Child Poverty Monitor 2014

Technical Report

While every endeavour has been made to use accurate data in this report, there are currently variations in the way data are collected by various agencies that may result in errors, omissions or inaccuracies in the information in this report. The NZCYES does not accept liability for any inaccuracies arising from the use of this data in the production of this report, or for any losses arising as a consequence thereof.

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INTRODUCTION

WELCOME TO THE CHILD POVERTY MONITOR 2014 TECHNICAL REPORT

This is the second year of the Child Poverty Monitor and this Technical Report provides data on a set of indicators that assess aspects of child poverty in New Zealand and their implications for child wellbeing. This work is supported by the partnership between the Office of the Children's Commissioner, the University of Otago's New Zealand Child and Youth Epidemiology Service (NZCYES) and the J R McKenzie Trust. The increased concern about child poverty within society underlines the importance of providing and publishing this compilation of publicly available measures. Only by having the essential measures on child poverty in New Zealand compiled, published and disseminated annually can we tell how well we are progressing in effectively reducing child poverty in our nation.

The indicators and measures used in this report arose partly from the recommendation of the Children's Commissioner's Expert Advisory Group (EAG) on Solutions to Child Poverty. In 2012 the EAG called for a suite of measures to capture different aspects of child poverty and report on these annually. The Child Poverty Monitor also owes its genesis to the Children's Social Health Monitor (CSHM) which had been produced by the NZCYES since 2009 to measure key indicators for children's health and wellbeing.

What this Technical Report Covers

This Report provides data and technical information on child poverty measures, economic indicators, and child health measures. It builds on the information previously reported in the Children's Social Health Monitor, thereby providing consistently in these measures (see **Appendix 1**).

The child poverty measures in this report examine aspects of income poverty, material hardship, and severity and persistence of child poverty. For these measures, we rely heavily on data available in the Ministry of Social Development report *Household Incomes in New Zealand: Trends in Indicators of Inequality and Hardship 1982 to 2013* [1].

Data are also provided on a few indicators that have economic implications for child poverty: income inequality, unemployment, GDP and reliance on benefits. A new set of measures included in this Technical Report relates to housing. Household crowding and housing costs are highly relevant to child poverty. Data for these indicators have been drawn from the 2001, 2006 and 2013 Censuses and *Household Incomes in New Zealand: Trends in Indicators of Inequality and Hardship 1982 to 2013* [1].

The health and wellbeing indicators look at hospital admissions and deaths from conditions associated with child poverty, including some infectious and respiratory diseases and injuries; the assault, neglect and maltreatment of children; and infant mortality. For each indicator, there are large disparities for children related to socioeconomic status and ethnicity. Monitoring these health indicators is entirely appropriate, as they are the early signs of the consequences of children living in poverty. Over time, we will look to include additional indicators of child poverty, related to issues such as education, social inclusion, disability and quality of life.

The report comprises the following indicators related to poverty and living standards, the wider economic context and children's health and wellbeing.

Overview of the Technical Report's Key Findings

This table provides an overview of the key findings of the Child Poverty Monitor Technical Report 2014.

Indicator	New Zealand Distribution and Trends
	Child Poverty and Living Standards
Income Based Poverty Measures	• In 2013, 260,000 dependent children aged 0–17 years were living in relative poverty after housing costs (AHC). This represents 24% of dependent children in New Zealand. • During 2010 to 2013, around 34% of Māori and 28% of Pacific children lived in poor households, compared with 16% of European children (using an after housing cost (AHC) <60% fixed-line measure). • Child poverty rates were higher for younger children (0–6 years and 7–11 years cf.12–17 years), sole parent families (cf. two parent families) and for those in households where no adults were in paid work or where none worked full time (cf. self-employed or 1+ full time).
Material Hardship	• 17% of children aged 0–17 years were in households considered to be in material hardship in 2013 using the Material Wellbeing Index (MWI). *The MWI replaced the abbreviated Economic Living Standards Index (ELSI) in the NZ Household Economic Survey (NZHES) in 2012–2013. The two indices are very similar but not the same.* • The 2008 Living Standards Survey showed that 22% of children lived in families experiencing material hardship (i.e. scoring four or more on a range of "enforced lacks"). *Children experiencing material hardship had much higher exposures to household economising behaviours such as having to wear worn out shoes or clothing, sharing a bed, cutting back on fresh fruit and vegetables and postponing doctor's visits because of cost. They might also be exposed to economising behaviours such as cutting back on meat, or having to put up with feeling cold.*

Indicator	New Zealand Distribution and Trends
Poverty Severity	• Over 10% of children aged 0–17 years were living in severe poverty in 2012 using the severity measure of households living below the 60% median income poverty threshold AND living in material hardship. This is more than 110,000 children. • Using a severe poverty threshold of living below 50% of the median income, the rates for children living in severe poverty increased during 2007–2011, levelled at 20% during 2012 then decreased slightly to 19% in 2013. • In the 1980s the rates used for severe child poverty were similar regardless of whether they were before (BHC) or after (AHC) adjustment for housing costs. Between 1990 and 1994 the AHC rates rose rapidly and they have remained considerably higher than the BHC rates. The AHC rate in 2013 is higher than the AHC rates in the 1980s whereas the BHC rate in 2012 is the same as the BHC rates in 1982.
Poverty Persistence	• Statistics NZ's Survey of Family, Income and Employment (SoFIE) followed the same group of people over time giving data for seven years (2002–2003 to 2008–2009). Having an income below 50% of the gross for the year under review, when averaged across all seven years was categorised as persistent poverty. An individual was said to be in current poverty if they fell below the income poverty line for the individual year being considered. Those in poverty comprise those living in poverty long term and those who move in and out poverty through the surveys. • Findings from SoFIE suggest that three out of five children currently living in poverty will remain this way for many years. • When averaged across all seven SoFIE years, 16% of children who were aged 0–11 years in 2002–2003 were found to be in persistent poverty, and 19% were in current poverty. • In any one year, 60% of those in current poverty were also in persistent poverty (using the 50% gross median threshold). There was also a further group of children that, while not in poverty in the current year, were exposed to persistent poverty when averaged over the seven survey years.
Wider Economic Context	
Income Inequality	• In New Zealand during 1982–2013 income inequality, as measured by the P80/P20 ratio and Gini coefficient, was higher after adjusting for housing costs, as housing costs make up a greater proportion of household income for lower income than for higher income households. • From 2012 to 2013 there was little change in the P80/P20 ratio, and the Gini Coefficient continued to be volatile as it had been since 2009 as a result of the impact of the global financial crisis, Christchurch earthquakes and associated economic downturn and recovery on different parts of the income distribution.

Indicator	New Zealand Distribution and Trends
Household crowding	*Statistics New Zealand uses the Canadian National Occupancy Standard (CNOS) to define household crowding*. • In the 2013 Census 11% of children aged 0–14 years lived in households identified as crowded and requiring one additional bedroom and 5% were living in households requiring two or more additional bedrooms. • Household crowding rates for Pacific, Māori and Asian/Indian children were significantly higher than for European children (25% for Māori and 47% for Pacific compared to 21% for Asian/Indian and 5% for European children). • 43% of children in the most deprived areas (NZDep decile 10) live in crowded houses.
Housing affordability	• The highest proportion of households spending more than 30% of their income on housing costs was in the lowest income quintile. • Those in the lowest income quintile were more likely than those in higher income quintiles to spend more than 30% of their income on housing. In 2013, the proportion of these lowest income households spending more than 30% of their income on housing was 42%. In the past this proportion was 16% in 1988, 48% in 1994, and 34% in 2004. • In 2013, 94% of Accommodation Supplement recipients who were in rental accommodation spent more than 30% of their income on housing with 48% spending more than 50% of their income on housing.
Gross Domestic Product (GDP)	• GDP grew by 0.7% in the June quarter of 2014 and economic activity for the year ending June 2014 increased by 3.5%, when compared to the year ending June 2013. • Real GDP per capita increased from $31,426 in the March quarter of 1975, to $50,261 in the March quarter of 2014, while real average ordinary time hourly earnings only increased from $23.81 to $28.18 during the same period.
Unemployment rates	• The seasonally adjusted unemployment rate fell in the June 2014 quarter to 5.6% and the number unemployed decreased from 146,000 in the March 2014 quarter, to 137,000 in the June 2014 quarter. • From 2007 to 2013, children in households with no adults in paid work had poverty rates around 6 to 7 times higher than for those in households where at least one adult worked full-time. • Unemployment rates were higher for Māori and Pacific people than for Asian/Indian people, with Europeans having the lowest rate. Unemployment rates were considerably higher for younger people aged 15–19 years than for any other age group. Unemployment rates for those with no qualifications dropped between 2009 and 2013, but were higher than for those with a school qualification, or post school but no school qualifications. Those post school with school qualifications had the lowest unemployment rate.

Indicator	New Zealand Distribution and Trends
Children reliant on benefit recipients	*The Ministry of Social Development introduced the Welfare Reform in July 2013. The changes made to a number of the benefits, means the benefit data in June 2014 are not directly comparable to the benefit data prior to July 2013.* • The number of children aged 0–17 years reliant on a benefit recipient in June 2014 was 196,247. Of these children, 72% were reliant on a recipient of Sole Parent Support and 17% reliant on a recipient of Jobseeker support. • In June 2013, 214,746 children aged 0–17 years were reliant on a benefit recipient. This equated to 20% of all New Zealand children. • The proportion of children reliant on a benefit recipient was highest for those aged 1–4 years. Rates tapered off gradually during middle to late childhood, and more steeply after 12 years of age.
Health and Wellbeing	
Hospitalisations and mortality with a social gradient in children 0–14 years	• The majority of hospital admissions with a social gradient were due to infectious and respiratory diseases among children aged 0–14 years. During 2009–2013, 82% of these admissions were for asthma and wheeze, acute bronchiolitis, acute upper respiratory infections, gastroenteritis, viral infection of unspecified site, skin infections or pneumonia (bacterial, non-viral). • The rate of hospitalisation from medical conditions with a social gradient for 0–14 year olds was 45 per 1,000 for 2009–2013 with an annual average of over 40,000 admissions. Rates of hospitalisations for children living in the most deprived areas (NZDep deciles 9–10) were nearly 3 times higher than for those in areas with the least deprivation (NZDep deciles 1–2). • SUDI continued to be the single largest contributor (43%) to children's deaths with a social gradient in 2011, with a rate of 6 per 100,000 (excludes babies <28 days and see below for further detail). • Rates for deaths from medical conditions with a social gradient were 6 times higher for those in NZDep deciles 9–10 areas than for those in the areas with the least deprivation (NZDep deciles 1–2). Rates were more than 3 times higher for Māori and over 4 times higher for Pacific than for European/Other children. • Vehicle occupant injuries were the leading cause of injury-related deaths and pneumonia was the leading reason for deaths from medical conditions. Traffic related vehicle occupant events are the most common cause of children's injury related deaths followed by drowning. • The overall rate of child deaths from injury with a social gradient has been decreasing since 2000. • Those living more deprived areas (NZDep deciles 9–10) were more than 3 times more likely to die from injury with a social gradient than those living in the least deprived areas (NZDep deciles 1–2). Rates for Māori children were over twice those of European/Other children.

Indicator	New Zealand Distribution and Trends
Infant mortality and Sudden Unexpected Death in Infancy (SUDI)	• During 2006–2011, extreme prematurity and congenital anomalies were the leading causes of death in infants younger than one month old, while SUDI was the leading cause of death among those aged between 1 month and 1 year. • Infant mortality rates were higher for those living in more deprived areas (NZDep deciles 7–10) than those in the least deprived areas. • Infant mortality was higher for Pacific and Māori infants than for European/Other or for Asian/Indian infants. • SUDI is highest among infants aged 4–7 weeks followed by those aged 8-11 weeks and then those 12–15 weeks old. Suffocation/strangulation in bed accounted for 45% of all SUDI deaths in those younger than 16 weeks of age. SUDI rates were higher for those living in more deprived areas (NZDep deciles 7–10) and higher for Māori and Pacific infants than for European/Other or Asian/Indian infants.
Injuries arising from the assault, neglect and maltreatment of children aged 0–14 years	• On average, during 2000–2011, 8 children died each year as a result of injuries arising from assault, neglect or maltreatment. The rate has been relatively static over that time. • During 2007–2011, mortality was highest for infants under 1 year, followed by pre-school aged children. • Hospital admissions for injuries from assault, neglect or maltreatment of children 0–14 years declined between 2000 and 2013. • Rates for hospital admission for assault, neglect or maltreatment were higher for those living in NZDep deciles 3–10 compared to those from NZDep deciles 1–2. • During 2009–2013, rates for hospital admission for assault, neglect or maltreatment were higher for infants aged <1 year and then for children aged over eleven years of age. Hospitalisation increased for males as adolescence approached. In 2009–2013, head injury was the most common cause of hospital admission as a result of assault, neglect and maltreatment and accounted for 59% of such injuries to children aged 0–4 years, 39% among 5–9 year olds and 55% among 10–14 year olds. • Rates for hospital admission for assault were higher for Maori and for Pacific children than for European/Other children.

CHILD POVERTY AND LIVING STANDARDS

MEASURING CHILD POVERTY: INTRODUCTION

"Children living in poverty are those who experience deprivation of the material resources and income that is required for them to develop and thrive, leaving such children unable to enjoy their rights, achieve their full potential and participate as equal members of New Zealand society" OCC EAG on Solutions to Child Poverty 2012 [2].

This definition encompasses the two approaches to child poverty measurement that have been most commonly used in New Zealand to date, with material deprivation or hardship referring to a family's living standards and the degree to which a family must forgo key consumables (e.g. fruit and vegetables, shoes and clothing, heating) in order to make ends meet [3].

In contrast, income measures are based on a family's disposable income (i.e. market income, less income tax, plus social assistance, including Working for Families tax credits) adjusted for family size and composition. Income poverty thresholds are traditionally set as a proportion of the national median household income, for example at 60% of the median household equivalent disposable income, after adjusting for housing costs. Median income refers to the mid-point of the distribution of all incomes in New Zealand, where half the number of households have income below that point, and half have incomes above [2,3].

This report includes two types of income poverty threshold. The first, the standard relative income poverty measure, compares incomes to 60% of the median in the current year. This measure is usually referred to as a relative, moving-line or relative-to-contemporary median measure. The second income measure included compares current incomes (expressed in the dollar value of a particular year, known as the reference year) to 60% of the median income in the reference year (e.g. 2007). This is often referred to as a fixed line measure [2,3].

Each group of measures captures a slightly different facet of economic wellbeing, as a family's overall economic position is determined by its ability to access the resources it requires, in relation to its needs. In this context, current income, even if measured accurately and adjusted for household size and composition, is only one part of the equation, and other resources (e.g. savings, accumulated assets, access to cash in kind and extended family and community networks) also need to be taken into account. Similarly, families may have differing demands placed on their incomes including the servicing of pre-existing debts, health and disability costs, transport costs and the expectations of extended family members and community networks [1].

In recognition of this fact, in its report on Solutions to Child Poverty, the EAG [2] recommended that the Government monitor at least five different poverty measures:

1. Fixed-Line Income Poverty Measure
2. Moving-Line Income Poverty Measure
3. Material Deprivation Measure
4. Severe Poverty Measure
5. Measure of Poverty Persistence.

These five measures were selected because the EAG [2] believed it was important not only to assess families' incomes, but also their day to day living standards. Measures of poverty severity and persistence were seen to be important, as the impact of poverty on child outcomes was believed to be greater when child poverty was severe, or lasted for long periods of time. The following sections review the data currently available in the New Zealand for each of these measures of child poverty.

CHILD POVERTY: INCOME-BASED MEASURES

Introduction

High rates of child poverty are a cause for concern, as low family income has been associated with a range of negative health, education, justice, labour market and social outcomes [4]. Negative health outcomes include low birth weight, infant mortality, poorer mental health and cognitive development, and hospital admissions from a variety of causes [5]. Research suggests that exposure to low family income during childhood and early adolescence may also increase the risk of leaving school without qualifications, economic inactivity, early parenthood and contact with the justice system. While adjusting for potentially confounding factors (e.g. parental education, maternal age, and sole parent status) reduces the magnitude of these associations somewhat, they do not disappear completely. This suggests that the pathways linking low family income to long term outcomes are complex, and in part may be influenced by other socioeconomic factors [6].

In New Zealand, the Ministry of Social Development uses a range of income based measures to monitor child poverty. All are based on a family's disposable income (i.e. market income, less tax, plus social assistance). This income has been equivalised: that is, adjusted for family size and composition. An income poverty threshold commonly used is a household equivalent disposable income of less than 60% of the median, after adjusting for housing costs. Two measures are used: the relative or standard measure that is calculated using the contemporary median income, and a fixed-line measure, which compares income to the median at a fixed point in time (1998 or 2007 in this report) [1].

The following section uses information from the NZ Household Economic Survey (NZHES) to review the proportion of children aged 0–17 years living in households with incomes below the 60% income poverty threshold (after tax, and adjusting for family size and composition) [1]. Because housing costs can consume a significant amount of a family's income, an after housing cost (AHC) measure provides a good picture of the resources available for other necessary spending.

Data Source and Methods

Definition

1. *Proportion of dependent children aged 0–17 years living below the 60% income poverty threshold before housing costs (BHC)*
2. *Proportion of dependent children aged 0–17 years living below the 60% income poverty threshold after housing costs (AHC)*

Data Source

New Zealand Household Economic Survey (NZHES n=2,800–3,500 households per survey) via Perry 2014 [1]. Note: Child Poverty measures are reported on by the Ministry of Social Development using NZHES data [1] which it reports 2-yearly from 1982–1998, and 3-yearly thereafter. Since 2007, income data have been reported annually through the new HES Incomes Survey. The full NZHES (including expenditure data) remains 3-yearly. For more detail on methodology see Perry 2014 [1]

Interpretation

Note 1: Child poverty measures traditionally compare a household's income to the national median rather than the mean. The median is calculated by assigning individuals the income of their household, ranking them from those with the lowest to the highest income, and then finding the middle point of the income distribution. The mean income is usually higher than the median because a few households with a very high income will shift the mean upwards, but not the median. The number of very high income households varies from year to year so the mean is a less stable measure than the median. For more detail see Perry 2014 [1].

Note 2: Relative (or standard) poverty measures are defined in relation to the incomes of others in the same year. This gives a poverty benchmark that rises and falls with changes in national median incomes. Fixed-line poverty measures select a poverty benchmark at a set point in time (in this report these are 1998 or 2007) and adjust forward and back in time for changes in consumer prices to maintain a constant buying power over time.

In his 2014 update, Perry [1] notes that in real terms, the median income in 1998 was similar to 1982 so there is a good case for using 1998 as the reference year for fixed-line poverty calculations back to 1982, as well as forward from 1998. By 2007, however, the median was 16% higher than in 1998 and by 2009 26% higher, hence the reference year was changed to 2007.

Note 3: While reporting fixed-line poverty figures back to 1982 using 2007 as the reference tells us what proportion was 'poor' back then relative to 2007, this approach is not useful for assessing the extent of

hardship ‘back then’ relative to the standards of the day. In the analyses which follow, 2007 fixed-line figures are provided from 2007 onwards, with earlier years using 1998 as the reference year.

Note 4: Most income poverty measures use equivalised disposable household income (i.e. after tax household income adjusted for family size and composition). Both measures can be calculated before or after taking housing costs into account.

The Numbers of Children Living in Poverty in New Zealand

In 2013 in New Zealand, 260,000 (24%) dependent children aged 0–17 years were living in relative poverty using the measure of below 60% of the contemporary median income, after housing costs (**Table 1**). If a fixed-line measure is applied (in this case, below 60% of the 2007 median income), 230,000 (22%) of dependent children aged 0–17 years were living in poverty in 2013 (**Table 1**).

Table 1. Number and proportion of dependent children aged 0–17 years living below various poverty thresholds, New Zealand 2001–2013 HES selected years

HES Year	Before housing costs		After housing costs					
	<60% contemporary median		<50% contemporary median		<60% contemporary median		<60% 2007 median	
	Number	% of children	Number	% of children	Number	% of children	Number	% of children
2001	250,000	24	215,000	21	310,000	30	380,000	37
2004	270,000	26	200,000	19	290,000	28	320,000	31
2007	210,000	20	170,000	16	240,000	22	240,000	22
2009	210,000	19	195,000	18	270,000	25	230,000	22
2010	245,000	23	200,000	19	300,000	28	260,000	24
2011	230,000	22	210,000	20	285,000	27	255,000	24
2012	220,000	21	205,000	20	285,000	27	240,000	23
2013	215,000	20	205,000	19	260,000	24	230,000	22

Source: Perry 2014 [1], derived from Statistics New Zealand Household Economic Survey (HES) 1982–2013

Child Poverty Trends Using Different Measures

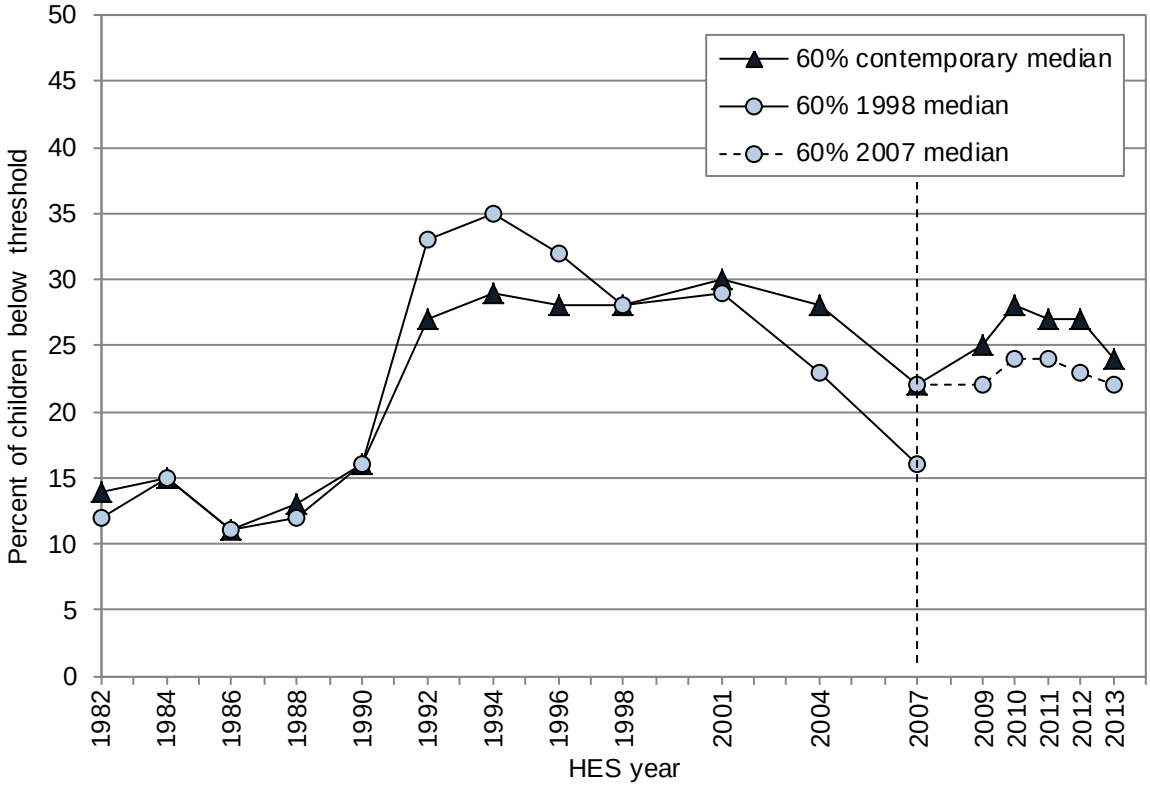
Relative or fixed-line poverty

Information about people in lower income households is gained from examining relative poverty measures (using the contemporary median) or fixed-line or constant value poverty measures (using 1998 or 2007 as the set points in time) with each method providing a different perspective [1] (see Methods box above).

Both relative and fixed-line measures show the rapid rise in child poverty in New Zealand during 1990–1992 that has been attributed to rising unemployment and cuts made to benefits in 1991 [1]. These benefit cuts disproportionately reduced incomes for beneficiaries compared with changes in median income. During 1992–1998, child poverty declined as a result of falling unemployment and the incomes of those around the poverty line rose more quickly than the median. After 1998, as economic conditions improved, the median income rose again. Incomes for many low-income households with children did not, however, and child poverty continued to rise until 2004.

The decline in poverty rates from 2004 to 2007 resulted from the Working for Families package [1]. Between 2007 and 2010 child poverty rates increased, then declined, so that in 2013 the rates were nearly equal to those in 2007 (**Figure 1**).

Figure 1. Proportion of dependent children aged 0–17 years living below the 60% income poverty threshold (relative and fixed-line) after housing costs, New Zealand 1982–2013 HES years



Source: Perry 2014 [1], derived from Statistics New Zealand Household Economic Survey (HES) 1982–2013

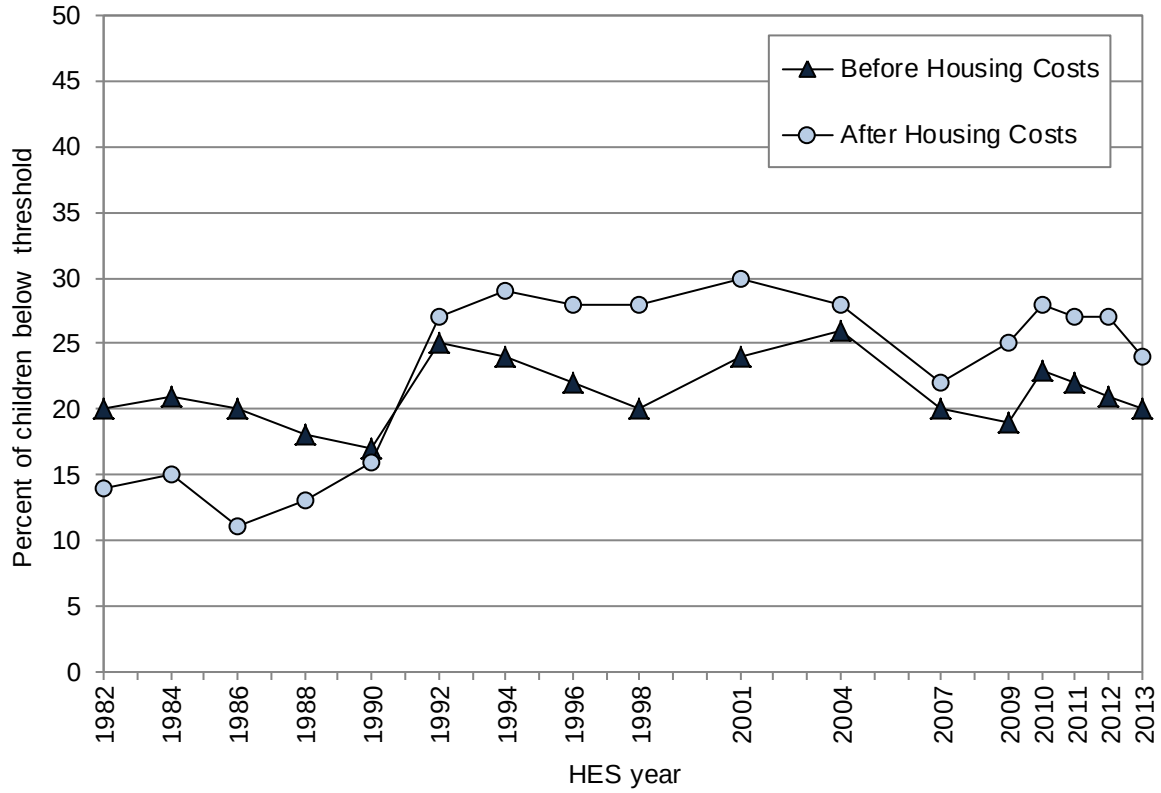
Before Housing Costs (BHC) or After Housing Costs (AHC)

Housing costs can be a substantial component of a household's expenditure. Figure 2 shows the proportion of children living in households below the relative poverty threshold (<60% of contemporary median) before housing costs and after housing costs have been accounted for. The proportion of children living below the poverty threshold, before housing costs (BHC), fluctuated in 1982–2013 with 20% of children below the poverty threshold in 1982 and 2013. In comparison, in 1982 the proportion of children living below the threshold after housing costs (AHC) was lower than the proportion BHC. The proportions BHC and AFC shared the same rapid rise in 1990, but since 1992, the proportion AHC has remained consistently higher than the proportion BHC (**Figure 2**).

Housing costs in 2012 accounted for a higher proportion of household expenditure for low-income households than such costs in the 1980s. Perry noted that the income-related rental policies introduced in 2000, along with later changes to accommodation supplements (AS), helped reduce housing expenditure for some low income households. These changes contributed to reductions in AHC child poverty during 2001–2007. There were no further policy changes during 2007–2012 and maximum rates of assistance remaining fixed although housing costs continued to increase [1]. This resulted in increases in the AHC child poverty rates during 2007–2010 (**Figure 2**).

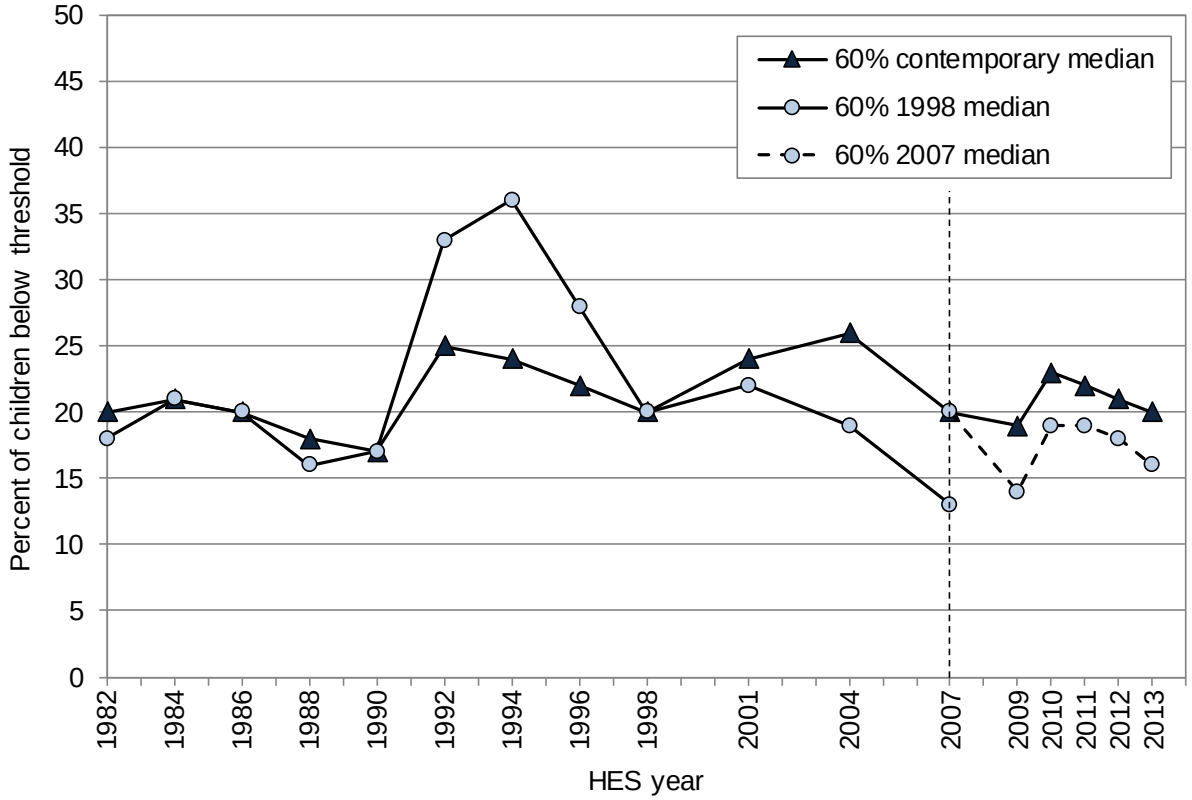
Similar changes are seen using a fixed line poverty measure. The AHC trend for the fixed line poverty threshold (<60% 1998 median) during 1984–2008, was broadly similar to that of the BHC trend with the AHC poverty rate in 2007 being just a little higher than the AHC rate in the 1980s (**Figure 3**).

