

Fetal and Infant Deaths

2008 and 2009

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This publication reports information provided to the Ministry of Health's Mortality Collection and the National Minimum Dataset (Hospital Events) by district health boards. It has not been possible to verify the accuracy of information in some instances where additional information, such as medical records, would be required to do so. It is important to note that because these national collections are dynamic, it is necessary to wait a certain period before publishing a record of the information in them. This reduces the chances of amendments to information after publication.

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Key points

Fetal deaths

Overview

- In 2009 there were 482 fetal deaths registered, compared to 555 in 2008. This equates to rates of 7.6 deaths per 1000 total births in 2009 and 8.4 in 2008.
- The fetal death rate remained relatively stable between 1996 and 2009.

Cause

- The most common specified cause of fetal death was *Slow fetal growth and fetal malnutrition* (9.5 percent).
- *Fetal death of unspecified cause* accounted for 35.0 percent of all fetal deaths.

Gestation

- The majority of fetal deaths occurred before 32 weeks' gestation (62.7 percent in 2009).
- The 2009 rate for fetal deaths at term (37–41 weeks' gestation) was 2.1 deaths per 1000 total births, compared to 280.7 for very pre-term fetal deaths (less than 32 weeks' gestation) and 14.5 for pre-term infants (32–36 weeks' gestation).

Weight

- Over half of all fetal deaths were associated with an extremely low birthweight (less than 1000 g).
- In 2009 the fetal death rate for extremely low birthweight infants was 478.6 per 1000 births, compared to 2.1 for normal birthweight infants (2500–4499 g).

Ethnicity

- Pacific peoples had the highest fetal death rates in 2009 at 9.3 deaths per 1000 births.
- The rate for Māori was 8.1 deaths per 1000 births, compared to 7.0 for the Other¹ ethnic group.

Deprivation

- In 2009 there were 8.2 fetal deaths per 1000 births in areas with the highest deprivation, compared to 6.4 deaths per 1000 births in the least deprived areas.

Maternal age

- Mothers younger than 20 years had the highest rate of fetal death (10.7 deaths per 1000 births in 2009). Mothers over the age of 35 had the second highest, with a rate of 8.9 in 2009.

¹ 'Other' covers all ethnic groups not included in the Māori and Pacific ethnic groups.

District health boards (DHBs)

- Waitemata and Counties Manukau DHBs had fetal death rates significantly higher than the national rate.
 - Auckland and Hawke's Bay DHBs had rates significantly lower than the national rate.
-

Infant deaths

Overview

- There were 324 infant deaths in 2008 compared to 332 in 2009. This equates to rates of 5.0 and 5.2 deaths per 1000 live births, respectively.
- There was a 27.7 percent decrease in the infant death rate between 1996 and 2009.

Cause

- The most common cause of infant death was *Disorders related to short gestation and low birthweight* (14.3 percent).
- The grouped causes *Respiratory and cardiovascular disorders specific to the perinatal period* accounted for 13.4 percent of all infant deaths.

Gestation

- Very pre-term and pre-term infants had a significantly higher death rate (180.9 and 11.1 deaths per 1000 live births, respectively, in 2009) than term infants (2.2 deaths per 1000 live births).
- Of infants who died in 2008 and 2009, 42.4 percent were born very pre-term, 13.0 percent were pre-term and 37.2 percent were born at term.

Weight

- In 2008 and 2009, over a third (34.8 percent) of all infant deaths were of infants with an extremely low birthweight (less than 1000 g).
- The death rate for infants with a normal birthweight in 2009 was 2.3 deaths per 1000 live births, compared to rates of 413.0 for extremely low, 44.9 for very low and 14.4 for low birthweight infants.

Ethnicity

- The Māori infant death rate was nearly twice the Other² rate in both 2008 and 2009.
 - The Māori rate decreased by 35.5 percent, from 11.5 deaths per 1000 live births in 1996 to a rate of 7.4 in 2009. The Pacific rate decreased by 15.7 percent, from 7.2 in 1996 to 6.0 in 2009.
-

² 'Other' includes all infants not included in the Māori or Pacific ethnic groups.

Deprivation

- Quintile 5 (the most deprived) areas had the highest rate of infant death, with 8.7 deaths per 1000 live births in 2009, more than twice the rate for the least deprived areas (3.3 deaths per 1000 live births).
- There have been significant decreases in the infant death rates for quintiles 2 and 4 since 1996 (48.5 percent and 39.8 percent, respectively).

Maternal age

- The infant death rate for mothers aged under 20 years of age was significantly higher than the rate for mothers over the age of 25 years (11.2 deaths per 1000 live births compared to 3.5 in 2009).
- The rate for mothers over the age of 35 years decreased by 49.6 percent between 1996 and 2009.

District health boards (DHBs)

- Counties Manukau and Waikato DHBs had infant death rates significantly higher than the national rate (6.9 and 6.2 deaths per 1000 live births, respectively, compared to 5.0).
- Waitemata, Nelson Marlborough, Canterbury and Otago DHBs all had rates significantly lower than the national rate (3.0, 3.0, 3.8 and 3.7 deaths per 1000 live births, respectively).

Age

- The majority of infant deaths occur before one month of age, with 31.3 percent occurring within 24 hours of birth, 14.2 percent between 1 and 6 days, and 13.3 percent between 7 and 27 days of age.
- The death rate for infants aged 1 to 11 months (post-neonatal) declined by 36.8 percent, from 3.4 deaths per 1000 live births in 1996 to a rate of 2.1 in 2009.

Sex

- In 2009 the male infant death rate was 5.6 deaths per 1000 live births compared to a rate of 4.9 for female infants.
- Males have had a higher infant death rate than females since 1996.

Sudden Infant Death Syndrome (SIDS)

- SIDS rates were highest for younger mothers, Māori and mothers from the most deprived areas.
 - SIDS deaths are most likely to occur between one and four months of age (64.5 percent).
-

Introduction

Purpose

The purpose of the *Fetal and Infant Deaths* publication series is to inform discussion and assist future policy development. Readership of this publication is wide-ranging, and its contents reflect this, aiming to meet the needs of all interested parties.

The *Fetal and Infant Deaths* series presents data on deaths that occurred before one completed year of life. This particular publication focuses on deaths that were registered in the 2008 and 2009 calendar years.

Key data sources

The Births, Deaths and Marriages Registry (BDM)

Every death occurring in New Zealand must be registered with Births, Deaths and Marriages. Deaths should be registered within three working days of burial or cremation, although the law does not impose any limit on the time after which a death may not be registered. This publication uses the year in which a death is registered rather than the actual year of death.

This information is then supplied to the Ministry of Health, which matches death registrations from the registry with individuals' National Health Index numbers. This combined information comprises the death registration data held in the National Mortality Collection.

Birth registration data, including stillbirths (fetal deaths), is also provided by the Births, Deaths and Marriages registry. This data has been used as a basis on which to calculate the death rates presented in this publication.

Certifying doctors and coroners

A certificate detailing the causes of death is completed by a medical practitioner or coroner for each BDM death and stillbirth registration. These documents include:

- *Medical Certificate of Causes of Fetal and Neonatal Death* (HP4721) for stillbirths and for infants who die within 28 days of birth
- *Medical Certificate of Cause of Death* (HP4720) for any other death that is not reported to the coroner
- *Certificate of Findings* for deaths reported to the coroner.

Note that coroners do not investigate fetal deaths.

Post-mortem reports are an additional source of cause-of-death information. Copies of these reports are sent to the Ministry of Health by hospitals and coroners, and they are matched with corresponding medical certificates or coroners' findings. Post-mortem findings are taken into consideration when assigning the underlying cause of death. Access to this additional information ensures the high quality of data held in the National Mortality Collection.

The National Mortality Collection

The Ministry of Health is responsible for compiling and publishing cause-of-death statistics for New Zealand. Using the information provided by the Births, Deaths and Marriages registry, the Ministry of Health assigns underlying cause-of-death codes in accordance with the guidelines contained in the World Health Organization's (WHO's) *International Statistical Classification of Diseases and Related Health Problems, 10th Revision*. In this publication, the *10th Revision, Australian Modification, 2nd Edition* (ICD-10-AM-II) was used for coding purposes (National Centre for Classification in Health 2008).

Underlying cause of death is defined by WHO as 'the disease or injury which initiated the train of morbid events leading directly to death, or ... the circumstances of the accident or violence which produced the fatal injury' (WHO 1977).

Figure 1: Stages of processing cause of death data in New Zealand

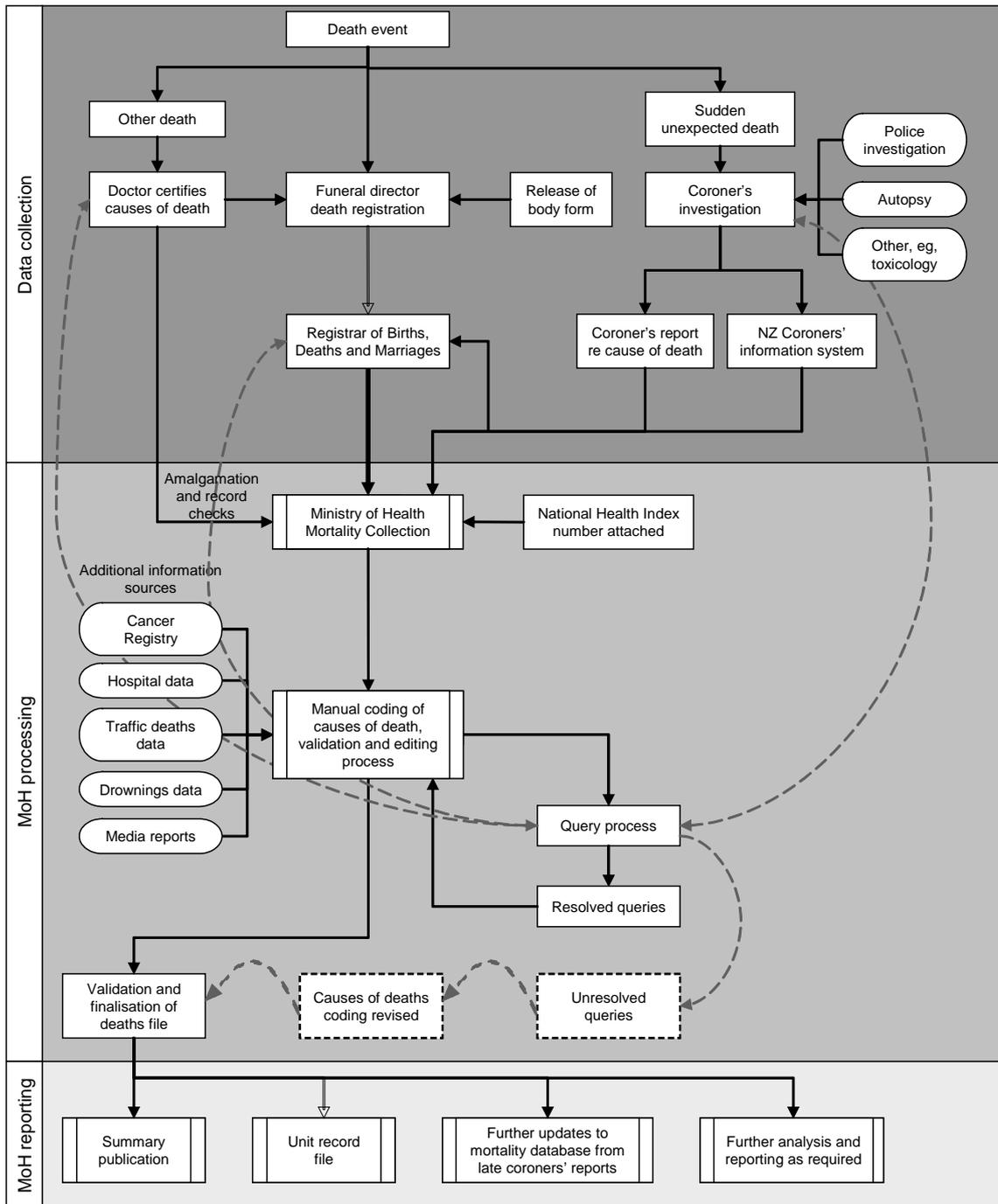
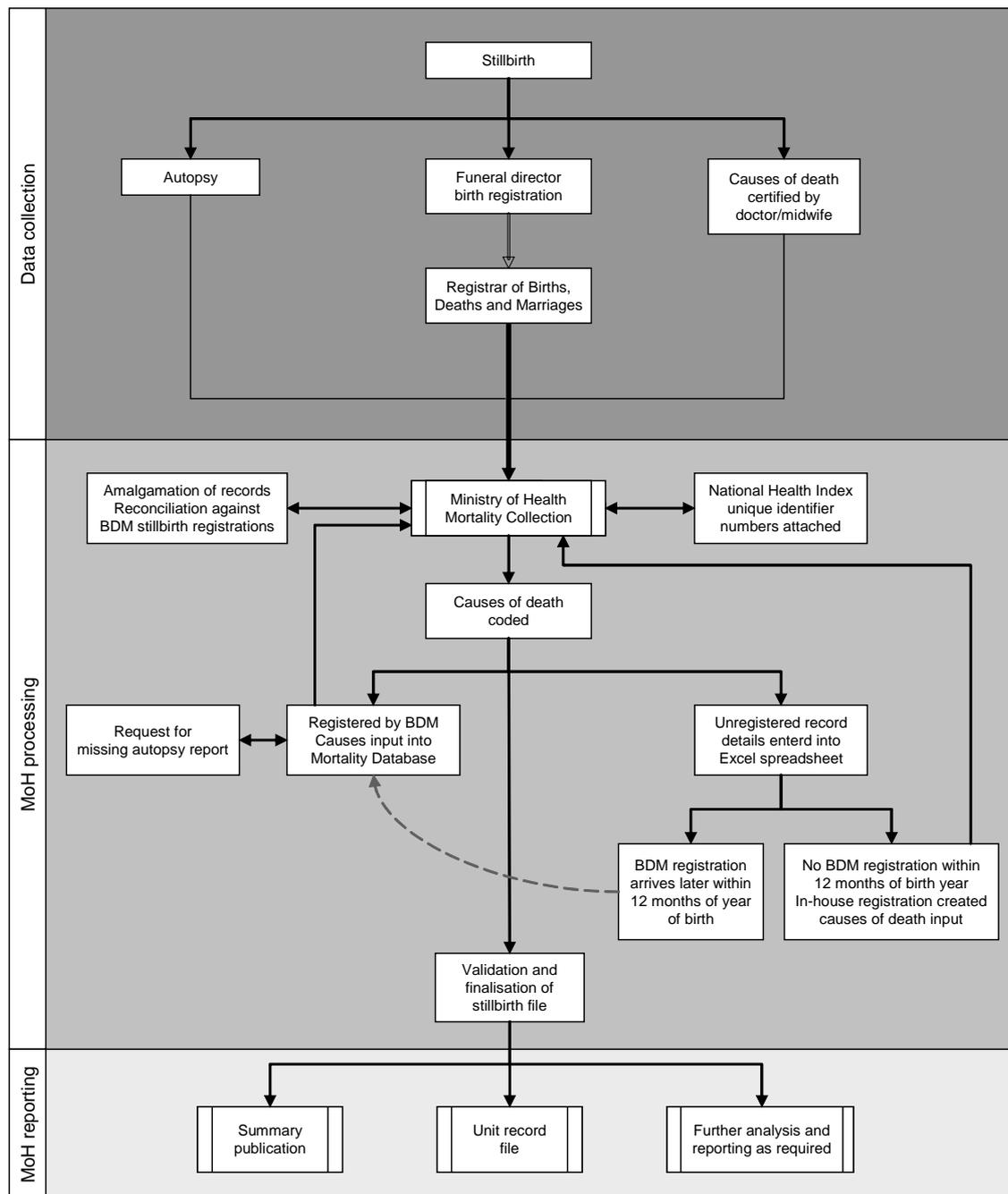


Figure 2: Stages of processing stillbirth data in New Zealand



Data quality and timing issues

Late data

The National Mortality Collection is a dynamic collection, which continues to be updated as new information is received. This means there may be small differences between future extracts of mortality data for 2008 or 2009 and the data contained in this publication.

The extended length of time that some coronial inquiries take means there is always a small number of deaths for which the Ministry of Health has been unable to assign provisional causes of death at the time mortality data is published. These deaths are included in the statistics under the ICD codes P969 (*Condition originating in the perinatal period, unspecified*), R99 (*Unspecified causes of mortality*) and X59 (*Exposure to unspecified factor*). The records for these deaths are provisionally coded and then updated in the National Mortality Collection database, with final underlying cause of death codes assigned when coroners' findings are received.

Differences between numbers and rates published by the Ministry of Health and Statistics New Zealand

Statistics New Zealand also publishes numbers of live births, stillbirths (fetal deaths) and infant deaths (see the 'Definitions' section, below, for a discussion of these death classifications) by date of registration.

The live birth numbers used to calculate the rates presented in this publication differ from those published by Statistics New Zealand. Unlike the Ministry of Health, Statistics New Zealand excludes as a matter of policy late registrations (births registered more than two years after the date of birth) and births to mothers resident overseas. Fetal or infant deaths for which the mother's usual residence is overseas are also excluded by Statistics New Zealand.

The Ministry of Health receives detailed medical information for deaths from medical certificates of causes of death, post-mortem reports and the National Minimum Dataset.³ As a consequence of processing this additional information, some fetal deaths are reclassified as infant deaths and some infant deaths are reclassified as fetal deaths, in accordance with the definitions of live births and fetal deaths as described in the next section. Additional unregistered fetal deaths may also be identified by the Ministry of Health through medical certificates, post-mortem reports and follow-up information sought from relevant hospitals in order to confirm these deaths as registrable stillbirths. Those that meet the BDM definition of 'stillbirth' are provided with in-house registrations and are included in the data published in *Fetal and Infant Deaths*.

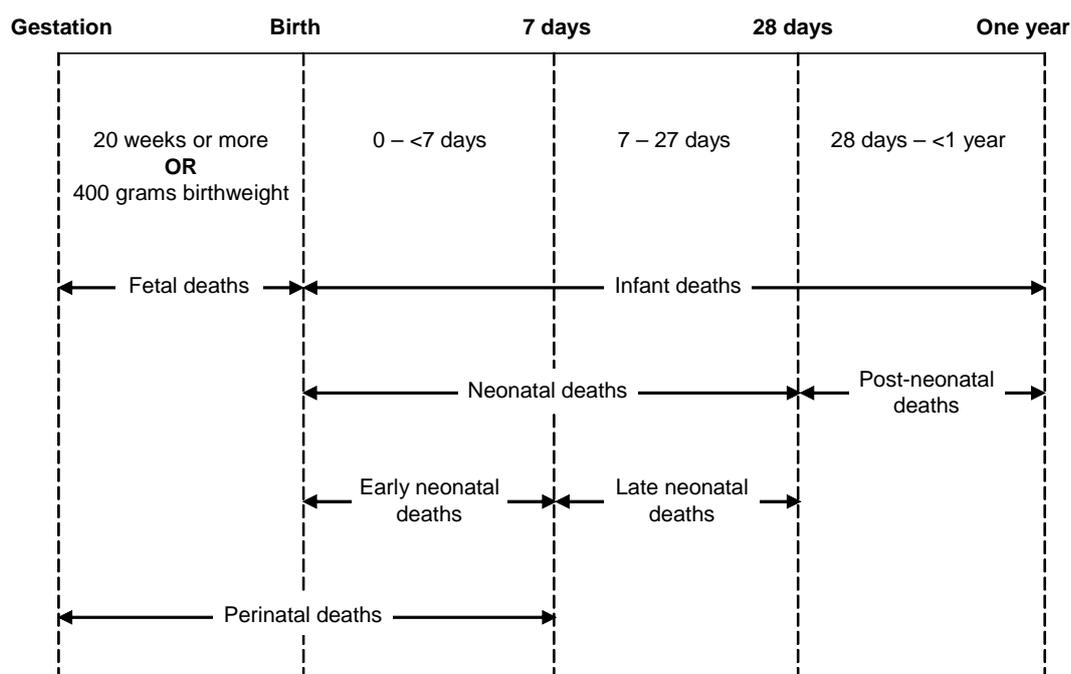
³ The National Minimum Dataset is a national collection of public and private hospital discharge information, including clinical information, for inpatients and day patients.

