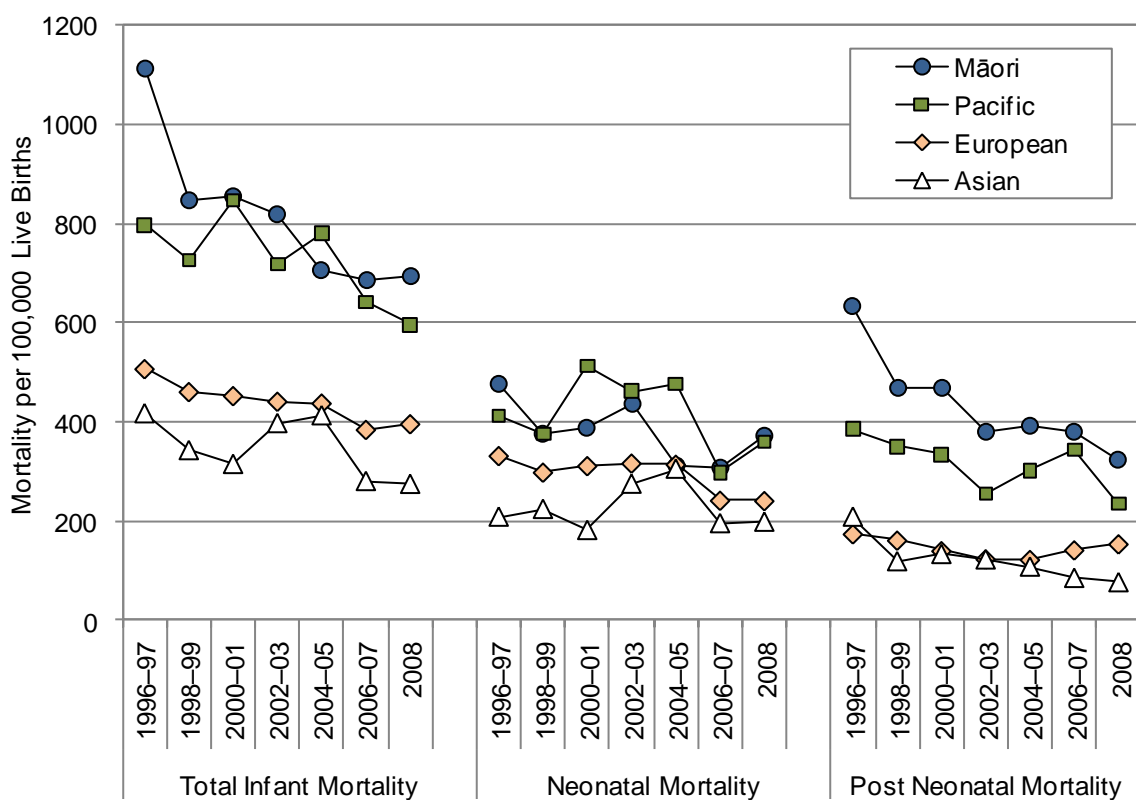


Figure 1. Total Infant, Neonatal and Post Neonatal Mortality, New Zealand 1990–2008



Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset

Figure 2. Total Infant, Neonatal and Post Neonatal Mortality by Ethnicity, New Zealand 1996–2008



Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset. Note: Ethnicity is Level 1 Prioritised.



Distribution by Cause

In New Zealand during 2004–2008, extreme prematurity and congenital anomalies were the leading causes of neonatal mortality, although intrauterine / birth asphyxia and other perinatal conditions also made a significant contribution. In contrast, SUDI was the leading cause of post neonatal mortality, followed by congenital anomalies (**Table 1**).

Table 1. Neonatal and Post Neonatal Mortality by Cause, New Zealand 2004–2008

Cause of Death	Number: Total 2004–2008	Number: Annual Average	Rate per 100,000	Percent of Deaths (%)
New Zealand				
Neonatal Mortality				
Extreme Prematurity	215	43.0	69.8	23.7
Congenital Anomalies: CVS	65	13.0	21.1	7.17
Congenital Anomalies: CNS	34	6.8	11.0	3.75
Congenital Anomalies: Other	130	26.0	42.2	14.3
Intrauterine/Birth Asphyxia	47	9.4	15.3	5.19
Other Perinatal Conditions	331	66.2	107.4	36.5
SUDI: SIDS	17	3.4	5.5	1.88
SUDI: Suffocation/Strangulation in Bed	25	5.0	8.1	2.76
SUDI: Unspecified	3	0.6	1.0	0.33
Injury/Poisoning	10	2.0	3.2	1.10
Other Causes	29	5.8	9.4	3.20
Total Neonatal Mortality	906	181.2	294.0	100.0
Post Neonatal Mortality				
SUDI: SIDS	177	35.4	57.4	26.1
SUDI: Suffocation/Strangulation in Bed	79	15.8	25.6	11.7
SUDI: Unspecified	10	2.0	3.2	1.48
Congenital Anomalies: CVS	54	10.8	17.5	7.97
Congenital Anomalies: CNS	9	1.8	2.9	1.33
Congenital Anomalies: Other	63	12.6	20.4	9.29
All Other Perinatal Conditions	73	14.6	23.7	10.8
Injury/Poisoning	30	6.0	9.7	4.43
Other Causes	183	36.6	59.4	27.0
Total Post Neonatal Mortality	678	135.6	220.0	100.0
New Zealand Total	1584	316.8	514.0	100.0

Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset

Distribution by Ethnicity, Gender, NZDep Deprivation, Maternal Age and Gestation

Neonatal Mortality: In New Zealand during 2004–2008, neonatal mortality was *significantly* higher for Pacific and Māori infants than for European infants, for males, those in average / more deprived (NZDep decile 5–10) areas, preterm infants, and those whose mothers were <25 years of age (**Table 2, Figure 3**).

Post Neonatal Mortality: In New Zealand during 2004–2008, post neonatal mortality was also *significantly* higher for Māori and Pacific infants than for European and Asian infants, for males, those in average / more deprived (NZDep decile 5–10) areas, preterm infants, and those whose mothers were <30 years of age (**Table 2, Figure 3**).



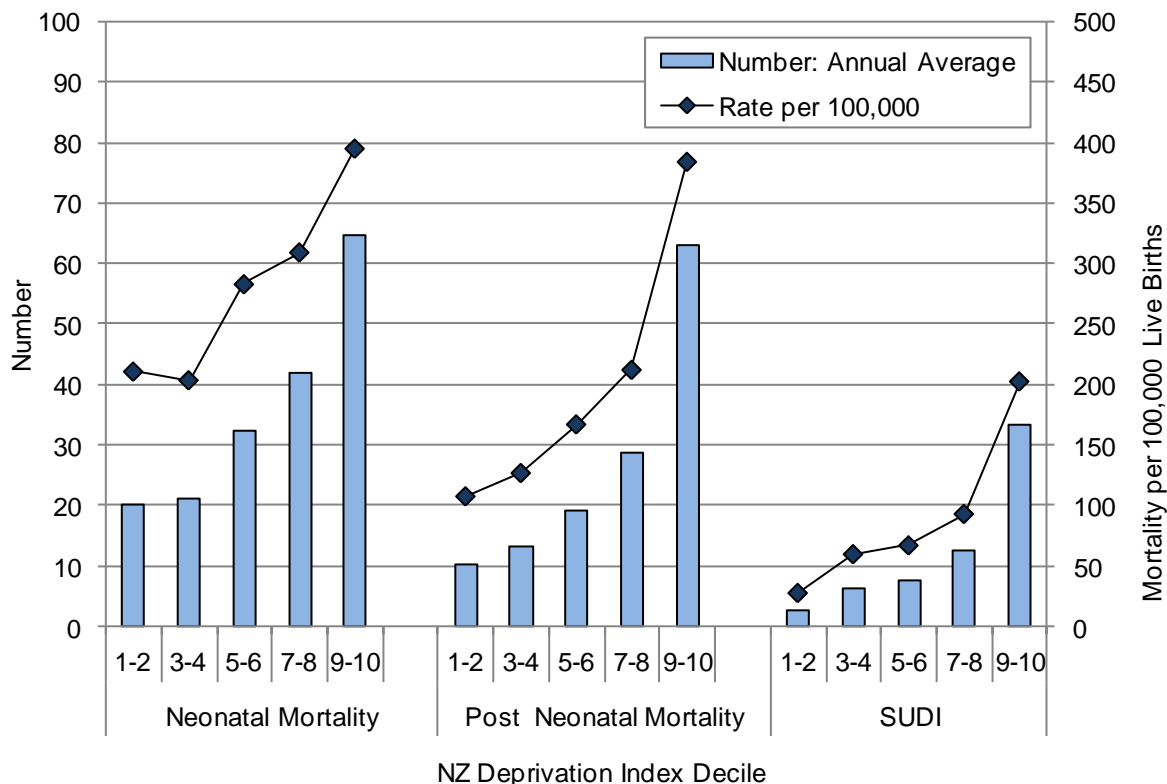
Table 2. Risk Factors for Neonatal and Post Neonatal Mortality, and Sudden Unexpected Death in Infancy (SUDI), New Zealand 2004–2008