Figure 2. Proportion of dependent 0–17 year olds living below the 60% income poverty threshold (relative) before and after housing costs, New Zealand 1982–2013 HES years



Source: Perry 2014 [1], derived from Statistics New Zealand Household Economic Survey (HES) 1982–2013

Figure 3. Proportion of dependent children aged 0–17 years living below the 60% income poverty threshold before housing costs, New Zealand 1982–2013 HES years



Source: Perry 2014 [1], derived from Statistics New Zealand Household Economic Survey (HES) 1982–2013

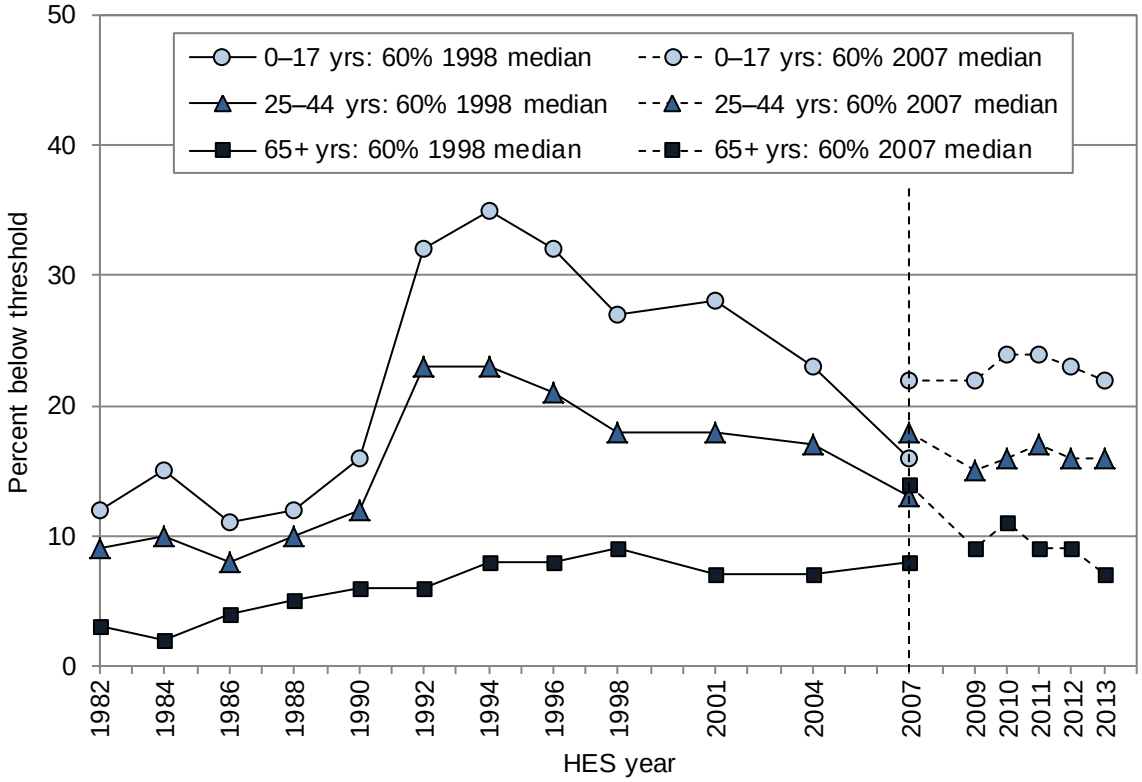
Child Poverty and Demographic Factors

Poverty by Age

In 2013, children aged 0–17 years were three times more likely to be in poverty than those aged 65+ years. During 1982–2013, poverty rates in New Zealand were consistently higher for children aged 0–17 years than for adults aged 25–44 years with the lowest poverty rates being seen amongst those aged 65+ years (**Figure 4**).

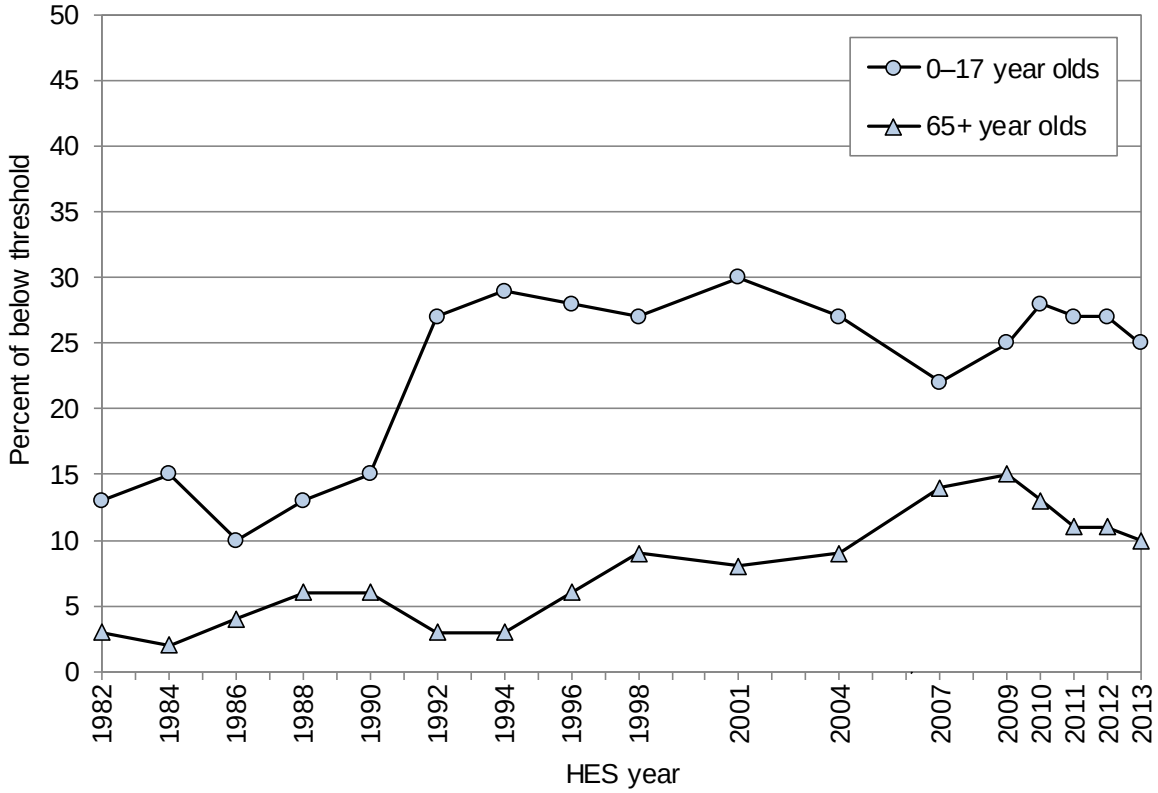
Using the relative <60% income poverty threshold (contemporary median), **Figure 5** compares the proportion of 0–17 year olds living below the threshold with those aged 65+ years who also live below this same poverty income threshold.

Figure 4. Proportion of population living below the 60% income poverty threshold after housing costs by selected age-group, New Zealand 1982–2013 HES years



Source: Perry 2014 [1], derived from Statistics New Zealand Household Economic Survey (HES) 1982–2013

Figure 5. Proportion of population living below the 60% income poverty threshold (relative) after housing costs by selected age groups, New Zealand, 1982–2013 HES years

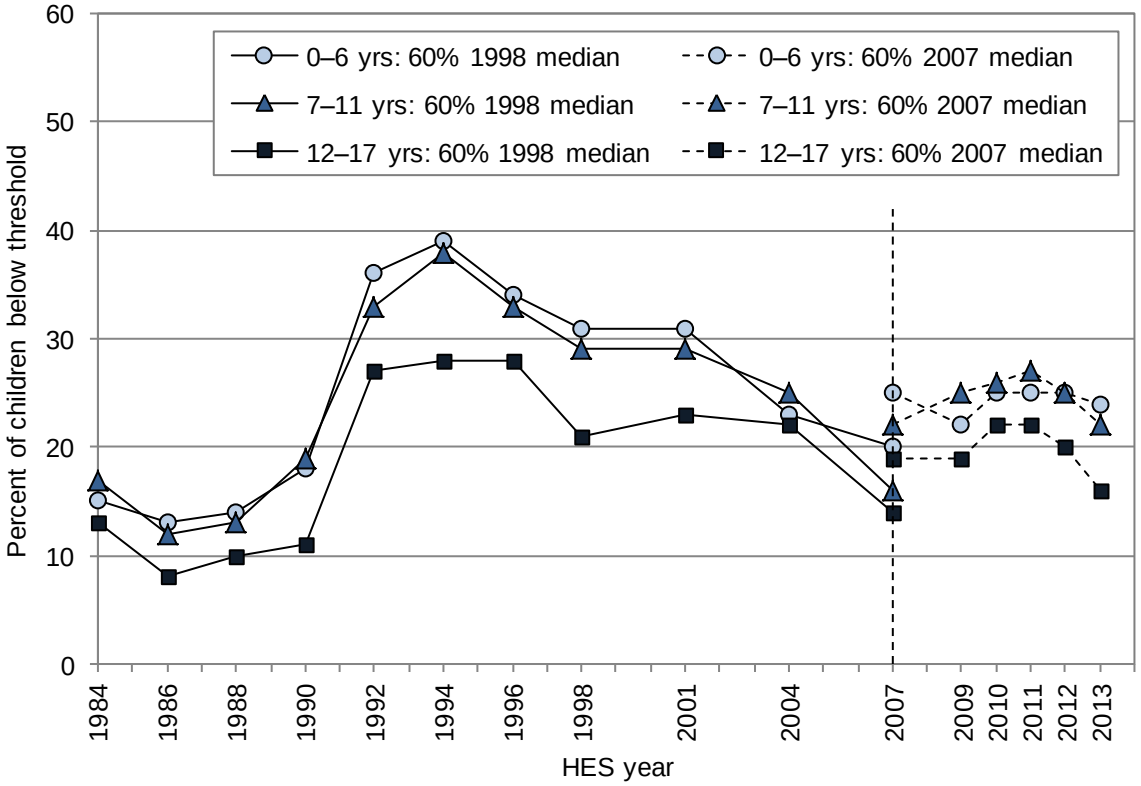


Source: Perry 2014 [1], derived from Statistics New Zealand Household Economic Survey (HES) 1982–2013

Child Poverty by Children's Age

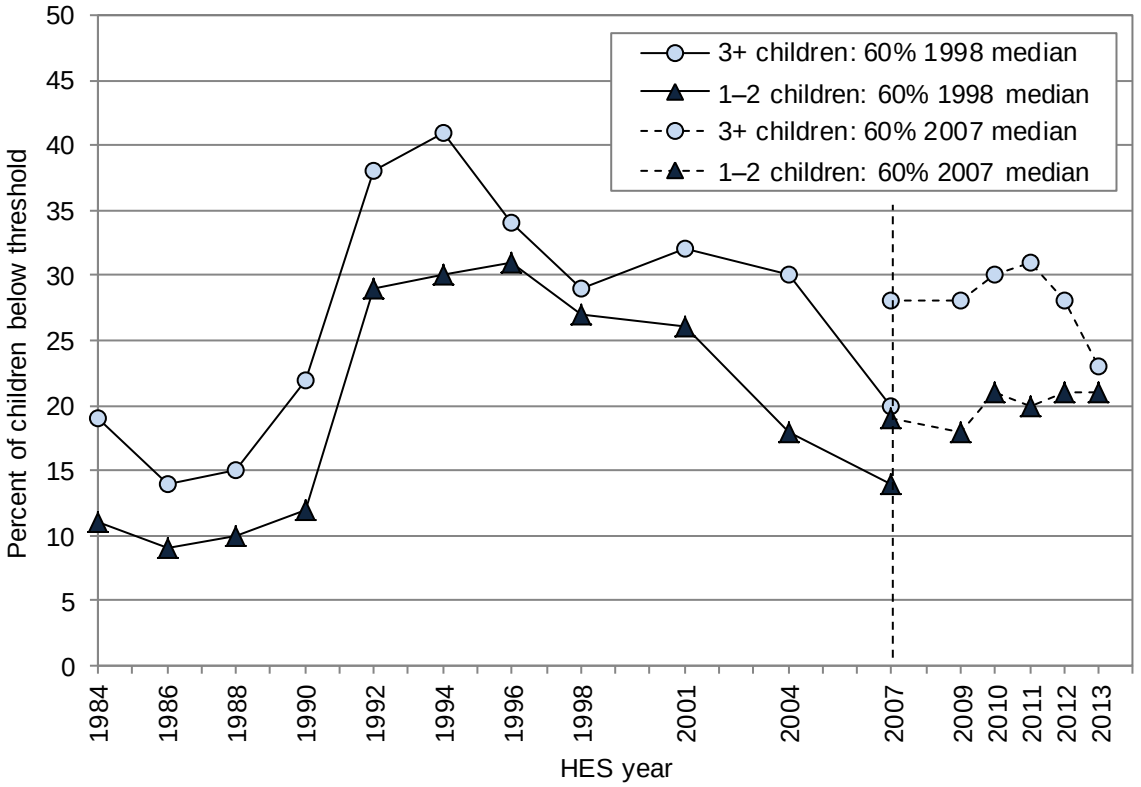
In New Zealand throughout 1984–2013, poverty rates for younger children (0–6 years and 7–11 years) were generally higher than for older children (12–17 years) (**Figure 6**).

Figure 6. Proportion of dependent children aged 0–17 years living below the 60% income poverty threshold after housing costs by age, New Zealand 1984–2013 HES years



Source: Perry 2014 [1], derived from Statistics New Zealand Household Economic Survey (HES) 1984–2013

Figure 7. Proportion of dependent children aged 0–17 years living below the 60% income poverty threshold, after housing costs, by number of children in household, New Zealand 1984–2013 HES years



Source: Perry 2014 [1], derived from Statistics New Zealand Household Economic Survey (HES) 1984–2013

Child Poverty by Number of Children in Household

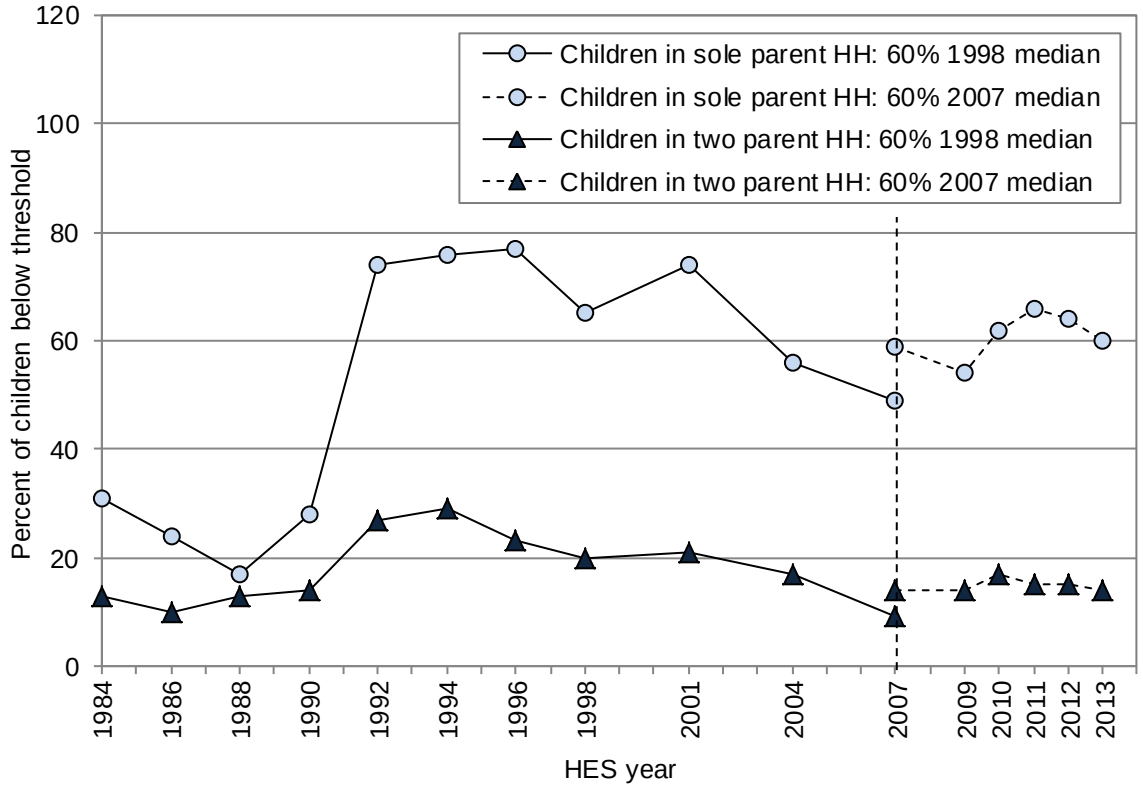
In New Zealand during 1984–2013, child poverty rates for households with three or more children were consistently higher than for those with one or two children (**Figure 7**).

Child Poverty by Family Type

In 2011–2013, on average, 53% of children living in sole parent families were living in poverty compared to 15% of children of two parent families (**Figure 8**). The majority of New Zealand children lived in two parent families (76%) compared to 16% in sole parent families on their own. Perry identified that 53% of children in poverty were in sole parent families and 47% in two parent households [1]. Perry also noted that children living in multi-adult family households have lower poverty rates than those living in sole parent households [1].

Historically, poverty rates for children in both sole parent and two-parent families declined between 2001 and 2007 in New Zealand. In 2007, however, rates for children in sole-parent families remained higher than their 1980s levels while rates for children in two-parent families were similar [1].

Figure 8. Proportion of dependent children aged 0–17 years living below the 60% income poverty threshold after housing costs by family type, New Zealand 1984−2013 HES years



Source: Perry 2014 [1], derived from Statistics New Zealand Household Economic Survey (HES) 1984–2013

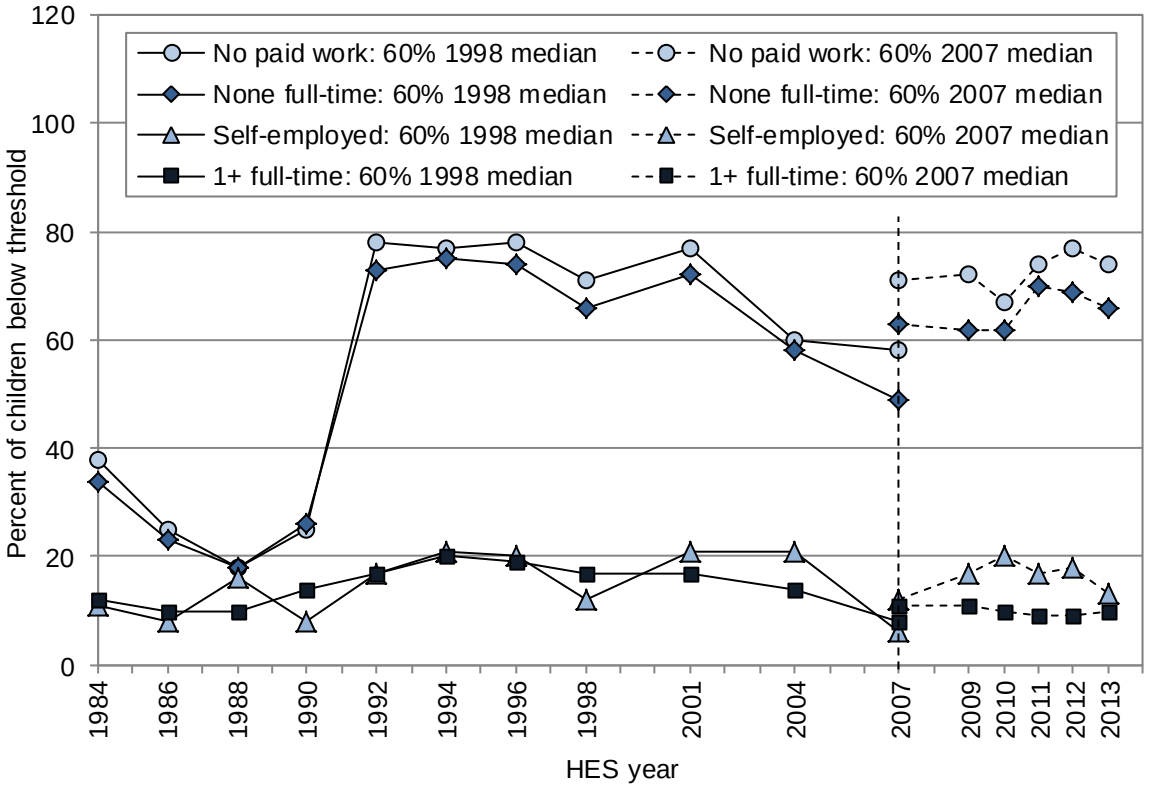
Child Poverty by Work Status of Adults in Household

From 2011 to 2013, on average, around 37% children who were living in households below the fixed line <60% median poverty threshold AHC came from working families (down from one in two (52%) in 2004 before Working for Families) while 63% were in families reliant on a benefit income [1].

Perry notes that from 1992 to 2004, children in households with no adults in paid work generally had poverty rates around four times higher than for those in households where at least one adult worked full-time. From 2007 to 2013, the difference was even greater—around six to seven times higher for children in households where no adults were in paid work [1].

Historically in New Zealand, child poverty rates for children in households with no adults in paid work, or where no adults worked full-time, increased rapidly during 1988–1992. Poverty rates for children in these households remained elevated during the 1990s (range 66%–78%), before declining during 2001–2007. Even at their lowest point in 2007, poverty rates for children in these households remained much higher than 1980s levels. In contrast, increases in child poverty for households where an adult worked full-time, or was self-employed, were much less marked, with rates in 2007–2009 being similar to those in the 1980s (**Figure 9**).

Figure 9. Proportion of dependent children aged 0–17 years living below the 60% income poverty threshold after housing costs by work status of adults in the household, New Zealand 1984–2013 HES years



Source: Perry 2014 [1], derived from Statistics New Zealand Household Economic Survey (HES) 1984–2013

Child Poverty by Ethnicity

Over the period 2011–2013, on average, around 34% of Māori children and 28% of Pacific children lived in poor households, compared to an average of 16% of European children (using the AHC 60% fixed-line measure) [1]. The higher poverty rates seen in Māori children potentially reflect the relatively high proportion of Māori children living in sole parent beneficiary households (during 2007 to 2011 around 43% of domestic purpose benefit (DPB) recipients were Māori). On average, during 2011 to 2013, just under half (48%) of children living in poverty were Māori or Pacific, using the AHC 60% fixed line measure [1].

No time series data are available for ethnicity, however, Perry reports that poverty rates for Pacific and Māori children are consistently higher than for European children [1]. Limited analyses by ethnic group are reported In the NZHES [1] because of the relatively small sample sizes for Māori, Pacific and Other ethnic groups.

CHILD POVERTY: MATERIAL HARDSHIP

Introduction

The Ministry of Social Development (MSD) uses non-income measures to assess the material wellbeing of families with children, as well as measures of income poverty. The non-income measures provide insight into what hardship looks like for everyday life by indicating families' actual living standards, including their ability to keep the house warm in winter, to afford meat and fresh fruit and vegetables, to replace worn out shoes and clothing, and broken appliances, and to visit the doctor when they need to [1]. MDS monitors these measures using:

1. The New Zealand Household Economic Survey (NZHES) which contains a 40-item Economic Living Standards Index (ELSI) that ranks households from low to high living standards using a range of non-income measures. A short (25 item) form of the ELSI has been included in the NZHES since 2006–07 [1].
2. Material Wellbeing Index (MWI which is a new index developed by MSD that uses 13 of the 25 items from ELSI and 11 new ones [1]. This index was first used to collect data on material hardship in 2012–13. There is considerable similarity on the household rankings between ELSI and MWI. The main differences between the MWI and the ELSI are the removal from the MWI of three items previously included in the ELSI that required a high level self-assessment (of income inadequacy, standard of living and satisfaction with standard of living) and the MWI having greater emphasis on material things that households or families have and activities they could participate in.
3. The Living Standards Surveys (LSS), undertaken nationally by MSD in 2000, 2004 and 2008, provided data on households with children and child specific measures. The 2008 survey collected information from 5,000 households on their material circumstances including ownership and quality of household durables, and their ability to keep the house warm, pay the bills, have broken down appliances repaired and pursue hobbies and other interests [1]. The details of the 2008 Survey are available from earlier MSD reports [7].

The following section provides the data from the Household Economic Survey (NZHES), and the MWI, which provide insight into children's exposure to hardship. The 2008 Living Standards Survey data have been included for their child specific measures that reflect children's experience of material hardship.

New Zealand Household Economic Surveys

Data Source and Methods

Definition

Proportion of children aged 0–17 years experiencing material hardship

Data Source

New Zealand Household Economic Survey (NZHES) (n=2,800–3,500 households per survey) via Perry 2014 [1].

The MSD developed the 40-item Economic Living Standards Index (ELSI), which ranks households from low to high living standards using a range of non-income measures. A short (25 item) form of the ELSI has been included in the NZHES since 2006–07, with 16 items being used to calibrate a material hardship measure [1]. The MSD has developed the ELSI further with the Material Wellbeing Index (MWI) that retains 13 of the 25 items from the ELSI and adds 11 new ones. These were first collected in HES in 2012−13.The ELSI and MWI rank the population as a whole and the different groups in it in much the same way (correlation of 0.95) [1] and the following 16 items are common to both. There is, however, a discontinuity in the HES-based material hardship measures of 2007–12 (ELSI) and those of 2012−13 (MWI).

Enforced lack of essentials

Meal with meat, fish or chicken (or vegetarian equivalent) at least each 2nd day
Two pairs of shoes in good repair and suitable for everyday use

Suitable clothes for important or special occasions

A good bed

Economised, cut back or delayed purchases 'a lot' because money was needed for other essentials

Fresh fruit and vegetables
Meat
Replacing worn out clothes
Put up with being cold
Visits to the doctor
Trips to the shops or other local places
Repair or replace broken or damaged appliances

In arrears more than once in last 12 months, because of shortage of cash at the time

Rates, electricity, water
Vehicle registration, insurance or Warrant of Fitness

Financial stress and vulnerability

Had to borrow from friends or family more than once in last 12 months to cover everyday expenses
Feel 'very limited' by the money available when thinking about purchase of clothes or shoes for self
Could not pay an unexpected and unavoidable bill of $500 within a month without borrowing

The ELSI hardship threshold was set at 6 or more deprivations out of 16 from the calibration list above. This gave a population hardship rate in 2008 of 12%, which was close to the 2008 income poverty rate (using the more stringent 50% of median AHC threshold) of 13%. For further detail on the methodology used see Perry 2014 [1].

Proportion Living in Material Hardship by Age and Household Type

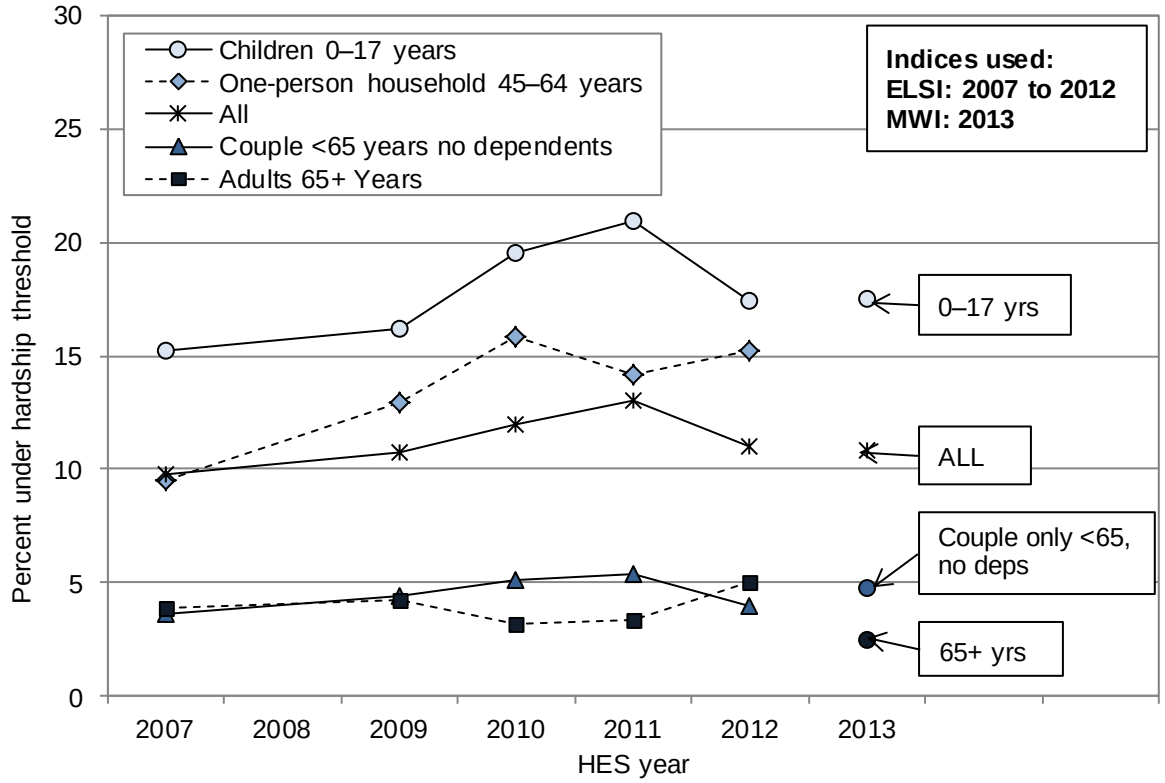
In New Zealand during 2007–2012, material hardship, as defined using the Economic Living Standards Index (ELSI), was consistently highest for households with children aged 0–17 years, followed by one person households aged 45–64 years. The lowest rates of hardship were seen among those aged 65+ years. The proportion of children aged 0–17 years in material hardship in rose from 16% in 2009 to 21% in 2011, before falling to 17% in 2012 (**Figure 10**). In 2012, around 180,000 children were living in material hardship. The Material Wellbeing Index (MWI) and ELSI rank the population in much the same way [1].

Perry notes that the rise in material hardship from 2007 to 2011 for the total population and for children 0–17 years was not unexpected, given the impact of the Global Financial Crisis and economic downturn, and that the improvements seen between 2011 and 2012 reflect the early impacts of the more recent economic recovery [1] (**Figure 10**).

Proportion of Children Living in Material Hardship by Family Income

During 2007–2012, a lower proportion of children with a family income above the 60% poverty threshold (non income-poor families) lived in material deprivation than did New Zealand children overall. However, material hardship rates rose during 2009–11 both for non income-poor families and for all families. Perry suggests that a number of families with incomes above the 60% threshold may be in relatively precarious financial circumstances, with small drops in income or unexpected bills potentially making a significant difference to their day-to-day living standards [1].