Definitions

Fetal and infant death periods

The following diagram specifies periods for the terms used to describe fetal and infant deaths.

Figure 3: Time periods for fetal and infant deaths



Live births

The World Health Organization defines a live birth as follows:

Live birth is the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy, which, after such separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached; each product of such birth is considered liveborn. (WHO 1977)

There was an undercount of 1998 birth registrations. The data for 1997 has been used in calculations in this publication.

Fetal death

The World Health Organization defines fetal death as follows:

Fetal death is death prior to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy; the death is indicated by the fact that after such separation the fetus does not breathe or show any other evidence of life such as beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles. (WHO 1977)

The statistics in this publication include only fetal deaths (known also as stillbirths) of 20 weeks or more gestation, or 400 g or more birthweight. This is in line with the Births, Deaths, Marriages and Relationships Registration Act 1995. The 1995 legislation defines a stillborn child as:

a dead foetus that:

- (a) weighed 400 g or more when it issued from its mother; or
- (b) issued from its mother after the 20th week of pregnancy.

The 1995 Act requires a medical certificate of causes of death and a birth registration form to be completed in respect of each stillborn child (including stillbirths resulting from terminations of pregnancy).

The fetal death rate is calculated as follows:

$$\frac{\text{Fetal deaths}}{\text{Total births (live births plus fetal deaths)}} \times 1000$$

Total births

'Total births' counts all live births plus all fetal deaths as defined by the WHO. Total births are used as the denominator for fetal and perinatal death rate calculations.

Infant deaths (early neonatal, late neonatal and post-neonatal deaths)

The WHO defines infant death as a live-born infant dying before the first year of life is completed (WHO 1977). Infant deaths comprise early neonatal deaths, late neonatal deaths and post-neonatal deaths.

The infant death rate is calculated as follows:

$$\frac{\text{Early, late and post-neonatal deaths}}{\text{Live births}} \times 1000$$

International comparisons of fetal and infant mortality

In order to assist in the comparison of fetal and perinatal mortality rates internationally, the Organisation for Economic Co-operation and Development (OECD) recommends calculating age- or weight-specific death rates. Weight-specific death rates are calculated for babies weighing 1000 g and over, or with a gestation of 28 or more completed weeks.

The weight-specific fetal death rate is calculated as follows:

$$\frac{\text{Fetal deaths of 28+ weeks' gestation or weighing 1000 g and over}}{\text{Total births (live births plus fetal deaths of 28+ weeks or 1000 g or over)}} \times 1000$$

The weight-specific perinatal death rate is calculated as above, with the addition of early neonatal deaths in the numerator. Rates for comparing early neonatal, late neonatal, post-neonatal and infant deaths use the same methodology as in this publication. See the 'International comparisons of fetal and infant mortality' section for more detail (page 46).

Sudden Infant Death Syndrome

To capture information about all deaths reported to be due to SIDS, the Ministry of Health uses a flag (called the cot death 'Y' indicator). The cot death flag identifies all of the SIDS records classified to ICD code R95 (Sudden Infant Death Syndrome) either as the underlying cause of death or as a contributing cause. The SIDS statistical tables include all cases captured by the cot death flag.

The SIDS rate is calculated as follows:

$$\frac{\text{Total number of SIDS deaths}}{\text{Number of live births}} \times 1000$$

Numbers and rates

Some tables and figures in this publication present death rates by various sub-groups of the total population, defined by ethnicity, age of mother, socioeconomic deprivation, sex of infant, or district health board (DHB). These rates have been calculated using the relevant population for each sub-group. For example, infant death rates for Māori were calculated using the number of Māori live births as the denominator.

Small numbers can affect the reliability, and therefore the interpretation, of results. It is important to note that because the number of fetal and infant deaths in New Zealand is small, rates tend to fluctuate markedly from year to year. Rates derived from small numbers should be therefore treated with caution.

Confidence intervals

A confidence interval is a range of values describing the uncertainty around a single value (such as a rate) used to estimate the true value in a population, such as the underlying or true rate. Confidence intervals describe how different the estimate could have been if chance had led to a different set of data. Where confidence intervals are used in this publication, they have been calculated at the 95 percent level. See Glossary on page 59 for more information.

Fetal and infant deaths in 2008 and 2009

This publication focuses on describing fetal and infant death numbers and rates by:

- cause of death
- gestational age
- birthweight
- ethnicity
- deprivation
- maternal age
- DHB region of domicile.

In addition, the following areas are discussed:

- infant death by age
- infant death by sex
- international comparisons of fetal and infant mortality
- Sudden Infant Death Syndrome (SIDS).

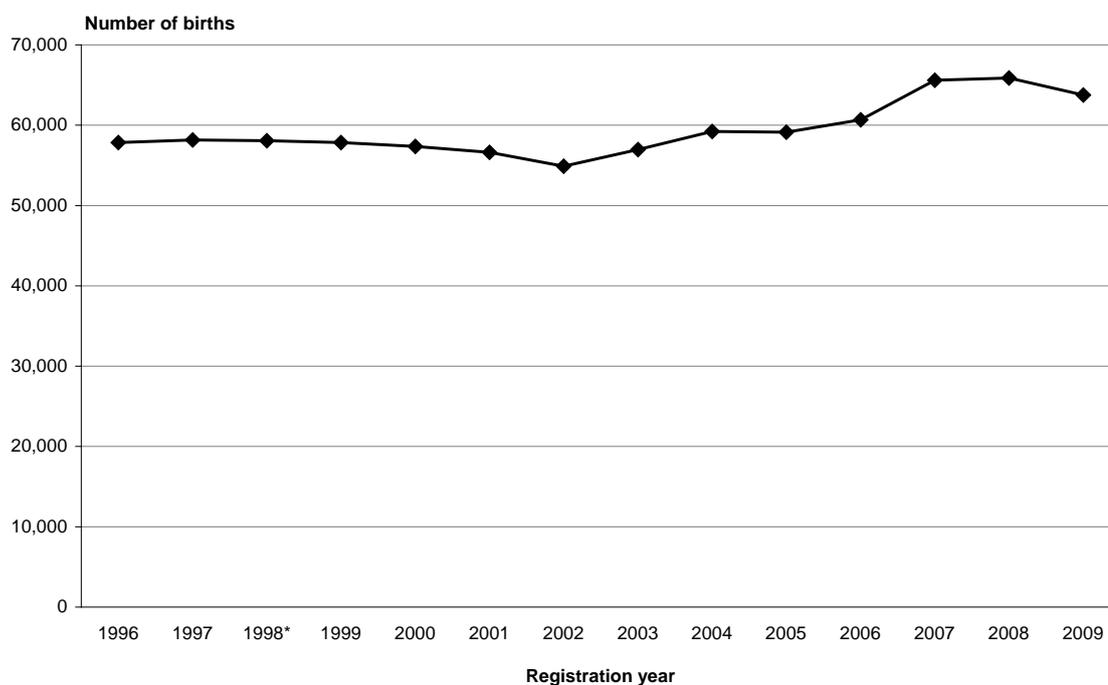
Perinatal and neonatal trends between 1996 and 2009 are briefly discussed in the overview section.

Overview

The total number of births in New Zealand increased 10.2 percent from 57,850 in 1996 to 63,767 in 2009. Figure 4 shows the number of births, by year of registration, between 1996 and 2009.

Please note that in 1998 there was a large undercount in birth registrations. This publication uses 1997 live birth figures in all calculations for 1998.

Figure 4: Number of births, 1996–2009



Source: Statistics New Zealand

Note: 1997 data has been used in calculations for 1998.

In 2008 there were 879 fetal and infant deaths, a rate of 13.3 deaths per 1000 total births. In 2009 this decreased to 814 deaths (12.8 deaths per 1000 total births). Table 1 shows the number and rate of fetal and infant deaths in 2008 and 2009 by classification.

Table 1: Fetal and infant deaths and rates, 2008 and 2009

| | 2008 | | 2009 | |
|-------------------------------------|--------|------|--------|------|
| | No. | Rate | No. | Rate |
| Births | | | | |
| Live births | 65,333 | - | 63,285 | - |
| Total births | 65,888 | - | 63,767 | - |
| Individual classifications | | | | |
| Fetal deaths | 555 | 8.4 | 482 | 7.6 |
| Early neonatal deaths | 146 | 2.2 | 152 | 2.4 |
| Late neonatal deaths | 42 | 0.6 | 45 | 0.7 |
| Post-neonatal deaths | 136 | 2.1 | 135 | 2.1 |
| Total fetal and infant deaths | 879 | 13.3 | 814 | 12.8 |
| Grouped classifications | | | | |
| Total infant deaths | 324 | 5.0 | 332 | 5.2 |
| Total perinatal deaths | 701 | 10.6 | 634 | 9.9 |
| Total neonatal deaths | 188 | 2.9 | 197 | 3.1 |
| Sudden Infant Death Syndrome | | | | |
| Sudden infant deaths (SIDS) | 50 | 0.8 | 43 | 0.7 |

Source: New Zealand Mortality Collection

Note: The rate for fetal, perinatal and total fetal and infant deaths is per 1000 total births. All other rates are per 1000 live births.

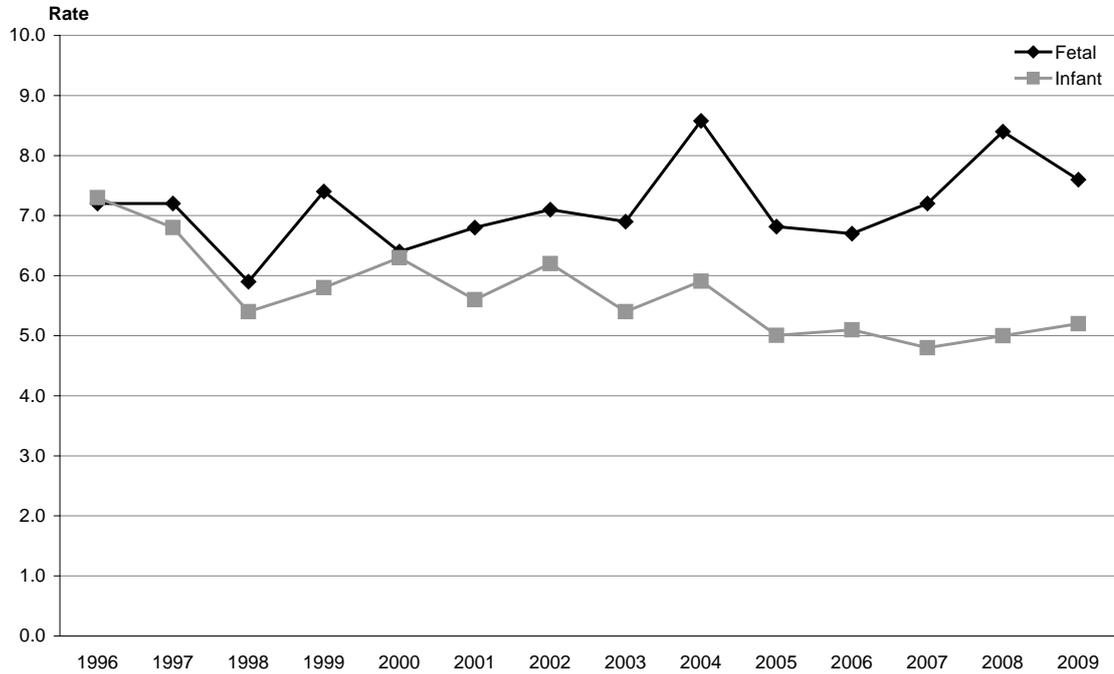
There were 482 fetal deaths and 332 infant deaths registered in 2009, rates of 7.6⁴ and 5.2⁵ deaths per 1000 births. This compares to 555 fetal and 324 infant deaths in 2008 (rates of 8.4 and 5.0 per 1000 births).

⁴ Fetal rates are per 1000 total births.

⁵ Infant rates are per 1000 live births.

Figure 5 shows fetal and infant death rates from 1996 to 2009. The fetal death rate has been significantly higher than the infant rate since 2003. There has been no significant change in the fetal death rate since 1996. The infant death rate decreased 27.7 percent from 7.3 deaths per 1000 live births in 1996 to 5.2 in 2009.

Figure 5: Fetal and infant death rates, 1996–2009



Source: New Zealand Mortality Collection

Notes: Data from 1997 has been used in calculations for 1998.

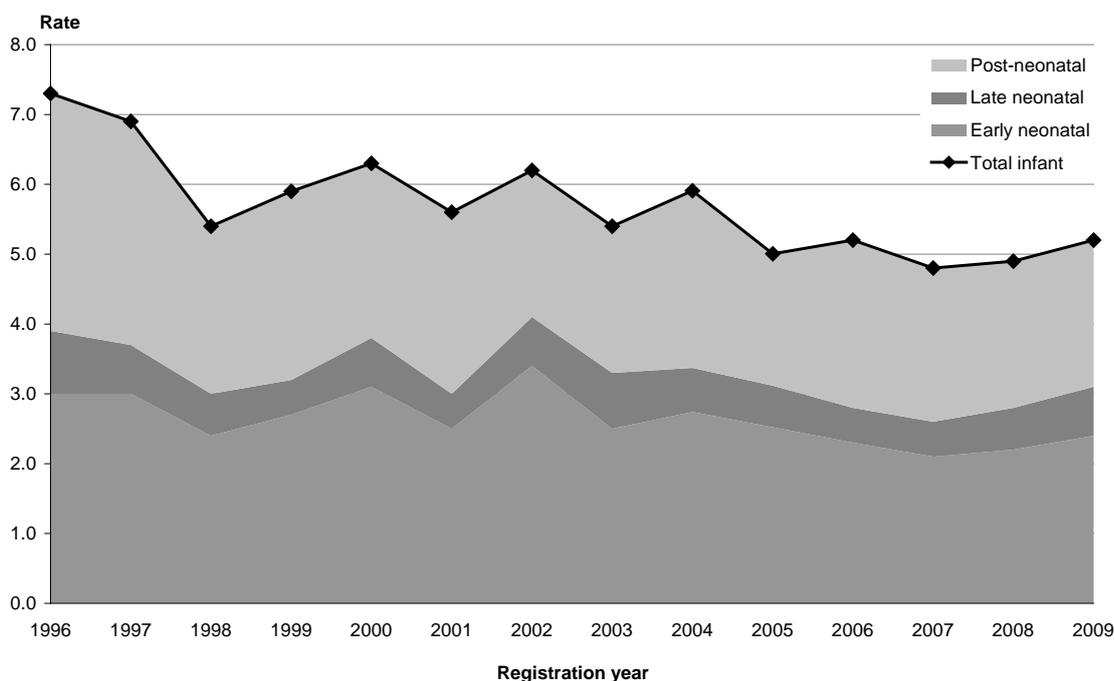
Fetal rate is per 1000 total births.

Infant rate is per 1000 live births.

Infant deaths

Infant deaths include all deaths in the early, late and post-neonatal periods. Figure 6 shows the breakdown of infant deaths by death type between 1996 and 2009. The post-neonatal rate decreased 36.8 percent from 3.4 deaths per 1000 live births in 1996 to 2.1 in 2009. The early neonatal rate decreased from 3.0 deaths per 1000 live births in 1996 to 2.4 in 2009, while the late neonatal rate decreased from 0.9 to 0.7 deaths per 1000 live births.

Figure 6: Infant death rates, by death type, 1996–2009



Source: New Zealand Mortality Collection

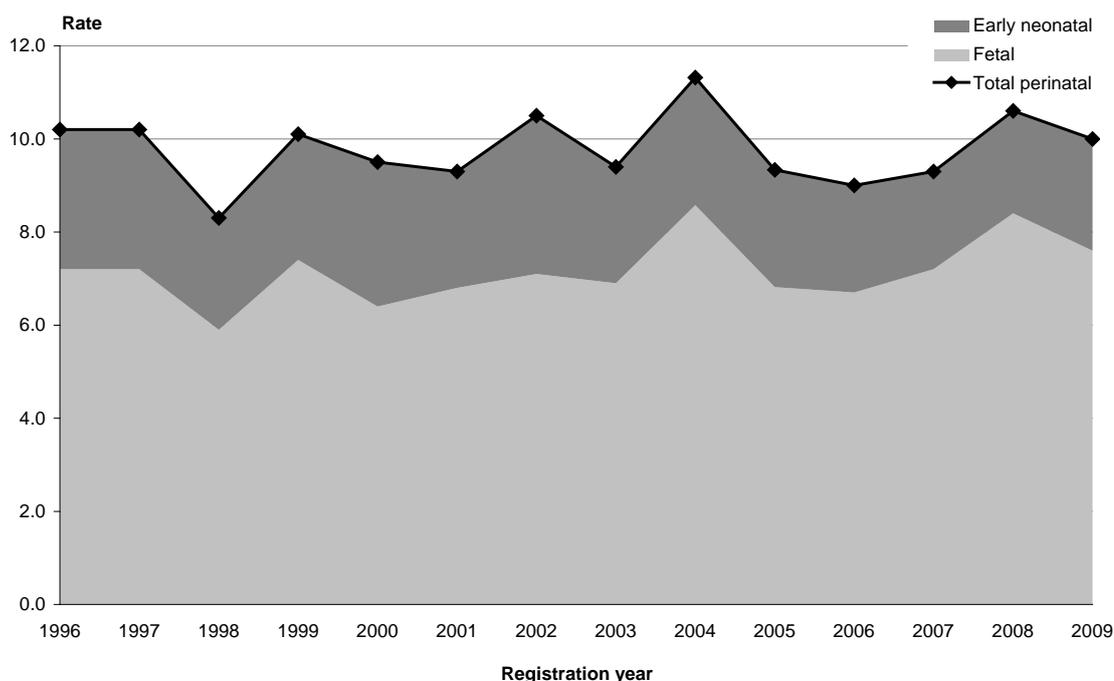
Notes: Data from 1997 has been used in calculations for 1998.
Rates are per 1000 live births.

Perinatal deaths

Perinatal deaths are all fetal deaths as well as early neonatal deaths (deaths before seven completed days of life). Figure 7 shows the breakdown of perinatal death rates by type between 1996 and 2009. There was no significant change in the perinatal death rate between 1996 and 2009.

In 2009 there were 634 perinatal deaths compared to 701 in 2008. This equates to a rate of 9.9 perinatal deaths per 1000 total births in 2009 and a rate of 10.6 in 2008. In 1996 the perinatal death rate was 10.2 deaths per 1000 total births.

Figure 7: Perinatal death rates, by death type, 1996–2009



Source: New Zealand Mortality Collection

Notes: Data from 1997 has been used in calculations for 1998.

Fetal rate is per 1000 total births.

Early neonatal rate is per 1000 live births.