Neonatal Mortality							
Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZ Deprivation Index Decile				Ethnicity			
Decile 1–2	210.6	1.00		Asian	237.5	0.88	0.68–1.13
Decile 3–4	203.5	0.97	0.74–1.27	European	270.1	1.00	
Decile 5–6	282.9	1.34	1.05–1.72	Māori	323.5	1.20	1.03–1.39
Decile 7–8	309.3	1.47	1.16–1.86	Pacific	379.3	1.40	1.15–1.71
Decile 9–10	395.2	1.88	1.50–2.35	Gender			
Maternal Age Group				Female	263.3	1.00	
<20 years	504.7	1.96	1.57–2.45	Male	323.1	1.23	1.08–1.40
20–24 years	328.4	1.28	1.05–1.55	Gestation at Birth			
25–29 years	283.0	1.10	0.91–1.33	20–36 Weeks	2,695.8	31.8	27.4–36.9
30–34 years	257.0	1.00		37+ Weeks	84.7	1.00	
35+ years	246.0	0.96	0.78–1.17				
Post Neonatal Mortality							
Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZ Deprivation Index Decile				Ethnicity			
Decile 1–2	107.4	1.00		Asian	91.6	0.67	0.45–1.00
Decile 3–4	126.7	1.18	0.82–1.70	European	137.4	1.00	
Decile 5–6	167.0	1.55	1.11–2.18	Māori	372.3	2.71	2.28–3.22
Decile 7–8	212.1	1.97	1.43–2.72	Pacific	304.1	2.21	1.75–2.81
Decile 9–10	384.2	3.58	2.66–4.81	Gender			
Maternal Age Group				Female	191.3	1.00	
<20 years	474.0	3.44	2.66–4.45	Male	247.2	1.29	1.11–1.50
20–24 years	313.6	2.28	1.81–2.86	Gestation at Birth			
25–29 years	217.0	1.57	1.25–1.99	20–36 Weeks	879.2	5.87	4.96–6.94
30–34 years	137.8	1.00		37+ Weeks	149.9	1.00	
35+ years	144.2	1.05	0.80–1.37				
Sudden Unexpected Death in Infancy (SUDI)							
Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZ Deprivation Index Decile				Ethnicity			
Decile 1–2	27.4	1.00		Asian	13.6	0.30	0.11–0.82
Decile 3–4	59.5	2.17	1.14–4.15	European	45.1	1.00	
Decile 5–6	66.8	2.44	1.30–4.58	Māori	223.8	4.96	3.77–6.53
Decile 7–8	92.8	3.39	1.87–6.16	Pacific	108.4	2.40	1.60–3.60
Decile 9–10	202.5	7.40	4.21–13.01	Gender			
Maternal Age Group				Female	96.0	1.00	
<20 years	276.5	4.96	3.43–7.17	Male	105.6	1.10	0.88–1.37
20–24 years	183.7	3.29	2.35–4.62	Gestation at Birth			
25–29 years	84.9	1.52	1.05–2.20	20–36 Weeks	255.7	3.23	2.42–4.32
30–34 years	55.8	1.00		37+ Weeks	79.1	1.00	
35+ years	47.1	0.84	0.54–1.32				

Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset. Note: Rates are per 100,000; Rate Ratios are unadjusted; Ethnicity is Level 1 Prioritised; SUDI is neonatal AND post neonatal.



Figure 3. Distribution of Neonatal and Post Neonatal Mortality, and Sudden Unexpected Death in Infancy (SUDI) by NZ Deprivation Index Decile, New Zealand 2004–2008



Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset. Note: SUDI is neonatal AND post neonatal; Decile is NZDep2001.

SUDI: In New Zealand during 2004–2008, mortality from SUDI was *significantly* higher for Māori > Pacific > European > Asian infants, those in average / more deprived (NZDep decile 3–10) areas, preterm infants, and those whose mothers were <30 years of age (Table 2, Figure 3).

Summary

In New Zealand during 1990–2008, neonatal and post neonatal mortality both declined, with neonatal mortality exceeding post neonatal mortality during 1996–2008. When broken down by ethnicity, neonatal mortality was higher for Pacific and Māori > European > Asian infants during the late 1990s, although ethnic differences were less consistent during the 2000s. In contrast, post neonatal mortality was higher for Māori > Pacific > European and Asian infants throughout 1996–2008.

During 2004–2008, neonatal and post neonatal mortality were also *significantly* higher for Pacific and Maori infants, males, those in average / more deprived areas, preterm infants and those with younger mothers. Similarly mortality from SUDI was *significantly* higher for Māori > Pacific > European > Asian infants, those in average / more deprived areas, preterm infants, and those whose mothers were <30 years of age.



References

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