Figure 10. Proportion living in material hardship, for children 0–17 years and selected sub-groups, New Zealand 2007–2013 HES years



Source: Perry 2014 [1] derived from Statistics New Zealand Household Economic Survey (HES) 2007–2012; Note: Hardship defined using Economic Living Standards Index (ELSI) and Material Wellbeing Index (MWI), see methods for further detail

2008 Living Standards Survey

In the Living Standards Survey, respondents provided information about themselves and others in their economic family unit including information on specifically child related items [7]. In the Living Standards Survey, material hardship was defined as having a score of four or more "enforced lacks" from a list of 14 items on the material deprivation index outlined in the Methods box.

Data Source and Methods

Definition

Proportion of children aged 0–17 years experiencing material hardship

In the 2008 Living Standards Survey [7], respondents provided information about themselves and others in their economic family unit (EFU). A respondent's EFU comprised the respondent and partner (if any), together with their dependent children in the household (if any). This was a narrower concept than the census family unit which includes other family members such as adult children and parents of adult children. In the survey, total response ethnicity was used, meaning that categories were not mutually exclusive, as one person could be in two or more categories depending on their response.

Deprivation Index Based on Data from the 2008 Living Standards Survey

In the 2008 Living Standards Survey report [7], a 14 item material deprivation index was used to compare the relative positions of different population groups. Each item in the index assessed an 'enforced lack', with items being divided into two categories: ownership/participation, where an item was wanted but not possessed because of cost; and economising items, which focused on cutting back or going without in order to pay for other basic needs. The deprivation score for each respondent was the sum of all enforced lacks, with a cut off of 4+ being used as a measure of material hardship, as it represented the 15% of the population experiencing the most hardship (and was thus seen as being equivalent to the MSD's income poverty measures).

14 items (enforced lacks) are included in 2008 Living Standards Survey Deprivation Index (DEP)*

Ownership/Participation

A good bed
Ability to keep main rooms adequately warm
Suitable clothes for important or special occasions
Home contents insurance

Presents for family and friends on special occasions

Economising 'a lot' (to keep down costs to help pay for other basics)

Continued wearing worn out clothing
Continued wearing worn out shoes
Went without or cut back on fresh fruit and vegetables
Bought cheaper or less meat than wanted
Postponed visits to the doctor
Did not pick up a prescription
Put up with feeling cold to save on heating costs
Went without or cut back on visits to family or friends
Did not go to a funeral (tangi) you wanted to

** A DEP score is not to be confused with NZDep categories*

Proportion of Children Experiencing Material Hardship

Table 2 provides an overview of the distribution of children by their family's deprivation scores (DEP) according to items included in the Living Standards Survey. Additional child specific items not included in the calculation of the DEP score have been listed to highlight experiences of children living in households with differing experiences of material deprivation. It suggests that 22% of children lived in families experiencing four or more enforced lacks (10% had a DEP Score of 4–5 and 12% had a DEP score of 6+).

When broken down by individual item, those children experiencing material hardship (i.e. living in households with DEP scores of four or more) were exposed more to household economising behaviours such as having to wear worn out shoes or clothing, sharing a bed or bedroom, cutting back on fresh fruit and vegetables and postponing doctor's visits because of cost. For example, 39% of children whose families had a DEP score of 6+ continued to wear worn out shoes or clothing, while 58% had major difficulty keeping the house warm in winter (**Table 2**).

Proportion of Children Experiencing Material Hardship by Ethnicity and Family Income

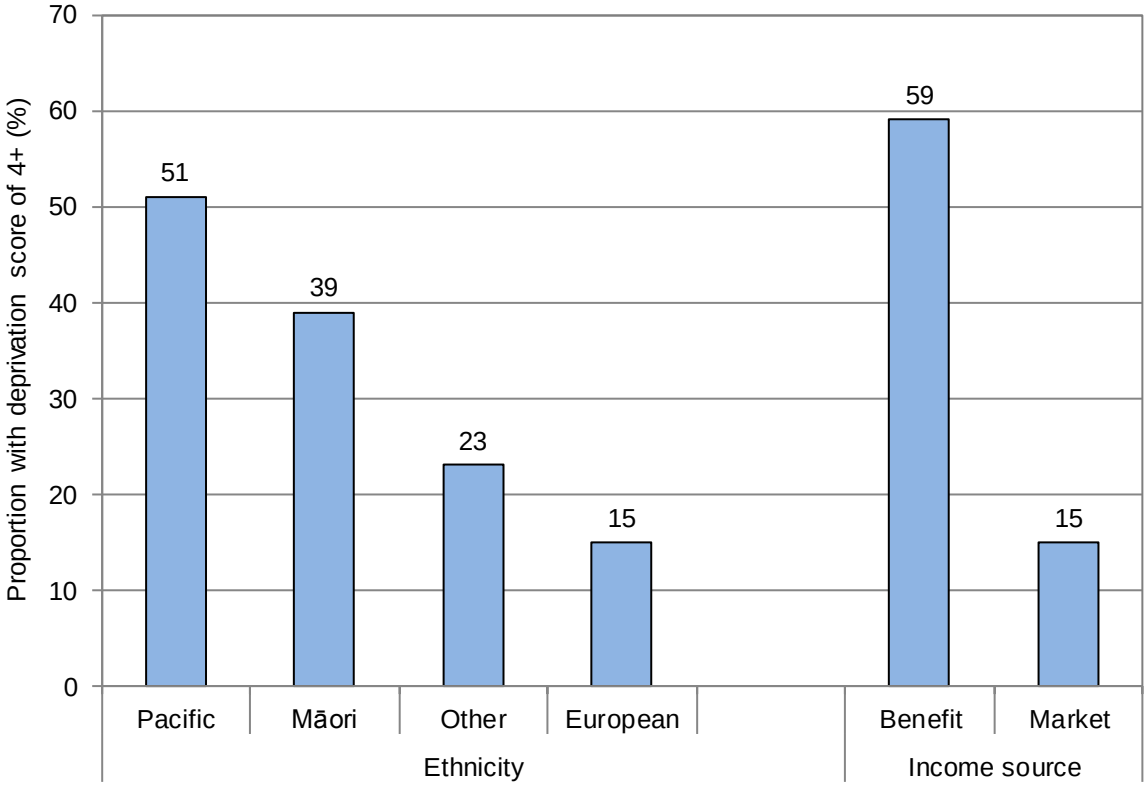
In the 2008 Living Standards Survey, 51% of Pacific children, 39% of Māori children, 23% of "Other" children and 15% of European children aged 0–17 years were in families experiencing material hardship (i.e. scored four or more on a composite deprivation index measuring a range of "enforced lacks", as outlined in the Methods box above). In addition, 59% of children whose family's income source was a benefit experienced material hardship (**Figure 11**).

Table 2. Restrictions experienced by children by the deprivation score of their family (DEP score), from the New Zealand Living Standards Survey 2008

	All[#]	DEP score (%)				
		0	1	2–3	4–5	6+
Distribution of children across the DEP scores (%)	**100**	**41**	**18**	**18**	**10**	**12**
Average number of children per family (n)		2.2	2.3	2.5	2.7	2.7
Enforced lacks of children's items (%)						
Friends to birthday party*	6	-	-	5	9	31
Waterproof coat	8	-	2	8	11	39
Separate bed	5	-	-	3	13	20
Separate bedrooms for children of opposite sex (10+ yr)*	8	2	3	6	14	24
All school uniform items required by the school	5	-	-	2	9	19
Economising 'a lot' on children's items to keep down costs to afford other basics						
Children continued to wear worn out shoes/clothes	8	-	-	5	15	39
Postponed child's visit to doctor	2	-	-	-	5	13
Did not pick up prescription for children	1	-	-	-	3	7
Unable to pay for school trip*	3	-	-	-	6	17
Went without music, dance, kapa haka, art etc*	9	2	4	8	18	37
Involvement in sport had to be limited*	8	-	4	6	17	32
Multiple deprivation						
4+ of the 11 children's items above	6	-	-	2	11	35
5+ of the 11 children's items above	4	-	-	-	7	29
6+ of the 11 children's items above	3	-	-	-	2	24
Children's serious health problems reported by respondent						
Serious health problems for child in the last year*	28	22	25	31	35	43
Enforced lacks reported by respondent in child's family						
Keep main rooms warm	9	-	3	8	18	37
Meal with meat/chicken/fish at least each second day	3	-	-	-	6	18
Cut back/did without fresh fruit and vegetables	14	-	-	15	32	63
Postponed visit to doctor	14	-	4	18	38	65
One week's holiday away from home in last year*	33	14	28	42	52	73
Home computer*	8	3	6	8	13	25
Internet access*	9	-	7	9	18	28
Housing and local community conditions						
Physical condition of house (poor/very poor)*	7	-	3	7	15	28
Major difficulty to keep house warm in winter	22	9	13	27	38	58
Dampness or mould (major problem)*	17	5	13	18	37	49
Crime or vandalism in the area (major problem)*	11	6	6	11	13	31

Source: NZ 2008 Living Standards Survey [7]; Note: Only those items mentioned in the Methods box are included in the calculation of DEP Scores. This table includes a number of additional child specific items (marked *) which were not included in the calculation of the DEP Index as they did not relate to all family types. These additional items have been included here in order to highlight the experiences of children living in households with differing experiences of material deprivation. [#] 'All' refers to all children aged 0–17 years

Figure 11. Proportion of children aged 0–17 years experiencing material hardship* by ethnicity and family income source, NZ Living Standards Survey 2008



Source: NZ 2008 Living Standards Survey [7]; Note: * Material hardship defined as scoring four or more "enforced lacks" on the material deprivation index as outlined in the Methods box; Ethnicity is total response

CHILD POVERTY: SEVERITY AND PERSISTENCE

The timing, duration and severity of poverty during childhood influence long term outcomes for children. In general, those experiencing poverty early or for prolonged periods have worse outcomes than those exposed to poverty only during adolescence, or for shorter periods of time [8,9]. Further, the duration of income poverty also influences the severity of material deprivation. The Statistics NZ's Survey of Family Income and Employment (SoFIE) indicates significant correlations between the length of time spent on a low income and levels of material deprivation [10].

In 2012 the Office of the Children's Commissioner's Expert Advisory Group on Child Poverty recommended that the Government monitor the severity and persistence of poverty for families with children [2]. Measures of poverty persistence and severity are much less developed than the headline income poverty and material deprivation measures. The Household Economic Survey (HES) provides data on a cross section of households showing poverty over time. However, different sets of households are included in each survey, so the lack of continuity means the survey cannot provide information on how many of the households who were poor in one survey are still poor in the subsequent survey [1].

A number of measures are available to assess the depth and severity of poverty but these are not updated regularly [1]:

- The ratio of the number below the 50% line to the number of those below the 60% line (the higher the ratio, the greater the depth of poverty)
- Median poverty gap ratio, defined as the ratio of the gap between the poverty threshold and the median income of those below the threshold with the threshold itself
- The total poverty gap that measures the total resources ($m) required to bring all those identified as poor to just above the poverty line via targeted tax transfers.

The quality of HES data for households with very low incomes is a concern, according to Perry, and may have a detrimental impact on the robustness of measures of poverty depth [1].

The Statistics NZ's longitudinal Survey of Family, Income and Employment (SoFIE) that ran between 2002 and 2009 has provided a range of reasonably robust measures of poverty persistence [1] but no further updates are planned.

Given their significant influence on long term outcomes for children, and despite the limitations in the data, poverty severity and persistence need to be monitored. In the absence of more robust measures, or in the case of persistent poverty more up to date data, the following sections present two proxy indicators that capture different aspects of the severity and duration of child poverty in New Zealand.

Poverty Severity

- The proportion of children living in households who were both income poor and experiencing material deprivation, as measured using HES data [1].
- The proportion of children living in households below the 50% income poverty threshold, as measured using HES data [1].

Poverty Persistence

- The proportion of children exposed to chronic low income, as measured using data from Statistics New Zealand's Longitudinal Survey of Families, Income and Employment (SoFIE) up until 2009 [1,11].

It is hoped that in time, these proxy indicators will be replaced by more robust measures, which better capture the severity and persistence of poverty for New Zealand children.

Poverty Severity

Data Source and Methods

Definitions

1. Proportion of children aged 0–17 years who are both income poor and materially disadvantaged

2. Proportion of children aged 0–17 years living below the 50% income poverty threshold before and after housing costs

Data Source

New Zealand Household Economic Survey (NZHES n=2,800–3,500 households per survey) via Perry 2014 [1]. Note: Child Poverty measures are reported on by the Ministry of Social Development using NZHES data with data being reported on 2-yearly from 1982–1998 and 3-yearly thereafter. Since 2007, income data have been reported annually using the new HES Incomes Survey. The full NZHES (including expenditure data), however, remains 3-yearly. For more detail on methodology see Perry 2014 [1].

Interpretation

The <50% relative poverty measure is based on a poverty benchmark (50% of the median income) that rises and falls with changes in national median incomes (i.e. poverty is defined in relation to the incomes of others in the same year).
For further detail see Perry 2014 [1].

Children in Income-poor Households Experiencing Material Hardship

One approach to assessing the severity of child poverty in the absence of more robust measures, is to identify children living in households that are both income poor and experiencing material hardship. Perry notes that living above the poverty threshold reduces the risk of material hardship, but does not remove it. Those in hardship with incomes above the poverty line may have some expectation of living standards improving. For those in hardship and who also have low incomes, there is little chance of an improvement unless their income increases and stays up [1].

Figure 12 shows the proportion of those who are both income poor and materially disadvantaged for the population as a whole and for households with children [1].

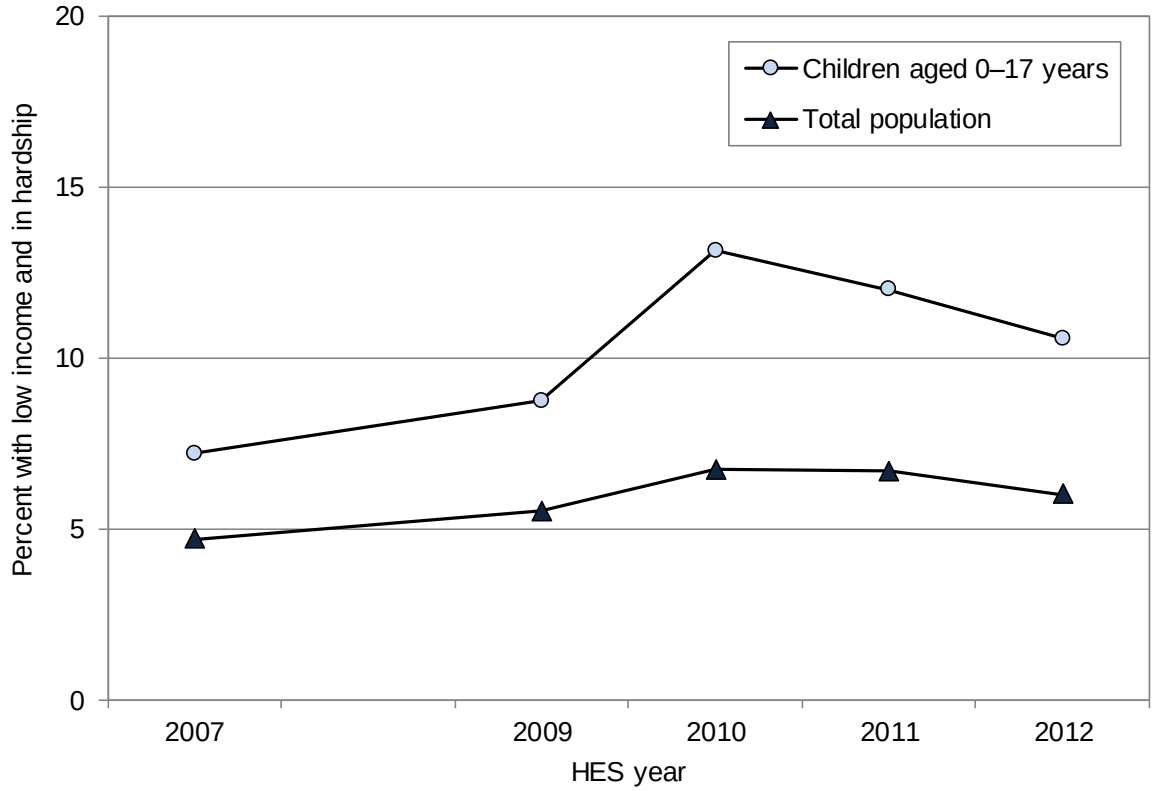
Children in Households with Incomes less than 50% of Contemporary Median

A second approach to assessing the severity of child poverty in the absence of more robust measures, is to select an income threshold lower than the traditional 60% cut-off. Where all else is the same, children in households with incomes below the 50% moving line threshold, will experience greater material disadvantage than those just below the 60% threshold.

Figure 13 reviews the proportion of children aged 0–17 years living in households with incomes below 50% of the contemporary median, before (BHC) and after (AHC) adjusting for housing costs. Using the <50% poverty measure, during the 1980s the proportion of children living in poverty was similar before and after adjusting for housing costs. However, from 1992 onwards, child poverty rates were much higher after adjusting for housing costs, with the most rapid rises in child poverty between 1990 and 1994 being seen when the AHC measure was used. While child poverty rates in 2012 were similar to those in the early 1980s using the BHC measure, when the AHC measure was used, rates remained much higher than those in the 1980s.

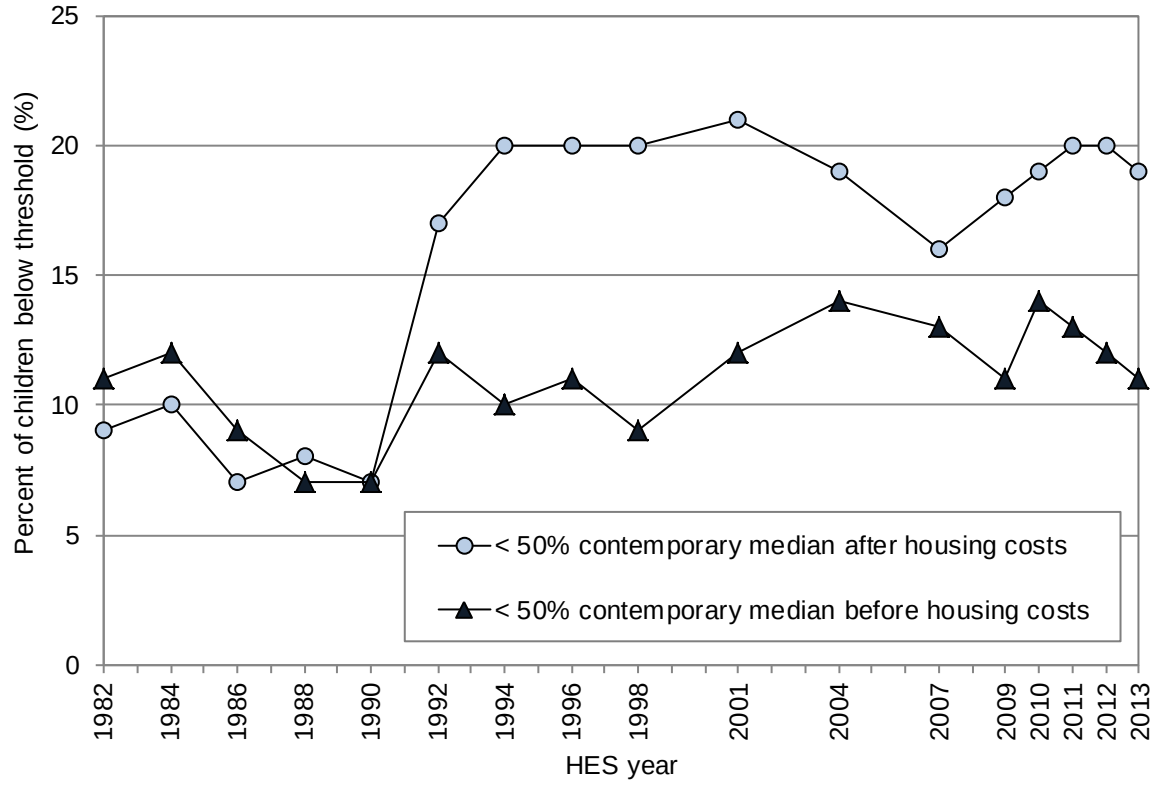
An increase in child poverty (<50% AHC measure) was also evident between 2007 and 2011. In 2012, 20% of children were living in severe poverty (**Figure 13**) with a slight drop to 19% in 2013.

Figure 12. Trends in the proportion of those who are both income poor and materially deprived, New Zealand 2007–2012 HES years



Source: Perry 2014 [1] derived from Statistics NZ Household Economic Survey (HES) 2007−2012

Figure 13. Proportion of dependent children aged 0–17 years living below the 50% of median income poverty threshold, New Zealand 1982–2013 HES years



Source: Perry 2014 [1] derived from Statistics NZ Household Economic Survey (HES) 1982−2013

Poverty Persistence

The child poverty measures in the previous section were based on data from the Household Economic Survey (HES), this survey samples a different set of households in each survey, so it is not possible to explore poverty persistence at the household level using HES data. However, Statistics NZ's Survey of Family, Income and Employment (SoFIE) that began in October 2002, followed the same group of individuals and has longitudinal data available for seven years, from 2002–03 to 2008–09 [1].

The following section uses SoFIE data to show the proportion of children who in 2002–03 were aged 0–17 years (living below 60% gross median threshold) or 0–11 years (living below the 50% gross median threshold) and who experienced persistent poverty (i.e. an average family income below the specified low income threshold) across the seven years.

Data Source and Methods

Definition

1. *Proportion of children aged 0–17 years (using 60% gross median threshold) in year one of Statistics New Zealand's Survey of Family, Income and Employment (SoFIE) who were exposed to persistent poverty*
2. *Proportion of children aged 0–11 years (using 50% gross median threshold) in year one of Statistics New Zealand's Survey of Family, Income and Employment (SoFIE) who were exposed to persistent poverty*

Data Source

Statistics New Zealand's Survey of Family, Income and Employment (SoFIE)
The information in this section is drawn from Perry's 2014 Household Incomes Report [1], which is based on the analysis of SoFIE data published by Carter and Imlach Gunasekara (2012) [11] and some otherwise unpublished data provided to Perry by Carter and Imlach Gunasekara.

Interpretation

The initial SoFIE sample in 2002–03 included around 11,500 households with almost 30,000 respondents (22,000 being aged 15+ years). In the final year of SoFIE (2008–09), just under 14,000 adults (aged 15+ years) were left. The overall attrition rate (63% remaining after seven years) is comparable to similar international longitudinal surveys. In this analysis, SoFIE participants who were eligible in the first year (2002−03) and who responded in all seven survey years have been included, giving a sample of just under 19,000.

Persistent Poverty: In this analysis, participants' average income over the seven years was compared with an average low income (poverty) line over the same period. People whose average income across all seven years was below the average low income (poverty) line were said to be in persistent poverty. As income was averaged across all seven years, participants may have been above the income poverty line in some years, but still classified as being in persistent poverty [1].

Current Poverty: Participants were considered to be in current poverty if they fell below the income poverty line for which ever survey year was under review [1].

Note: In this analysis the poverty benchmarks used are based on 50% and 60% of gross income. This is different to the benchmarks used in the earlier income poverty section which are based on 60% of disposable income. Perry [1] notes that the two 60% benchmarks are not comparable (due to differences in the methodology used), and that that where comparisons are required, that the 50% gross is the most appropriate, as it is closer to the usual poverty figures reported (60% median disposable income).

Proportion in Current and Persistent Income Poverty

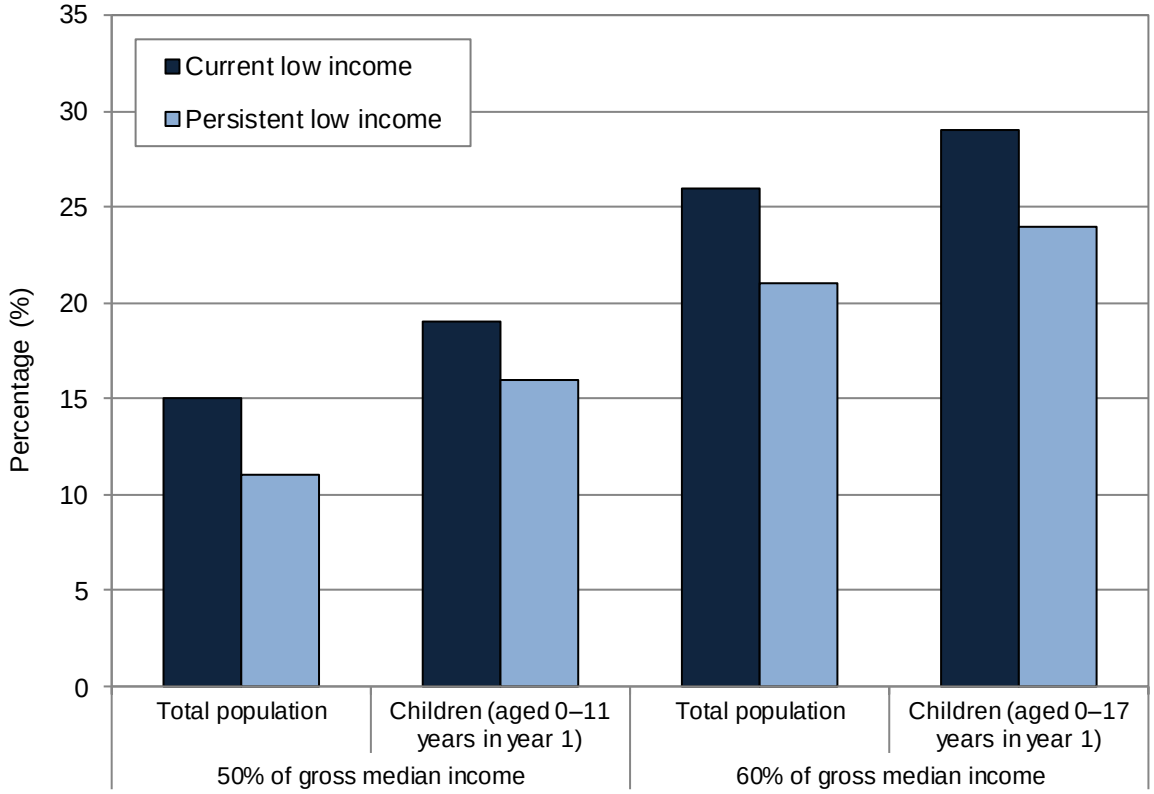
<60% Gross Median Threshold

Of the children who were aged 0–17 years in the first year of SoFIE (2002–03), 24% lived in households experiencing persistent poverty (i.e. an income which, when averaged across all seven years, was below 60% of the gross median) and 29% were deemed to be in current poverty (i.e. with an income below 60% of the gross in the year under review) (**Figure 14**). The reason for this difference is because in any given year, those in poverty comprise a mix of those who have transiently moved into poverty and moved out in later surveys, and those who were living in long term poverty.

<50% Gross Median Threshold

When the threshold used is 50% of the gross median income, 16% of children who were aged 0–11 years in the first year (2002–03) were deemed to be in persistent poverty and 19% in current poverty (**Figure 14**). Perry [1] notes that in any one year, 60% of those in current poverty were also in persistent poverty (using the 50% gross median threshold). There was also a further group of children who, although not in poverty in the current year, were in persistent poverty when their households' incomes were averaged over the seven survey years.

Figure 14. Proportion of children with current and persistent low incomes, Statistics New Zealand's Survey of Family, Income and Employment (SoFIE) 2002–2009



Source: Perry 2013 [12] derived from Statistics NZ's Survey of Family, Income and Employment 2002–2009

WIDER ECONOMIC CONTEXT

INCOME INEQUALITY

Introduction

Inequality and poverty are two different concepts. Perry describes them thus: “Inequality is essentially about the gap between the better off and those not so well off (on whatever measure) – it is about having ‘less than’ or ‘more than’. Poverty is about household resources being too low to meet basic needs – it is about ‘not having enough’ when assessed against a benchmark of ‘minimum acceptable standards’.” (Perry, 2014, p16.)

There has been much debate regarding the influence of income inequality on population health. The World Health Organization’s Commission on Social Determinants of Health noted that “the structural determinants and conditions of daily life constitute the social determinants of health and are responsible for a major part of health inequities between and within countries” [13]. Research has shown that people with higher socioeconomic position in society have more chance of experiencing better health. For example, Wilkinson and Marmot [14] cite the Whitehall studies of British civil servants that found that mortality increased in a stepwise manner as relative socioeconomic status decreased, and that social gradients were evident even amongst those who were not poor [14]. In addition, they note that while health inequalities exist within societies, there is little association between average income (as measured by GDP per capita) and life expectancy across rich countries. Rather, there appears to be a strong correlation between income inequality and mortality.

The authors of the Marmot Review “Fair Society, Healthy Lives” identified health inequalities as arising from inequalities of income, education, employment and neighbourhood circumstances. They argue that these inequalities are unfair but they are not inevitable [15]. The review does not present income inequalities as the only reason for health inequality but concurs with the view that income inequalities affect the lives people can lead [16]. For example, in England life expectancy in the poorest neighbourhoods is, on average, seven years less than in rich areas. In addition, people in the poorest areas are likely to have, on average, 17 fewer disability-free years than those in the richest neighbourhoods. Similar relationships can be found for indicators in education, occupation and housing conditions [15].

The following section explores income inequalities in New Zealand since 1982 using two different measures, the P80/P20 Ratio and the Gini Coefficient.

Definition

1. *Income inequality as measured by the P80/P20 Ratio*

2. *Income inequality as measured by the Gini Coefficient*

Data Source

Statistics New Zealand Household Economic Surveys (NZHES n=2,800–3,500 households per survey) via Perry 2014 [1]

Note 1: The P80/P20 Ratio and Gini coefficient are monitored by the Ministry of Social Development using NZHES data which was available 2-yearly from 1982 to 1998, and 3-yearly thereafter. Since 2007, income data has become available annually through the new NZHES Incomes Survey. The full NZHES (including expenditure data), however, remains 3-yearly. For more detail on the methodology used see Perry 2014[1].

Notes on Interpretation

P80/P20 Ratio: The P80/P20 ratio is often used as a measure of income inequality. It is calculated by ranking individuals by equivalised household income and dividing into 100 equal groups. Each group is called a percentile. If ranking starts with the lowest income, the income at the top of the 20th percentile is denoted P20 and the income at the top of the 80th percentile is called P80. The relationship between income value at the 80th percentile and the income value of the 20th percentile is called the P80/20 ratio. In general, the higher the ratio, the greater is the level of inequality [1] so a P80/20 ratio of 3.0 indicates that those at the top of the 80th percentile have incomes three times higher than those at the top of the 20th percentile.