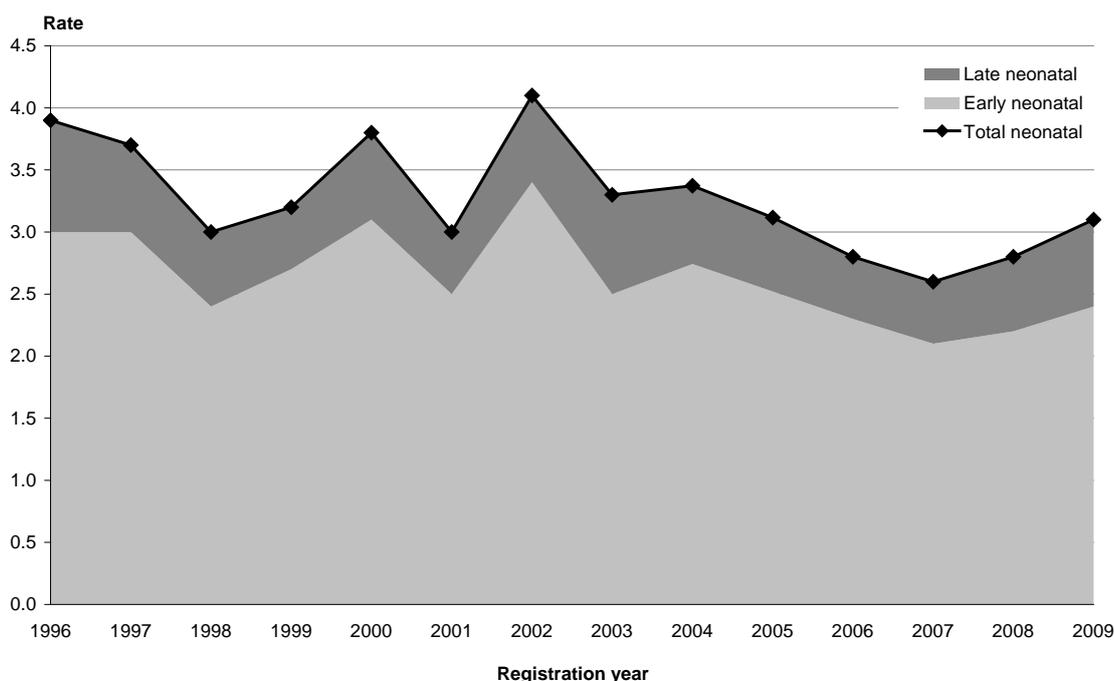
Total perinatal rate is calculated per 1000 total births.

Neonatal deaths

Neonatal deaths are all infant deaths before 28 completed days of life (early neonatal plus late neonatal deaths). There were 197 neonatal deaths in 2009 compared to 188 in 2008. This equates to a rate of 3.1 deaths per 1000 live births in 2009 and a rate of 2.9 in 2008.

Figure 8 shows neonatal death rates broken down by death type between 1996 and 2009. In 2009 the neonatal rate was 3.1 deaths per 1000 live births, 19.8 percent lower than the rate in 1996 (3.9 deaths per 1000 live births).

Figure 8: Neonatal death rates, by death type, 1996–2009



Source: New Zealand Mortality Collection

Notes: Data from 1997 has been used in calculations for 1998.

Neonatal rate is per 1000 live births.

Cause of death

The primary cause of death for 62.7 percent of all fetal and infant deaths was categorised as *Conditions originating in the perinatal period*. This includes disorders related to short gestation and low birthweight, and to respiratory and cardiovascular disorders. The majority of these deaths were fetal deaths (72.8 percent). Data in this section has been aggregated for 2008 and 2009 due to the small number of deaths from some causes.

Fetal deaths

In 2008 and 2009 almost all (99.6 percent) fetal deaths were in the classification groups ICD P05–P99 *Certain conditions originating in the perinatal period* (74.4 percent) and ICD Q00–Q99 *Congenital malformations, deformations and chromosomal abnormalities* (25.2 percent). Table 2 shows the breakdown of the cause of fetal deaths by ICD chapter.

Table 2: Fetal deaths and rates, by cause, aggregated data, 2008 and 2009

| ICD chapter | Cause of death description | No. | Rate | % |
|--------------|--|-------------|------------|--------------|
| C00–D48 | Neoplasms | 3 | 0.0 | 0.3 |
| D50–D89 | Diseases of blood and blood-forming organs and certain disorders involving immune mechanisms | 1 | 0.0 | 0.1 |
| P05–P99 | Conditions originating in perinatal period | 772 | 6.0 | 74.4 |
| Q00–Q99 | Congenital malformations, deformations and chromosomal abnormalities | 261 | 2.0 | 25.2 |
| Total | | 1037 | 8.0 | 100.0 |

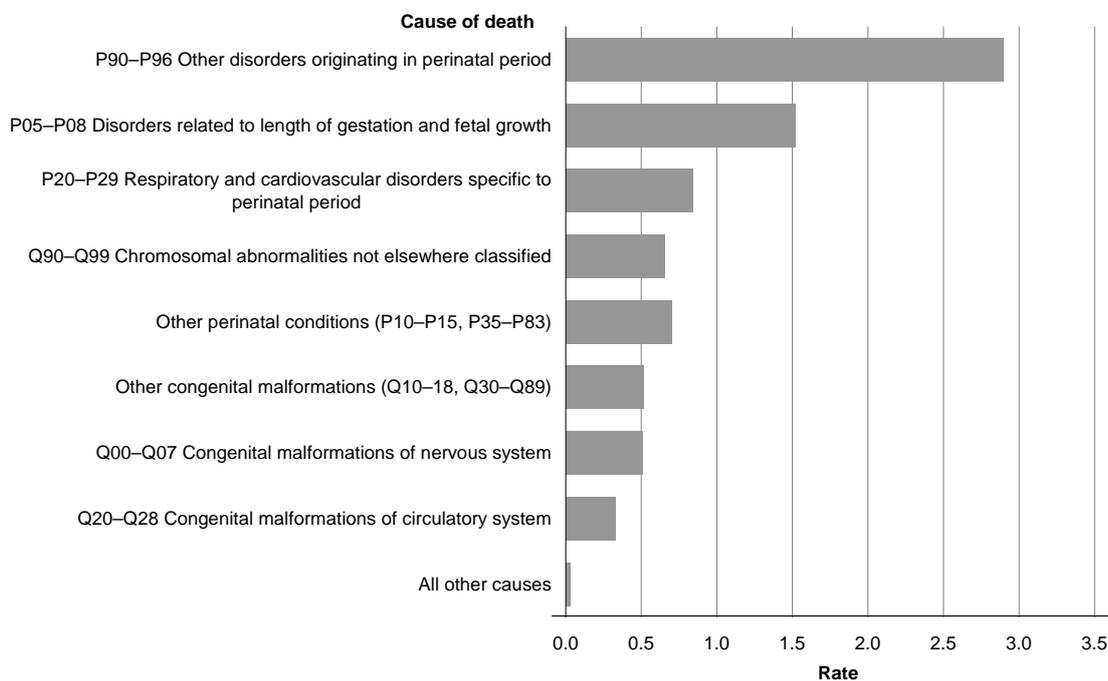
Source: Ministry of Health Mortality Collection

Note: Rate is per 1000 total births.

Just under a fifth of fetal deaths were a result of *Disorders related to the length of gestation and fetal growth* (ICD P05–P08). Over a third of all fetal deaths were classified in P90–P96 *Other disorders originating in the perinatal period* (36.7 percent), the majority of which were fetal deaths of unspecified causes.

The two most common single classifications were P05 *Slow fetal growth and fetal malnutrition* (99 deaths) and P07 *Disorders related to short gestation and low birth weight not elsewhere classified* (93 deaths). In 363 fetal deaths no cause was able to be specified (P95 *Fetal death of unspecified cause*). Figure 9 shows fetal deaths for perinatal-related and congenital malformations, by ICD sub-group.

Figure 9: Fetal death rates, by cause of death, aggregated data, 2008 and 2009



Source: Ministry of Health Mortality Collection

Note: Rate is per 1000 total births.

Infant deaths

Conditions relating to the perinatal period (P05–P99) and Congenital malformations (Q00–Q99) made up a large proportion of infant deaths (65.9 percent). Early neonatal deaths (deaths before one week of age) made up the majority (74.4 percent) of the infant deaths in P05–P99. Table 3 shows the breakdown of the cause of infant deaths by ICD chapter.

Table 3: Infant deaths and rates, by cause, aggregated data, 2008 and 2009

| ICD chapter | Cause of death description | No. | Rate | % |
|--------------|---|------------|------------|------------|
| A00–B99 | Certain infectious and parasitic diseases | 21 | 0.2 | 3.2 |
| C00–D48 | Neoplasms | 7 | 0.1 | 1.1 |
| D50–D89 | Diseases of blood and blood-forming organs and certain disorders involving the immune mechanism | 4 | 0.0 | 0.6 |
| E00–E89 | Endocrine, nutritional and metabolic diseases | 9 | 0.1 | 1.4 |
| G00–G99 | Diseases of the nervous system | 7 | 0.1 | 1.1 |
| I00–I99 | Diseases of the circulatory system | 8 | 0.1 | 1.2 |
| J00–J99 | Diseases of the respiratory system | 22 | 0.2 | 3.4 |
| K00–K93 | Diseases of the digestive system | 3 | 0.0 | 0.5 |
| M00–M99 | Diseases of the musculoskeletal system and connective tissue | 1 | 0.0 | 0.2 |
| P05–P99 | Conditions originating in perinatal period | 289 | 2.2 | 44.1 |
| Q00–Q99 | Congenital malformations, deformations and chromosomal abnormalities | 143 | 0.9 | 18.6 |
| R00–R99 | Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified | 76 | 0.6 | 11.6 |
| V01–Y98 | External causes of morbidity and mortality | 66 | 0.5 | 10.1 |
| Total | | 656 | 5.1 | 100 |

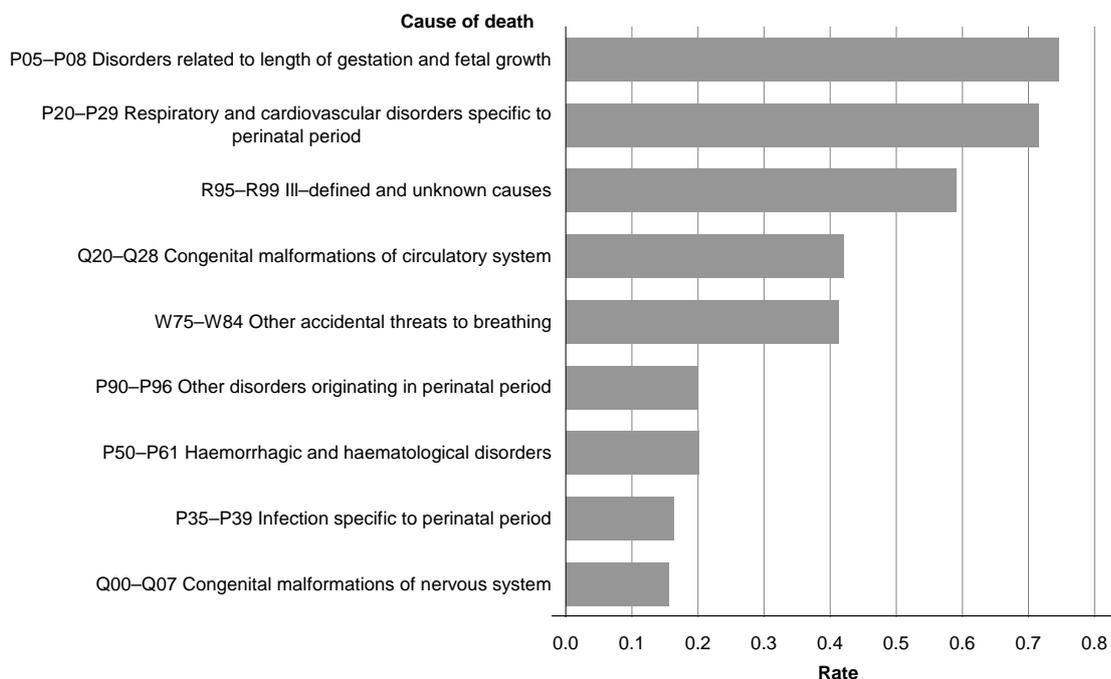
Source: Ministry of Health Mortality Collection

Note: Rate is per 1000 live births.

The most common individual causes of death were P07 Disorders related to short gestation and low birth weight not elsewhere classified (94 deaths), R95 Sudden infant death syndrome (SIDs) (73 deaths), and W75 Accidental suffocation and strangulation in bed (53 deaths).

Figure 10 shows the top causes of infant death by ICD sub-group. In 2008 and 2009, 96 infant deaths were classified as P05–P08 *Disorders related to length of gestation and fetal growth*. Most of these deaths occurred before one week of age. An additional 88 deaths were classified as P20–P29 *Respiratory and cardiovascular disorders specific to perinatal period*. There were 76 deaths that were classified to R95–R99 *Ill-defined and unknown causes*, which includes SIDS deaths.

Figure 10: Rates of most common cause of infant death, by cause, aggregated data, 2008 and 2009



Source: Ministry of Health Mortality Collection

Note: Rate is per 1000 live births.

Gestational age and birthweight

Short gestation, or pre-term birth, is the main cause of death, morbidity and disability in babies. Low birthweight is closely associated with fetal and neonatal mortality and can be the result of pre-term birth, multiple pregnancy or restricted fetal (intrauterine) growth. A short gestation is likely to result in a low birthweight baby, and is therefore associated with an increased risk of death to the fetus or infant (UNICEF and WHO 2004).

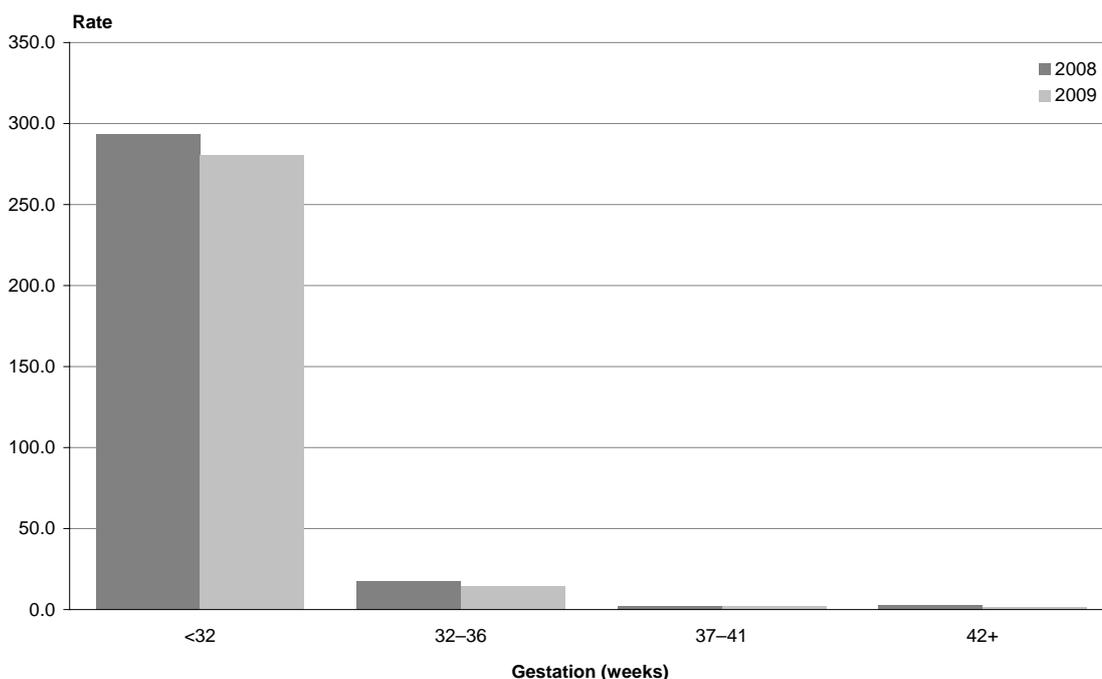
Gestational age

Gestational age is measured by calculating the duration of the pregnancy in completed weeks. 'Pre-term' birth is defined as a birth occurring before 37 weeks' gestation, while a 'very pre-term birth' occurs before 32 weeks' gestation. A 'term' birth is defined as a birth occurring between 37 and 41 weeks' gestation.

Fetal

The majority (62.7 percent in 2009) of fetal deaths occurred before 32 weeks' gestation, and 24.3 percent occurred at term. Figure 11 shows fetal death rates by gestational age in 2008 and 2009. The 2009 rate for fetal deaths before 32 weeks' gestation was 280.7 per 1000 total births. This rate is substantially higher than the rate of 2.1 for fetal deaths at term. The pre-term fetal death rate was also significantly higher than the rate for term births (14.5 deaths per 1000 total births).

Figure 11: Fetal death rates, by gestational age, 2008 and 2009



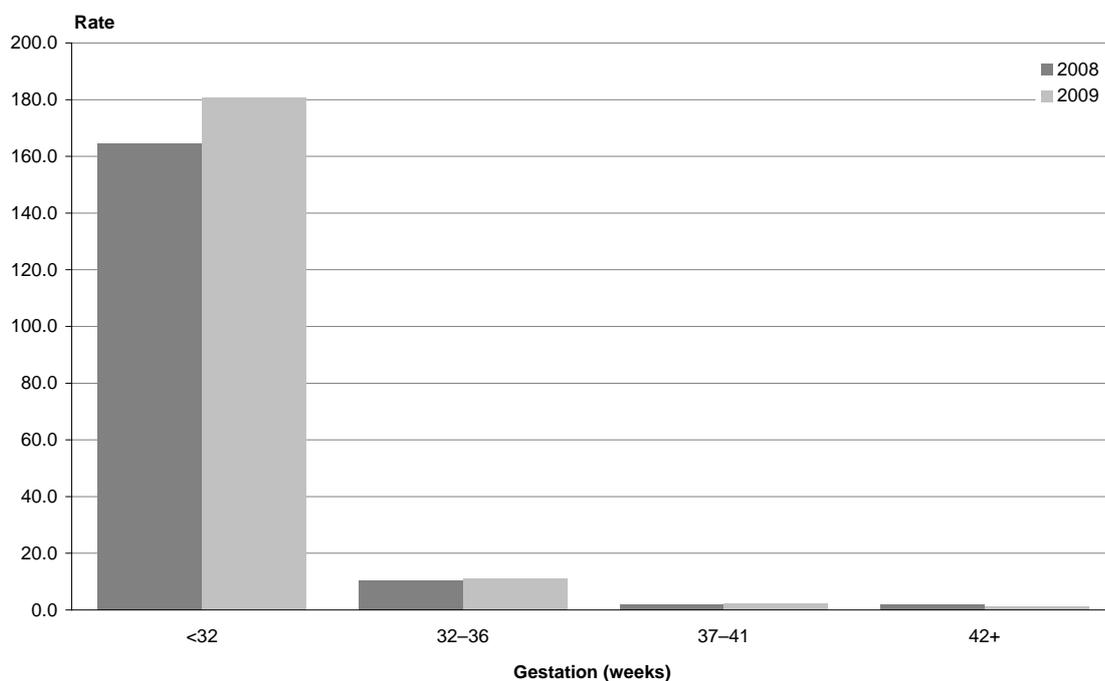
Source: Ministry of Health Mortality Collection

Note: Rate is per 1000 total births.

Infant

About 42.4 percent of the infants who died in 2008 and 2009 were very pre-term and 37.2 percent were term. As with fetal deaths, the infant death rate was substantially higher for very pre-term infants (180.9 deaths per 1000 live births in 2009), and also significantly higher for pre-term infants (11.1), compared to term infants (2.2) in 2009. There was no significant difference between the rates for 2008 and 2009. Figure 12 shows infant death rates by gestational age for 2008 and 2009.