Gini Coefficient: The Gini coefficient is another common measure of inequality used internationally. It gives a summary of income differences between individuals in the population. When the Gini coefficient = 0, all people have the same level of income. When it approaches 1, one person receives all the income. It is an overall measure of income inequality as the higher the value, the greater the level of inequality. The Gini coefficient is often reported as a percentage so scores range between 0 and 100. [17]. When comparing changes in income

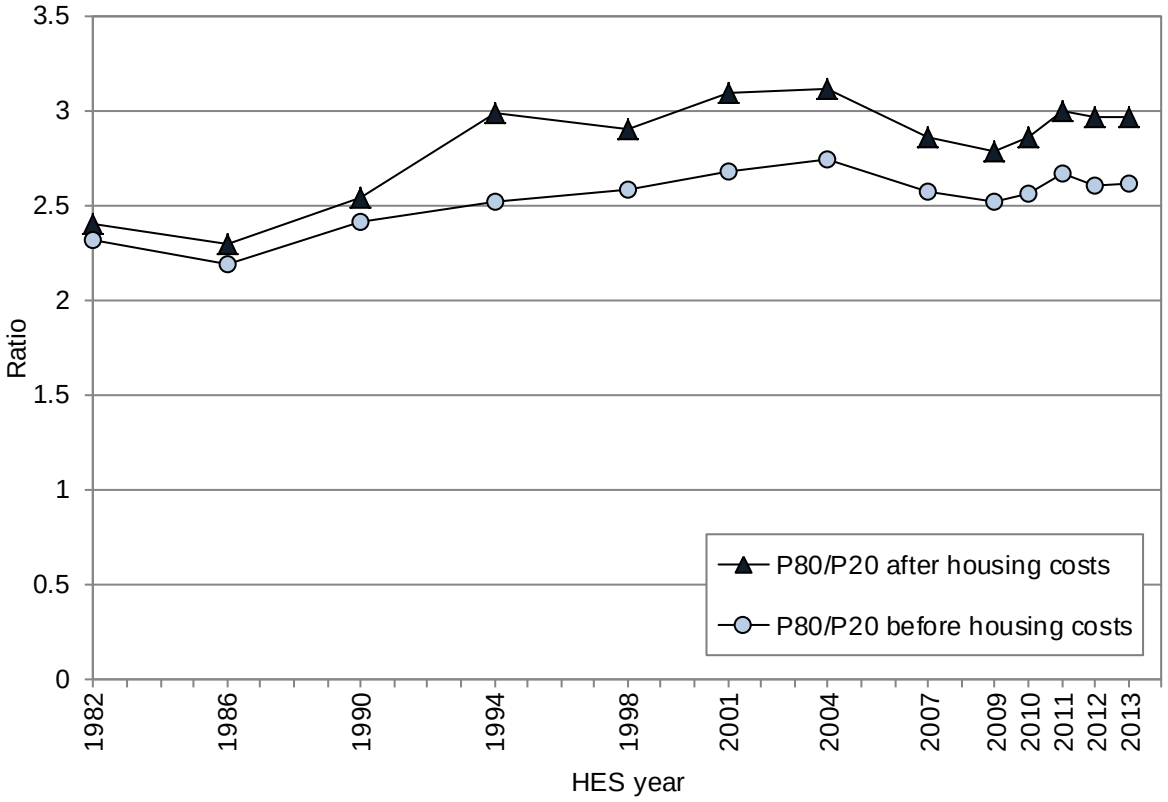
distributions over time, the Gini coefficient is more sensitive to changes in the more dense low-to-middle parts of the distribution, than it is to changes towards the ends of the distribution [1]. For more detail on calculating the Gini coefficient see The World Bank [18].

New Zealand Trends

Income Inequality: P80/P20 Ratio

In New Zealand during 1982–2013 income inequality, as measured by the P80/P20 ratio, was higher after adjusting for housing costs than before housing costs. Housing costs generally make up a greater proportion of household income for households on lower incomes than those on higher incomes. The most rapid rises in income inequality occurred during 1988–1992. While income inequality also rose during 1994–2004, the overall rate of increase was slower. During 2004–2007, income inequality fell, a decline that Perry attributes to the Working for Families package. The impact of the economic downturn and global financial crisis during 2009–2011 led to an increase in inequality, although Perry notes that it may take one or two further surveys before the post-crisis inequality level becomes clear [1] (**Figure 15**).

Figure 15. Income inequality in New Zealand as assessed by the P80/P20 ratio for the 1982–2013 HES years

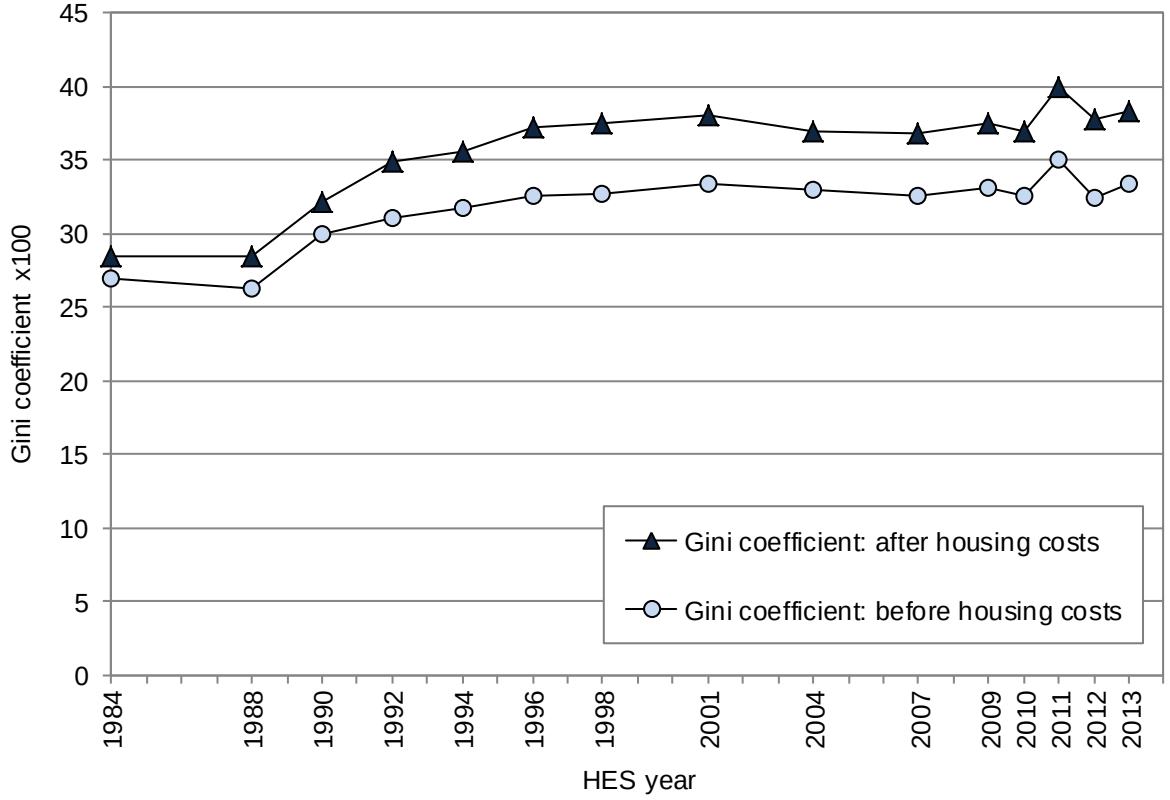


Source: Perry 2014 [1], derived from Statistics NZ Household Economic Survey (HES) 1982−2013

Income Inequality: Gini Coefficient

In New Zealand during 1984–2013 income inequality, as measured by the Gini coefficient, was higher after adjusting for housing costs, for the same reasons as given above. The most rapid rises in income inequality also occurred between the late 1980s and early 1990s. Using both the before and after housing cost measures, the Gini Coefficient declined slightly between 2001 and 2007, a decline which Perry attributes to improving employment and the impact of the Working for Families package. During 2009–2013, however, there was considerable volatility in the Gini coefficient, which Perry attributes to the differing size and timing of the impact of the global financial crisis, Christchurch earthquakes and the associated economic downturn and recovery on different parts of the income distribution. While Perry notes it may take one or two more surveys to see where the inequality trend will settle, he also notes that the overall trend line for this period was flat [1] (**Figure 16**).

Figure 16. Income inequality in New Zealand as assessed by the Gini Coefficient for the 1984–2013 HES years



Source: Perry 2014 [1] derived from Statistics NZ Household Economic Survey (HES) 1984−2013

HOUSING

Introduction

The association between poor housing and poor health is well established [19]. The focus of this chapter is on two key aspects of housing that adversely affect child wellbeing: household crowding and housing affordability. These are not unrelated. In New Zealand there are socioeconomic and ethnic disparities in access to healthy housing [20]. A recent report found that some children in New Zealand are "exposed to housing in poor condition, housing that is unaffordable, housing that has insecure tenure and households that are crowded" [21].

Household crowding has been associated with a number of factors that adversely affect children including respiratory illness, the spread of communicable diseases, mental health problems, strained household relationships and an increased risk of physical injury [22]. Other housing characteristics that can affect the wellbeing of children include: housing insecurity and frequent moves, which may result in long-term mental health problems, behaviour problems, and under-achievement at school; and cold and damp which are associated with respiratory conditions, poor infant weight gain and increased hospital admissions [22]. High housing costs can increase families' financial stress and leave little or no resources for buying other necessities such as food [1].

The following sections use data from the NZ Censuses to review the proportion of children who live in crowded households, and data from the NZ Household Economic Survey to review the proportion of households that spend more than 30% of their income on housing costs.

Household Crowding

Introduction

Household crowding was identified as a health issue in New Zealand in the 1920s, when census data were used to identify the proportion of New Zealanders for whom the household composition challenged "health and decency" [23]. Evidence from recent research suggests that living in a crowded household in childhood may negatively affect aspects of health in adulthood [22].

In New Zealand, household crowding has been linked to meningococcal disease and acute rheumatic fever in children [24,25]. Internationally, research has suggested correlations between crowding and tuberculosis, respiratory infections, hepatitis B and other enteric disease, conjunctivitis, and poor mental health outcomes [26]. Proposed mechanisms for these associations include closer, more prolonged and increased frequency of contact between children and people with infectious diseases, and increased exposure to second-hand tobacco smoke [26].

Crowding is more common among low-income households, households in rental accommodation (particularly state owned rental accommodation), younger households, single parent households, households with more dependent children, and households that include two or more families [20]. Māori and Pacific people are more likely than NZ Europeans to live in rental properties, and home ownership declined more substantially for Māori and Pacific peoples than for NZ Europeans between 1991 and 2006 [27]. Research suggests that rental accommodation tends to be of lower quality than owner-occupied homes, and more likely to lack insulation and to be prone to damp and mould [28].

The following section uses data from the 2001, 2006 and 2013 Censuses to review the proportion of children living in crowded households.

Data Source and Methods

Indicator

The proportion of children aged 0–14 years living in crowded households, as defined by Statistics New Zealand, using the Canadian National Occupancy Standard

Numerator: The number of children aged 0–14 years living in households which required one or more additional bedrooms.

Denominator: The total number of children aged 0–14 years living in households at the Census for whom crowding status was known.

Data Source
Census

Notes on Interpretation
Note 1: Information is for the usual resident population and relates to the household crowding status of individual children. Thus the number of children reported on will be greater than the number of households on Census night (e.g. two children from the same household will be counted twice in these statistics).

Note 2: The Canadian National Occupancy Standard (CNOS) definitions were developed in Canada in the 1980s to enable the calculation of person-to-bedroom ratios for households of differing sizes and compositions [29]. Using the CNOS, Statistics New Zealand defines household crowding as a deficit of at least one bedroom according to the standard of: no more than two people per bedroom; couples can share a room; children under 5 of either gender or under 18 years of the same gender can share a room; children aged 5 to 17 years should not share a room with a child under 5 of the opposite gender; single adults and unpaired children should have a separate room [29].

The CNOS was used in the 2001, 2006 and 2013 NZ censuses, and households were reported as having two plus, one or no bedrooms spare, or as requiring an additional one, or two plus bedrooms. Households needing one or two plus additional bedrooms are deemed to be crowded [29].

Note 3: The NZ Deprivation Index uses household crowding as one of the nine variables to create its Deprivation Scores. Household crowding can therefore be expected to exhibit a social gradient by NZDep. However, it is the degree of the crowding experienced by children in each NZDep decile which is likely to have the greatest impact on their housing related health outcomes.

New Zealand Distribution and Trends

Distribution by household bedroom requirements

At the 2013 Census, 16.6% of New Zealand children aged 0–14 years lived in households with two or more spare bedrooms, while 35.8% lived in households with one spare bedroom. A further 10.7% lived in households requiring one additional bedroom, while 5.1% lived in households requiring two or more additional bedrooms (**Figure 17**).

New Zealand Trends

The proportion of New Zealand children living in crowded households (i.e. households requiring one or more additional bedrooms) did not change markedly between Censuses. It was 16.2% in 2001, 16.4% in 2006 and 15.8% in 2013 (**Figure 18**).

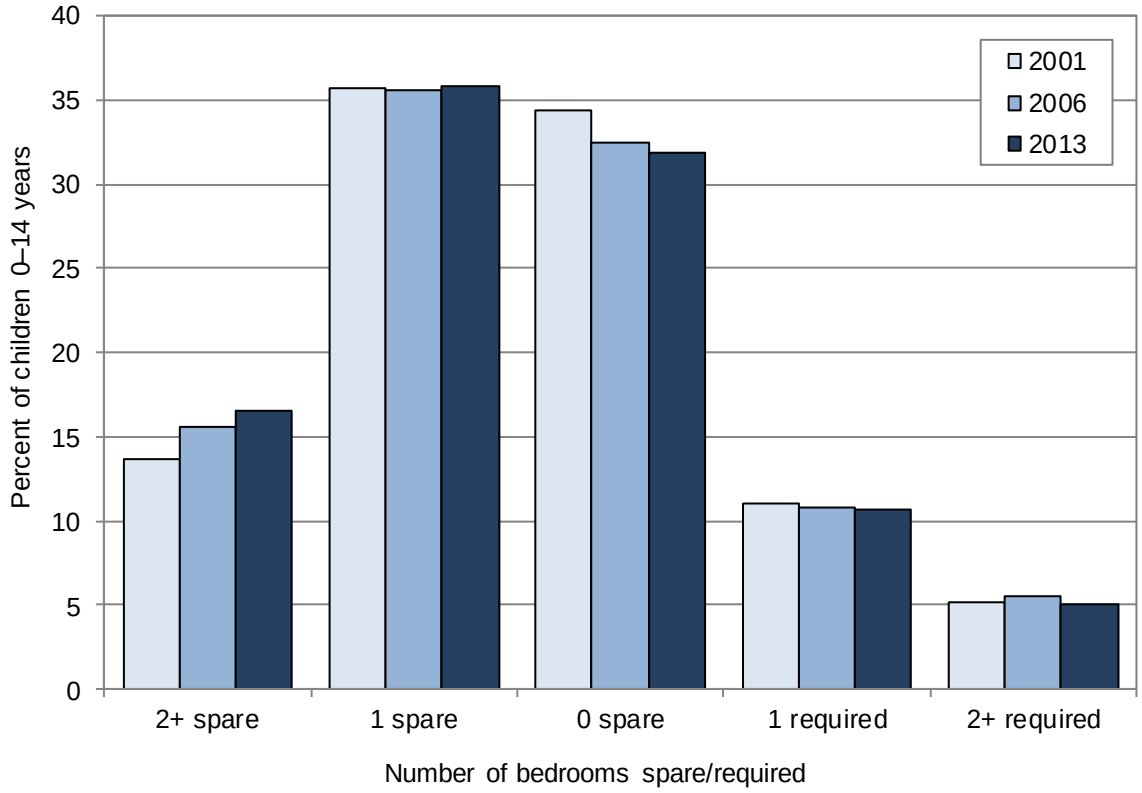
Distribution by Ethnicity

At the 2013 Census, 24.8% of Māori and 46.8% of Pacific children lived in crowded households, compared to 20.8% of Asian/Indian and 4.8% of European children. Household crowding rates for Pacific, Māori and Asian/Indian children were *significantly higher* than for European children (**Figure 18**). Household crowding rates for children of all ethnic groups declined slightly between 2001 and 2013.

Distribution by NZ Deprivation Index Decile

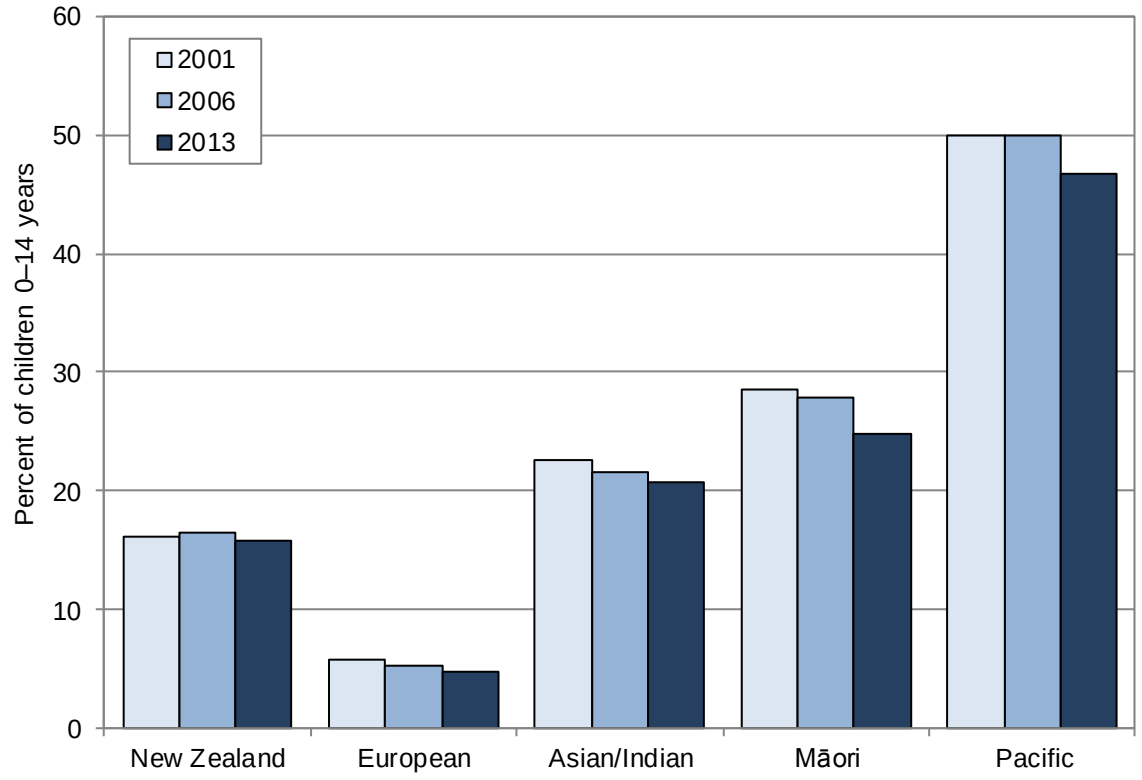
At the 2013 Census, the proportion of children living in crowded households increased with increasing deprivation, from 2.1% for those in the least deprived areas (NZDep decile 1) to 42.8% for those in the most deprived areas (NZDep decile 10). Crowding rates for children in the areas with the most deprived NZDep scores were over 20 times higher than for children in the least deprived areas (**Figure 19**, **Table 3***)*. See Note 3 in Methods box for further interpretation.

Figure 17. Proportion of children aged 0–14 years by the number of bedrooms spare or required in their household, New Zealand at the 2001, 2006 and 2013 Censuses



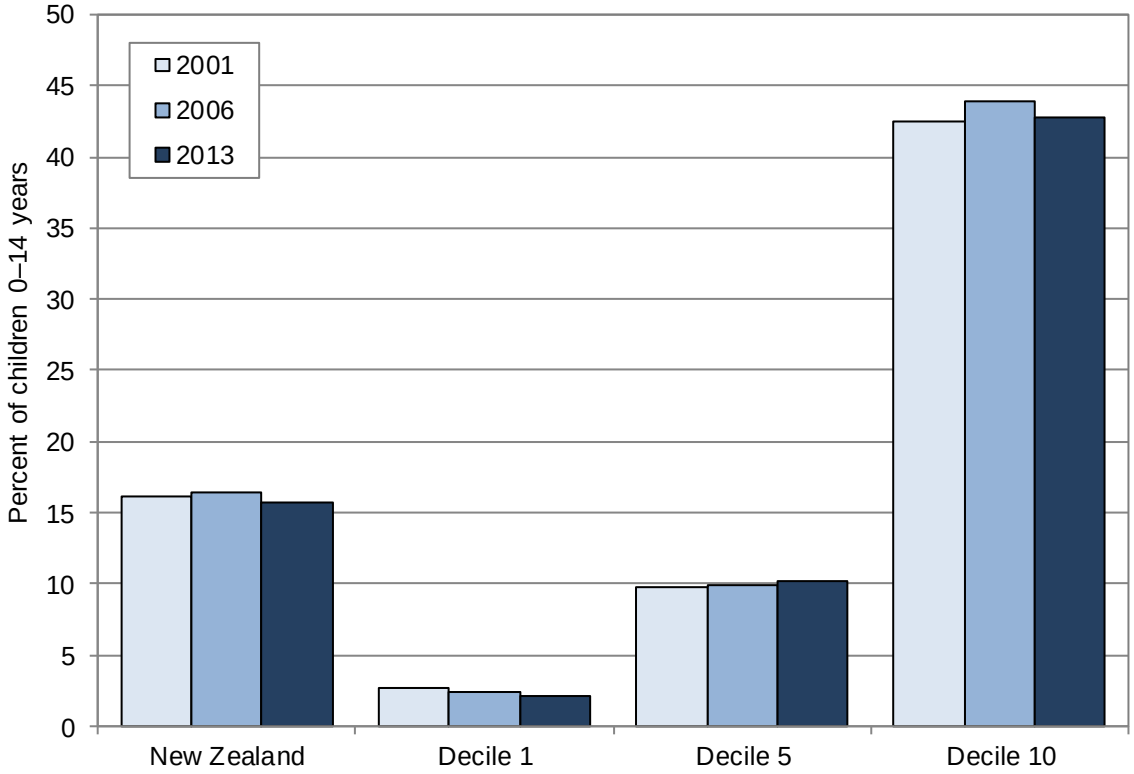
Source: Statistics New Zealand; Note: Measure is the Canadian National Occupancy Standard

Figure 18. Proportion of children aged 0–14 years living in crowded households by ethnicity, New Zealand at the 2001, 2006 and 2013 Censuses



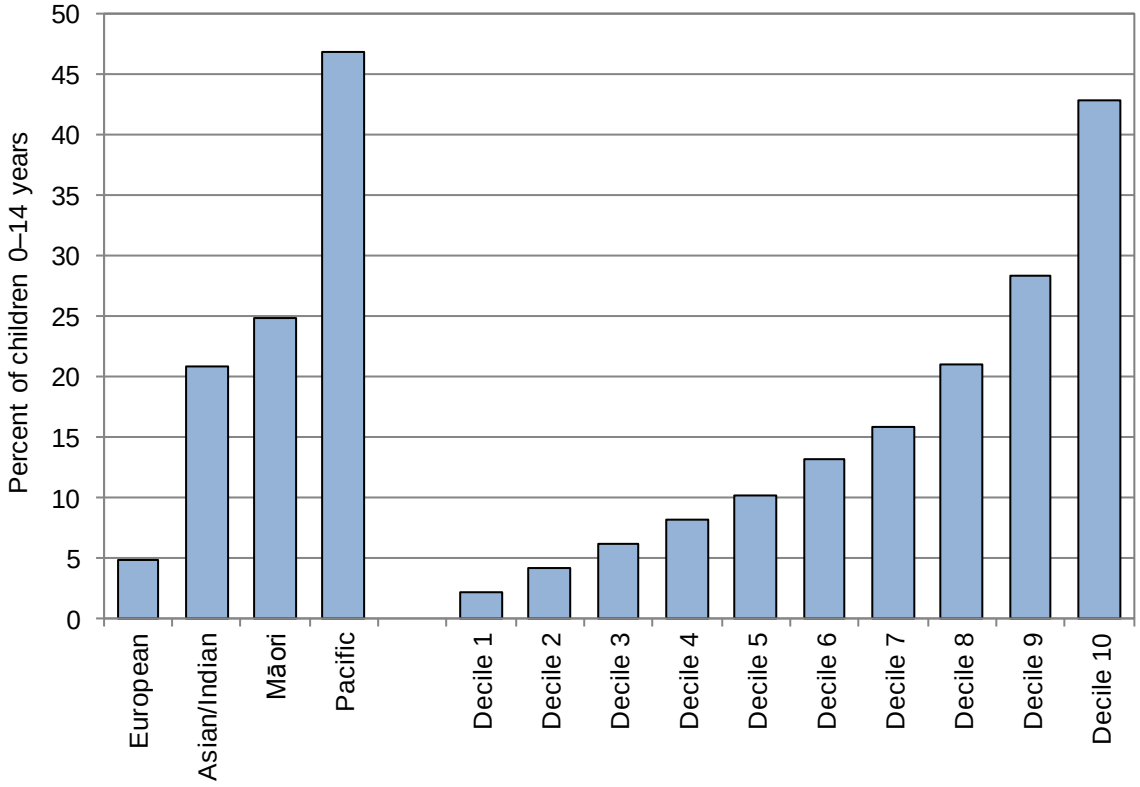
Source: Statistics New Zealand; Note: Ethnicity is level 1 prioritised

Figure 19. Proportion of children aged 0–14 years living in crowded households by NZ Deprivation Index decile, New Zealand at the 2001, 2006 and 2013 Censuses



Source: Statistics New Zealand; Note: See Note 3 in Methods box for further interpretation

Figure 20. Proportion of children aged 0–14 years living in crowded households by ethnicity and NZ Deprivation Index decile, New Zealand at the 2013 Census



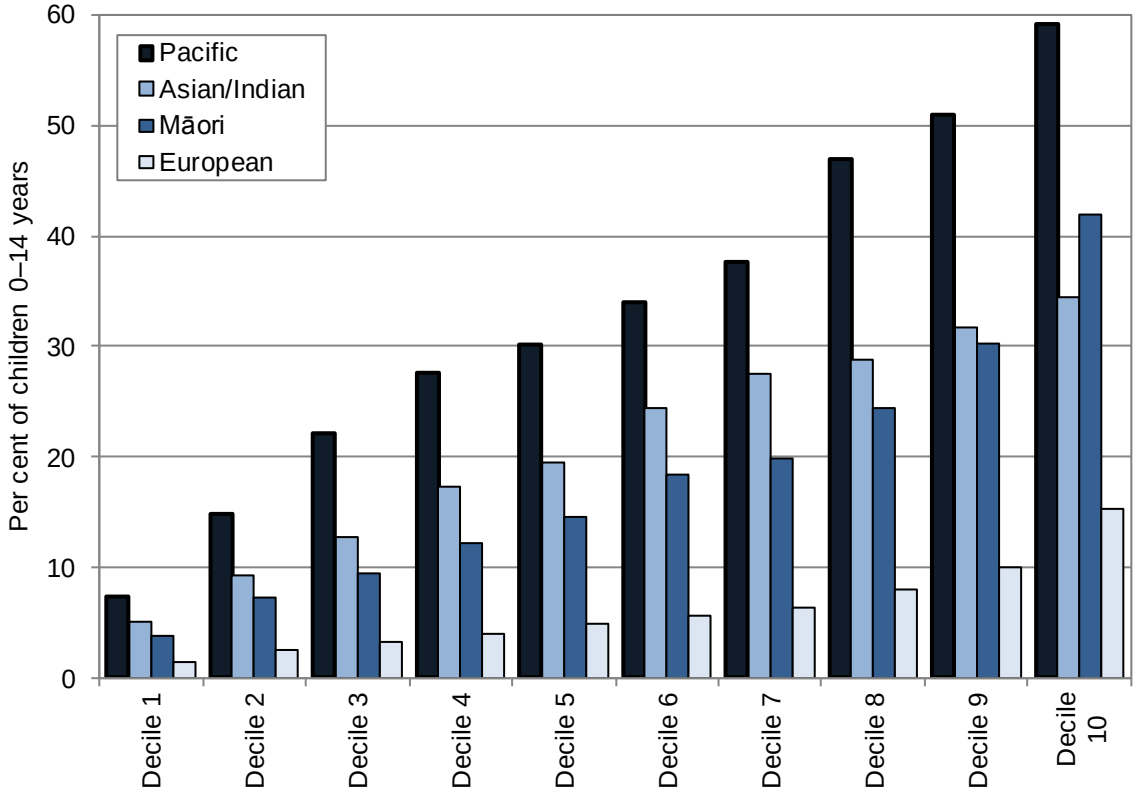
Source: Statistics New Zealand; Note: Ethnicity is level 1 prioritised; decile is NZDep13; See Note 3 in Methods box for further interpretation

Table 3. Proportion of children aged 0–14 years living in crowded households by ethnicity and NZ Deprivation Index decile, New Zealand at the 2013 Census

	Number of children	Percent of children	Rate ratio	95% CI
Ethnicity				
Māori	47,724	24.8	5.21	5.13–5.29
Pacific	33,576	46.8	9.85	9.70–10.01
Asian/Indian	17,919	20.8	4.37	4.29–4.46
European	19,839	4.8	1.00	
NZ deprivation index decile				
Decile 1	1,806	2.1	1.00	
Decile 2	3,423	4.2	1.97	1.86–2.09
Decile 3	4,734	6.0	2.86	2.71–3.01
Decile 4	6,267	8.2	3.87	3.67–4.07
Decile 5	7,671	10.1	4.80	4.56–5.05
Decile 6	9,744	13.1	6.18	5.89–6.50
Decile 7	11,613	15.8	7.47	7.12–7.85
Decile 8	15,858	21.0	9.94	9.47–10.42
Decile 9	23,373	28.3	13.38	12.77–14.03
Decile 10	42,078	42.8	20.26	19.35–21.22

Source: Statistics New Zealand; Note: Ethnicity is level 1 prioritised; decile is NZDep13; See Note 3 in Methods box for further interpretation

Figure 21. Proportion of children aged 0–14 years living in crowded households by ethnicity and NZ Deprivation Index decile, New Zealand at the 2013 Census



Source: Statistics New Zealand; Note: Ethnicity is level 1 prioritised; decile is NZDep13; See Note 3 in Methods box for further interpretation

Distribution by Ethnicity and NZ Deprivation Index Decile

At the 2013 Census, the proportion of children living in crowded households increased with increasing NZDep13 deprivation within each of New Zealand's largest ethnic groups. At each level of NZDep13 deprivation, the proportion of children living in crowded households was highest for Pacific children, followed by Māori and then European children. Asian/Indian children had higher exposures to household crowding than European children in each NZDep13 Index decile, as well as higher exposures than Māori children in NZDep13 deciles 1–8. In the most deprived areas (NZDep13 decile 10), however, Māori children had higher exposures to household crowding than Asian/Indian children (**Figure 21**).

Distribution by Territorial Local Authority

At the 2013 Census, the proportion of children living in crowded households varied by Territorial Local Authority from 4.0% in Selwyn District to 29.1% in Opotiki District. The largest number of children living in crowded households (n=61,272) resided in the Auckland Region (**Table 4**, **Table 5**).