Figure 12: Infant death rates, by gestational age, 2008 and 2009



Source: Ministry of Health Mortality Collection

Note: Rate is per 1000 live births.

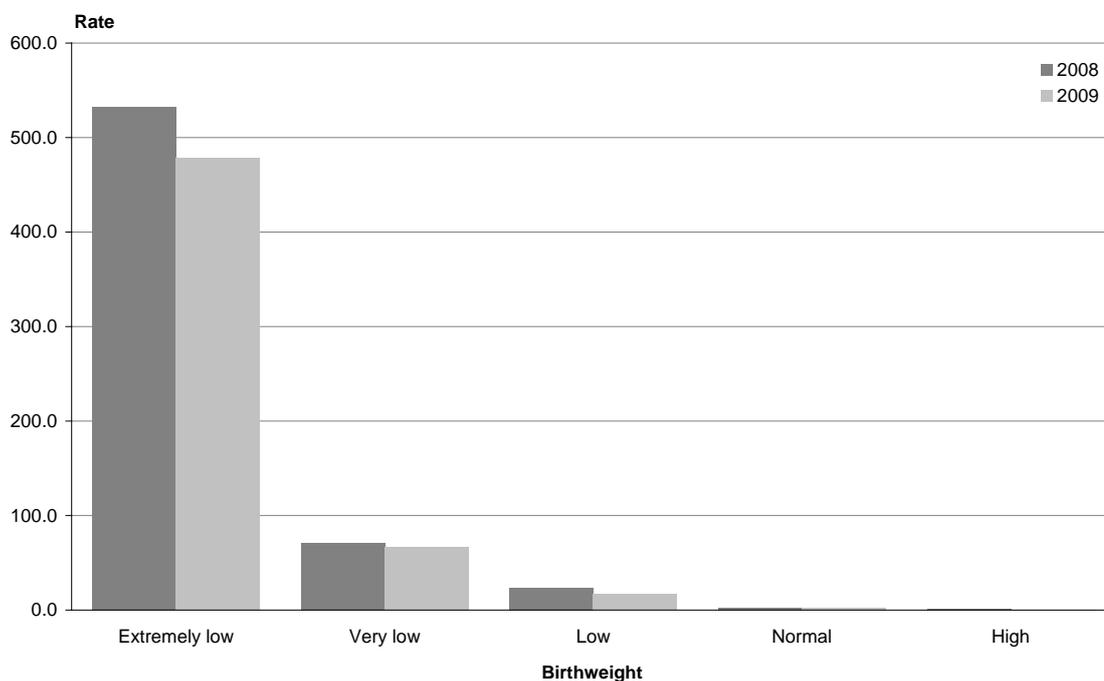
Birthweight

Birthweight is usually measured within an hour of birth. 'Low birthweight' has been defined by WHO as a weight of less than 2500 g, 'very low birthweight' as less than 1500 g, and 'extremely low birthweight' as less than 1000 g.⁶

Fetal

In 2008 and 2009 more than half of all fetal deaths were of extremely low birthweight foetuses (56.0 percent and 55.8 percent, respectively). Around a quarter of fetal deaths were of normal birthweight foetuses (22.7 percent in 2008 and 25.1 percent in 2009). The fetal death rate of extremely low birthweight foetuses was substantially higher than the rate for other birthweights (506.1 deaths per 1000 total births in 2008 and 2009). There was no significant difference between the rates for 2008 and 2009. Figure 13 shows fetal death rates in 2008 and 2009 by birthweight.

Figure 13: Fetal death rates, by birthweight, 2008 and 2009



Source: Ministry of Health Mortality Collection

Note: Rate is per 1000 total births.

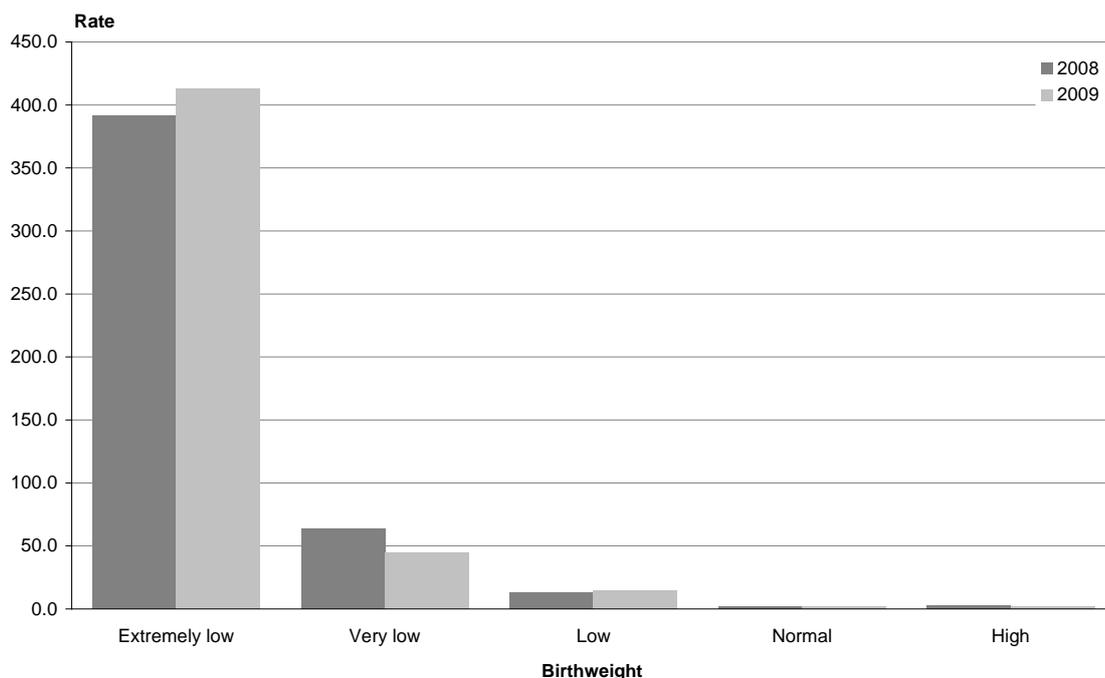
⁶ See the Glossary for a detailed breakdown of birthweight and gestation categories.

Infant

Around a third of infant deaths were extremely low birthweight infants (33.0 percent in 2008 and 36.4 percent in 2009). Infants with normal birthweight made up 39.5 percent of infant deaths in 2008 and 40.1 percent in 2009.

Figure 14 shows infant death rates by birthweight for 2008 and 2009. At 413.0 deaths per 1000 live births in 2009, the rate for extremely low birthweight infants was substantially higher than the rate for any other group.

Figure 14: Infant death rates, by birthweight, 2008 and 2009



Source: Ministry of Health Mortality Collection

Note: Rate is per 1000 live births.

Birthweight and gestation

Pre-term birth is associated with low birthweight. In 2008 and 2009 almost all (95.3 percent) very pre-term infants had a low birthweight (below 2500 g) compared to 59.1 percent of pre-term infants and 1.9 percent of term infants.

Fetal

Of the fetal deaths in 2008 and 2009, 54.5 percent were very pre-term (less than 32 weeks' gestation) and extremely low birthweight (below 1000 g). The rate for this group was 520.7 deaths per 1000 total births. This compares to a rate of 18.7 for low birthweight pre-term infants and a rate of 1.8 for normal birthweight term infants.

Table 4 shows fetal deaths and rates by gestation and birthweight for 2008 and 2009. The data has been aggregated due to the small numbers in some groupings, but there are still very few deaths in the post-term or high birthweight groups, so rates tend to fluctuate and should be interpreted with caution.

Table 4: Fetal deaths and rates, by gestation and birthweight, aggregated data, 2008 and 2009

| Birthweight | Gestation (weeks) | | | | | | | | | | | |
|---------------|-------------------|--------------|------------|-------------|------------|------------|----------|------------|----------|------------|-------------|------------|
| | < 32 | | 32–36 | | 37–41 | | 42+ | | Unknown | | Total | |
| | No. | Rate | No. | Rate | No. | Rate | No. | Rate | No. | Rate | No. | Rate |
| Extremely low | 565 | 520.7 | 10 | 454.5 | 2 | 62.5 | 0 | 0.0 | 3 | ... | 580 | 506.1 |
| Very low | 43 | 67.3 | 13 | 78.8 | 1 | 45.5 | 0 | 0.0 | 0 | ... | 57 | 69.0 |
| Low | 25 | 57.7 | 70 | 18.7 | 31 | 14.2 | 3 | 230.8 | 1 | ... | 130 | 20.4 |
| Normal | 5 | 58.1 | 35 | 8.6 | 201 | 1.8 | 6 | 1.8 | 0 | ... | 247 | 2.1 |
| High | 0 | 0.0 | 0 | 0.0 | 4 | 1.2 | 0 | 0.0 | 0 | ... | 4 | 1.1 |
| Unknown | 13 | ... | 0 | ... | 4 | ... | 0 | ... | 2 | ... | 19 | ... |
| Total | 651 | 287.5 | 128 | 16.0 | 243 | 2.1 | 9 | 2.4 | 6 | ... | 1037 | 8.0 |

Source: Ministry of Health Mortality Collection

Notes: ... = Not applicable.

Rate is per 1000 total births.

Infant

In 2008 and 2009 about a third (34.3 percent) of all infant deaths were of very pre-term infants of extremely low birthweight. This was similar to the proportion of deaths of term infants of normal birthweight (32.8 percent). However, the rate for very pre-term infants with an extremely low birthweight was substantially higher at 432.7 per 1000 live births compared to 2.0 for term infants with a normal birthweight.

Most deaths for very pre-term, extremely low birthweight infants occurred within 24 hours of birth (62.2 percent), compared to only 10.7 percent of deaths for term, normal birthweight infants. The majority of deaths of term infants of normal birthweight occur between 1 and 12 months of age (60.9 percent).

Table 5 shows infant deaths and rates by gestation and birthweight for 2008 and 2009. As for fetal deaths in Table 4, the data has been aggregated for 2008 and 2009.

Table 5: Infant deaths and rates, by gestation and birthweight, aggregated data, 2008 and 2009

| Birthweight | Gestation (weeks) | | | | | | | | | | | |
|---------------|-------------------|--------------|-----------|-------------|------------|------------|----------|------------|-----------|------------|------------|------------|
| | < 32 | | 32–36 | | 37–41 | | 42+ | | Unknown | | Total | |
| | No. | Rate | No. | Rate | No. | Rate | No. | Rate | No. | Rate | No. | Rate |
| Extremely low | 225 | 432.7 | 1 | 83.3 | 0 | 0.0 | 0 | 0.0 | 2 | ... | 228 | 402.8 |
| Very low | 34 | 57.0 | 8 | 52.6 | 0 | 0.0 | 0 | 0.0 | 0 | ... | 42 | 54.6 |
| Low | 15 | 36.8 | 45 | 12.3 | 23 | 10.7 | 1 | 100.0 | 1 | ... | 85 | 13.6 |
| Normal | 3 | 37.0 | 30 | 7.4 | 215 | 2.0 | 4 | 1.2 | 9 | ... | 261 | 2.2 |
| High | 0 | 0.0 | 1 | 55.6 | 5 | 1.5 | 1 | 3.3 | 1 | ... | 8 | 2.2 |
| Unknown | 1 | ... | 0 | ... | 1 | ... | 0 | ... | 30 | ... | 32 | ... |
| Total | 278 | 172.3 | 85 | 10.8 | 244 | 2.1 | 6 | 1.6 | 43 | ... | 656 | 5.1 |

Source: Ministry of Health Mortality Collection

Note: Rate is per 1000 live births.

Ethnicity

Fetal deaths

In 2008 and 2009 Pacific people had the highest fetal death rate (11.0 and 9.3 per 1000 total Pacific births, respectively). This compares to the Māori rate of 8.7 per 1000 Māori births in 2008 and 8.1 in 2009, and the Other rate of 7.8 in 2008 and 7.0 in 2009. Table 6 shows fetal deaths (numbers and rates), by ethnicity, for 2008 and 2009.

Note that the small numbers of fetal deaths for Pacific people mean that rates for this group tend to be highly variable and should be interpreted with caution.

Table 6: Fetal deaths, by ethnic group, numbers and rates, 2008 and 2009

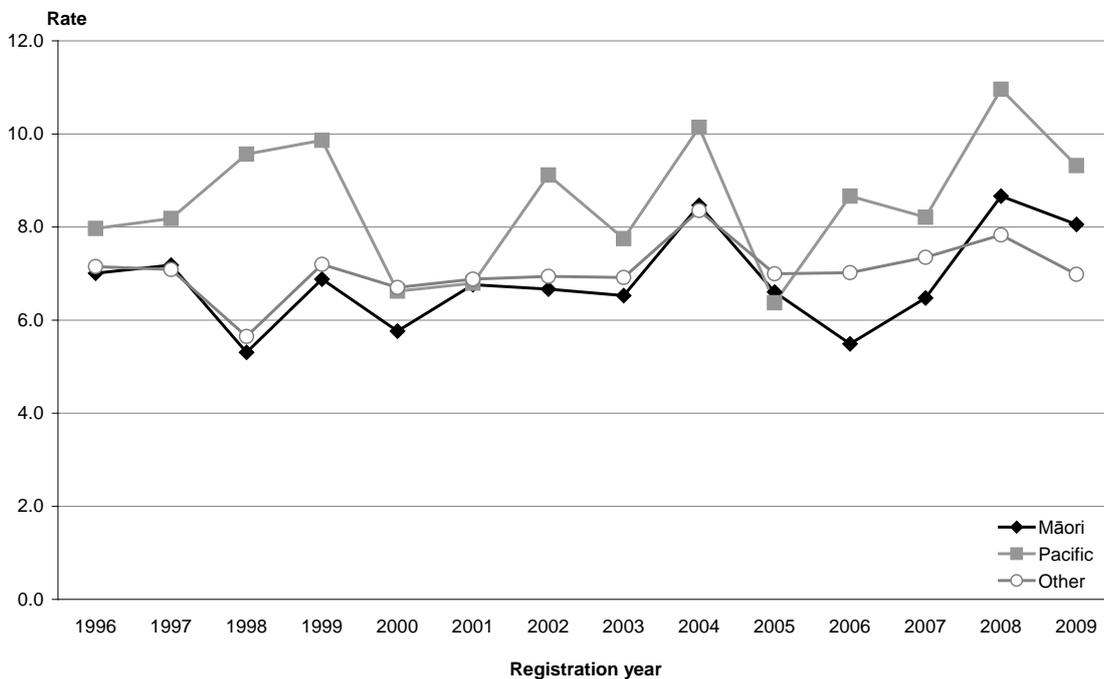
| | 2008 | | | 2009 | | |
|--------------|------------|------------|---------------|------------|------------|---------------|
| | No. | Rate | Total births | No. | Rate | Total births |
| Māori | 170 | 8.7 | 19,622 | 150 | 8.1 | 18,620 |
| Pacific | 80 | 11.0 | 7301 | 67 | 9.3 | 7191 |
| Other | 305 | 7.8 | 38,965 | 265 | 7.0 | 37,956 |
| Total | 555 | 8.4 | 65,888 | 482 | 7.6 | 63,767 |

Source: New Zealand Mortality Collection

Note: Rate is per 1000 total births.

Figure 15 shows fetal death rates by ethnicity from 1996 to 2009. There were no significant differences between the fetal death rates for each ethnic group over this period. There was also no significant difference between the rate in 1996 and that in 2009 for any ethnic group.

Figure 15: Fetal death rates, by ethnic group, 1996–2009



Source: New Zealand Mortality Collection

Notes: Data from 1997 has been used in calculations for 1998.
Rate is per 1000 total births.

Infant deaths

The Māori infant death rate was the highest of all ethnic groups in 2008 and 2009 (6.9 and 7.4 per 1000 live Māori births, respectively). This compares to 6.0 per 1000 live Pacific births in both years for Pacific people, while the Other ethnic grouping had the lowest rates of 3.8 and 4.0 per 1000 live Other births in 2008 and 2009. The Māori rates were significantly higher than the Other rates in both years. There were no significant differences between the 2008 and 2009 rates of any ethnic group.

Table 7: Infant deaths, by ethnic group, numbers and rates, 2008 and 2009

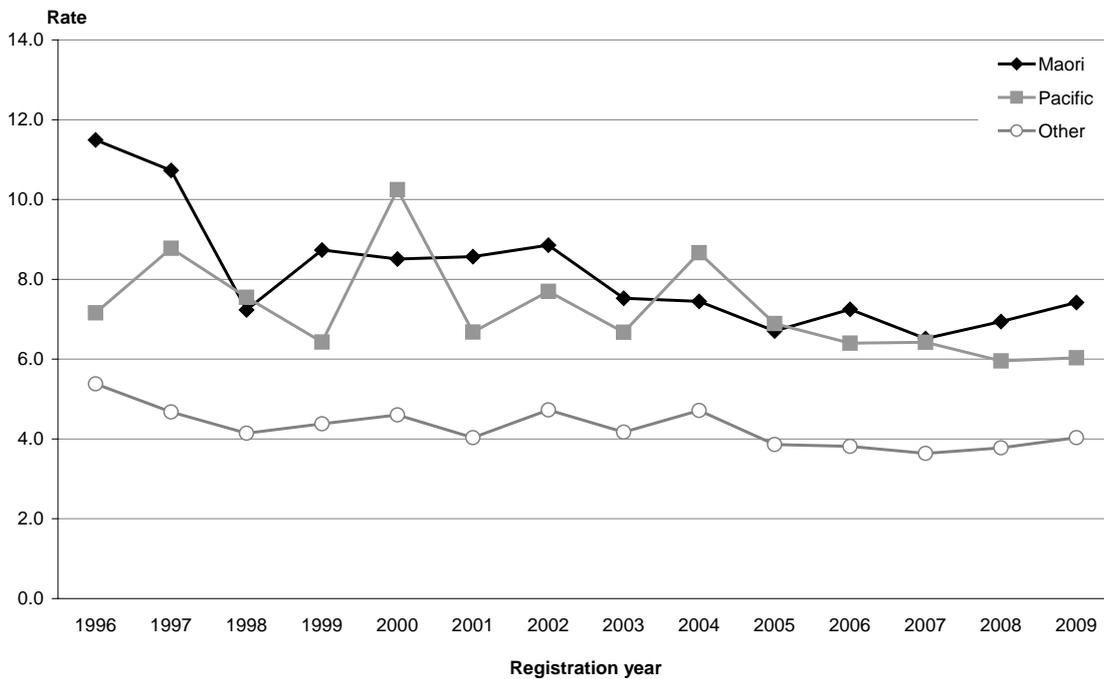
| | 2008 | | | 2009 | | |
|--------------|------------|------------|---------------|------------|------------|---------------|
| | No. | Rate | Live births | No. | Rate | Live births |
| Māori | 135 | 6.9 | 19,452 | 137 | 7.4 | 18,470 |
| Pacific | 43 | 6.0 | 7221 | 43 | 6.0 | 7124 |
| Other | 146 | 3.8 | 38,660 | 152 | 4.0 | 37,691 |
| Total | 324 | 5.0 | 65,333 | 332 | 5.2 | 63,285 |

Source: New Zealand Mortality Collection

Note: Rate is per 1000 live births.

The Māori infant death rate has been significantly higher than the Other rate since 1996. In 2009 the Māori rate was nearly twice the Other rate. The small number of Pacific infant deaths means that the rate tends to fluctuate and the confidence intervals are wide, making it difficult to interpret the changes over time. Figure 16 shows the infant death rate, by ethnicity, from 1996 to 2009. The Māori rate has decreased 35.5 percent since 1996, compared to a decrease of 25.0 percent for Other and 15.7 percent for Pacific people.