Table 4. Proportion of South Island children aged 0–14 years living in crowded households by Territorial Local Authority, New Zealand at the 2013 Census

Territorial Local Authority	Number of children	Percent of children	Rate ratio	95% CI
South Island children 0–14 years living in crowded households				
Tasman District	597	6.7	0.42	0.39–0.46
Nelson City	750	9.0	0.57	0.53–0.61
Marlborough District	594	8.1	0.52	0.48–0.56
Kaikoura District	54	9.6	0.61	0.47–0.78
Buller District	177	9.9	0.63	0.55–0.72
Grey District	144	6.6	0.42	0.36–0.49
Westland District	102	7.3	0.46	0.38–0.56
Hurunui District	132	6.4	0.40	0.34–0.48
Waimakariri District	666	6.9	0.44	0.41–0.47
Christchurch City	6,240	11.1	0.70	0.69–0.72
Selwyn District	378	4.0	0.25	0.23–0.28
Ashburton District	540	8.9	0.56	0.52–0.61
Timaru District	483	6.4	0.41	0.37–0.44
Mackenzie District	33	4.5	0.28	0.20–0.40
Waimate District	75	6.1	0.38	0.31–0.48
Chatham Islands Territory	9	9.1	0.58	0.31–1.07
Waitaki District	318	8.9	0.57	0.51–0.63
Central Otago District	141	4.8	0.31	0.26–0.36
Queenstown-Lakes District	261	5.4	0.34	0.30–0.38
Dunedin City	1,140	6.3	0.40	0.38–0.42
Clutha District	177	5.4	0.34	0.30–0.40
Gore District	129	5.7	0.36	0.31–0.43
Invercargill City	819	8.5	0.54	0.51–0.58
New Zealand	126,603	15.8	1.00	

Source: Statistics New Zealand

Table 5. Proportion of North Island children aged 0–14 years living in crowded households by Territorial Local Authority, New Zealand at the 2013 Census

Territorial Local Authority	Number of children	Percent of children	Rate ratio	95% CI	Territorial Local Authority	Number of children	Percent of children	Rate ratio	95% CI
North Island children 0–14 years living in crowded households									
Far North District	2,757	25.1	1.59	1.54–1.64	Hastings District	2,862	18.8	1.19	1.15–1.23
Whangarei District	2,214	14.7	0.93	0.90–0.97	Napier City	1,548	14.4	0.91	0.87–0.95
Kaipara District	474	13.5	0.85	0.78–0.93	Central Hawke's Bay District	225	9.2	0.58	0.52–0.66
Auckland	61,272	22.3	1.42	1.40–1.43	New Plymouth District	1,254	8.8	0.56	0.53–0.59
Thames-Coromandel District	495	12.4	0.79	0.72–0.85	Stratford District	120	6.5	0.42	0.35–0.49
Hauraki District	417	12.7	0.81	0.74–0.88	South Taranaki District	582	10.5	0.67	0.62–0.72
Waikato District	1,989	14.2	0.90	0.87–0.94	Ruapehu District	519	20.8	1.32	1.22–1.42
Matamata-Piako District	786	12.2	0.77	0.72–0.83	Wanganui District	1,071	13.6	0.86	0.81–0.91
Hamilton City	4,599	16.2	1.03	1.00–1.06	Rangitikei District	381	13.8	0.87	0.80–0.96
Waipa District	660	7.1	0.45	0.42–0.48	Manawatu District	420	7.7	0.49	0.45–0.54
Otorohanga District	231	11.6	0.74	0.65–0.83	Palmerston North City	1,668	11.1	0.71	0.68–0.74
South Waikato District	936	19.5	1.24	1.17–1.31	Tararua District	279	8.2	0.52	0.46–0.58
Waitomo District	426	21.7	1.38	1.27–1.50	Horowhenua District	894	16.7	1.06	1.00–1.12
Taupo District	933	14.4	0.91	0.86–0.97	Kapiti Coast District	723	8.5	0.54	0.50–0.58
Western Bay of Plenty District	1,143	14.1	0.89	0.85–0.94	Porirua City	2,511	21.8	1.38	1.33–1.43
Tauranga City	2,460	11.0	0.70	0.67–0.73	Upper Hutt City	786	10.2	0.65	0.61–0.69
Rotorua District	2,493	18.3	1.16	1.12–1.20	Lower Hutt City	3,276	16.8	1.07	1.03–1.10
Whakatane District	1,515	21.8	1.38	1.32–1.45	Wellington City	3,039	9.8	0.62	0.60–0.64
Kawerau District	396	27.4	1.74	1.60–1.89	Masterton District	471	10.9	0.69	0.64–0.75
Opotiki District	486	29.1	1.84	1.71–1.99	Carterton District	105	6.8	0.43	0.36–0.52
Gisborne District	2,301	23.6	1.50	1.44–1.55	South Wairarapa District	114	6.5	0.41	0.35–0.49
Wairoa District	462	26.5	1.68	1.55–1.81	New Zealand	126,603	15.8	1.00	

Source: Statistics New Zealand

Housing Affordability

Introduction

High housing costs relative to income are often associated with financial stress, particularly for lower income households. Meeting housing costs can leave lower income households with insufficient money to cover other basic needs such as food, clothing, transport, medical care and education [1].

When a household spends more than 30% of its income on housing it is said to have a high 'outgoings-to-income' ratio (OTI) [1]. In 1988, around 11% of New Zealand households had an OTI of >30%, and this had increased to 22–24% by the late 1990s–early 2000s, and to 27% during 2009–2013 [1]. Factors contributing to increases in housing costs during the early 1990s included the introduction of 'market rates' for State houses and the Accommodation Supplement ('market rates' were repealed in 2000) [30]. During the 2000s, house prices increased rapidly, driven in part by relatively low interest rates, strong population growth (including net migration inflows), the Canterbury earthquakes, and land supply constraints, particularly in Auckland [31]. A 2012 review by the Productivity Commission found that problems with achieving scale in new house construction and inefficiencies, costs and delays in regulatory processes also contributed to high housing costs. The Commission also noted that the current approach to social housing did not provide sufficient support for many New Zealanders in need [31].

The following section use data from the NZ Household Economic Survey to review the proportion of households spending more than 30% of their income on housing costs.

Data Source and Methods

Definition

1. *Proportion of households spending more than 30% of their income on housing costs by income quintile*
2. *Proportion of individuals in households spending more than 30% of their income on housing costs by age*
3. *Housing costs as a proportion of income for Accommodation Supplement recipients*

Data Source

New Zealand Household Economic Survey (NZHES n=2,800–3,500 households per survey) via Perry 2014 [1]. Note: Housing cost measures are reported on by the Ministry of Social Development using NZHES data [1]. Cost measures were reported 2-yearly from 1988–1998, and 3-yearly thereafter. Since 2007, income data have been reported annually through the new HES Incomes Survey. The full NZHES (including expenditure data) remains 3-yearly. For more detail on methodology see Perry 2014 [1].

Interpretation

Note 1: Housing costs include all mortgage outgoings (principal and interest) together with rent and rates for all household members. Repairs, maintenance and dwelling insurance are not included. Any housing-related cash assistance from the Government (e.g. Accommodation Supplement) is included in household income [1].

Note 2: Variations in housing costs do not necessarily correspond to similar variations in housing quality. This is because many older individuals live in high quality housing but have relatively low housing costs as they have paid off their mortgages. In contrast, many younger households may live in housing of a similar quality but have relatively high housing costs, as a result of mortgage or rental payments [1].

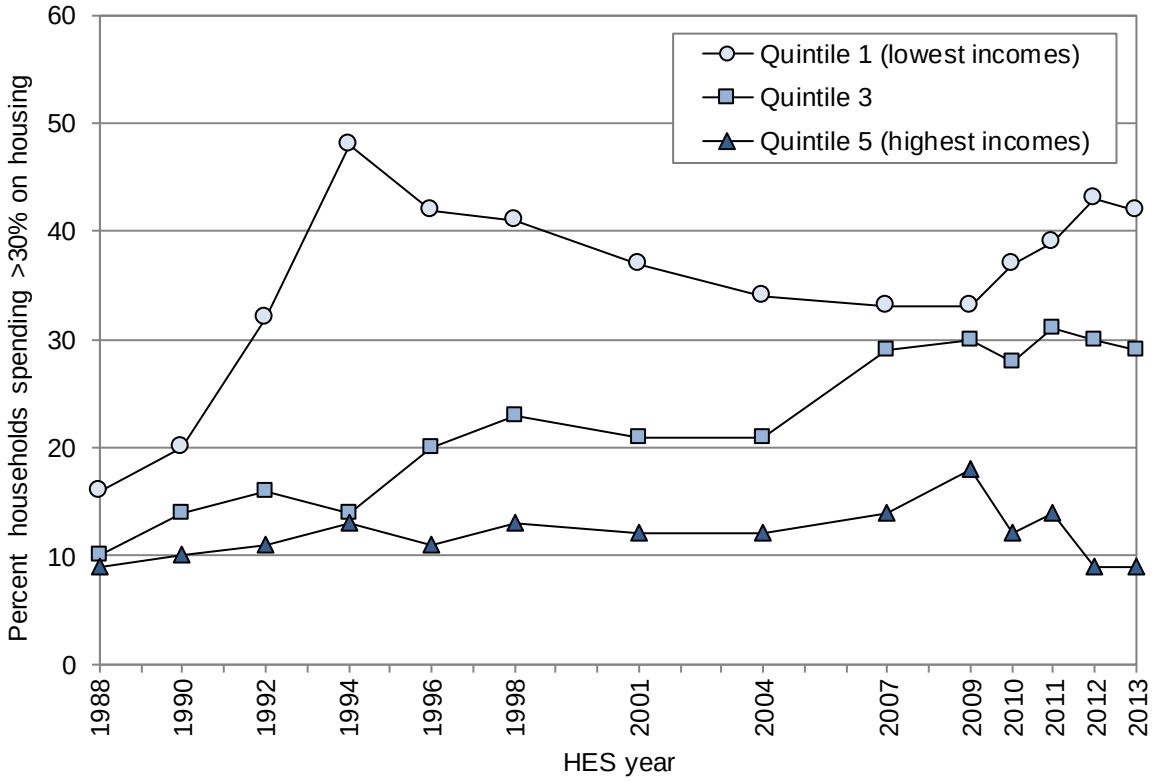
Note 3: When a household spends more than 30% of its income on accommodation (rent, mortgage outgoings, rates) it is said to have a high 'outgoings-to-income' ratio or OTI [1].

Distribution by Income Quintile

In New Zealand during 1988–2013, the highest proportion of households spending more than 30% of their income on housing costs was in the lowest income quintile (quintile 1). For this lowest income group, the proportion spending more than 30% of their income on housing increased from 16% in 1988, to 48% in 1994, probably as a result of high unemployment and the introduction of market rates for State houses and the accompanying Accommodation Supplement [30]. Over the next decade, the proportion of the lowest income households spending more than 30% of their income on housing fell steadily, reaching 34% by 2004. Perry attributes these declines to falling unemployment, rising incomes, and the re-introduction (in 2000) of income-related rents for State houses [1]. The proportion of quintile 1 households spending more than 30% of their incomes on

housing then remained reasonably static between 2004 and 2009, before increasing again, to 42% in 2013 (**Figure 22**). In contrast the proportion of households in income quintiles 3 and 5 who spent more than 30% of their incomes on housing did not increase as markedly during the early 1990s. However, the proportion of quintile 3 households spending more than 30% of their incomes on housing did increase from 21% in 2004 to 31% in 2011 (**Figure 22**).

Figure 22. Proportion of households spending more than 30% of their income on housing costs by income quintile, New Zealand 1988–2013 HES years



Source: Perry 2014 [1], derived from Statistics NZ Household Economic Survey (HES) 1988−2013

Perry noted a similar pattern among low income households with children. In 1988, the proportion of low income households with children spending over 30% of their income on housing costs was very similar to all households (17%) but in 1994 this proportion peaked at 52% and in 2007 the proportion had dropped to 39% [1].

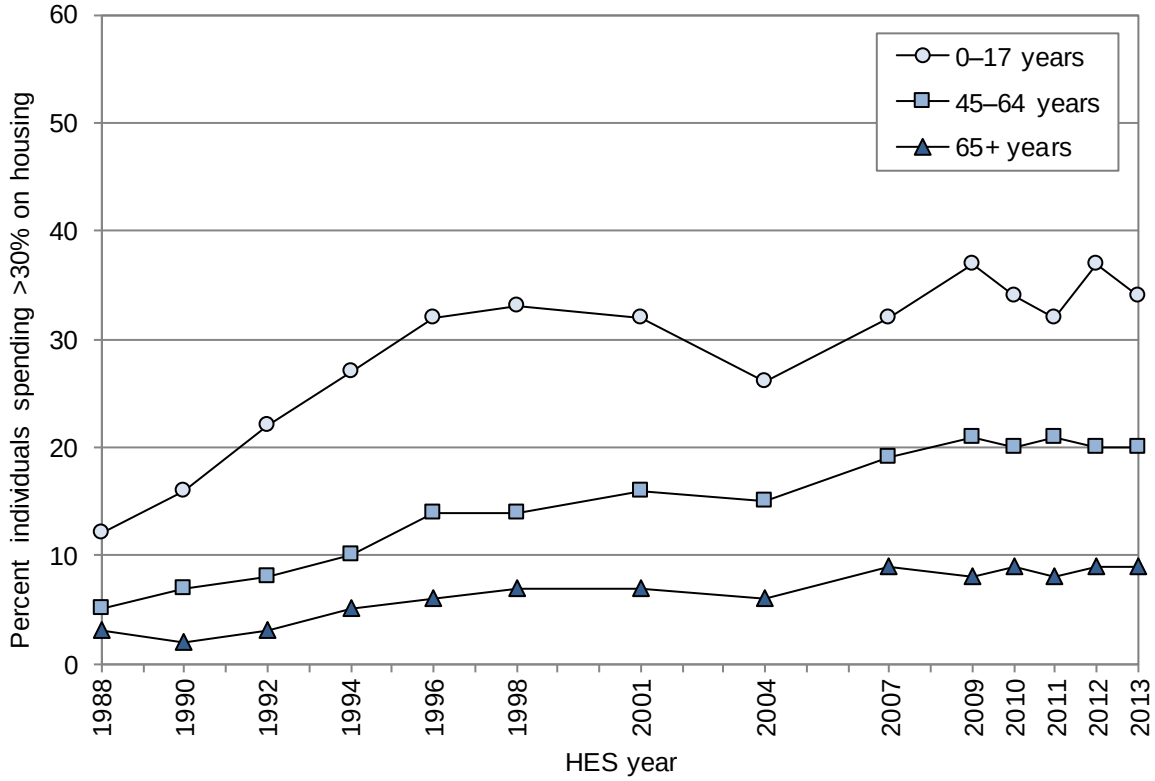
Distribution by Age

In New Zealand during 1988–2013, the 0–17 year age group had one of the highest proportions of individuals living in households spending more than 30% of their income on housing costs. Similarly high proportions (rates not shown due to significant overlap) were seen for individuals aged 18–24 and 25–44 years (Note: It is likely a number of adults in these age groups were parents, living in the same households as those aged 0–17 years). In contrast, those aged 65+ years had the lowest proportion of individuals living in households spending more than 30% of their income on housing costs (**Figure 23**).

Housing costs for Accommodation Supplement recipients

In New Zealand during 2013, 94% of Accommodation Supplement recipients who were in rental accommodation spent more than 30% of their income on housing, with 48% spending more than 50% of their incomes on housing. Similarly 92% of sole parents with one child receiving the Accommodation Supplement spent more than 30% of their income on housing, with 42% spending more than 50% of their incomes on housing Table 6. Housing costs as a proportion of income for accommodation supplement recipients by household type, New Zealand 2013 HES year (**Table 6**).

Figure 23. Proportion of individuals in households spending more than 30% of their income on housing costs for selected age groups*, New Zealand 1988–2013 HES years



Source: Perry 2014 [1], derived from Statistics NZ Household Economic Survey (HES) 1988−2013; Note: *Rates for those aged 18–24 and 25–44 years were very similar to those aged 0–17 years

Table 6. Housing costs as a proportion of income for accommodation supplement recipients by household type, New Zealand 2013 HES year

Household type	Group as % of those receiving accommodation supplement*	Housing costs as a proportion of income		
		>30%	>40%	>50%
All	100	92	67	40
Renters	66	94	75	48
Single adult	52	93	71	45
Two parent with dependent children	9	89	52	23
One parent with one child	17	92	69	42
One parent with 2+ children	15	89	64	32
NZ Superannuation /Veterans Pension	10	83	49	23

Source: Perry 2014 [1], derived from Statistics NZ Household Economic Survey (HES) 2013; Note: * Categories are not mutually exclusive and therefore do not sum to 100%

GROSS DOMESTIC PRODUCT

Introduction

The gross domestic product (GDP) is often used as a measure of the size of a nation's economy, with nominal GDP being expressed in current dollar prices, and real GDP being expressed in constant dollar prices (i.e. the dollar value of a particular year, after adjustment for inflation). Changes in real GDP are often used as a measure of economic growth, or the strength of the economy [32] with a recession typically being defined as two consecutive quarters of negative growth [33].

The following section briefly reviews quarterly changes in New Zealand's GDP since March 2006 before considering the share of economic growth that has been passed on to workers from 1975–2014.

Data Source and Methods

Definitions

1. *Gross Domestic Product (GDP): Percent change from previous quarter*

2. Real per capita gross domestic product (RPC-GDP)

3. *Real ordinary time average hourly earnings (ROT-AHE)*

Data Sources

1. Gross Domestic Product (GDP): Percent change from previous quarter

Source: Statistics New Zealand: The New Zealand System of National Accounts (produced quarterly)

GDP is the total market value of all final goods and services produced in a country in a given year equal to total consumer, investment and government spending, plus the value of exports, minus the value of imports. Three approaches can be used to calculate GDP. Short term-quarter on quarter monitoring traditionally uses the production approach which calculates what each separate producer adds to the value of final output by deducting intermediate consumption from gross output. Value-added is summed for all producers. Expenditure based approaches can also be used but they have historically shown more quarterly volatility and are more likely to be subject to timing and valuation problems [34].

2. *Real per capita gross domestic product (RPC-GDP)*

Real GDP is adjusted for changing prices and reflects the extent to which growth in the value of goods and services is due to increased production rather than an increase in the absolute value of the goods and services produced [35]. Per capita real GDP divides the national GDP by the population.

Numerator:
Base series 1975–1987Q1 from [36] and supporting web page https://sites.google.com/site/eaqubs/ NZ Economy tables and graphs (27 July 2014). The authors sourced the GDP data from the following: 1975–1977: McDermott and Hall (2009); 1977–1987: Statistics NZ, SNBQ.S2SZT. Base series 1987Q2–current: Statistics NZ SND103AA. All these GDP data were re-expressed in March 2014 prices using a constant ratio based on the ratio of the nominal and real values in the March 2014 quarter.

Denominator:
Population series from [36] and supporting web page https://sites.google.com/site/eaqubs/ NZ Economy tables and graphs (27 July 2014). The authors sourced the population data from the following: 1934−1991: Statistics NZ, de facto population, DPEQ.SBEC; 1991–current: Statistics NZ, resident population DPEQ.SDAC.

3. *Real ordinary time average hourly earnings (ROT-AHE)*

ROT-AHE represent the number of hours usually worked and the usual income in a reference week. Average hourly earnings data are available split by ordinary time, overtime and total (ordinary time plus overtime). As with real GDP, real average hourly earnings are adjusted for changing prices. Average hourly earnings are calculated from the Quarterly Employment Survey (QES) which is a sample of approximately 18,000 business locations selected from a population of economically significant enterprises in surveyed industries, weighted to represent the number of employees in each industry sourced from the Business Register. Certain industries, including agriculture and aquaculture are not included in the QES [37].

An ordinary time average hourly earnings series was compiled from the following Statistics NZ sources:

1987–2014—Average hourly earnings QEX001AA
1980–1986—Average hourly rates, all sectors EMP013AA
1975–1979—Average hourly earnings index ERN001AA was used to calculate back from EMP013AA data.

While the different data series used to develop a composite AHE data set may have had different underlying methodologies, this is not likely to have a significant effect on the overall pattern of quarterly change in AHE.

The composite AHE data set was adjusted for changing prices using the Statistics NZ Consumer Price Index quarterly data rebased to March 2014 prices.

Notes on Interpretation
The important comparison in the section on RPC-GDP and ROT-AHE is the quarterly percentage change in each variable rather than the absolute monetary value. The graph axes have been scaled to make it easier to compare the relative changes in each variable over time.

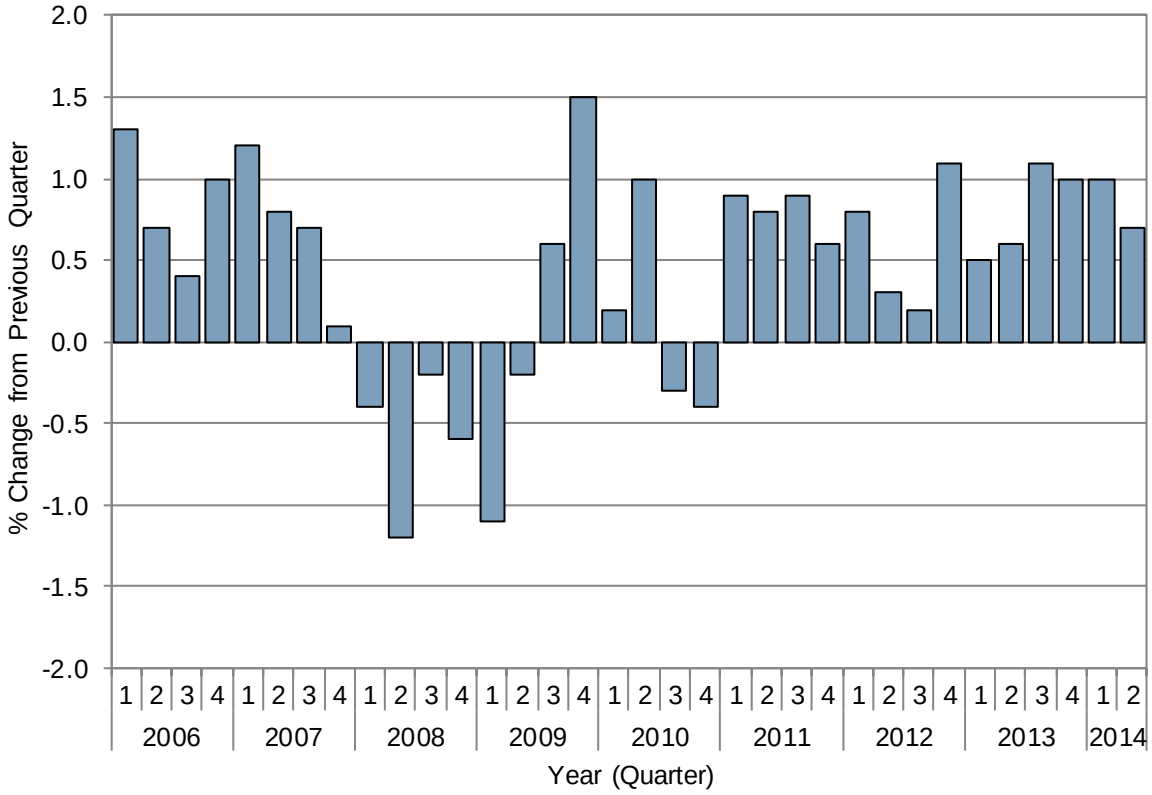
New Zealand Trends

Quarterly Changes in Production-Based Measure of GDP

In New Zealand, GDP decreased for six consecutive quarters from March 2008 to June 2009, before increasing again, for four consecutive quarters, from September 2009 to June 2010. GDP then decreased for two quarters, before increasing again, for 14 consecutive quarters from March 2011 to June 2014. GDP grew by 0.7% in the June quarter of 2014 (**Figure 24**). Economic activity for the year ending June 2014 increased by 3.5%, when compared to the year ending June 2013 [38].

During the June 2014 quarter, business services (up 4.2%) was the main driver of growth. Agriculture, forestry and fishing (down 2.8%) partly offset the growth [38].

Figure 24. Gross Domestic Product (GDP): percentage change from previous quarter, New Zealand March quarter 2006 to June quarter 2014

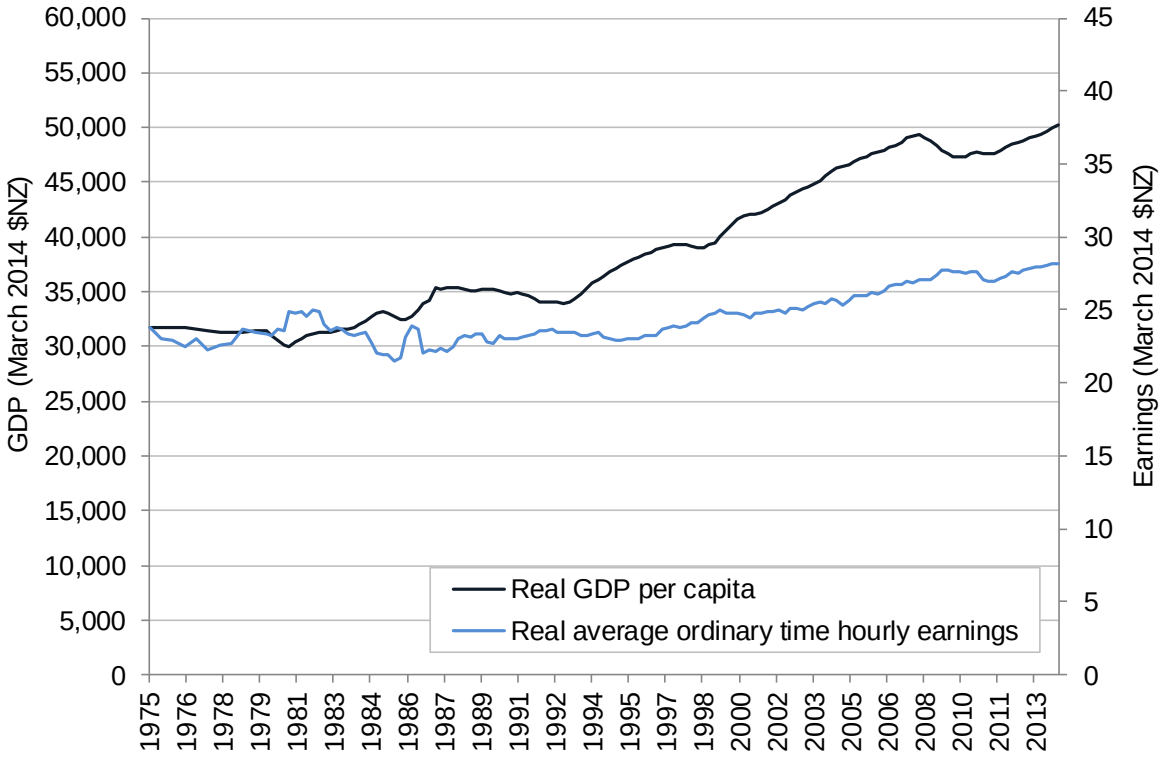


Source: Statistics New Zealand; Note: Seasonally adjusted chain volume series expressed in 1995/96 prices

Trends in real GDP and average hourly earnings

In New Zealand real GDP per capita increased from $31,426 in the March quarter of 1975, to $50,261 in the March quarter of 2014, while real average ordinary time hourly earnings only increased from $23.81 to $28.18 during the same period (**Figure 25**).

Figure 25. Real Gross Domestic Product (GDP) per capita and real average ordinary time hourly earnings, New Zealand March quarter 1975 to March quarter 2014



Source: Lattimore and Eaqub 2011 [36] and Statistics New Zealand; Note: Figures are expressed in March 2014 $NZ

UNEMPLOYMENT RATES

Introduction

Over the last year or two, the unemployment rate has been falling from its high of 7.4% in the second and third quarters of 2012. The seasonally adjusted employment rate for the June 2014 quarter was 5.6%, the lowest it has been since the March 2009 quarter [39]. Unemployment rates are higher for young people and for Māori and Pacific Peoples (compared to European people). Some, but not all, of the higher unemployment rates for Māori and Pacific people can be explained by the younger age structure of the Māori and Pacific populations as unemployment rates for these groups are higher at all ages. After age standardisation (which takes account of the differences in the age structures of the different ethnic populations) Māori and Pacific peoples still have significantly higher unemployment rates than Europeans and these ethnic differences appear to have increased since the recession of 2008−2009 [40].

Parental unemployment can have significant effects on children's wellbeing. It reduces the family's financial resources and may lead to poverty especially if the unemployed parent is the sole breadwinner [41]. The effects of parental unemployment vary depending on the age of the child, whether one or both parents are unemployed and for how long, and whether the negative effects of reduced family income outweigh the positive effects of more time spent with the child. A recent study used data from the British Household Panel Survey (a longitudinal survey which interviews participants annually) for youths aged 11–15 years to assess self-reported happiness with life in relation to parental employment [42]. The results indicated that parental job loss had a positive effect on younger children's overall happiness but a negative or non-significant effect on older children's happiness. A similar German study of 17–25 year olds found that paternal involuntary unemployment and maternal voluntary unemployment both had significant negative effects on sons' subjective wellbeing, but daughters were unaffected by unemployment of either parent due to any reason [43]. A Swedish study used hospitalisation data for children aged 3–18 years in 1992–2007 combined with register data on parental unemployment to determine whether the children of unemployed parents had worse health [44]. It found that the children of unemployed parents were 17% more likely to be hospitalised than other children but that this effect was mostly explainable by the factors associated with unemployment: low parental age, education, and income, immigrant background, parental separation and parental hospitalisation.

The following section uses information from Statistics New Zealand's Quarterly Household Labour Force Surveys, to review unemployment rates since 1986.

Data Source and Methods

Definition

1. Unemployment rate: The number of unemployed people expressed as a percentage of the labour force

Data Source

Statistics New Zealand's Household Labour Force Survey (n≈15,000 households). Quarterly since March 1986 and available on Statistics New Zealand's website www.stats.govt.nz

Notes on Interpretation

Note 1: Unemployed refers to all people in the working-age population who during the reference week were without a paid job, were available for work and:

(a) had actively sought work in the past four weeks ending with the reference week, or

(b) had a new job to start within four weeks [45].

Note 2: A person whose only job search method in the previous four weeks has been to look at job advertisements in the newspapers is not considered to be actively seeking work.

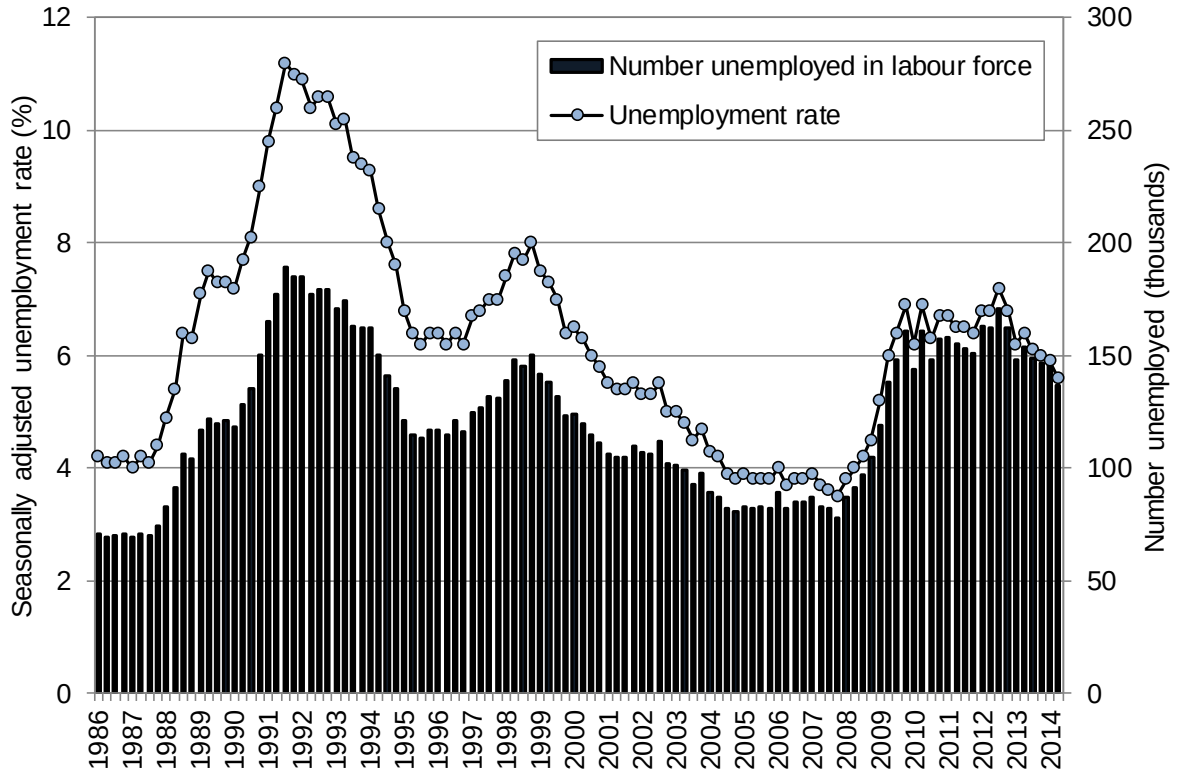
Note 3: Seasonal adjustment makes data for adjacent quarters more comparable by smoothing out the effects of any regular seasonal events. This ensures the underlying movements in time series are more visible. Each quarter, the seasonal adjustment process is applied to the latest and all previous quarters. This means that seasonally adjusted estimates for previously published quarters may change slightly [46].