Figure 16: Infant death rates, by ethnic group, 1996–2009



Source: Ministry of Health Mortality Collection

Notes: Data from 1997 has been used in calculations for 1998.

Rate is per 1000 live births.

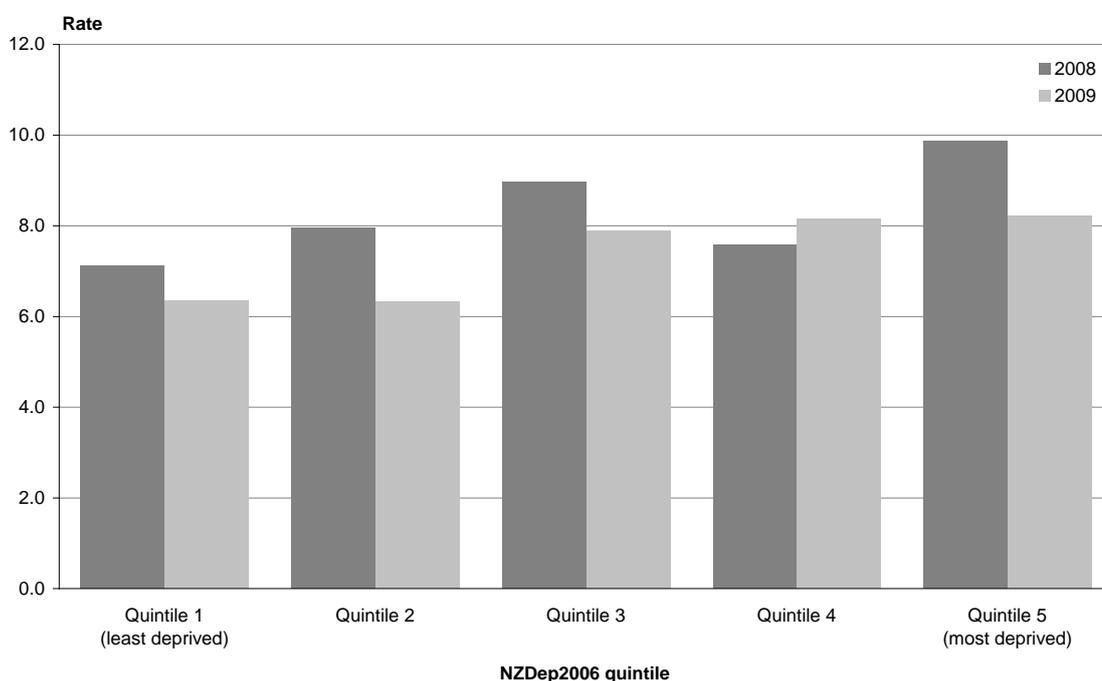
Deprivation

Socioeconomic deprivation has been associated with a number of adverse health outcomes. From the social inequalities literature it is clear that those who are most deprived generally experience poorer health (White et al 2008; Benzeval et al 2001). Fetal and infant death rates are presented in this publication by deprivation quintile according to the New Zealand Deprivation Index 2006 (NZDep2006) (Salmond et al 2007). (See the 'Glossary' section of this document for more information on NZDep2006.)

Fetal deaths

In 2009 the quintile 1 (least deprived) and quintile 2 socioeconomic groups had slightly lower rates of fetal death (6.4 and 6.3 deaths per 1000 total births, respectively) compared to 8.2 per 1000 births in both quintiles 4 and 5 (most deprived). Figure 17 shows fetal death rates by deprivation quintile for 2008 and 2009.

Figure 17: Fetal death rates, by NZDep2006 quintile, 2008 and 2009



Source: New Zealand Mortality Collection

Note: Rate is per 1000 total births.

Table 8 shows the number and rate of fetal deaths by deprivation quintile since 1996. While the rate for quintile 1 (least deprived) areas has generally been the lowest, it was only significantly lower than quintile 5 (most deprived) areas from 2002 to 2004. There were no significant differences between any other quintiles, nor were there significant changes across time.

Table 8: Fetal deaths, numbers and rates, by NZDep2006 quintile, 1996–2009

| | Quintile 1 | | Quintile 2 | | Quintile 3 | | Quintile 4 | | Quintile 5 | |
|------|------------|------|------------|------|------------|------|------------|------|------------|------|
| | No. | Rate |
| 1996 | 47 | 6.0 | 55 | 6.2 | 73 | 6.9 | 111 | 8.3 | 129 | 7.6 |
| 1997 | 43 | 5.4 | 64 | 7.1 | 73 | 6.9 | 110 | 8.1 | 129 | 7.6 |
| 1998 | 35 | 4.4 | 63 | 7.0 | 56 | 5.3 | 74 | 5.5 | 115 | 6.8 |
| 1999 | 51 | 6.2 | 61 | 6.8 | 68 | 6.5 | 103 | 7.7 | 144 | 8.8 |
| 2000 | 41 | 5.1 | 75 | 8.3 | 55 | 5.2 | 96 | 7.1 | 102 | 6.5 |
| 2001 | 57 | 7.0 | 61 | 6.8 | 66 | 6.3 | 81 | 6.2 | 121 | 7.8 |
| 2002 | 40 | 4.8 | 62 | 7.1 | 79 | 7.8 | 83 | 6.7 | 126 | 8.6 |
| 2003 | 38 | 4.4 | 61 | 6.6 | 63 | 6.0 | 105 | 8.2 | 126 | 8.2 |
| 2004 | 60 | 6.7 | 73 | 7.7 | 104 | 9.5 | 109 | 8.1 | 162 | 10.1 |
| 2005 | 66 | 7.2 | 63 | 6.5 | 66 | 6.1 | 104 | 7.8 | 103 | 6.5 |
| 2006 | 43 | 4.7 | 66 | 6.8 | 92 | 8.1 | 91 | 6.6 | 115 | 7.0 |
| 2007 | 62 | 6.2 | 64 | 6.0 | 93 | 7.7 | 113 | 7.5 | 138 | 7.9 |
| 2008 | 69 | 7.1 | 84 | 7.9 | 110 | 9.0 | 113 | 7.6 | 179 | 9.9 |
| 2009 | 60 | 6.4 | 64 | 6.3 | 94 | 7.9 | 120 | 8.2 | 142 | 8.2 |

Source: Ministry of Health Mortality Collection

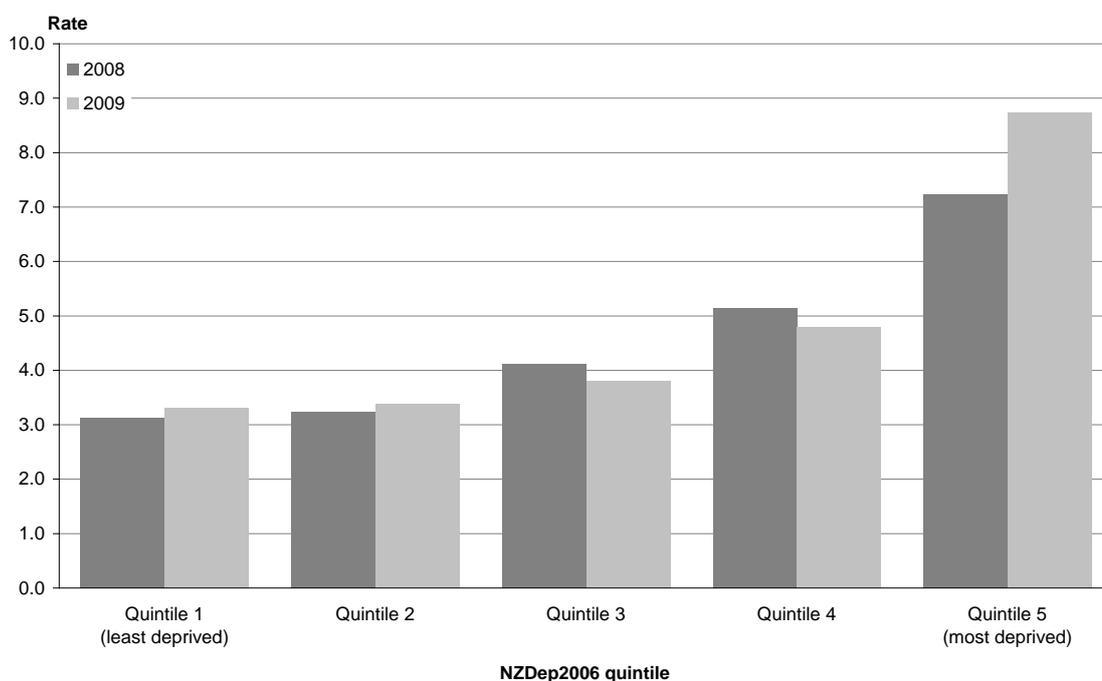
Notes: Data from 1997 has been used in calculations for 1998.

Rate is per 1000 total births.

Infant deaths

Although there was little difference in fetal death rates across the deprivation quintiles, there were significant differences in infant death rates. Infant death rates were highest for quintile 5 areas in both 2008 and 2009 (7.2 and 8.7 deaths per 1000 live births, respectively). These rates were over twice as high as those for quintile 1 (3.1 and 3.3 deaths per 1000 live births, for 2008 and 2009 respectively) and about 1.5 times higher than the national rates (5.0 and 5.2 deaths per 1000 live births).

Figure 18: Infant death rates, by NZDep2006 quintile, 2008 and 2009



Source: New Zealand Mortality Collection

Note: Rate is per 1000 live births.

Table 9 shows infant deaths and rates by deprivation quintile from 1996 to 2009. The difference between quintiles was consistent over time, with quintile 5 having significantly higher rates than all other quintiles in most years since 1996. There were no significant differences in the rates of quintiles 1 to 3.

Table 9: Infant deaths, numbers and rates, by NZDep2006 quintile, 1996–2009

| | Quintile 1 | | Quintile 2 | | Quintile 3 | | Quintile 4 | | Quintile 5 | |
|------|------------|------|------------|------|------------|------|------------|------|------------|------|
| | No. | Rate |
| 1996 | 32 | 4.1 | 58 | 6.6 | 56 | 5.4 | 106 | 8.0 | 163 | 9.7 |
| 1997 | 35 | 4.5 | 43 | 4.8 | 56 | 5.3 | 104 | 7.7 | 152 | 9.0 |
| 1998 | 20 | 2.5 | 44 | 4.9 | 54 | 5.1 | 72 | 5.4 | 119 | 7.1 |
| 1999 | 30 | 3.7 | 48 | 5.4 | 41 | 3.9 | 88 | 6.7 | 127 | 7.8 |
| 2000 | 32 | 4.0 | 48 | 5.4 | 53 | 5.0 | 81 | 6.1 | 142 | 9.1 |
| 2001 | 23 | 2.9 | 32 | 3.6 | 46 | 4.4 | 74 | 5.7 | 138 | 8.9 |
| 2002 | 32 | 3.8 | 55 | 6.3 | 53 | 5.3 | 64 | 5.2 | 130 | 9.0 |
| 2003 | 26 | 3.0 | 35 | 3.8 | 53 | 5.1 | 76 | 6.0 | 111 | 7.3 |
| 2004 | 34 | 3.8 | 45 | 4.8 | 47 | 4.3 | 75 | 5.6 | 143 | 9.0 |
| 2005 | 28 | 3.1 | 39 | 4.1 | 38 | 3.5 | 67 | 5.1 | 121 | 7.6 |
| 2006 | 28 | 3.0 | 32 | 3.3 | 45 | 4.0 | 64 | 4.7 | 136 | 8.4 |
| 2007 | 19 | 1.9 | 44 | 4.2 | 50 | 4.2 | 70 | 4.7 | 128 | 7.4 |
| 2008 | 30 | 3.1 | 34 | 3.2 | 50 | 4.1 | 76 | 5.1 | 130 | 7.2 |
| 2009 | 31 | 3.3 | 34 | 3.4 | 45 | 3.8 | 70 | 4.8 | 150 | 8.7 |

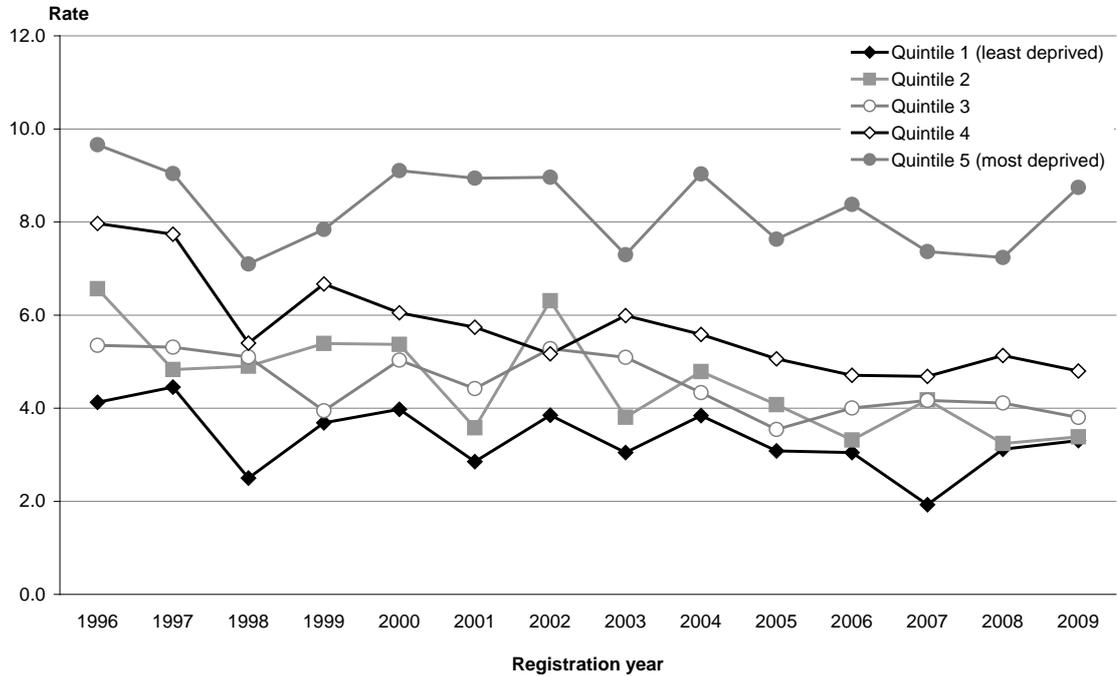
Source: New Zealand Mortality Collection

Notes: Data from 1997 has been used in calculations for 1998.

Rate is per 1000 live births.

Figure 19 shows the trends in infant death rates since 1996. The infant death rates for quintiles 2 and 4 have decreased significantly since 1996 (by 48.5 percent and 39.8 percent, respectively) compared to a decrease of 27.7 percent in the national rate. At 9.5 percent, quintile 5 had the smallest decrease in rate.

Figure 19: Infant death rates, by NZDep2006 quintile, 1996–2009



Source: New Zealand Mortality Collection

Notes: Data from 1997 has been used in calculations for 1998.

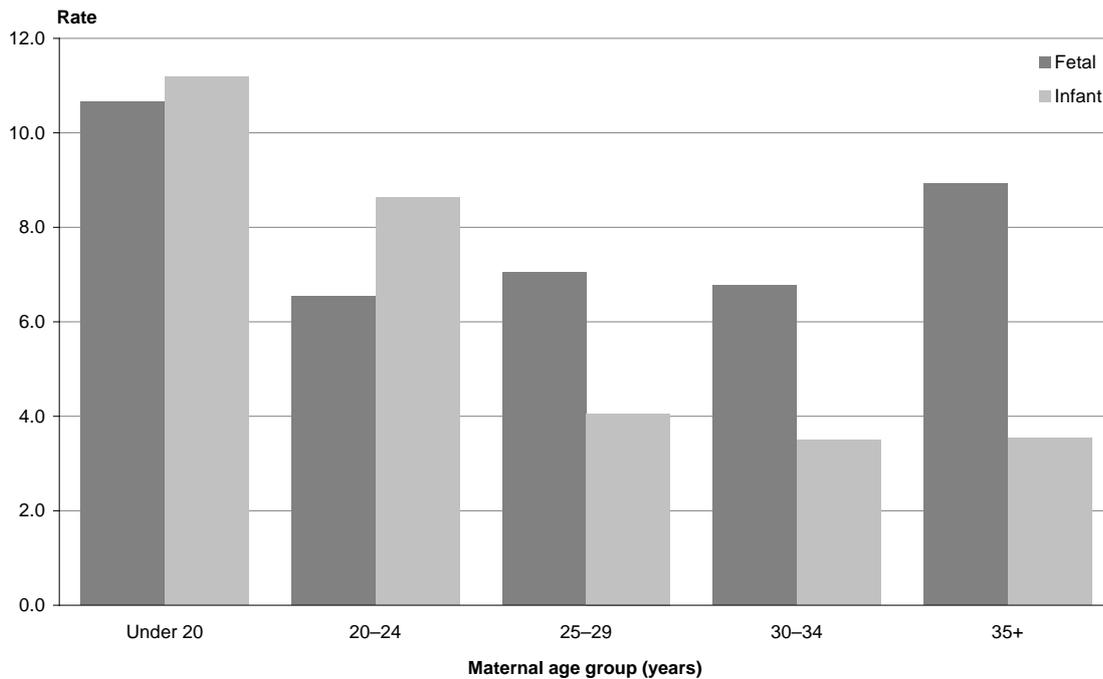
Rate is per 1000 live births.

Maternal age

The number of women giving birth over the age of 35 years has increased by 76.7 percent since 1996. In contrast, the number of women aged 25 to 29 years giving birth has decreased by 11.1 percent.

Figure 20 shows fetal and infant death rates by maternal age group in 2009. The fetal and infant death rates were significantly different for the 25 to 29 years, 30 to 34 years and over 35 years age groups.

Figure 20: Fetal and infant death rates, by maternal age, 2009



Source: Ministry of Health Mortality Collection

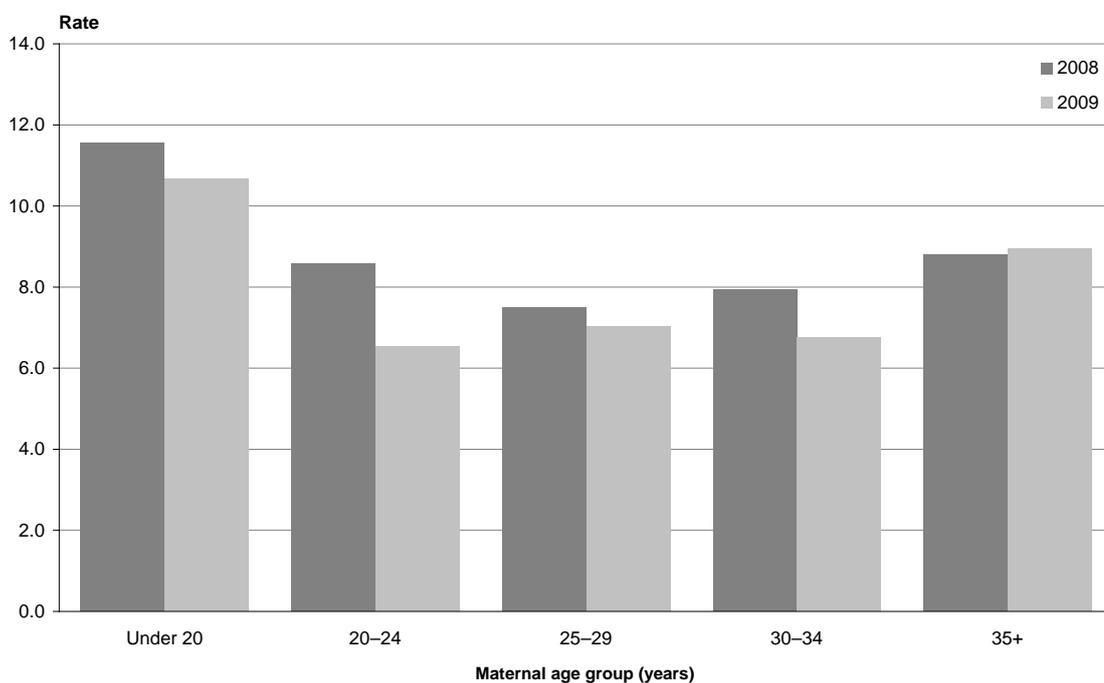
Notes: Fetal rate is per 1000 total births.