New Zealand Distribution and Trends

Seasonally Adjusted Unemployment Rates

In the quarter ending June 2014, the seasonally adjusted unemployment rate fell to 5.6%, while seasonally adjusted unemployment numbers decreased from 146,000 in the March quarter of 2014, to 137,000 in the June quarter (**Figure 26**). The number of people employed increased by 10,000 to reach 2,328,000 [47].

Figure 26. Seasonally adjusted quarterly unemployment rates, New Zealand March 1986 to June 2014



Source: Statistics New Zealand, Household Labour Force Survey; Note: Rates have been seasonally adjusted

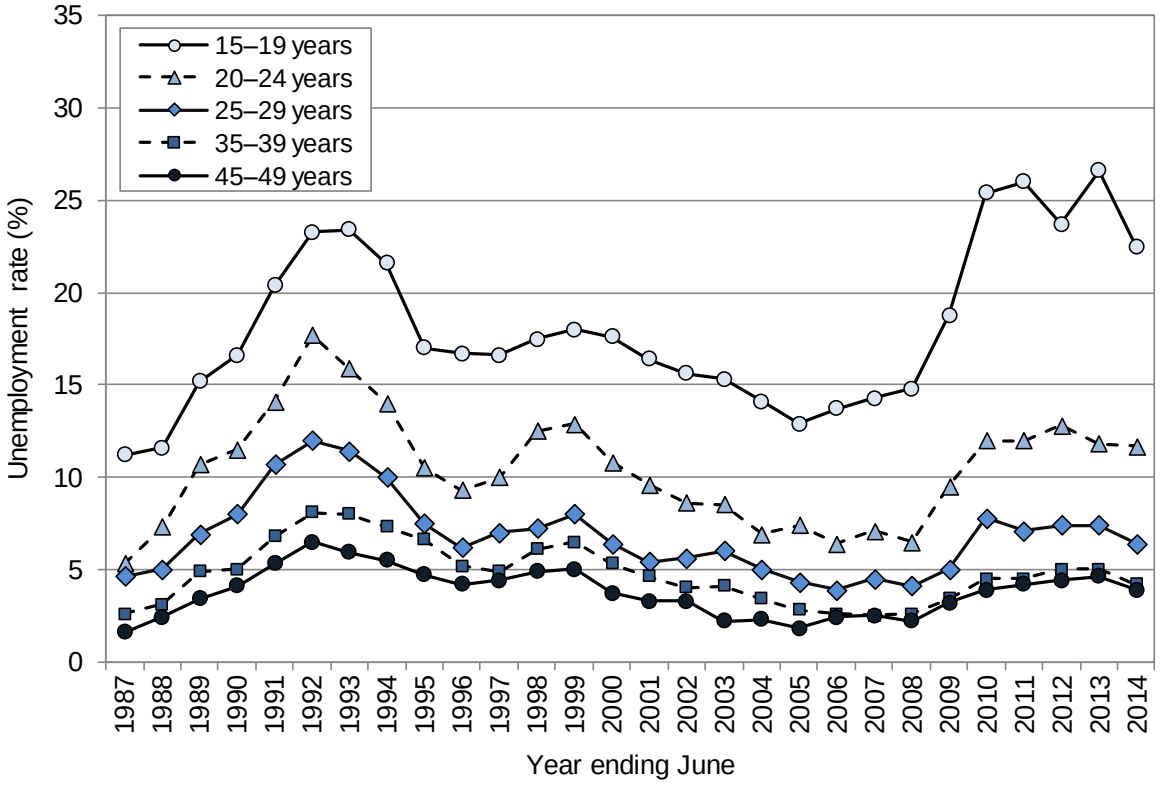
Unemployment Rates by Age

In New Zealand during June 1987–2014, unemployment rates were consistently higher for younger people aged 15–19 years than other age groups. Rates were lower for each age group, with those aged 45–49 years having the lowest). In the year ending June 2014, annual unemployment rates were 22.5% for those aged 15–19 years and to 11.7% for those aged 20–24 years (**Figure 27**).

Unemployment Rates by Ethnicity

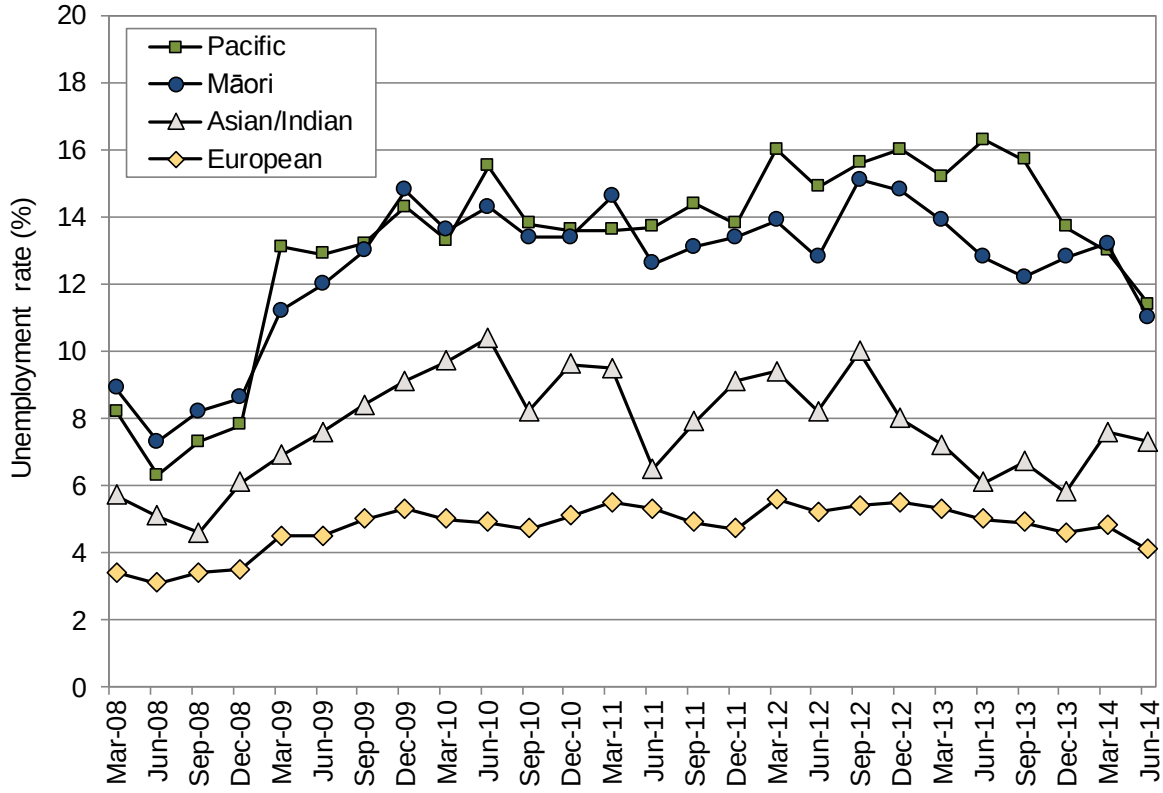
In New Zealand during the period March 2008 to June 2014 unemployment rates were consistently higher for Māori and Pacific people, followed by Asian/Indian and then European people. Unemployment rates increased for all ethnic groups during 2008 and 2009, but were more variable between 2010 and 2014. In the quarter ended June 2014, unemployment rates were 11.4% for Pacific, 11.0% for Māori, 7.3% for Asian/Indian and 4.1% for European people (**Figure 28**).

Figure 27. Unemployment rates by age (selected age groups), New Zealand years ending June 1987–2014



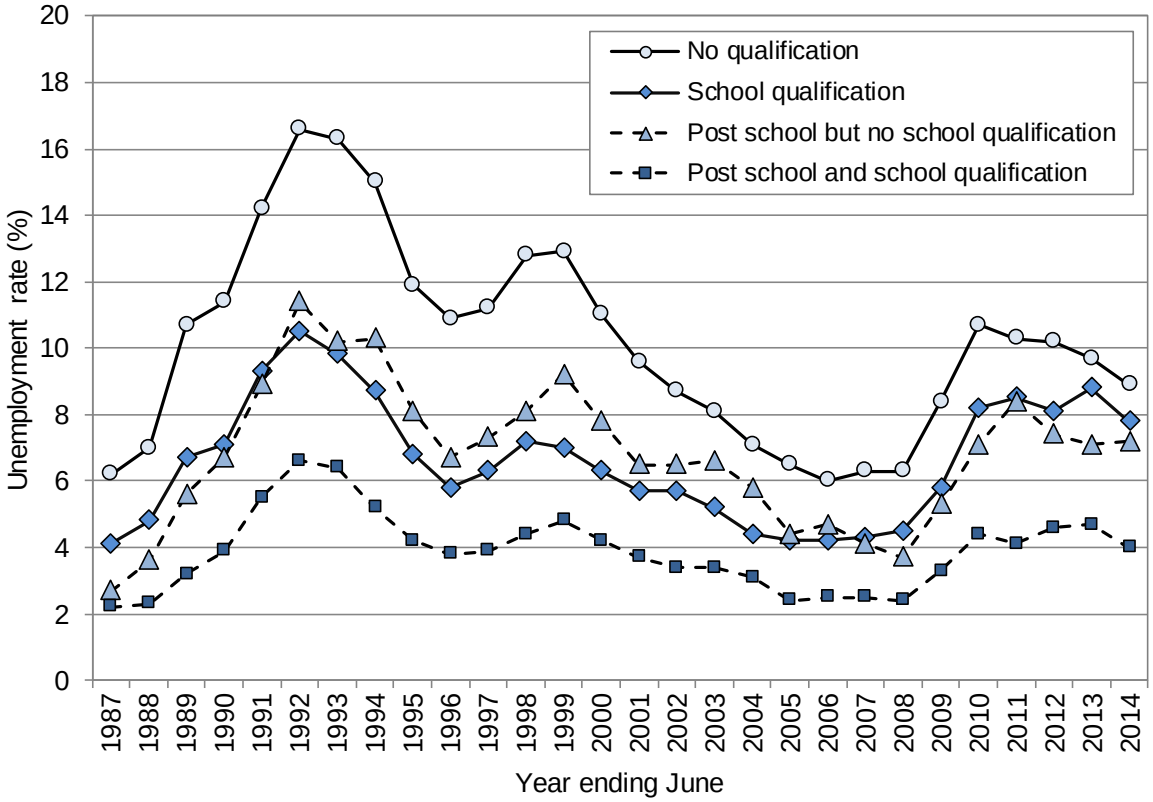
Source: Statistics New Zealand Household Labour Force Survey

Figure 28. Quarterly unemployment rates by ethnicity, New Zealand March 2008 to June 2014



Source: Statistics New Zealand Household Labour Force Survey; Note: Ethnicity is total response

Figure 29. Unemployment rates by qualification, New Zealand years ending June 1987–2014



Source: Statistics New Zealand Household Labour Force Survey

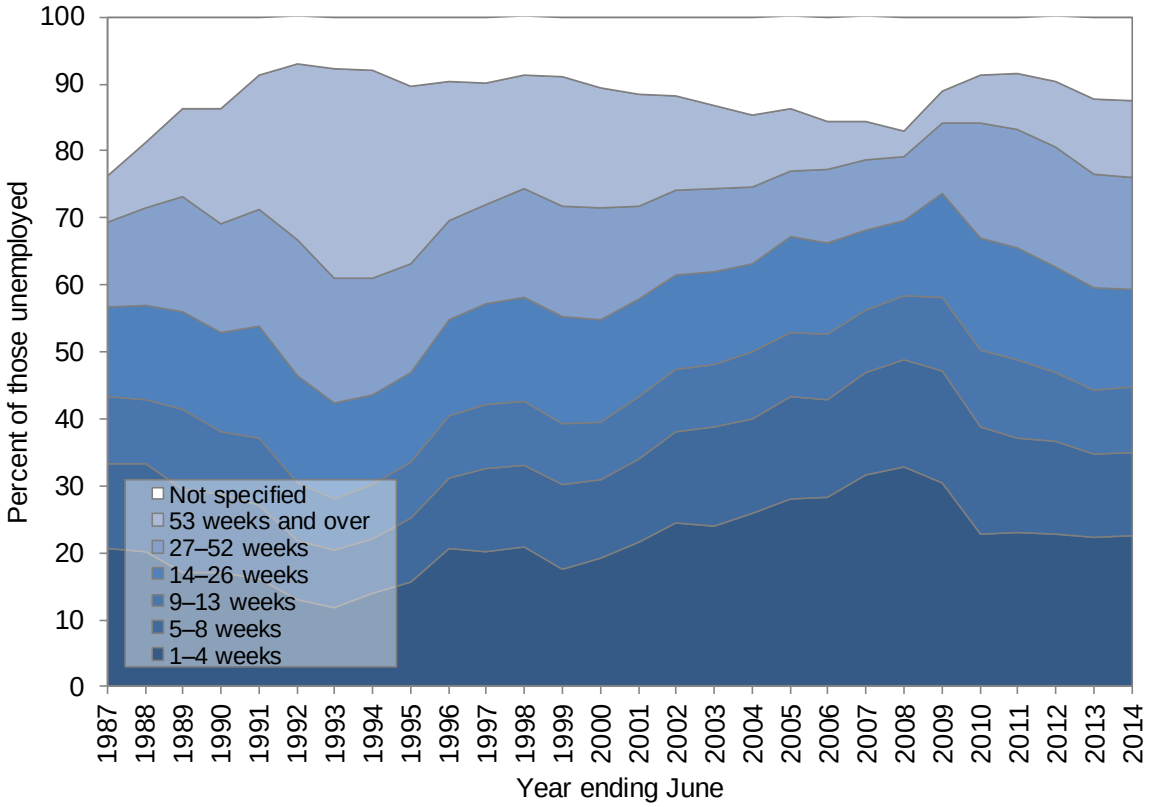
Unemployment Rates by Qualification

In New Zealand during the years ended June 1987–2014, unemployment rates were highest for those with no qualifications, followed by those with school qualifications, or post school but no school qualifications. Rates were lowest for those with both post school and school qualifications. In the year ended June 2014, unemployment rates were 8.9% for those with no qualifications, 7.8% for those with school qualifications, 7.2% for those with post school but no school qualifications and 4.0% for those with post school and school qualifications (**Figure 29**).

Duration of Unemployment

In New Zealand during the years ended June 1987–2014, duration of unemployment varied markedly, and in a manner consistent with prevailing unemployment rates. Thus the highest proportion of people unemployed for 53+ weeks occurred during the early to mid-1990s, when unemployment rates were at their peak, while the highest proportion unemployed for only 1–4 weeks occurred in the mid to late 2000s, when unemployment rates were at their lowest (**Figure 30**).

Figure 30. Proportion of those unemployed by duration of unemployment, New Zealand years ending June 1987–2014



Source: Statistics New Zealand Household Labour Force Survey

CHILDREN RELIANT ON BENEFIT RECIPIENTS

Introduction

In New Zealand, children who are reliant on benefit recipients are a particularly vulnerable group. The Living Standards Survey conducted five years ago found that about three out of five children living in households whose main source of income was a benefit experienced material hardship [7]. Benefit-reliant families were much more likely to report living in houses that were damp or mouldy, or in very poor physical condition; that their children were having to continue to wear worn out shoes or clothing; and that they were postponing doctors' visits because of cost. All these are factors that are likely to impact adversely on children's health and wellbeing.

The following section reviews the number of children aged 0–17 years who were reliant on a benefit recipient during June, 2000–2014, using information from the Ministry of Social Development's SWIFTT database. While the number of children reliant on a benefit recipient is not exactly the same as the number living in significant hardship, nevertheless it is an indicator of the size of a vulnerable group who tend to have higher than average health needs, and so make significant demands on health services.

With the introduction of the Ministry of Social Development's Welfare Reform in July 2013, changes were made to a number of benefits, so the data on benefits in June 2014 are not directly comparable to the benefit data prior to July 2013.

Data Source and Methods

Definition

1. Number of children aged 0–17 years reliant on a benefit recipient by benefit type

Data Source

Numerator: SWIFTT Database: Number of children aged 0–17 years who were reliant on a benefit recipient

Denominator: Statistics NZ Estimated Resident Population as at 30 June each year

Notes on Interpretation

Note 1: All data in this section were provided by the Ministry of Social Development (MSD) and were derived from the SWIFTT database. SWIFTT was developed by the NZ Income Support Service to calculate, provide and record income support payments and related client histories [48]. It provides information on the recipients of financial assistance through Work and Income.

Note 2: All figures refer to the number of children reliant on a benefit recipient at the end of June and provide no information on the number receiving assistance at other times of the year.

Note 3: The MSD's Welfare Reforms, brought into effect in July 2013, made changes to the types of benefits available, and to the obligations to be met by benefit recipients. Three new benefits (Jobseeker Support, Sole Parent Support, and Supported Living Payment) were introduced, and these replaced many of the previously existing benefits. The welfare reform changes have been described at https://www.msd.govt.nz/about-msd-and-our-work/work-programmes/welfare-reform/july-2013/

Note 4: The benefits prior to the June 2013 reform are not directly comparable with the benefits as at June 2014.

Prior to 2014, "Other benefits" included: Domestic Purposes Benefit - Women Alone and Caring for Sick or Infirm, Emergency Benefit, Independent Youth Benefit, Unemployment Benefit Training, and Unemployment Benefit Training Hardship, Unemployment Benefit Student Hardship, Widows Benefit, NZ Superannuation, Veterans and Transitional Retirement Benefit. "Other Benefits" *did not include* Orphan's and Unsupported Child's Benefits, and Non-benefit assistance.

From 2014, "Other benefits" included: Emergency Benefit, Youth Payment, Young Parent Payment, Unemployment Benefit Student Hardship, NZ Superannuation, Veterans and Transitional Retirement Benefit.

To be eligible for a benefit, clients must have insufficient income from all sources to support themselves and any dependents and meet specific eligibility criteria. The current eligibility criteria for benefits can be found at http://www.workandincome.govt.nz/individuals/a-z-benefits/index.html

New Zealand Distribution and Trends

Number of Children Reliant on a Benefit Recipient

Between 2000 and 2013, the number of children aged 0–17 years in New Zealand who were reliant on a benefit recipient dropped overall, although not consistently. There was a steady decrease from 271,463 in June 2000, to 200,525 in June 2008. The number then increased over the next three years to reach 233,633 in June 2010 after which it declined, with the greatest fall occurring between 2012 and 2013. In June 2013, 214,746 children were reliant on a benefit recipient.

Much of this variation can be attributed to changes in the number of children reliant on unemployment benefit recipients. The number of children dependent on a recipient of an unemployment benefit fell from 51,124 in June 2000 to 5,243 in June 2008. The numbers then increased to reach 17,281 in June 2010 before falling again. By June 2013, 12,622 children were reliant on an unemployment benefit recipient (**Table 7**).

Following the welfare reform of July 2013, the number of children aged 0–17 years who were reliant on a benefit recipient as at June 2014 was 196,247. Of these children, the majority were reliant on a recipient of Sole Parent Support (141,468; 72.1%). The next largest group were those reliant on a recipient of Jobseeker support (18,502; 17.0%) (**Table 7**).

Proportion of Children Reliant on a Benefit Recipient

The proportion of all children aged 0–17 years in New Zealand who were reliant on a benefit recipient fell from 26.2% in June 2000 to 18.5% in June 2008. The proportion then increased, to reach a peak of 21.4% in June 2010, before falling again to 19.6% in June 2013 (**Figure 31**).

A large part of the initial decline was due to a fall in the proportion of children reliant on unemployment benefit recipients. This fell from 4.9% of children in June 2000 to 0.5% in June 2008. It then increased to 1.6% in June 2010 before falling again to 1.2% in June 2013. The proportion of children reliant on DPB recipients also fell from 17.9% in June 2000 to 14.5% in June 2008, before increasing to 16.5% in June 2011. It then fell again to 15.1% in June 2013 (**Figure 31**).

During this period, the rate of decline in the number of children reliant on DPB recipients was much less than the rate of decline in the number reliant on unemployment benefit recipients (**Figure 31**). As a consequence, the proportion of benefit-dependent children who were reliant on DPB recipients actually increased, from 68.4% of benefit-dependent children in June 2000, to 76.9% in June 2013 (**Table 7**).

In June 2014, after the welfare reform was introduced, the proportion of all children aged 0–17 years in New Zealand who were reliant on a benefit recipient was 17.9%. The proportion of all children who were reliant on recipients of the various benefits types was: Sole Parent Support 12.9%, Jobseeker Support 3.0%, and Supported Living Payment 1.7% (**Figure 31**).

Distribution by Age

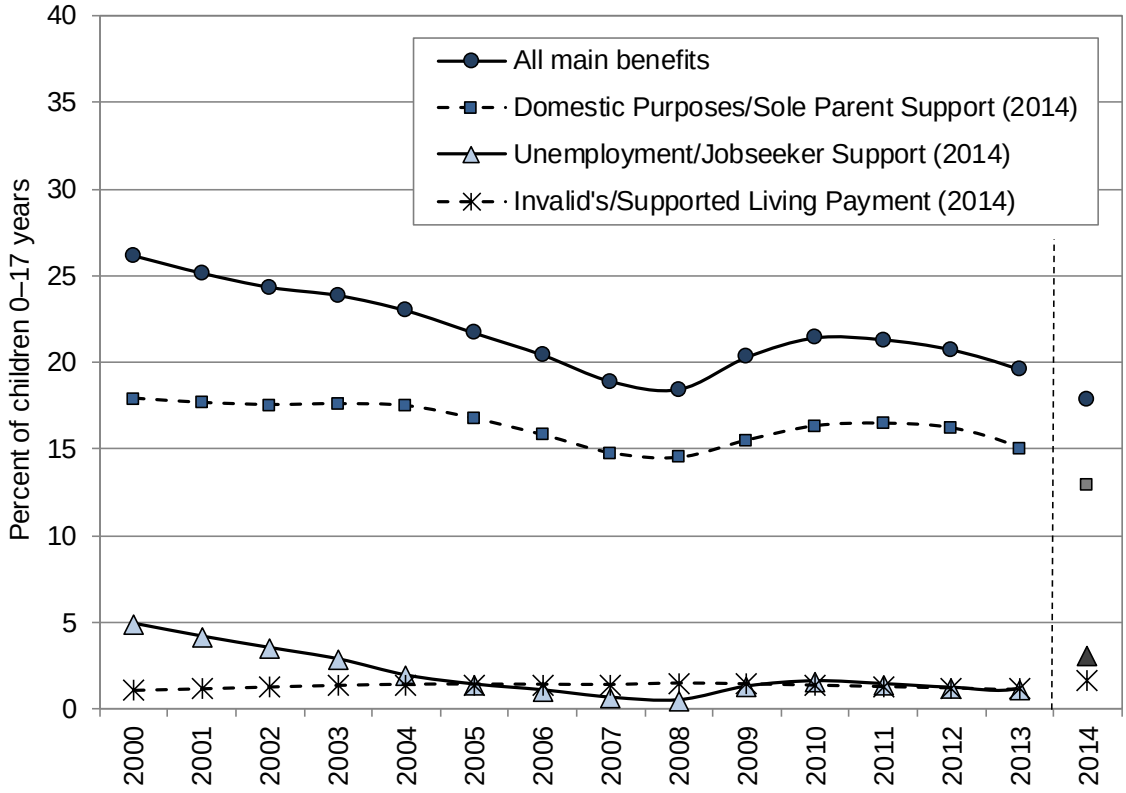
At the end of June 2014, the proportion of children reliant on a benefit recipient was highest among those aged 1–4 years. The proportion reduced gradually with increasing age through middle to late childhood, and then more steeply as children reached 13 years of age (**Figure 32**).

Table 7. Number of children aged 0–17 years who were reliant on a benefit recipient by benefit type, New Zealand, as at end of June 2000–2014

Year	Domestic Purposes		Unemployment		Invalid's		Sickness		Other benefits		Total
	Number	Percent*	Number	Percent *	Number	Percent *	Number	Percent *	Number	Percent *	Number
2000	185,658	68.4	51,124	18.8	11,205	4.1	11,425	4.2	12,051	4.4	271,463
2001	184,448	70.2	43,688	16.6	12,164	4.6	11,155	4.2	11,468	4.4	262,923
2002	184,497	72.0	36,960	14.4	13,290	5.2	11,836	4.6	9,611	3.8	256,194
2003	186,288	73.6	30,257	12.0	14,306	5.7	12,477	4.9	9,701	3.8	253,029
2004	186,372	76.0	20,413	8.3	15,091	6.2	13,782	5.6	9,711	4.0	245,369
2005	179,791	77.1	14,968	6.4	15,277	6.6	13,892	6.0	9,267	4.0	233,195
2006	171,011	77.3	11,422	5.2	15,291	6.9	13,775	6.2	9,598	4.3	221,097
2007	160,137	78.1	6,800	3.3	15,197	7.4	13,509	6.6	9,394	4.6	205,037
2008	157,693	78.6	5,243	2.6	16,045	8.0	11,980	6.0	9,564	4.8	200,525
2009	168,709	76.3	13,943	6.3	15,605	7.1	13,025	5.9	9,855	4.5	221,137
2010	177,874	76.1	17,281	7.4	14,840	6.4	13,798	5.9	9,840	4.2	233,633
2011	179,784	77.2	15,486	6.7	14,044	6.0	13,351	5.7	10,144	4.4	232,809
2012	177,237	78.1	13,205	5.8	13,287	5.9	12,955	5.7	10,212	4.5	226,896
2013	165,113	76.9	12,622	5.9	12,804	6.0	12,590	5.9	11,617	5.4	214,746
	Sole Parent Support (incl EMA[t])		Jobseeker Support		Supported Living Payment				Other benefits		Total
	Number	Percent *	Number	Percent *	Number	Percent *			Number	Percent *	Number
2014	141,468	72.1	33,447	17.0	18,502	9.4			2,830	1.4	196,247

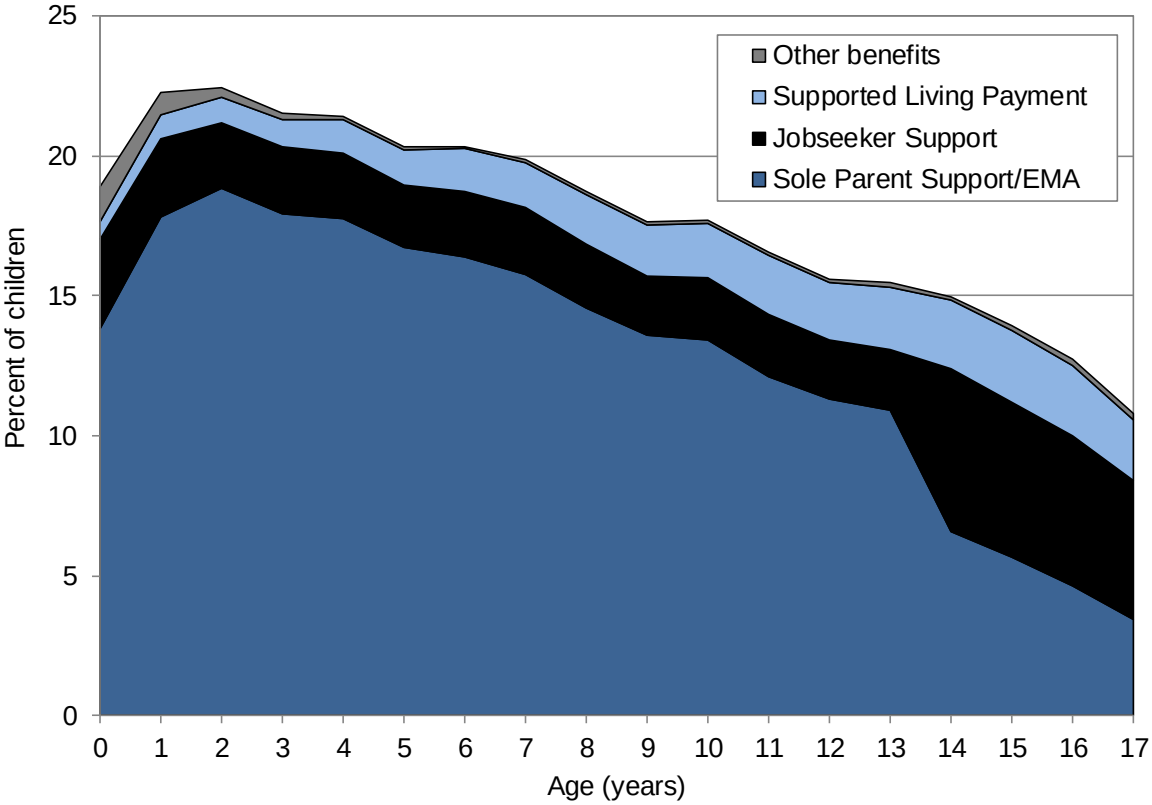
Source: MSD SWIFTT Database; Note: * Percent refers to percent of children relying on benefit recipients, rather than percent of all children; [t] EMA: Emergency Maintenance Allowance; For composition of “Other benefits” see Methods box above

Figure 31. Proportion of all children aged 0–17 years who were reliant on a benefit recipient by benefit type, New Zealand as at end of June 2000–2014



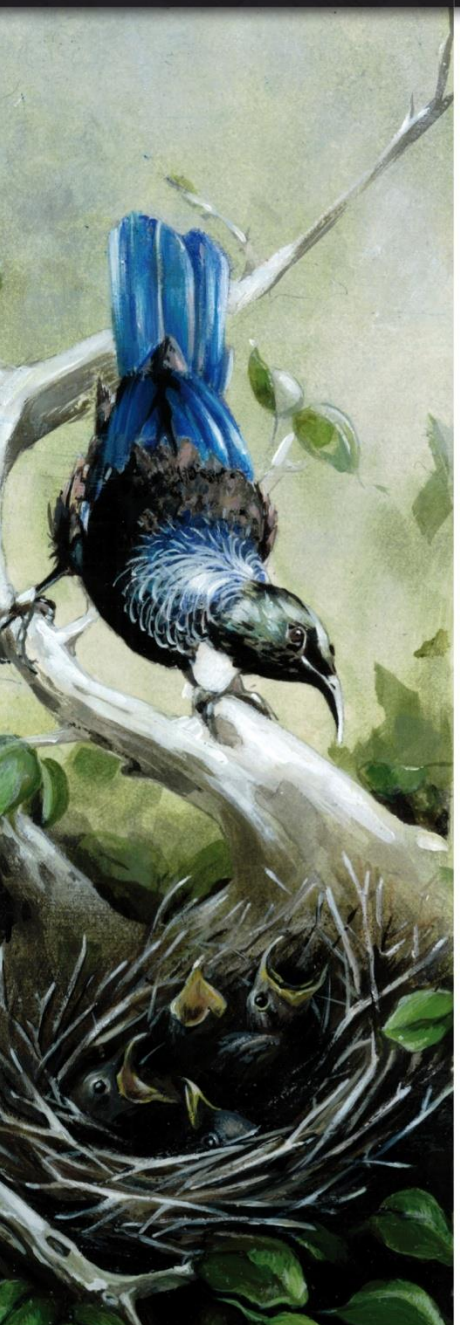
Source: Numerator: MSD SWIFTT Database; Denominator: Statistics NZ Estimated Resident Population; Note: The benefits prior to the June 2013 reform are not directly comparable with the benefits as at June 2014

Figure 32. Proportion of all children aged 0–17 years who were reliant on a benefit recipient by age and benefit type, New Zealand as at end of June 2014



Source: Numerator: MSD SWIFTT Database; Denominator: Statistics NZ Estimated Resident Population; Note: for composition of “Other benefits” see Methods box

HEALTH AND WELLBEING



HEALTH AND WELLBEING INDICATORS: INTRODUCTION

There are currently large disparities in child health status in New Zealand with Māori and Pacific children and those living in areas with more deprived NZDep scores experiencing a disproportionate burden of morbidity and mortality [49]. Such disparities reflect trends in child poverty rates, and the macroeconomic environment (including the official recession which ran from June 2008 to June 2009), as well as a range of historical and policy factors going back over many years.

Children growing up in low income households face multiple health risks. The health outcomes associated with childhood poverty are wide-ranging and well documented in the international and New Zealand health science literature [4].

Some of the negative health outcomes statistically associated with childhood poverty include: low birth weight; infant mortality and Sudden Unexpected Death in Infancy (SUDI); poorer mental health and cognitive development; and higher rates of hospital admissions for infectious and respiratory diseases, which are often associated with living in crowded household conditions [49]. Children who grow up in poverty are also more likely to have poorer health outcomes in adulthood, such as heart disease and addictions [4].

This Technical Report focuses on a number of child health outcomes which have a social gradient. These conditions were selected because they have a much higher prevalence in children living in the most socioeconomically deprived areas, and because it was thought they might respond relatively quickly (e.g. months to small number of years) to changing economic conditions (see **Appendix 1**). Monitoring such health indicators is entirely appropriate, as they are the early signs of the consequences of children living in poverty.

HOSPITAL ADMISSIONS AND MORTALITY WITH A SOCIAL GRADIENT

Introduction

In New Zealand, there are currently large disparities in many measures of child health status between children belonging to different socio-economic groups within the population, and between Māori and Pacific children and children of other ethnicities. Ethnic and/or socioeconomic disparities among children have been observed in rates of skin infections [50], asthma [51], rheumatic fever [52], road traffic crashes [53], meningitis [54], unintentional injuries [55] burns [56], overall mortality, and mortality from injury (both road and non-road traffic injury) [57] and sudden infant death syndrome [58].

The higher hospital admission rates for infectious and respiratory diseases for children in socioeconomically disadvantaged families can be readily understood to arise from poor living conditions: poor quality housing, especially housing that is cold and damp, crowded living spaces which facilitate the spread of infection, and inability to pay for adequate heating, nutritious food, and the costs associated with accessing medical care. Since infectious and respiratory diseases are among the most common reasons for children to be admitted to hospital, if the infectious disease admission rates of the most deprived children were reduced to the same to as those of the least deprived children there could be substantial savings for the hospital sector. The causes of socio-economic disparities in admission rates for other medical conditions and for injuries may be less obvious but these disparities undoubtedly exist, and have been well documented, both in New Zealand and in other countries [5,59,60].

This section reports on hospital admission rates and mortality rates for medical conditions and injuries for which there is a social gradient, using data from the National Minimum Dataset and the National Mortality Collection, for children aged 0–14 years.

Data Source and Methods

Definition

1. *Hospital admissions for medical conditions and injuries with a social gradient in children aged 0–14 years*
2. *Mortality from medical conditions and injuries with a social gradient and sudden unexpected death in infancy (SUDI) in children aged 0–14 years*

Data source

Numerator:

Hospital admissions for medical conditions with a social gradient: acute and arranged (arranged = within 7 days of referral) hospital admissions (waiting-list cases and neonates <28 days excluded) with the following ICD-10-AM primary diagnoses: A00–A09, R11, K529 (gastroenteritis); A15–A19 (tuberculosis); A33, A34, A35, A36, A37, A80, B05, B06, B16, B26, B18.0, B18.1, P35.0 or M01.4 (vaccine preventable diseases); A39 (meningococcal disease); B34 (viral infection of unspecified site); E40–E64 or D50–D53 (nutritional deficiencies/anaemias); J00–J03 or J06 (acute upper respiratory infections); J04 (croup/laryngitis/tracheitis/ epiglottitis); J12, J10.0 or J11.0 (pneumonia: viral); J13–J16 or J18 (pneumonia: bacterial, non-viral, unspecified); J21 (acute bronchiolitis); J22 (acute lower respiratory infection unspecified); J45–J46, R062 (asthma and wheeze); J47 (bronchiectasis); G00–G01 (meningitis: bacterial); A87, G02 or G03 (meningitis: viral, other, NOS); G40 or G41 (epilepsy or status epilepticus); H65, H66 or H67 (otitis media); I00–I09 (rheumatic fever/heart disease); K40 (inguinal hernia); L00–L08, H00.0, H01.0, J34.0 or L98.0 (skin infections); L20–L30 (dermatitis and eczema); M86 (osteomyelitis); N10, N12, N13.6, N30.0, N30.9 or N39.0 (urinary tract infection); R56.0 (febrile convulsions).

Injury admissions with a social gradient: hospital admissions (emergency department cases, neonates <28 days excluded) with a primary diagnosis of injury (ICD-10-AM S00–T79) and an ICD-10-AM primary external cause code in the following range: V01–V09 (transport: pedestrian); V10–V19 (transport: cyclist); V40–V79 (transport: vehicle occupant); W00–W19 (falls); W20–W49 (mechanical forces: inanimate); W50–W64 (mechanical forces: animate); W85–X19 (thermal injury); X40–X49 (poisoning). In order to ensure comparability over time, all injury cases with an Emergency Department specialty code (M05–M08) on discharge were excluded.

Mortality from conditions with a social gradient: all deaths (neonates <28 days excluded) with a main underlying cause of death in the ICD-10-AM medical and injury categories outlined above. In addition, post-neonatal sudden unexpected deaths in infancy (SUDI) were included if the child was aged between 28 days and 1 year and their main underlying cause of death was SUDI (R95, R96, R98, R99, W75, W78, W79).

Denominator: Statistics NZ estimated resident population

Notes on Interpretation

Note 1: Hospital admissions in neonates (<28 days) were excluded from both indicators. These admissions are more likely to reflect issues arising prior to or at the time of birth (e.g. preterm infants may register multiple admissions as they transition from neonatal intensive care (NICU), through special care baby units (SCBU) to the postnatal ward). Further, the aetiology of respiratory infections and/or other medical conditions arising in these contexts may differ from those arising in the community.

Note 2: For medical conditions, only acute and arranged admissions were included, as waiting list admissions were seen as being more influenced by service capacity (e.g. the demographic profile of those admitted acutely with otitis media may have differed from those admitted from the waiting list for grommets (who in the vast majority of cases also have a primary diagnosis of otitis media)). For injury admissions, however, filtering by admission type was not undertaken. All injury cases with an Emergency Department specialty code (M05−M08) on discharge were excluded however (see Appendix 3 for rationale).

Note 3: Hospital admissions were considered to have a social gradient if rates for those in the most deprived (NZDep deciles 9–10) areas were ≥1.8 times higher than for those in the least deprived areas (NZDep deciles 1–2), or where rates for Māori, Pacific or Asian/Indian children were ≥1.8 times higher than for European children. In addition, a small number of conditions were included where rates were ≥1.5 times higher, they demonstrated a consistent social gradient, and the association was biologically plausible.

Note 4: When considering differences in the magnitude of social gradients between medical and injury admissions note that these rates are not strictly comparable. For technical reasons, Emergency Department (ED) cases have been removed from injury admissions (and social differences in attendance at the ED vs. primary care for minor medical conditions may have accounted for some of the social gradients in medical admission seen). No such differential filtering was applied to mortality data, however, and thus the magnitude of the social differences seen in mortality data is more readily comparable.

Note 5: SUDI rates are traditionally calculated per 1,000 live births. For this analysis the denominator used was children aged 0–14 years, so that the relative contribution SUDI makes to mortality in this age group (as compared to other causes of death) is more readily appreciated. As a result, the SUDI rates in this section are not readily comparable to traditional SUDI mortality rates for those <1 year reported elsewhere.

Note 6: In 2013, a number of changes were made to the ICD-10-AM codes included in this indicator. The changes included the broadening of asthma (J45–J46) to asthma and wheeze (J45–J46, R062) to take into account a shift in the way paediatricians were diagnosing asthma in preschool children, and the addition of J22 (unspecified lower respiratory infections), due to the likely overlap with the already included J18.9 (unspecified pneumonia) category. Two additional codes were added to the sudden unexpected death in infancy (SUDI) indicator (W78: inhalation of gastric contents; and W79: inhalation and ingestion of food causing obstruction of the respiratory tract) to ensure consistency with the Child and Youth Mortality Review Committee's SUDI reporting. As a result, the rates in this section are not directly comparable with those presented in NZCYES reports prior to 2013.

For further detail on the methodology used see **Appendix 1**.

New Zealand Distribution and Trends

Distribution by Cause

Hospital admissions: In New Zealand during 2009–2013, asthma and wheeze, bronchiolitis, and acute respiratory infections (excluding croup) made the largest individual contributions to hospitalisations for medical conditions with a social gradient, and infectious and respiratory diseases collectively were responsible for the majority of admissions. Similarly, falls followed by inanimate mechanical forces were the leading causes of injury admissions with a social gradient, although transport injuries as a group also made a significant contribution (**Table 8**).

Mortality: In New Zealand during 2007–2011, SUDI made the single largest contribution to mortality with a social gradient in children aged 0–14 years. This occurred despite the fact that, by definition, all of these deaths occurred during the first year of life. Vehicle occupant deaths made the largest contribution to injury-related deaths, followed by drowning/submersion, and pedestrian injuries. Bacterial, non-viral, or unspecified pneumonia was the leading cause of mortality from medical conditions (**Table 9**).

Table 8. Hospital admissions for conditions with a social gradient in children aged 0–14 years (excluding neonates) by primary diagnosis, New Zealand 2009–2013

Primary diagnosis	New Zealand			
	Number: total 2009−2013	Number: annual average	Rate per 1,000	% of total
Medical conditions				
Asthma and wheeze	31,390	6,278.0	6.95	15.4
Acute bronchiolitis	29,431	5,886.2	6.52	14.4
Acute respiratory infections*	28,418	5,683.6	6.29	13.9
Gastroenteritis	27,325	5,465.0	6.05	13.4
Viral infection of unspecified site	20,882	4,176.4	4.63	10.2
Skin infections	16,273	3,254.6	3.60	8.0
Pneumonia: bacterial, non-viral	13,267	2,653.4	2.94	6.5
Urinary tract infection	7,319	1,463.8	1.62	3.6
Croup/laryngitis/tracheitis/epiglottitis	6,223	1,244.6	1.38	3.1
Epilepsy or status epilepticus	4,471	894.2	0.99	2.2
Dermatitis and eczema	3,586	717.2	0.79	1.8
Febrile convulsions	3,181	636.2	0.70	1.6
Otitis media	2,966	593.2	0.66	1.5
Pneumonia: viral	2,357	471.4	0.52	1.2
Inguinal hernia	1,206	241.2	0.27	0.6
Osteomyelitis	1,172	234.4	0.26	0.6
Rheumatic fever/heart disease	996	199.2	0.22	0.5
Vaccine preventable diseases	943	188.6	0.21	0.5
Meningitis: viral, other, NOS	813	162.6	0.18	0.4
Bronchiectasis	681	136.2	0.15	0.3
Meningococcal disease	355	71.0	0.08	0.2
Nutritional deficiencies/anaemias	325	65.0	0.07	0.2
Meningitis: bacterial	198	39.6	0.04	0.1
Tuberculosis	48	9.6	0.01	0.0
New Zealand total	203,826	40,765.2	45.15	100.0
Injury admissions				
Falls	22,550	4,510.0	4.99	50.1
Mechanical forces: inanimate	11,664	2,332.8	2.58	25.9
Mechanical forces: animate	2,910	582.0	0.64	6.5
Transport: cyclist	2,140	428.0	0.47	4.8
Thermal injury	1,996	399.2	0.44	4.4
Poisoning	1,908	381.6	0.42	4.2
Transport: vehicle occupant	849	169.8	0.19	1.9
Transport: pedestrian	791	158.2	0.18	1.8
Drowning/submersion	167	33.4	0.04	0.4
New Zealand total	44,975	8,995.0	9.96	100.0

Source: Numerator: National Minimum Dataset (neonates removed); Denominator: Statistics NZ Estimated Resident Population; Note: *Medical conditions*: acute and arranged admissions only; *Injury admissions*: excludes Emergency Department cases

Table 9. Mortality from conditions with a social gradient in children aged 0–14 years (excluding neonates) by main underlying cause of death, New Zealand 2007–2011

Cause of death	Number: total 2007−2011	Number: annual average	Rate per 100,000	Percent of category
Medical conditions				
Pneumonia: bacterial, non-viral	39	7.8	0.87	27.3
Meningococcal disease	24	4.8	0.54	16.8
Epilepsy or status epilepticus	22	4.4	0.49	15.4
Pneumonia: viral	13	2.6	0.29	9.1
Asthma and wheeze	12	2.4	0.27	8.4
Gastroenteritis	11	2.2	0.25	7.7
Meningitis	5	1.0	0.11	3.5
Bronchiectasis	3	0.6	0.07	2.1
Acute bronchiolitis	3	0.6	0.07	2.1
Other conditions	11	2.2	0.25	7.7
Total medical conditions	143	28.6	3.19	100.0
Injuries				
Transport: vehicle occupant	79	15.8	1.76	35.9
Drowning/submersion	50	10.0	1.11	22.7
Transport: pedestrian	36	7.2	0.80	16.4
Mechanical forces: inanimate/animate	15	3.0	0.33	6.8
Thermal injury	14	2.8	0.31	6.4
Transport: cyclist	10	2.0	0.22	4.5
Poisoning	9	1.8	0.20	4.1
Falls	7	1.4	0.16	3.2
Total injuries	220	44.0	4.90	100.0
Post neonatal SUDI				
Post neonatal SUDI	271	54.2	6.04	
Total mortality New Zealand	634	126.8	14.13	

Source: Numerator: National Mortality Collection (neonates removed); Denominator: Statistics NZ Estimated Resident Population; Note: SUDI numerators are for infants aged 28–364 days only

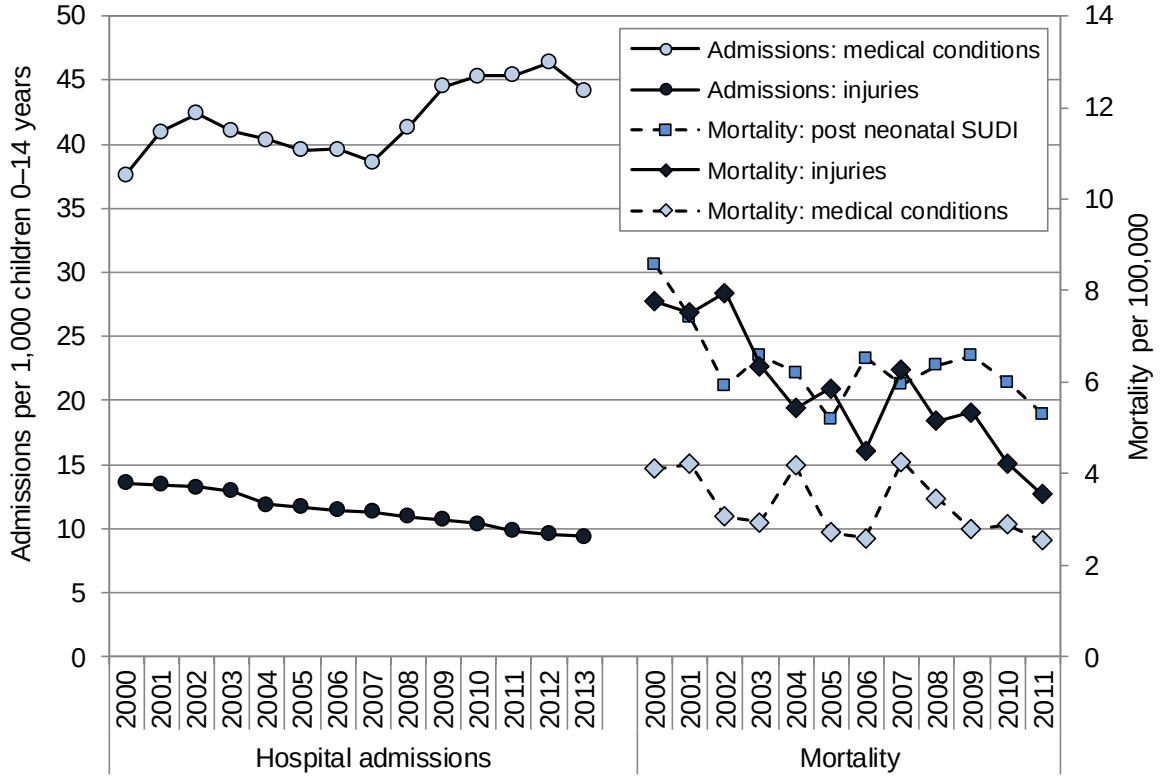
New Zealand Trends

Hospital admissions: In New Zealand, medical admissions with a social gradient increased during the early 2000s, reached a peak in 2002, and then declined until 2007. An upswing in rates was evident from 2007 to 2012. In contrast, injury admissions with a social gradient declined throughout 2000–2013 (**Figure 33**).

Note: Emergency Department (ED) cases are excluded from injury admissions so trends in medical and injury admissions are not comparable. Inconsistencies in DHB reporting of ED cases to the National Minimum Dataset may have affected trends in admissions for medical conditions with a social gradient. Many DHBs were reporting their ED cases from the early 2000s. **Figure 34** shows the increase in admissions in DHBs who changed their reporting practice from 2009, when the Ministry made reporting of ED day cases mandatory. While the increase in numbers is modest, some (but not all) of the increase in medical admissions seen during this period may be due to these changes. See **Appendix 3**: The National Minimum Dataset for further details.

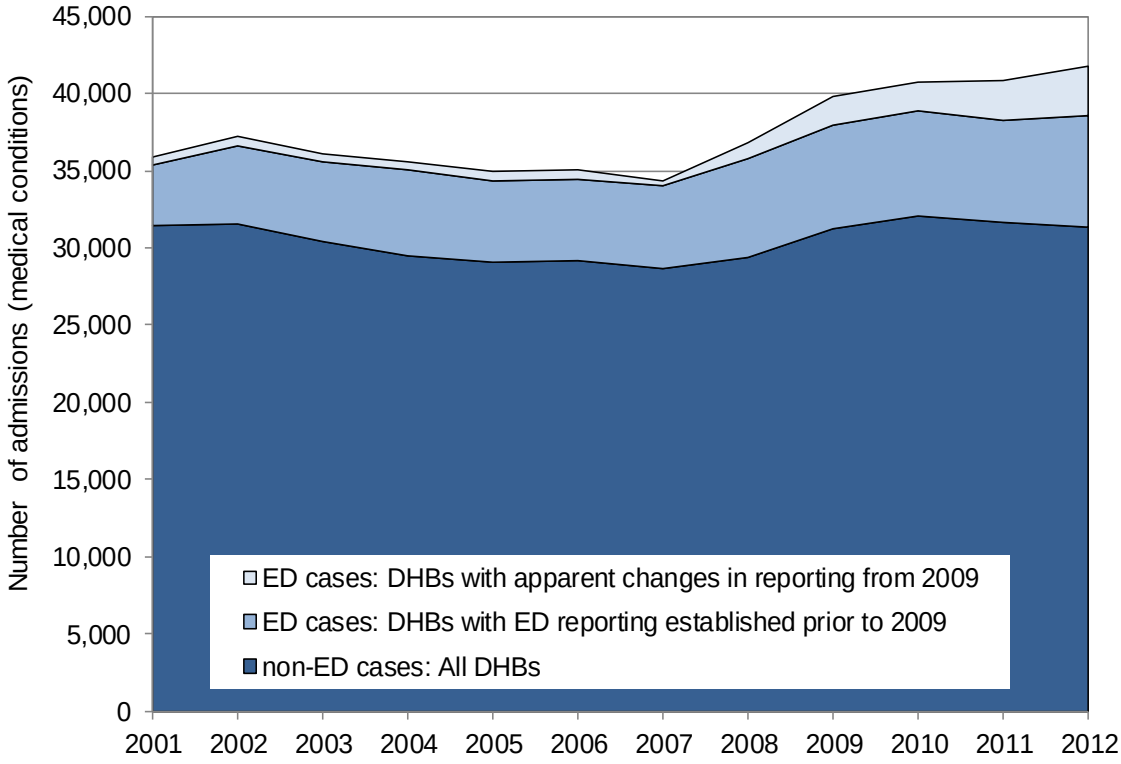
Mortality: In New Zealand, mortality from injuries with a social gradient gradually decreased between 2000 and 2011. Post-neonatal SUDI decreased between 2000 and 2002 and thereafter remained relatively static, while mortality from medical conditions with a social gradient fluctuated throughout 2000–2011 (**Figure 33**).

Figure 33. Hospital admissions (2000–2013) and mortality (2000–2011) from conditions with a social gradient in New Zealand children aged 0–14 years (excluding neonates)



Source: Numerator Admissions: National Minimum Dataset; Numerator Mortality: National Mortality Collection Denominator: Statistics NZ Estimated Resident Population; Note: *Medical conditions*: acute and arranged admissions only; *injury admissions*: excludes emergency department cases

Figure 34. Hospital admissions for medical conditions with a social gradient in children aged 0–14 years by health specialty on discharge and DHB reporting practice, New Zealand 2000–2012



Source: National Minimum Dataset. Acute and arranged admissions only; Note: ED cases are those with a health speciality code on discharge of M05–M08

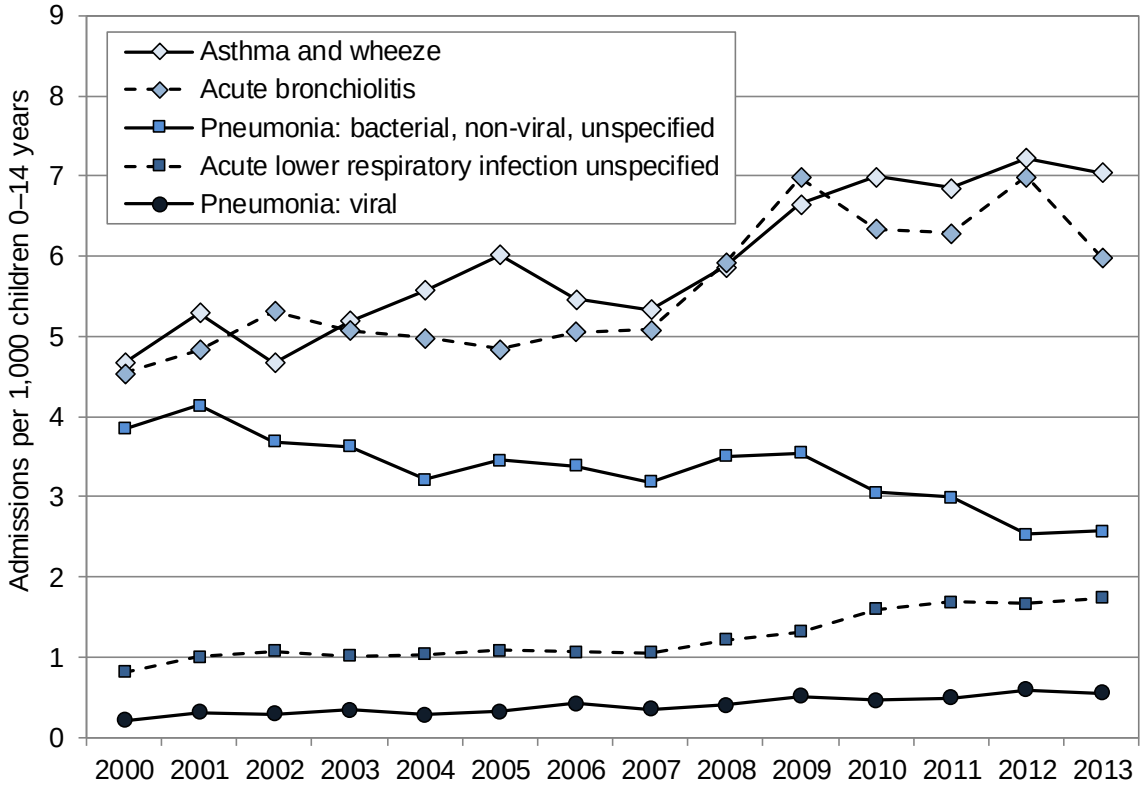
Trends in Hospital Admissions by Primary Diagnosis

Lower respiratory conditions: From 2000, hospital admissions for bronchiolitis and asthma and wheeze increased in children aged 0–14 years, as did admissions for viral pneumonia. Admissions for bacterial, non-viral, or unspecified pneumonia declined. Admissions for unspecified acute lower respiratory infections were relatively stable during 2000–2006, and increased thereafter (**Figure 35**).

Upper respiratory tract and unspecified viral infections: While trends in admissions for acute upper respiratory infections and viral infections of unspecified site were variable during the early-to-mid 2000s, since 2007 both have exhibited a general upward trend. Admissions for croup/laryngitis/tracheitis/epiglottitis were static, while admissions for otitis media declined after 2007 (**Figure 36**).

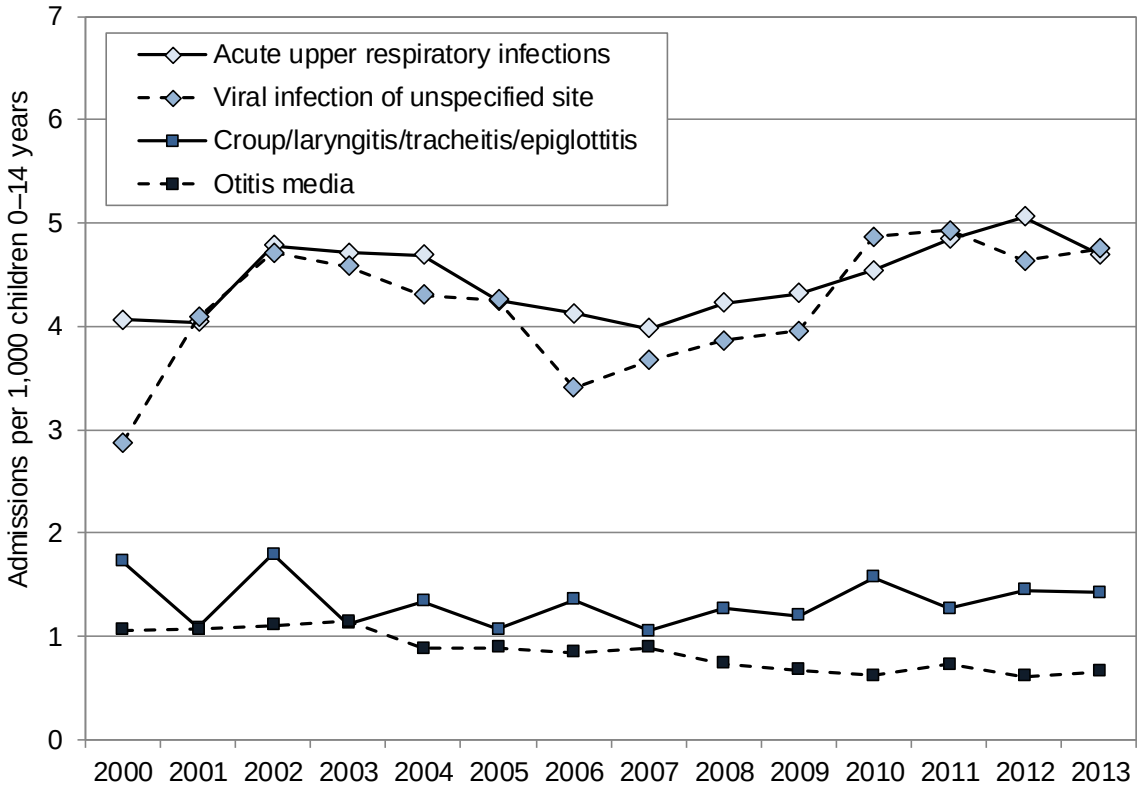
Other medical conditions: During 2000–2013, hospital admissions for gastroenteritis, skin infections, dermatitis and eczema, and urinary tract infections in children aged 0–14 years all exhibited a general upward trend, while admissions for inguinal hernias declined. Trends for a number of other conditions were more variable (**Figure 37**, **Figure 38**).