Infant rate is per 1000 live births.

Fetal deaths

Fetal death rates were highest in the under 20 years age group in 2008 and 2009 (11.5 and 10.7 deaths per 1000 total births, respectively). The 35 years and over age group had the second highest fetal death rates in both years, with 8.8 and 8.9 deaths per 1000 total births, respectively.

Figure 21: Fetal death rates, by maternal age, 2008 and 2009



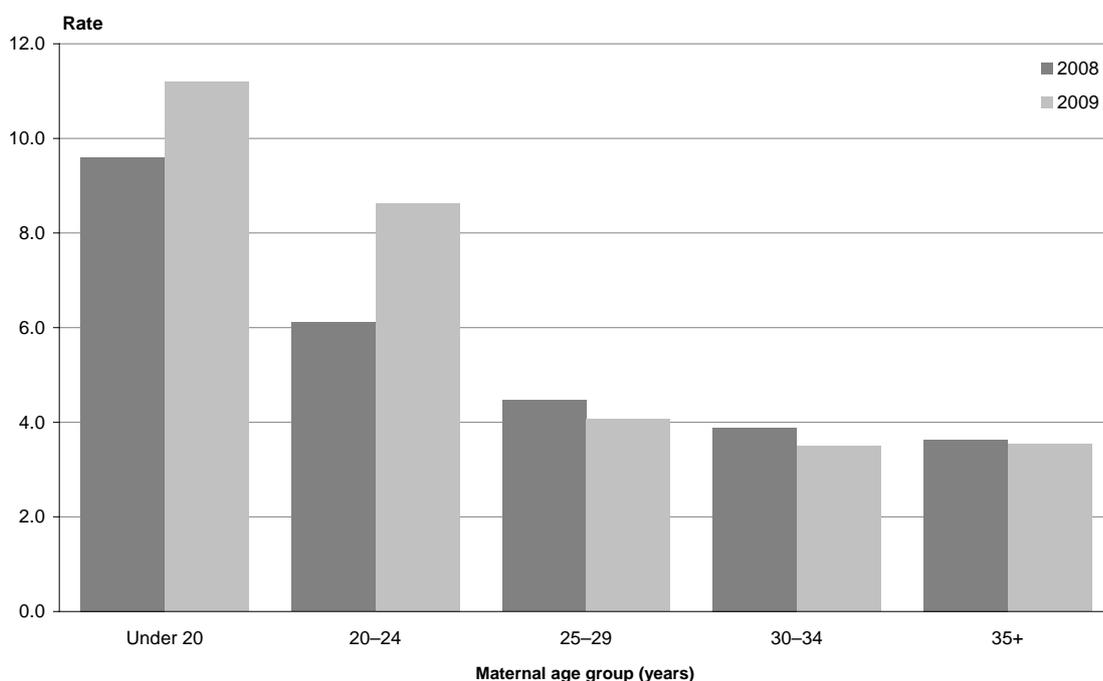
Source: Ministry of Health Mortality Collection

Note: Rate is per 1000 total births.

Infant deaths

Infant death rates decreased as mothers got older. The under 20 years age group had the highest infant death rates in both 2008 and 2009 (9.6 and 11.2 deaths per 1000 live births, respectively), approximately twice the national rate for all age groups (5.0 and 5.2 per 1000 live births). The rates for the under 20 years age group were significantly higher than the rates of all other age groups except for the 20 to 24 years age group. Figure 22 shows infant death rates by maternal age group for 2008 and 2009.

Figure 22: Infant death rates, by maternal age, 2008 and 2009

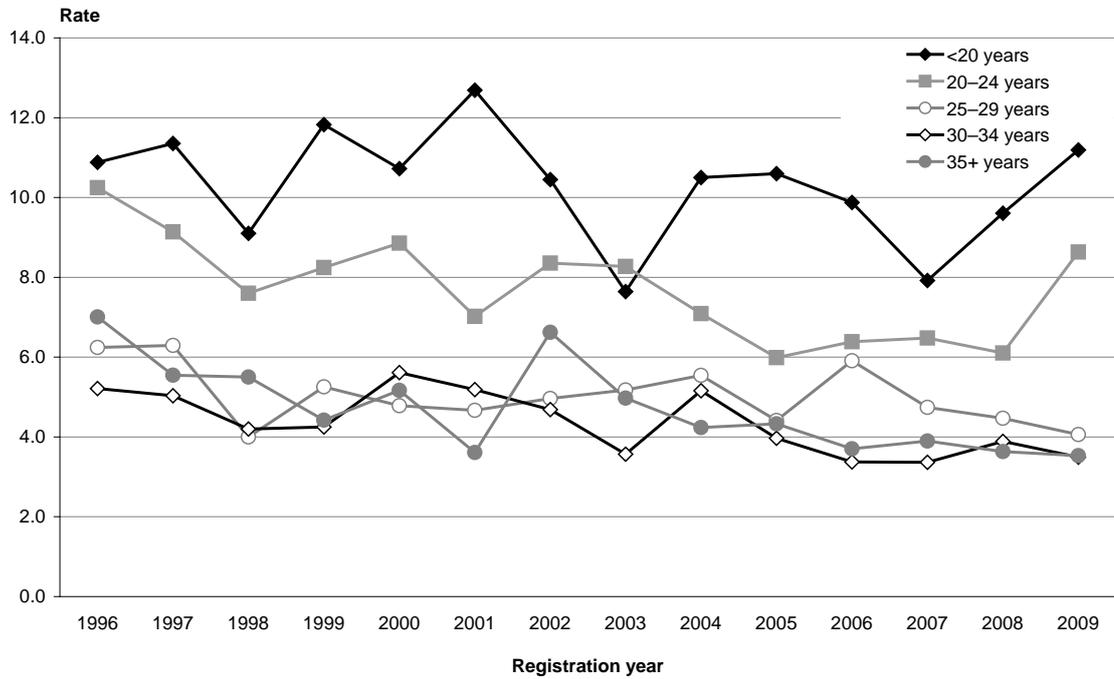


Source: Ministry of Health Mortality Collection

Note: Rate is per 1000 live births.

Figure 23 shows infant death rates by maternal age group from 1996 to 2009. Since 1996 the infant death rate for mothers under the age of 20 years has been the highest of all age groups. The infant death rate for mothers over 35 years of age has halved, from a rate of 7.0 deaths per 1000 live births in 1996 to 3.5 in 2009. This compares to a decrease of 15.8 percent for mothers aged 20–24 years, 35.0 percent for those aged 25–29 years, and 33.0 percent for those in the 30–34 years age group. In 2009 the rate for the under-20-years age group was 2.9 percent higher than in 1996.

Figure 23: Infant death rates, by maternal age, 1996–2009



Source: Ministry of Health Mortality Collection

Notes: Data from 1997 has been used in calculations for 1998.

Rate is per 1000 live births.

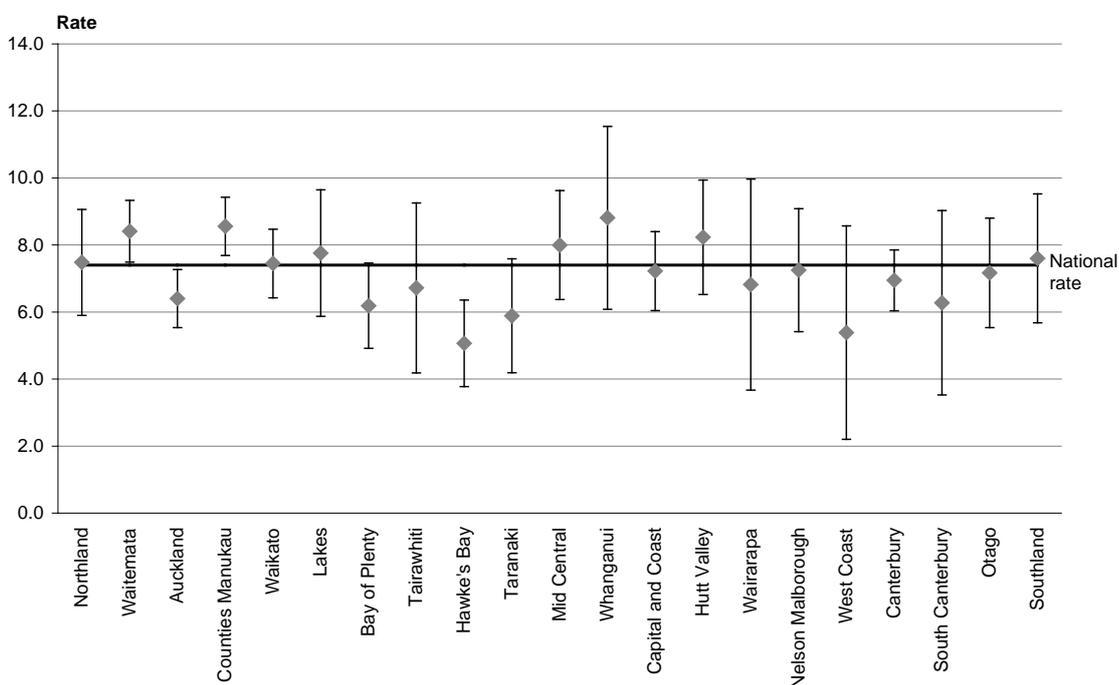
District health boards (DHBs)

In this section, data for DHBs has been aggregated over five years (2005–2009) because of the small number of fetal and infant deaths in many areas. Figures 24 and 25 also show 95 percent confidence intervals to help with their interpretation. If a DHB region's confidence interval crosses the national rate, then this means the fetal or infant death rate was not significantly different to the national rate. DHB regions with fewer births have larger confidence intervals, so it is less likely that their rates will be significantly different from the national rate.

Fetal deaths

The national fetal death rate for 2005 to 2009 was 7.4 deaths per 1000 total births. Figure 24 shows that the fetal death rates for Waitemata and Counties Manukau DHBs were significantly higher than the national rate (8.4 and 8.6 deaths per 1000 total births, respectively). Auckland and Hawke's Bay DHBs had rates that were significantly lower than the national rate (6.4 and 5.1 deaths per 1000 total births, respectively).

Figure 24: Fetal death rates, by DHB, 2005–2009



Source: New Zealand Mortality Collection

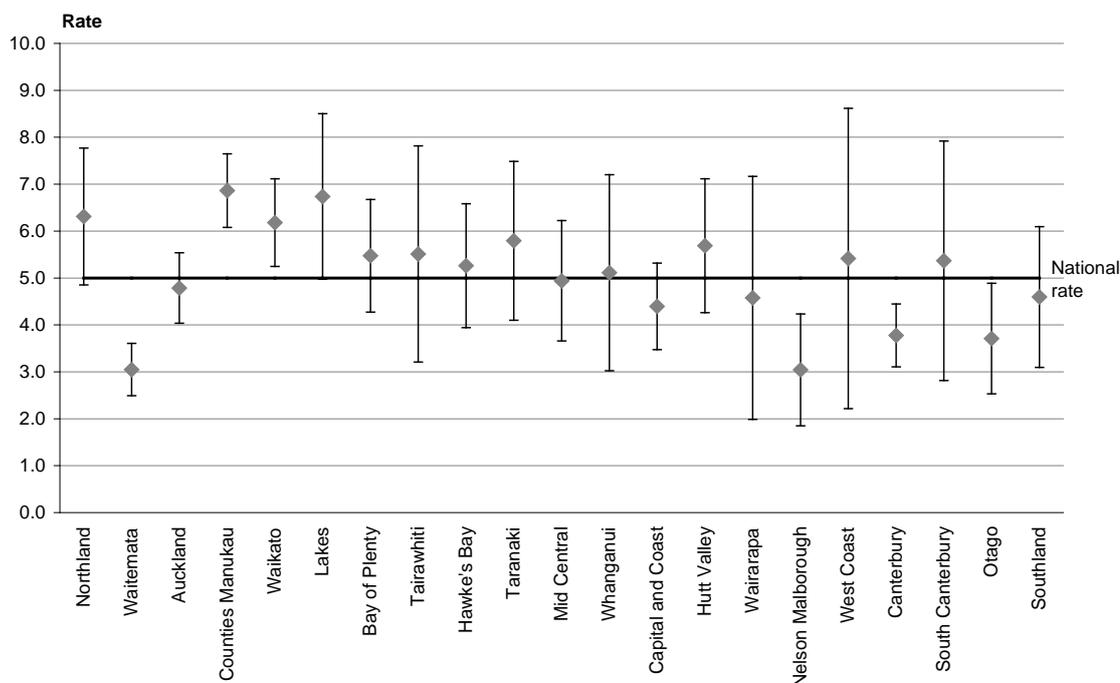
Notes: Rate is per 1000 total births.

See 'Glossary' for more information on 95 percent confidence intervals.

Infant deaths

The national infant death rate for the 2005 to 2009 period was 5.0 per 1000 live births. Figure 25 shows the infant death rate for each DHB for the period 2005 to 2009, with 95 percent confidence intervals. Counties Manukau and Waikato DHBs had rates that were significantly higher than the national rate (6.9 and 6.2 deaths per 1000 live births, respectively). Waitemata, Nelson Marlborough, Canterbury and Otago DHBs all had significantly lower infant death rates (3.0, 3.0, 3.8 and 3.7 deaths per 1000 live births, respectively).

Figure 25: Infant death rates, by DHB, 2005–2009



Source: New Zealand Mortality Collection

Notes: Rate is per 1000 live births.

See 'Glossary' for more information on 95 percent confidence intervals.

Infant deaths, by age

Table 10 shows the breakdown of infant deaths by age for 2008 and 2009. In 2008 and 2009 over half of all infant deaths occurred within the first month of life (58.7 percent). Nearly a third (31.3 percent) occurred within 24 hours of birth, and an additional 14.2 percent occurred before one week of age.

The death rate in both 2008 and 2009 for infants aged 1 to 11 months was 2.1 deaths per 1000 live births. This compares to rates of 1.6 for infants less than 24 hours old, 0.7 for those aged one to six days, and 0.7 for those aged one to three weeks.

Table 10: Infant deaths by age, rates and percentages, 2008 and 2009

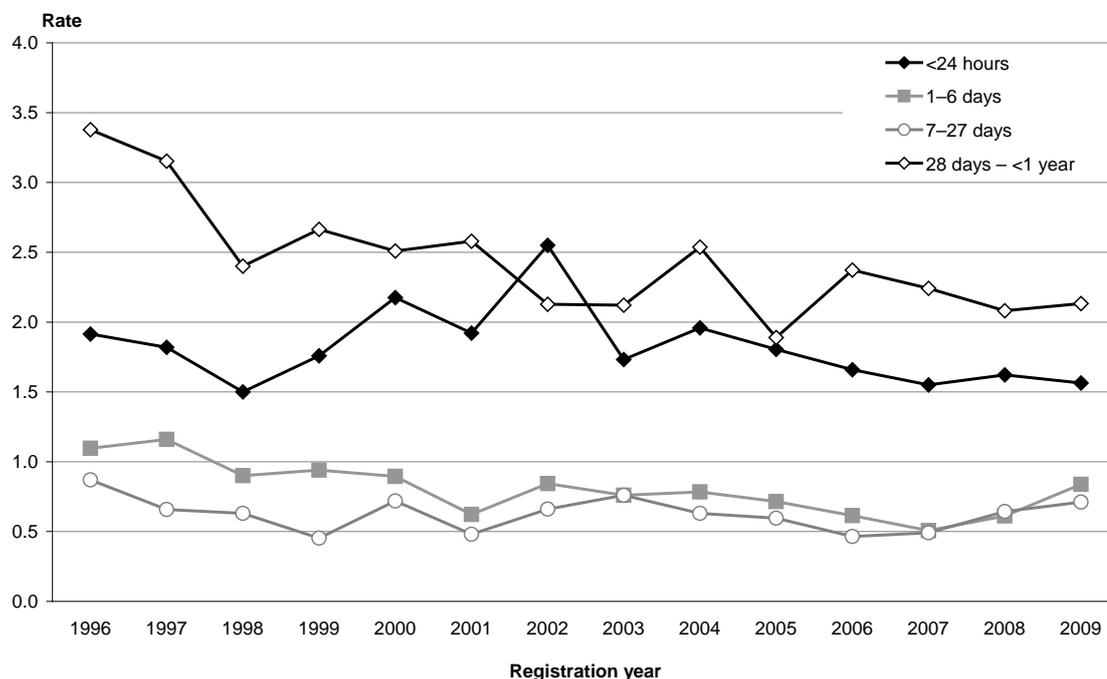
| Age | 2008 | | | 2009 | | | Total | | |
|------------------|------------|------------|--------------|------------|------------|--------------|------------|------------|--------------|
| | No. | Rate | % | No. | Rate | % | No. | Rate | % |
| < 24 hours | 106 | 1.6 | 32.7 | 99 | 1.6 | 29.8 | 205 | 1.6 | 31.3 |
| 1-6 days | 40 | 0.6 | 12.3 | 53 | 0.8 | 16.0 | 93 | 0.7 | 14.2 |
| 7-27 days | 42 | 0.6 | 13.0 | 45 | 0.7 | 13.6 | 87 | 0.7 | 13.3 |
| 28 days-< 1 year | 136 | 2.1 | 42.0 | 135 | 2.1 | 40.7 | 271 | 2.1 | 41.3 |
| Total | 324 | 5.0 | 100.0 | 332 | 5.2 | 100.0 | 656 | 5.1 | 100.0 |

Source: Ministry of Health Mortality Collection

Note: Infant rate is per 1000 live births.

Figure 26 shows infant death rates by age since 1996. The death rate for infants 28 to 364 days of age decreased by 36.8 percent, from 3.4 deaths per 1000 live births in 1996 to 2.1 in 2009. There was also a decrease in the rates for infants under 24 hours old and those one to six days of age, but these changes were not significant.

Figure 26: Infant death rates, by age, 1996–2009



Source: Ministry of Health Mortality Collection

Notes: Data from 1997 has been used in calculations for 1998.
 Infant rate is per 1000 live births.

Of the infants that died within 24 hours of birth, 74.6 percent were born before 36 weeks' gestation (pre-term) and had a very low birthweight (less than 1500 g). The majority of deaths of infants born at term and of normal birthweight occurred between 28 days and before 1 year after birth (60.9 percent). Table 11 shows the age of infants at death, by gestation and birthweight.

Table 11: Infant deaths, by gestation, birthweight and age, aggregated data, 2008 and 2009

| Gestation (weeks) | Birthweight (grams) | Age at death | | | | | | | | | |
|-------------------|---------------------|--------------|------------|-----------|------------|-----------|------------|------------------|------------|------------|------------|
| | | < 24 hours | | 1-6 days | | 7-27 days | | 28 days-< 1 year | | Total | |
| | | No. | % | No. | % | No. | % | No. | % | No. | % |
| < 36 | < 1500 g | 153 | 74.6 | 34 | 36.6 | 33 | 37.9 | 48 | 17.7 | 268 | 40.9 |
| | 1500-2499 g | 13 | 6.3 | 13 | 14.0 | 9 | 10.3 | 25 | 9.2 | 60 | 9.1 |
| | 2500-4499 g | 6 | 2.9 | 7 | 7.5 | 7 | 8.0 | 13 | 4.8 | 33 | 5.0 |
| | 4500 g and over | 0 | 0.0 | 0 | 0.0 | 1 | 1.1 | 0 | 0.0 | 1 | 0.2 |
| | Unknown | 1 | ... | 0 | ... | 0 | ... | 0 | ... | 1 | ... |
| 37-41 | < 1500 g | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | 1500-2499 g | 2 | 1.0 | 1 | 1.1 | 3 | 3.4 | 17 | 6.3 | 23 | 3.5 |
| | 2500-4499 g | 23 | 11.2 | 31 | 33.3 | 30 | 34.5 | 131 | 48.3 | 215 | 32.8 |
| | 4500 g and over | 0 | 0.0 | 2 | 2.2 | 1 | 1.1 | 2 | 0.7 | 5 | 0.8 |
| | Unknown | 1 | ... | 0 | ... | 0 | ... | 0 | ... | 1 | ... |
| 42+ | < 1500 g | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | 1500-2499 g | 0 | 0.0 | 1 | 1.1 | 0 | 0.0 | 0 | 0.0 | 1 | 0.2 |
| | 2500-4499 g | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 4 | 1.5 | 4 | 0.6 |
| | 4500 g and over | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 0.4 | 1 | 0.2 |
| | Unknown | 6 | ... | 4 | ... | 3 | ... | 30 | ... | 43 | ... |
| Total | | 205 | 100 | 93 | 100 | 87 | 100 | 271 | 100 | 656 | 100 |

Source: Ministry of Health Mortality Collection

Notes: ... = Not applicable.

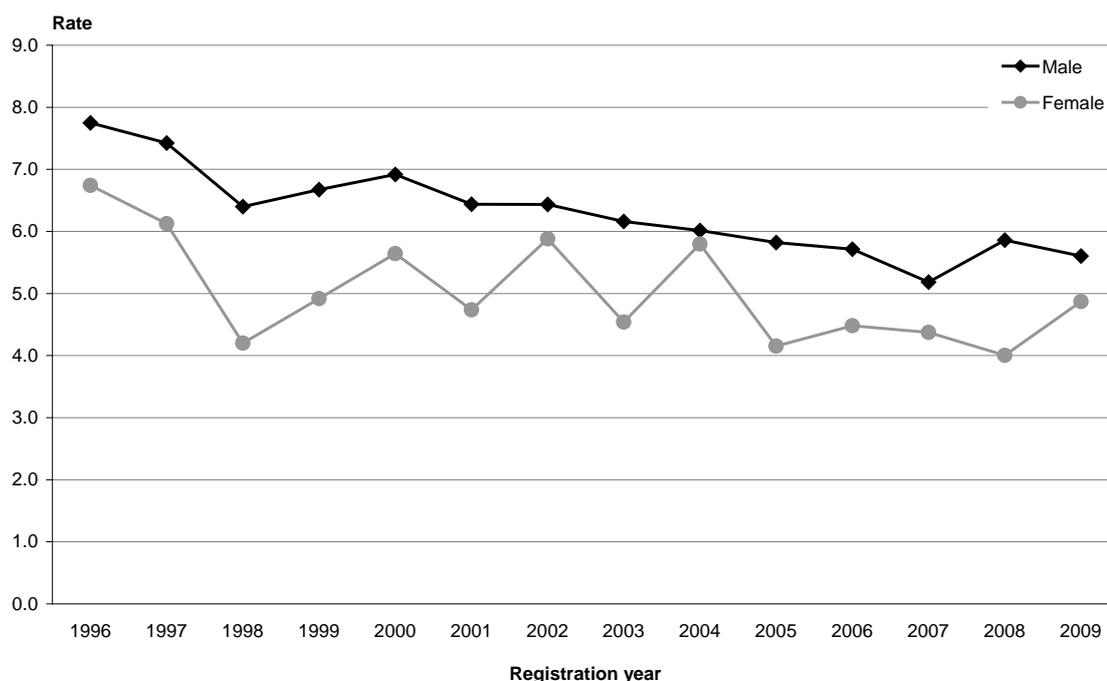
Rate is per 1000 live births.

Infant death, by sex

Male infants account for just over half of all infant deaths each year. In 2009, 54.8 percent of infant deaths were male. The death rate for male infants has been higher than the female rate since 1996, but the difference is generally not significant. In 2009 the death rate for male infants was 5.6 deaths per 1000 live male births compared to 4.9 for females.

Figure 27 shows infant death rates, by sex, since 1996. Both the male and female rates decreased between 1996 and 2009 (by 27.7 percent and 27.8 percent, respectively).

Figure 27: Infant death rate, by sex, 1996–2009



Source: Ministry of Health Mortality Collection

Notes: Data from 1997 has been used in calculations for 1998.

Infant rate is per 1000 live births.

International comparisons of fetal and infant mortality

Legal requirements for the registration of fetal deaths and live births vary between, and even within, countries. This makes it difficult to compare fetal and infant death rates internationally, because differences in registration practices may cause some variation in rates. For example, in several countries, including New Zealand, very premature babies who are born alive but have a low chance of survival are registered as live births.

This section uses the OECD method to calculate fetal and infant death rates (OECD 2007).

The weight-specific fetal death rate is calculated as follows:

$$\frac{\text{Fetal deaths of 28+ weeks' gestation or weighing 1000 g and over}}{\text{Total births (live births plus fetal deaths as defined above)}} \times 1000$$

Table 12 shows a breakdown of New Zealand's fetal and infant deaths and rates that can be used for international comparisons. Calculations for early neonatal, late neonatal, post-neonatal and infant death rates use live births, as per the method used elsewhere in this publication (see 'Definitions' on page 7).

Table 12: New Zealand fetal and infant deaths, numbers and rates, for international comparison, 1996–2009

| | Fetal | | Early neonatal | | Late neonatal | | Post-neonatal | | Infant | |
|------|-------|------|----------------|------|---------------|------|---------------|------|--------|------|
| | No. | Rate | No. | Rate | No. | Rate | No. | Rate | No. | Rate |
| 1996 | 211 | 3.7 | 173 | 3.0 | 50 | 0.9 | 194 | 3.4 | 417 | 7.3 |
| 1997 | 212 | 3.7 | 172 | 3.0 | 38 | 0.7 | 182 | 3.2 | 392 | 6.8 |
| 1998 | 174 | 3.0 | 137 | 2.4 | 35 | 0.6 | 137 | 2.4 | 309 | 5.4 |
| 1999 | 204 | 3.5 | 155 | 2.7 | 26 | 0.5 | 153 | 2.7 | 334 | 5.8 |
| 2000 | 188 | 3.3 | 175 | 3.1 | 41 | 0.7 | 143 | 2.5 | 359 | 6.3 |
| 2001 | 190 | 3.4 | 143 | 2.5 | 27 | 0.5 | 145 | 2.6 | 315 | 5.6 |
| 2002 | 176 | 3.2 | 185 | 3.4 | 36 | 0.7 | 116 | 2.1 | 337 | 6.2 |
| 2003 | 196 | 3.5 | 141 | 2.5 | 43 | 0.8 | 120 | 2.1 | 304 | 5.4 |
| 2004 | 225 | 3.8 | 161 | 2.7 | 37 | 0.6 | 149 | 2.5 | 347 | 5.9 |
| 2005 | 190 | 3.2 | 148 | 2.5 | 35 | 0.6 | 111 | 1.9 | 294 | 5.0 |
| 2006 | 184 | 3.0 | 137 | 2.3 | 28 | 0.5 | 143 | 2.4 | 308 | 5.1 |
| 2007 | 229 | 3.5 | 134 | 2.1 | 32 | 0.5 | 146 | 2.2 | 312 | 4.8 |
| 2008 | 265 | 4.0 | 146 | 2.2 | 42 | 0.6 | 136 | 2.1 | 324 | 5.0 |
| 2009 | 227 | 3.6 | 152 | 2.4 | 45 | 0.7 | 135 | 2.1 | 332 | 5.2 |

Source: Ministry of Health Mortality Collection

Notes: Fetal rate is per 1000 live births plus fetal deaths of 28+ weeks' gestation or over 1000 g birthweight.

Infant rate is per 1000 live births.

Data from 1997 has been used in calculations for 1998.

Rates published by other countries may be calculated using different methodologies.

Sudden Infant Death Syndrome (SIDS)

As per the WHO rules (see page 8), this section contains data on deaths classified to ICD code R95 (*Sudden Infant Death Syndrome*), either as the underlying cause of death or as a contributing cause.

The SIDS rate is calculated as follows:

$$\frac{\text{Total number of SIDS deaths}}{\text{Number of live births}} \times 1000$$

Overview

Since 1996 the number of SIDS deaths decreased by 60.6 percent, from 109 deaths in 1996 to 43 deaths in 2009. SIDS made up 13.0 percent of all infant deaths in 2009 compared to 26.1 percent in 1996. Table 13 shows SIDS deaths, rates, and the percentage of infant deaths classified as SIDS between 1996 and 2009.

Table 13: SIDS deaths, rates and percentages, 1996–2009

| | No. | Rate | % of infant deaths |
|------|-----|------|--------------------|
| 1996 | 109 | 1.9 | 26.1 |
| 1997 | 84 | 1.5 | 21.4 |
| 1998 | 67 | 1.2 | 21.7 |
| 1999 | 69 | 1.2 | 20.7 |
| 2000 | 65 | 1.1 | 18.1 |
| 2001 | 48 | 0.9 | 15.2 |
| 2002 | 45 | 0.8 | 13.4 |
| 2003 | 51 | 0.9 | 16.8 |
| 2004 | 45 | 0.8 | 13.0 |
| 2005 | 40 | 0.7 | 13.6 |
| 2006 | 50 | 0.8 | 16.2 |
| 2007 | 56 | 0.9 | 17.9 |
| 2008 | 50 | 0.8 | 15.4 |
| 2009 | 43 | 0.7 | 13.0 |

Source: Ministry of Health Mortality Collection

Notes: Data from 1997 has been used in calculations for 1998.

Rate is per 1000 live births.

SIDS and ethnicity

Although the number of SIDS deaths has more than halved since 1996, Māori continue to have disproportionately high numbers of SIDS deaths. Table 14 shows the numbers, rates and percentages of SIDS deaths in each ethnic group for 2008 and 2009. In 2008 and 2009 64.5 percent of all SIDS deaths were Māori and 11.8 percent were Pacific. The Māori rate for this period was over five times higher than the rate for the Other group and more than twice the national rate.

Table 14: SIDS deaths, rates and percentages, by ethnicity, 2008 and 2009

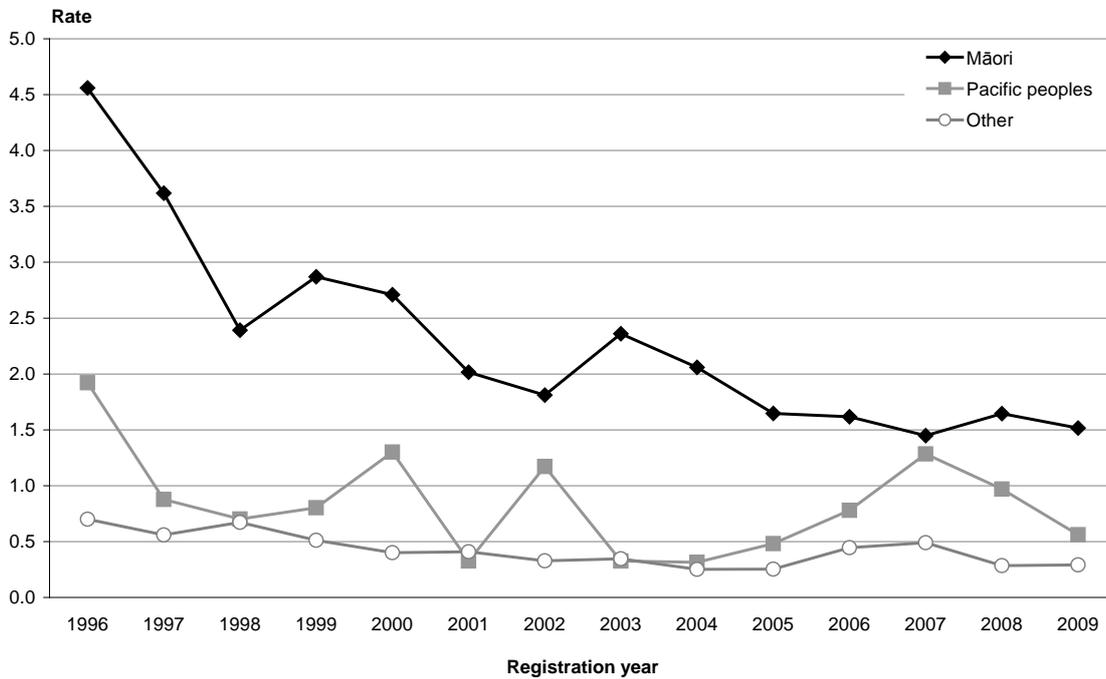
| | 2008 | | 2009 | | Total | | |
|--------------|-----------|------------|-----------|------------|-----------|------------|--------------|
| | No. | Rate | No. | Rate | No. | Rate | % |
| Māori | 32 | 1.6 | 28 | 1.5 | 60 | 1.6 | 64.5 |
| Pacific | 7 | 1.0 | 4 | 0.6 | 11 | 0.8 | 11.8 |
| Other | 11 | 0.3 | 11 | 0.3 | 22 | 0.3 | 23.7 |
| Total | 50 | 0.8 | 43 | 0.7 | 93 | 0.7 | 100.0 |

Source: Ministry of Health Mortality Collection

Note: Rate is per 1000 live births.

Figure 28 shows the rate of SIDS deaths by ethnicity since 1996. The Māori SIDS rate decreased significantly (by 66.8 percent), from 4.6 deaths per 1000 live births in 1996 to 1.5 in 2009. This compares to a decrease of 58.3 percent for the Other group, from a rate of 0.7 to a rate of 0.3 deaths per 1000 live births. While the Pacific rate in 2009 was much lower than in 1996, the rate fluctuates because of the small number of births and deaths.

Figure 28: SIDS death rate, by ethnicity, 1996–2009



Source: Ministry of Health Mortality Collection

Notes: Data from 1997 has been used in calculations for 1998.

Rate is per 1000 live births.

SIDS and deprivation

Over half (55.9 percent) of all SIDS deaths in 2008 and 2009 were in quintile 5, the most deprived areas, with an additional 26.9 percent in quintile 4. In quintile 5 the SIDS death rate was 1.5 deaths per 1000 live births, seven times higher than the rate in quintile 1 (least deprived). Table 15 shows the numbers and rates of SIDS deaths by deprivation quintile for 2008 and 2009.

Table 15: SIDS deaths and rates, by NZDep2006 quintile, 2008 and 2009

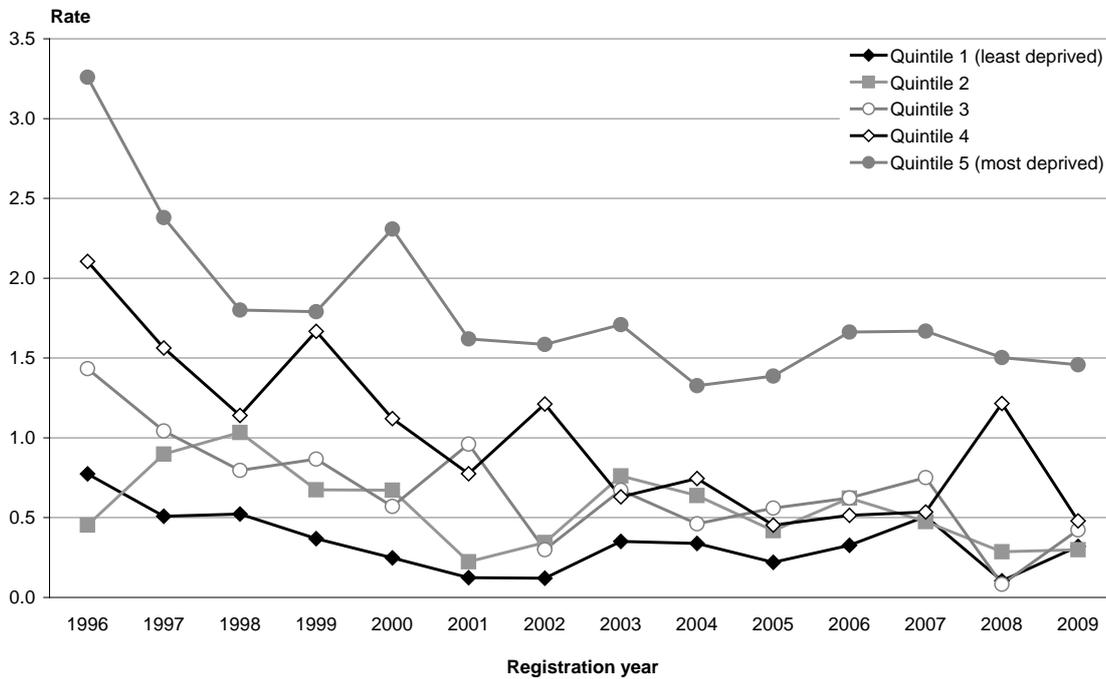
| | 2008 | | 2009 | | Total | | |
|-----------------------------|-----------|------------|-----------|------------|-----------|------------|--------------|
| | No. | Rate | No. | Rate | No. | Rate | % |
| Quintile 1 (least deprived) | 1 | 0.1 | 3 | 0.3 | 4 | 0.2 | 4.3 |
| Quintile 2 | 3 | 0.3 | 3 | 0.3 | 6 | 0.3 | 6.5 |
| Quintile 3 | 1 | 0.1 | 5 | 0.4 | 6 | 0.3 | 6.5 |
| Quintile 4 | 18 | 1.2 | 7 | 0.5 | 25 | 0.9 | 26.9 |
| Quintile 5 (most deprived) | 27 | 1.5 | 25 | 1.5 | 52 | 1.5 | 55.9 |
| Total | 50 | 0.8 | 43 | 0.7 | 93 | 0.7 | 100.0 |

Source: Ministry of Health Mortality Collection

Note: Rate is per 1000 live births.

The trends shown in Table 15 above are consistent with the trends over time. Quintile 5 areas have a consistently higher SIDS rate than any other deprivation quintile. Since 1996 there was a significant decrease in the quintile 5 rate, from 3.3 SIDS deaths per 1000 live births in 1996 to 1.5 in 2009. There was also a significant decrease in the rate for quintile 4 areas, from 2.1 deaths per 1000 live births in 1996 to 0.5 in 2009. Figure 29 shows SIDS death rates by deprivation quintile since 1996.

Figure 29: SIDS death rates, by NZDep2006 quintile, 1996–2009



Source: Ministry of Health Mortality Collection

Notes: Data from 1997 has been used in calculations for 1998.

Rate is per 1000 live births.

SIDS and maternal age

The rate of SIDS deaths in infants decreases as mothers get older. The largest proportion of SIDS deaths in 2008 and 2009 occurred in the 20 to 24 years maternal age group (35.5 percent). However, the rate was highest for the under-20-years age group (2.5 deaths per 1000 live births) and lowest for mothers aged 35 years and older (0.1 deaths per 1000 live births). Table 16 shows SIDS numbers and rates by maternal age for 2008 and 2009.

Table 16: SIDS deaths, numbers and rates, by maternal age, 2008 and 2009

| | 2008 | | 2009 | | Total | | |
|--------------|-----------|------------|-----------|------------|-----------|------------|--------------|
| | No. | Rate | No. | Rate | No. | Rate | % |
| < 20 years | 14 | 2.6 | 11 | 2.3 | 25 | 2.5 | 26.9 |
| 20–24 years | 15 | 1.3 | 18 | 1.5 | 33 | 1.4 | 35.5 |
| 25–29 years | 12 | 0.8 | 6 | 0.4 | 18 | 0.6 | 19.4 |
| 30–34 years | 5 | 0.3 | 6 | 0.3 | 11 | 0.3 | 11.8 |
| 35+ years | 2 | 0.1 | 2 | 0.1 | 4 | 0.1 | 4.3 |
| Unknown | 2 | ... | 0 | ... | 2 | ... | 2.2 |
| Total | 50 | 0.8 | 43 | 0.7 | 93 | 0.7 | 100.0 |

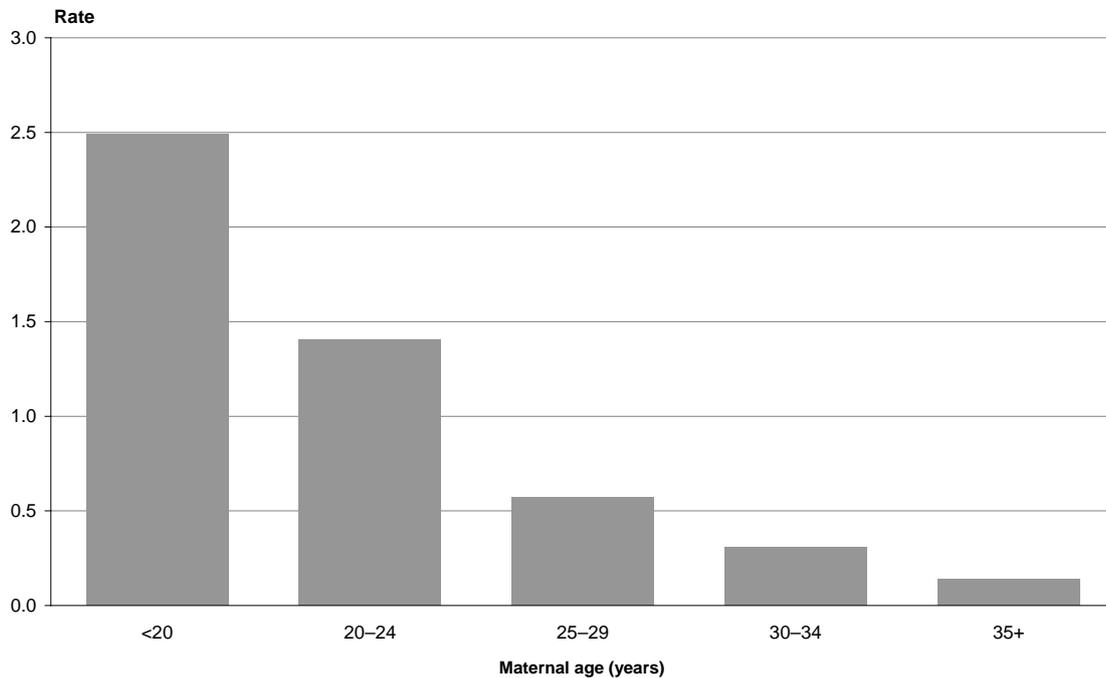
Source: Ministry of Health Mortality Collection

Notes: ... = Not applicable.

Rate is per 1000 live births.

Figure 30 shows the aggregated death rates for SIDS deaths, by maternal age, for 2008 and 2009. The rates for mothers in all age groups 25 years and over were significantly lower than those for younger age groups.

Figure 30: SIDS death rates, by maternal age, aggregated data, 2008 and 2009



Source: Ministry of Health Mortality Collection

Note: Rate is per 1000 live births.

SIDS and district health boards

At 2.7 deaths per 1000 live births, Whanganui had the highest SIDS rate in 2008 and 2009, although the actual number of deaths was small. SIDS deaths accounted for 38.5 percent of all infant deaths in the DHB area over this period. Table 17 shows the aggregated numbers and rates of SIDS deaths by DHB for 2008 and 2009.

Note that because of the small annual number of SIDS deaths in each DHB, it is difficult to draw meaningful conclusions from a single year of data, so the data in this section is aggregated. Caution should still be used when interpreting this data.

Table 17: SIDS deaths and rates, by DHB, aggregated data, 2008 and 2009

| | No. | Rate | % of infant deaths |
|------------------------|-----------|------------|--------------------|
| Northland | 9 | 2.0 | 25.7 |
| Waitemata | 6 | 0.4 | 11.5 |
| Auckland | 11 | 0.8 | 16.7 |
| Counties Manukau | 18 | 1.0 | 15.5 |
| Waikato | 10 | 0.9 | 14.1 |
| Lakes | 2 | 0.6 | 8.3 |
| Bay of Plenty | 3 | 0.5 | 8.3 |
| Tairāwhiti | 1 | 0.6 | 16.7 |
| Hawke's Bay | 5 | 1.0 | 20.8 |
| Taranaki | 3 | 0.9 | 13.6 |
| Mid Central | 4 | 0.9 | 16.0 |
| Whanganui | 5 | 2.7 | 38.5 |
| Capital & Coast | 1 | 0.1 | 2.9 |
| Hutt Valley | 4 | 0.9 | 14.3 |
| Wairarapa | 1 | 0.9 | 20.0 |
| Nelson Marlborough | 0 | 0.0 | 0.0 |
| West Coast | 0 | 0.0 | 0.0 |
| Canterbury | 6 | 0.5 | 11.3 |
| South Canterbury | 1 | 0.8 | 11.1 |
| Otago | 1 | 0.2 | 8.3 |
| Southland | 2 | 0.6 | 18.2 |
| Overseas and undefined | 0 | ... | ... |
| New Zealand | 93 | 0.7 | 14.2 |

Source: Ministry of Health Mortality Collection

Notes: ... = Not applicable.

Rate is per 1000 live births.

SIDS and infant age

The majority of SIDS deaths occur between one and four months of age. In 2008 and 2009, 22.6 percent of SIDS deaths occurred after one and before two months of age. An additional 19.4 percent occurred after two and before three months, and 16.1 percent after three and before four months of age. Over this period there were no SIDS deaths after 10 months of age. Table 18 shows SIDS deaths and rates, as well as the percentage of SIDS deaths at each age, for 2008 and 2009.

Table 18: SIDS deaths, numbers and rates, by infant age, 2008 and 2009

| Age (months) | 2008 | | 2009 | | Total | | |
|--------------|-----------|------------|-----------|------------|-----------|------------|--------------|
| | No. | Rate | No. | Rate | No. | Rate | % |
| < 1 | 6 | 0.1 | 1 | 0.0 | 7 | 0.1 | 7.5 |
| 1 | 13 | 0.2 | 8 | 0.1 | 21 | 0.2 | 22.6 |
| 2 | 14 | 0.2 | 4 | 0.1 | 18 | 0.1 | 19.4 |
| 3 | 6 | 0.1 | 9 | 0.1 | 15 | 0.1 | 16.1 |
| 4 | 2 | 0.0 | 4 | 0.1 | 6 | 0.0 | 6.5 |
| 5 | 1 | 0.0 | 6 | 0.1 | 7 | 0.1 | 7.5 |
| 6 | 3 | 0.0 | 2 | 0.0 | 5 | 0.0 | 5.4 |
| 7 | 2 | 0.0 | 5 | 0.1 | 7 | 0.1 | 7.5 |
| 8 | 3 | 0.0 | 0 | 0.0 | 3 | 0.0 | 3.2 |
| 9 | 0 | 0.0 | 4 | 0.1 | 4 | 0.0 | 4.3 |
| 10 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0.0 |
| 11 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0.0 |
| 12 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0.0 |
| Total | 50 | 0.8 | 43 | 0.7 | 93 | 0.7 | 100.0 |

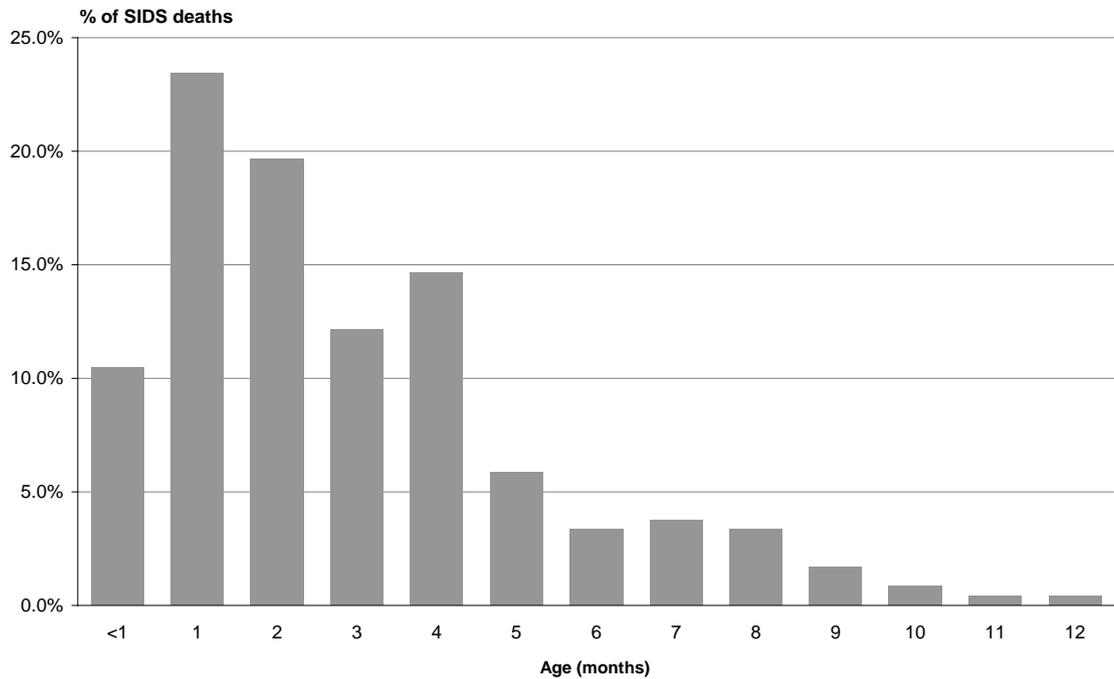
Source: Ministry of Health Mortality Collection

Note: Rate is per 1000 live births.

Percentage is of SIDS deaths at a given age for 2008 and 2009.

Between 2005 and 2009 there was similar pattern, with 86.2 percent of SIDS deaths occurring before six months of age. Figure 31 shows the percentage of SIDS deaths that occurred at each month of age between 2005 and 2009. There were 239 SIDS deaths over this period.

Figure 31: Percentage of SIDS deaths, by age in months, aggregated data, 2005–2009



Source: Ministry of Health Mortality Collection

Further fetal and infant death information

Electronic version of the *Fetal and Infant Deaths* publication

Electronic copies of this publication series (in PDF format) are available at:
<http://www.health.govt.nz/nz-health-statistics/health-statistics-and-data-sets/fetal-and-infant-death-data-and-stats>

Statistical mortality data tables are available online in Excel format alongside the *Fetal and Infant Deaths* publication. These tables contain fetal and infant death data by ICD-10-AM classification, gestation, birthweight, ethnicity, deprivation quintile, maternal age and district health board. Birth data is also provided at each level.

Other fetal and infant death-related publications

The Perinatal and Maternal Mortality Review Committee (PMMRC) produces an annual report on perinatal and maternal mortality. The rates and numbers presented in the PMMRC reports can differ from the data presented in the *Fetal and Infant Deaths* publication. This is because the PMMRC reports provide information on perinatal deaths occurring within a calendar year (1 January to 31 December), whereas *Fetal and Infant Deaths* includes deaths that were registered in that year. However, both the Ministry of Health and the PMMRC use live births and total births (live births plus fetal deaths) in the year of registration to calculate rates.

Glossary

Birthweight

The first weight of the baby obtained after birth (usually measured to the nearest 5 grams and obtained within one hour of birth). Birthweights are categorised as follows:

- high: birthweight of 4500 g or over
- normal: birthweight between 2500 and 4499 g
- low: birthweight of less than 2500 g
- very low: birthweight of less than 1500 g
- extremely low: birthweight of less than 1000 g.

Confidence intervals and statistical significance

A confidence interval is a range of values used to describe the uncertainty around a single value (such as an age-standardised rate). Confidence intervals describe how different the estimate could have been if chance had led to a different set of data. Confidence intervals are calculated with a stated probability: typically 95 percent (which would indicate that there is a 95 percent chance that the true value lies within the confidence intervals).

Confidence intervals may assist in comparing rates between different groups. If two confidence intervals do not overlap, then it is reasonable to assume that the difference is not due to chance. The difference between two values is considered to be significant if confidence intervals do not overlap. If they do overlap, it is not possible to draw any conclusion about the significance of any difference between them.

In this publication, 95 percent confidence intervals are used. The upper and lower confidence limits were calculated using the following formulae:

$$\text{upper limit} = (1000/n) (d + (1.96 * \sqrt{d}))$$

$$\text{lower limit} = (1000/n) (d - (1.96 * \sqrt{d}))$$

where:

n = number of events (number of deaths)

d = denominator of the rate (number of births).

Date of birth or death

The data presented in this publication refers to the year in which a birth or death was registered, irrespective of the actual year of birth or death.

Deprivation

The New Zealand Deprivation Index is a measure of socioeconomic status calculated for small geographic areas. The calculation uses a range of variables from the 2006 Census of Population and Dwellings, which represent nine dimensions of social deprivation. The Deprivation Index is calculated at the level of meshblocks (geographical units containing a median of 90 people), and the Ministry of Health maps these to domicile codes, which are built up to the relevant geographic scale using weighted average census usually resident population counts. The nine variables (proportions in small areas) in the index, by decreasing weight, are:

1. income: people aged 18–64⁷ receiving a means-tested benefit
2. income: people living in an equivalised⁸ household whose income is below a certain threshold
3. home ownership: people not living in their own home.
4. support: people aged under 65 living in a single-parent family
5. employment: people aged 18–64 who are unemployed
6. qualifications: people aged 18–64 with no qualifications
7. living space: people living in an equivalised household below a bedroom occupancy threshold
8. communication: people with no access to a telephone
9. transport: people with no access to a car.

Further information is available from www.health.govt.nz, search for 'NZDep2006 Index of Deprivation'.

District health board (DHB)

An organisation established as a district health board by, or under, section 19 of the New Zealand Public Health and Disability Act 2000. In 2009 there were 21 DHBs in New Zealand. District health boards are responsible for providing or buying government-funded health care services for the population of a specific geographical area. This publication presents data by DHB region of residence. Note that not all deaths in a particular DHB will be from that DHB region.

Domicile code

A code based on the Statistics New Zealand standard area unit code. Domicile is assigned according to usual place of residence. The 2006 domicile codes replaced the 2001 codes in 2008.

⁷ The upper age boundary of 65 is an increase from the NZDep01 value of 60 to better reflect societal norms.

⁸ Equivalisation is a method used to control for household composition.

Early neonatal death

The death of a live-born infant before 168 completed hours (seven days) after birth (WHO 1977).

Ethnicity

There are different methods for outputting ethnicity data. This publication uses 'prioritised ethnicity', by which each person represented in the data is allocated to a single ethnic group using the priority system Māori > Pacific peoples > Other (Ministry of Health 2004). The aim of prioritisation is to ensure that where it is necessary to assign people to a single ethnic group, ethnic groups that are small or important in terms of policy are not swamped by the European ethnic group (Ministry of Health 2004). This method is also a more robust method of dealing with the low rate of multiple ethnicities in health sector data.

Prior to 1996, the concept of ethnicity was based on biological race (that is, percentage of blood), as recorded on death registration forms, and on a sociocultural concept (that is, cultural affiliation) as defined in the Census. Since September 1995 death certificates have included a question comparable with the self-identified ethnicity question in the 1996 Census, which allows for multiple ethnic identities. New Zealand Census – Mortality Study adjustors can be applied to mortality counts from 1996 to 1999 (Blakely 2002). These adjust data to allow for an undercount of Māori and Pacific people. (They are not used in this publication.) From 2000 onwards comparisons across all ethnic groups are possible because adjustors are not necessary. For further discussion on inconsistencies in ethnicity collection, refer to *Decades of Disparity: Ethnic mortality trends in New Zealand 1980–1999* (Ajwani et al 2003).

Fetal death; stillbirth

Death prior to the complete expulsion or extraction from its mother of a product of conception, irrespective of duration of pregnancy; the death is indicated by the fact that after such separation the fetus does not breathe or show any other evidence of life such as beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles (WHO 1977).

The statistics in this publication only include fetal deaths (also known as stillbirths) of 20 weeks' or more gestation, or 400 g or more birthweight. This is in line with the Births, Deaths, Marriages and Relationships Registration Act 1995. Under the Act, a death certificate and a birth registration form are required to be completed in respect of each stillborn child. This includes stillbirths resulting from terminations of pregnancy.

Gestational age

The duration of pregnancy in completed weeks. This is calculated from the date of the first day of a woman's last menstrual period and her infant's date of birth. It can also be derived from clinical assessment during pregnancy or from examination of the infant after birth.

Infant death

Death of a live-born infant before the first year of life is completed (WHO 1977). Infant deaths can be further divided into early neonatal deaths, late neonatal deaths and post-neonatal deaths.

International comparisons

This section uses the OECD definition to calculate internationally comparable fetal death rates. Infant deaths have the same definition as those used throughout this publication.

The weight-specific fetal death rate is calculated as follows:

$$\frac{\text{Fetal deaths of 28+ weeks' gestation or weighing 1000 g and over}}{\text{Total births (live births plus fetal deaths as defined above)}} \times 1000$$

International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification, 6th Edition (ICD-10-AM) clinical codes

Codes based on the official version of WHO's *International Statistical Classification of Diseases and Related Health Problems*. This is designed for classifying morbidity and mortality information for statistical purposes and hospital indexing records. The clinical codes are used to classify the clinical description of a condition, cause of injury, underlying cause of death, operation or procedure performed, or pathological nature of a tumour.

Late neonatal death

Death of a live-born infant after seven days and before 28 completed days after birth (WHO 1977).

Live birth

The complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy, which, after such separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached; each product of such birth is considered live-born (WHO 1977).

Neonatal death

Death of a live-born infant before 28 completed days after birth.

Numbers and rates

The number of deaths refers to the actual number of infants or fetuses that died.

The rate of fetal death refers to the frequency with which these events occur relative to the total number of births, including stillbirths. Infant death refers to the frequency of events relative to the number of live births. Rates are given per 1000 total or live births.

Perinatal death

Perinatal deaths are fetal deaths (20 weeks' gestation or 400 g birthweight), plus infant deaths that occur within 168 completed hours (seven days) after birth (early neonatal deaths) (WHO 1977).

Perinatal death rates are calculated per 1000 total births.

Post-neonatal death

Death of a live-born infant after 28 completed days and before the first year of life is completed.

Pre-term birth

Birth/labour before 37 completed weeks of gestation.

Pre-term birth, very

Birth/labour before 32 completed weeks of gestation.

Post-term birth

Birth at 42 or more completed weeks of gestation.

Stillbirth

See 'Fetal death'.

Term birth

Birth/labour between 37 and 41 completed weeks of gestation.

Total births

Total number of stillbirths (fetal deaths) plus live births.

If you require further information relating to the methodology, classifications and processes used, and how they differ between publications, please contact data-enquiries@moh.govt.nz.

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Further information

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