Figure 35. Hospital admissions for lower respiratory conditions with a social gradient in children aged 0–14 years (excluding neonates), New Zealand 2000–2013



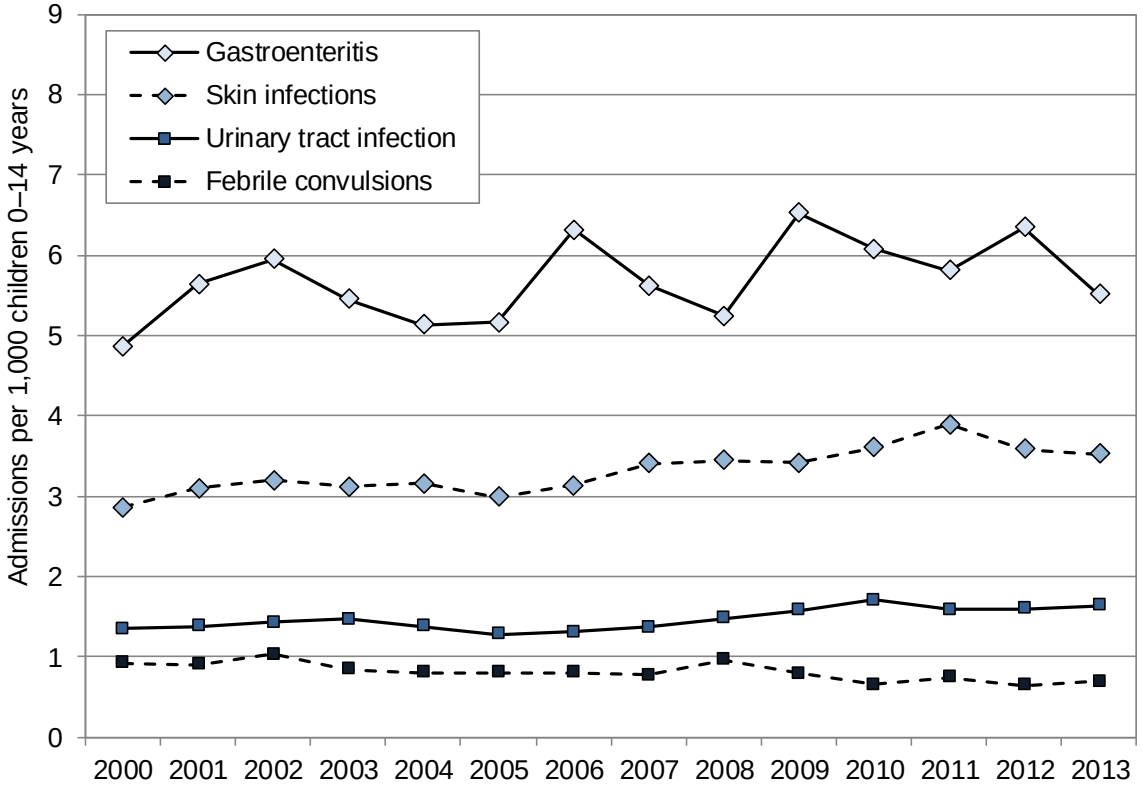
Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population; Note: Acute and arranged admissions only

Figure 36. Hospital admissions for acute upper respiratory tract infections and unspecified viral infections in children aged 0–14 years (excluding neonates), New Zealand 2000–2013



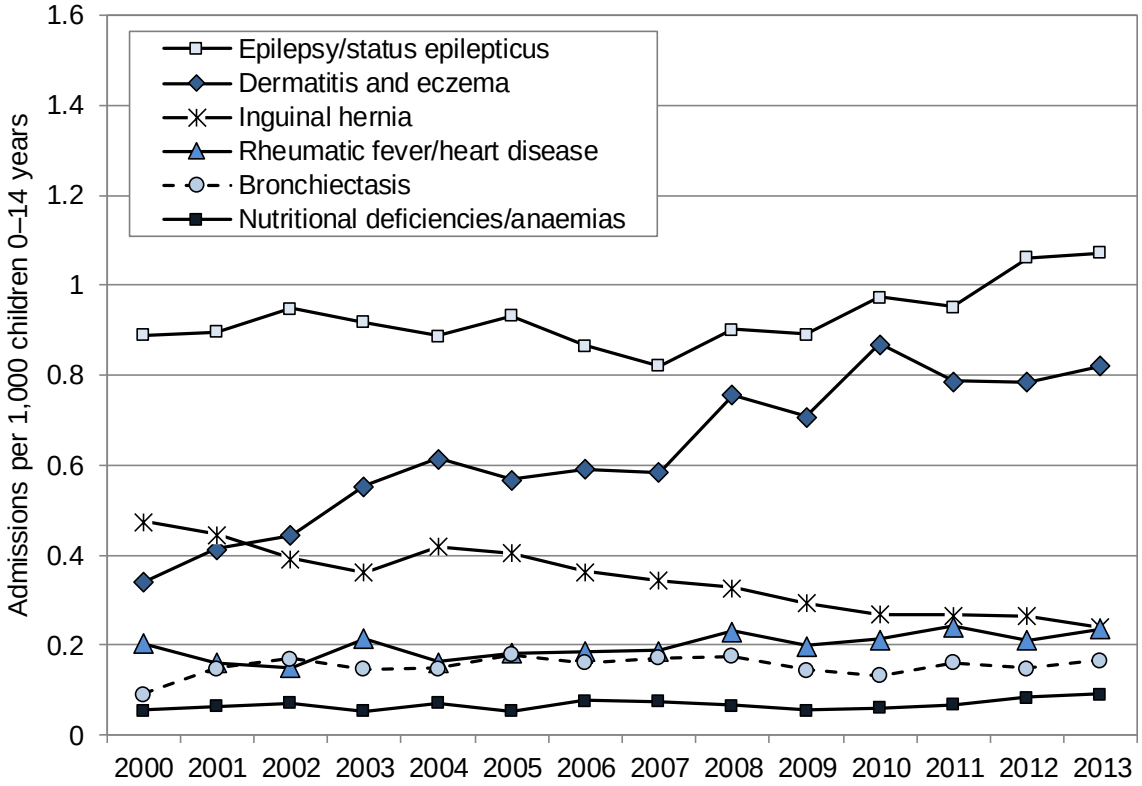
Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population; Note: Acute and arranged admissions only

Figure 37. Hospital admissions for selected acute medical conditions with a social gradient in children aged 0–14 years (excluding neonates), New Zealand 2000–2013



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population; Note: Acute and arranged admissions only

Figure 38. Hospital admissions for selected chronic medical conditions with a social gradient in children aged 0–14 years (excluding neonates), New Zealand 2000–2013



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population; Note: Acute and arranged admissions only

Trends in Hospital Admissions by Ethnicity

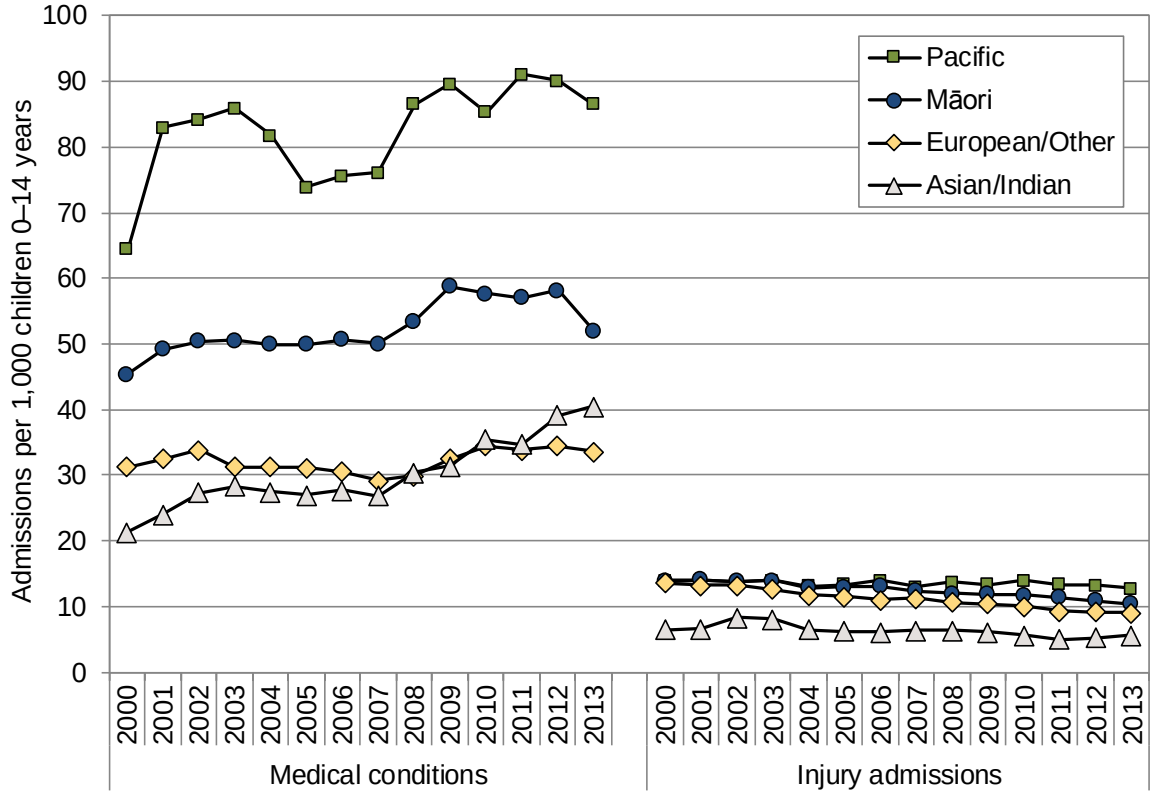
Medical conditions: During 2000–2013, hospitalisations for medical conditions with a social gradient were consistently higher for Pacific and Māori compared to European/Other and Asian/Indian children. For Pacific children, admissions increased during the early 2000s, reached a peak in 2003 and then declined. An upswing in rates was again evident during 2007–2009. For Māori children, rates were static during the mid-2000s, but then increased during 2007–2009, while the rates were relatively static during the mid-2000s for European/Other children and for Asian/Indian children, they did increase from 2007 (**Figure 39**).

Injuries: During 2000–2013, injury admissions with a social gradient were higher for Pacific and Māori, followed by European/Other, and Asian/Indian children. Admission rates declined for Pacific, Māori, and European/Other children during 2000–2013; however, the rate of decline was faster for European/Other, followed by Māori children. Thus ethnic differences were greater in 2013 than in 2000. Trends for Asian/Indian children were more variable (**Figure 39**).

Trends in Mortality by Ethnicity

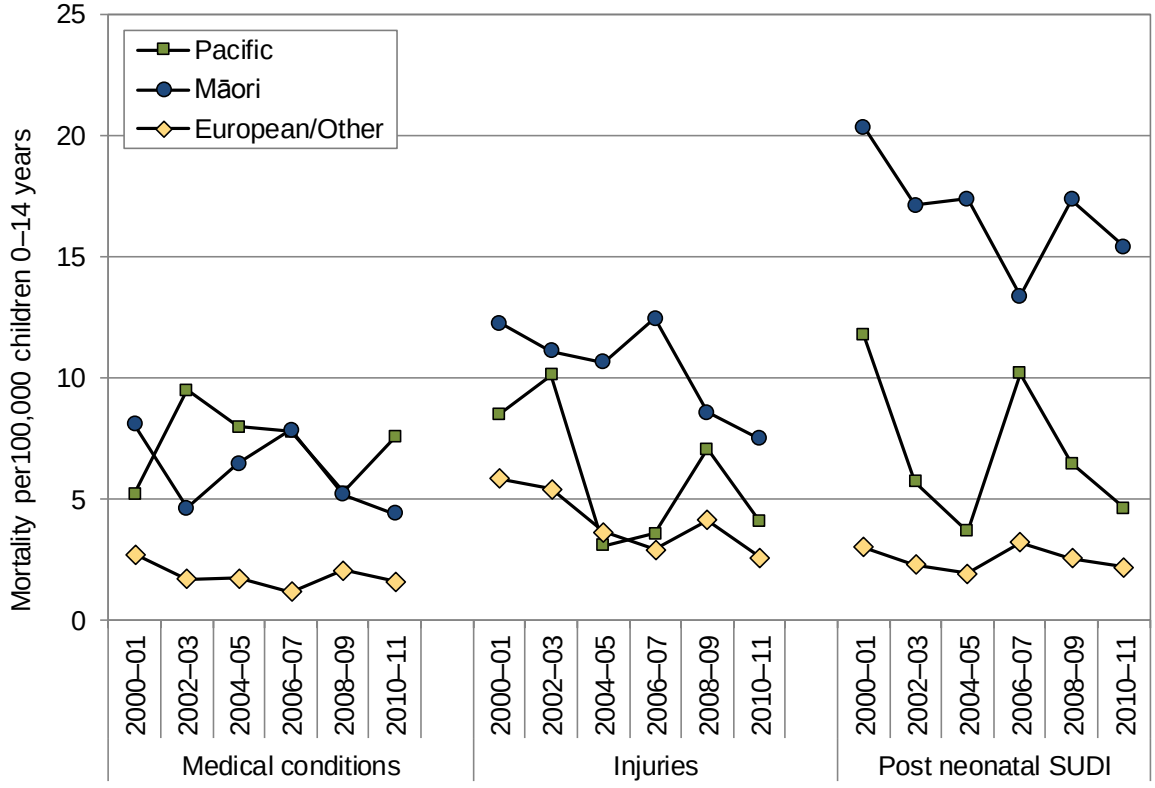
During 2000–2011, SUDI mortality was consistently higher for Māori infants, followed by Pacific, compared to European/Other infants, while the mortality rate from medical conditions with a social gradient was generally higher for Māori and Pacific children than for European/Other children. The mortality rate from injuries with a social gradient was higher for Māori children than for Pacific, and European/Other children (**Figure 40**).

Figure 39. Hospital admissions for conditions with a social gradient in children aged 0–14 years (excluding neonates) by ethnicity, New Zealand 2000–2013



Source: Numerator: National Minimum Dataset (neonates removed); Denominator: Statistics NZ Estimated Resident Population; Note: *Medical conditions*: acute and arranged admissions only; *Injury admissions*: excludes emergency department cases; Ethnicity is Level 1 prioritised

Figure 40. Mortality from conditions with a social gradient in children aged 0–14 years (excluding neonates) by ethnicity, New Zealand 2000–2011



Source: Numerator: National Mortality Collection (neonates removed); Denominator: Statistics NZ Estimated Resident Population; Note: SUDI deaths are for infants aged 28–364 days only; Ethnicity is Level 1 prioritised

Distribution of Hospital Admissions by Ethnicity, Gender and NZDep Index Decile

Medical conditions: During 2009–2013, hospital admissions for medical conditions with a social gradient, when compared to European/Other children, were *significantly higher* for Pacific, Māori and Asian/Indian children. Admissions were also *significantly higher* for males, and for those from the less to most deprived areas (NZDep06 deciles 3–10) (**Table 10**).

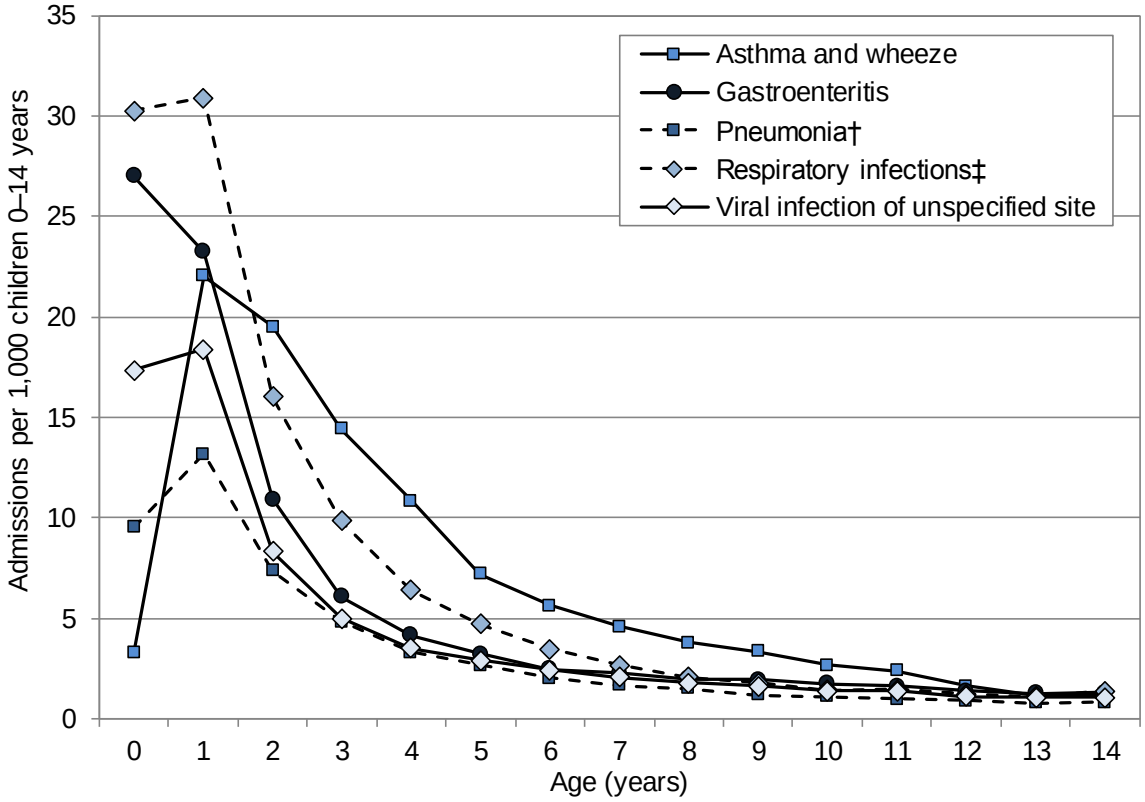
Injuries: Similarly during 2009–2013, hospital admissions for injuries with a social gradient, when compared to European/Other children, were *significantly higher* for Pacific and Māori children, and *significantly lower* for Asian/Indian children. Admissions were also *significantly higher* for males, and for those from average to most deprived areas (NZDep06 deciles 5–10) (**Table 10**).

While the magnitude of the social differences appeared less for injury than for medical admissions, there are technical reasons for this (See Note 4 in Methods box).

Hospital Admissions for Selected Conditions

The top 70% of hospital admissions for conditions with a social gradient among children aged 0–14 years are respiratory and infectious conditions. Most children admitted with respiratory and infectious conditions are under five years old, and 85% of the children admitted with bronchiolitis are infants under one year of age (**Figure 41**).

Figure 41. Hospital admissions for selected conditions with a social gradient in children aged 0–14 years (excluding neonates), by age, New Zealand 2009–2013



Source: Numerator: National Minimum Dataset (neonates removed, acute and arranged admissions only); Denominator: Statistics NZ Estimated Resident Population; Note: † pneumonia includes: bacteria, non-viral, viral and unspecified pneumonia; ‡ respiratory infections includes: acute upper respiratory infections, croup/laryngitis/tracheitis and unspecified acute lower respiratory infections

Distribution of Mortality by Ethnicity, Gender and NZDep Index Decile

During 2007–2011, mortality from medical conditions with a social gradient, when compared to European/Other children, was *significantly higher* for Pacific and Māori children. The mortality rate was also *significantly higher* for males, and for those from the average to most deprived areas (NZDep06 deciles 5–10) (**Table 11**).

Mortality from injuries with a social gradient was *significantly higher* for Māori children, when compared to European/Other children, and *significantly lower* for Asian/Indian children. Mortality was also *significantly higher* for males, and for those from the more deprived areas (NZDep06 deciles 7–10) (**Table 11**). Differences in SUDI mortality are considered in the Infant Mortality section.

Table 10. Distribution of hospital admissions with a social gradient in children aged 0–14 years (excluding neonates) by ethnicity, gender and NZ Deprivation Index decile, New Zealand 2009–2013

Hospital admissions in children 0–14 years							
Medical conditions							
Variable	Rate	Rate ratio	95% CI	Variable	Rate	Rate ratio	95% CI
NZ Deprivation Index decile				NZ Deprivation Index quintile			
Decile 1	25.78	1.00		Deciles 1–2	25.97	1.00	
Decile 2	26.14	1.01	0.99–1.04	Deciles 3–4	30.76	1.18	1.16–1.21
Decile 3	30.16	1.17	1.14–1.20	Deciles 5–6	38.82	1.49	1.47–1.52
Decile 4	31.38	1.22	1.19–1.25	Deciles 7–8	50.68	1.95	1.92–1.98
Decile 5	36.42	1.41	1.38–1.45	Deciles 9–10	70.94	2.73	2.69–2.77
Decile 6	41.43	1.61	1.57–1.65	Prioritised ethnicity			
Decile 7	47.55	1.84	1.80–1.89	Māori	56.71	1.68	1.66–1.70
Decile 8	53.39	2.07	2.03–2.12	Pacific	88.52	2.62	2.59–2.65
Decile 9	65.45	2.54	2.48–2.59	Asian/Indian	36.39	1.08	1.06–1.10
Decile 10	75.86	2.94	2.88–3.00	European/Other	33.76	1.00	
Gender							
Female	40.52	1.00					
Male	49.55	1.22	1.21–1.23				
Injuries							
Variable	Rate	Rate ratio	95% CI	Variable	Rate	Rate ratio	95% CI
NZ Deprivation Index decile				NZ Deprivation Index quintile			
Decile 1	8.03	1.00		Deciles 1–2	8.01	1.00	
Decile 2	7.99	1.00	0.95–1.04	Deciles 3–4	8.07	1.01	0.97–1.04
Decile 3	7.75	0.97	0.92–1.01	Deciles 5–6	8.83	1.10	1.07–1.14
Decile 4	8.38	1.04	1.00–1.10	Deciles 7–8	10.08	1.26	1.22–1.30
Decile 5	8.54	1.06	1.02–1.11	Deciles 9–10	13.46	1.68	1.63–1.73
Decile 6	9.15	1.14	1.09–1.19	Prioritised ethnicity			
Decile 7	9.65	1.20	1.15–1.26	Māori	11.23	1.18	1.15–1.20
Decile 8	10.46	1.30	1.25–1.36	Pacific	13.31	1.39	1.35–1.43
Decile 9	12.48	1.55	1.49–1.62	Asian/Indian	5.48	0.57	0.55–0.60
Decile 10	14.34	1.79	1.72–1.86	European/Other	9.56	1.00	
Gender							
Female	8.06	1.00					
Male	11.77	1.46	1.43–1.49				

Source: Numerator: National Minimum Dataset (neonates removed); Denominator: Statistics NZ Estimated Resident Population; Note: *Medical conditions*: acute and arranged admissions only; *injury*: excludes emergency department cases; Rates are per 1,000; Rate ratios are unadjusted; Ethnicity is Level 1 prioritised; Decile is NZDep06

Table 11. Distribution of mortality with a social gradient in children aged 0–14 years by ethnicity, gender and NZ Deprivation Index quintile, New Zealand 2007–2011

Mortality in children 0–14 years							
Medical conditions							
Variable	Rate	Rate ratio	95% CI	Variable	Rate	Rate ratio	95% CI
NZ Deprivation Index quintile				Prioritised ethnicity			
Deciles 1–2	1.07	1.00		Māori	6.01	3.69	2.50–5.44
Deciles 3–4	1.89	1.77	0.78–4.05	Pacific	7.29	4.47	2.81–7.13
Deciles 5–6	2.71	2.55	1.18–5.51	Asian/Indian	0.93	0.57	0.20–1.60
Deciles 7–8	2.90	2.73	1.28–5.80	European/Other	1.63	1.00	
Deciles 9–10	6.36	5.97	2.98–12.0	Gender			
				Female	2.51	1.00	
				Male	3.83	1.52	1.09–2.13
Injuries							
Variable	Rate	Rate ratio	95% CI	Variable	Rate	Rate ratio	95% CI
NZ Deprivation Index quintile				Prioritised ethnicity			
Deciles 1–2	2.37	1.00		Māori	8.70	2.38	1.79–3.17
Deciles 3–4	4.41	1.86	1.07–3.23	Pacific	5.41	1.48	0.94–2.34
Deciles 5–6	3.30	1.40	0.79–2.48	Asian/Indian	1.63	0.45	0.21–0.96
Deciles 7–8	4.30	1.82	1.06–3.11	European/Other	3.66	1.00	
Deciles 9–10	8.80	3.72	2.29–6.02	Gender			
				Female	3.84	1.00	
				Male	5.92	1.54	1.17–2.02

Source: Numerator: National Mortality Collection (neonates removed); Denominator: Statistics NZ Estimated Resident Population; Note: Rates are per 100,000; Rate ratios are unadjusted; Ethnicity is Level 1 prioritised; Decile is NZDep06

INFANT MORTALITY AND SUDDEN UNEXPECTED DEATH IN INFANCY

Introduction

Infant mortality, defined as the death of a child before his or her first birthday, is widely used as an indicator of the health of a country [61]. In a recent OECD report, New Zealand's infant mortality rates were shown to be lower than those in the United States, Turkey, Chile and Mexico, but higher than those of the rest of the OECD countries for 2009–2011 [62]. Mortality is higher during the first year of life than at any other time during childhood and adolescence in New Zealand [63]. Around half of all infant deaths occur in the first week of life [64].

The past sixty years have seen a steady decline in New Zealand's infant mortality rates, from 25.7 per 1,000 live births in 1953 to 4.9 in 2003, but the rate of decline has slowed over the past decade. The infant mortality rate in 2013 was 4.4 per 1,000 [65]. Infant mortality rates are generally higher for Pacific and Māori infants and for males [66]. There are significant socioeconomic inequalities and in 2008 and 2009, the infant mortality rate in the most deprived NZ Deprivation Index quintile was over twice that in the least deprived quintile [67]. The causes of infant mortality differ markedly with the age of the infant so total infant mortality rates are of limited utility for guiding population health interventions. For neonates (babies in the first 27 days of life), prematurity is a major cause of death, often in association with extremely low birthweight [67] and congenital malformations are also a common cause of death. Sudden Unexpected Death in Infancy (SUDI), and congenital anomalies are the most common causes of death in the post neonatal period (28 days to one year) [68].

The following section uses information from the National Mortality Collection to review neonatal, post neonatal, and total infant mortality rates, and SUDI rates 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 27 days of life*
3. *Post neonatal mortality: Death of a live born infant after 27 days but prior to 365 days of life*
4. *Sudden Unexpected Death in Infancy: Death of a live born infant <365 days of life, where the cause of death is Sudden Infant Death Syndrome (SIDS), accidental suffocation/strangulation in bed, inhalation of gastric contents/food, or Ill-defined/unspecified causes*

Data Sources

Numerator: National Mortality Collection: All deaths in the first year of life, using the definitions outlined above. Cause of death was derived from the ICD-10-AM main underlying cause of death as follows: Congenital anomalies: CVS (Q20); Congenital anomalies: CNS (Q00–Q07); Congenital anomalies: Other (remainder of Q00–Q99); Intrauterine/Birth asphyxia (P20–P21); Extreme prematurity (P07.2); Other perinatal conditions (P00–P96 excluding P07.2 and P20–P21); SUDI: SIDS (R95); SUDI: Unspecified (R96, R98, R99); SUDI: Suffocation/strangulation in bed (W75); SUDI: Inhalation of gastric contents/food (W78, W79); Injury/Poisoning (V01–Y36).

Denominator: Birth Registration Dataset (live births only)

Notes on Interpretation

Note 1: SUDI and SIDS: SIDS is defined as "the sudden unexpected death of an infant <1 year of age, with onset of the fatal episode apparently occurring during sleep, and that remains unexplained after a thorough investigation, including performance of a complete autopsy and review of the circumstances of death and the clinical history" [69]. Issues have emerged with defining SIDS, possibly as the result of pathologists and coroners becoming increasingly reluctant to label a death as SIDS in the context of equivocal death scene findings (e.g. death of an infant who had been co-sleeping with a parent who had recently consumed alcohol [70]). This has resulted in a fall in the number of SIDS deaths, and a rise in the number of deaths attributed to "suffocation/strangulation in bed" or "unspecified causes".

Note 2: In New Zealand, while SIDS rates have declined, there are still large ethnic differences and SIDS rates are six times higher for Māori infants than for European infants [49].

Note 3: Two additional codes were added to the SUDI indicator in 2013 (W78: Inhalation of gastric contents; and W79: Inhalation and ingestion of food causing obstruction of the respiratory tract) to ensure consistency with the Child and Youth Mortality Review Committee's SUDI reporting. As a result, the rates in this section are not directly comparable with those presented in NZCYES reports prior to 2013. See **Appendix 5** for an overview of the National Mortality Collection.

Total Infant, Neonatal and Post Neonatal Mortality

New Zealand Distribution and Trends

Distribution by Cause

In New Zealand during 2007–2011, extreme prematurity, and congenital anomalies were the leading causes of neonatal mortality, although intrauterine/birth asphyxia also made a significant contribution. SUDI was the leading cause of post neonatal mortality, followed by congenital anomalies (**Table 12**).

Table 12. Neonatal and post neonatal mortality by cause of death, New Zealand 2007–2011

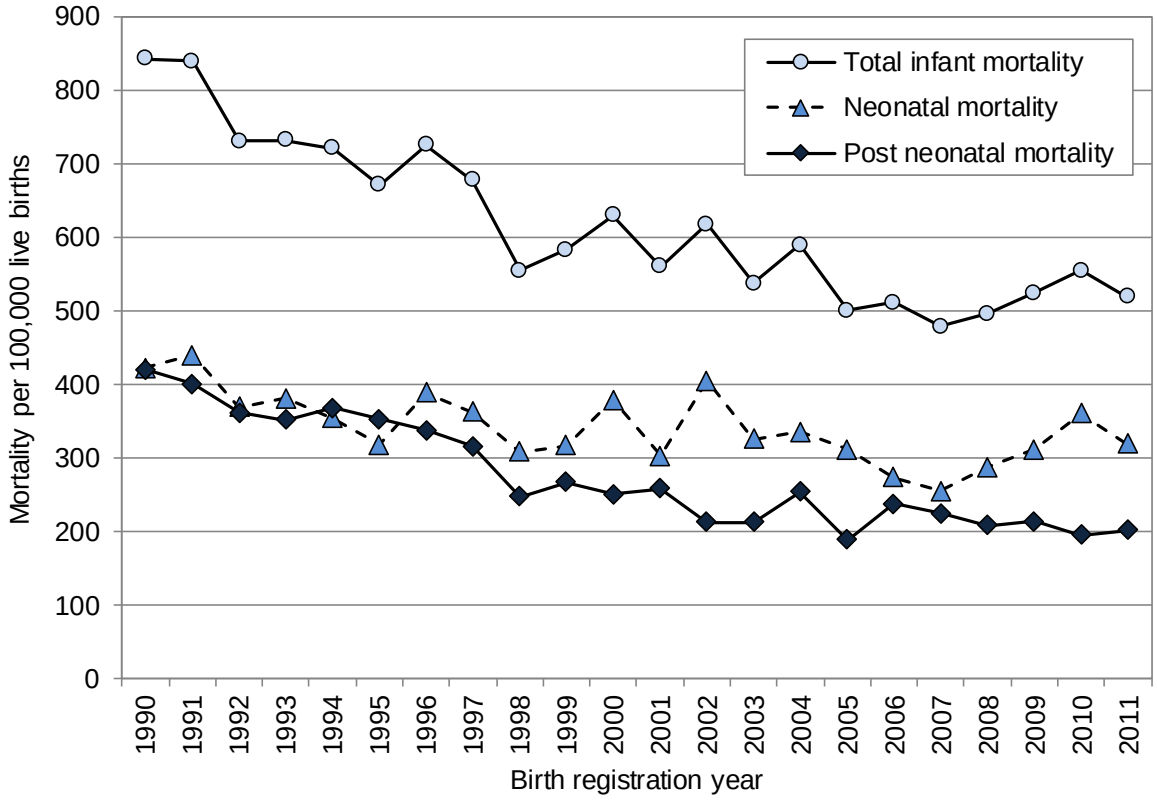
Cause of death	Number: Total 2007–2011	Number: Annual average	Rate per 100,000	Percent of deaths
New Zealand				
Neonatal mortality				
Extreme prematurity	246	49.2	76.73	25.1
Congenital anomalies: CVS	61	12.2	19.03	6.2
Congenital anomalies: CNS	45	9.0	14.04	4.6
Congenital anomalies: Chromosomal	38	7.6	11.85	3.9
Congenital anomalies: other	104	20.8	32.44	10.6
Intrauterine/birth asphyxia	32	6.4	9.98	3.3
Other perinatal conditions	377	75.4	117.59	38.4
SUDI: SIDS	12	2.4	3.74	1.2
SUDI: all other types	25	5.0	7.80	2.5
Injury/poisoning	6	1.2	1.87	0.6
Other causes	36	7.2	11.23	3.7
Total neonatal mortality	982	196.4	306.29	100.0
Post neonatal mortality				
SUDI: SIDS	147	29.4	45.85	22.0
SUDI: suffocation/strangulation in bed	108	21.6	33.69	16.2
SUDI: all other types	16	3.2	4.99	2.4
Congenital anomalies: CVS	51	10.2	15.91	7.6
Congenital anomalies: Chromosomal	27	5.4	8.42	4.0
Congenital anomalies: CNS	8	1.6	2.50	1.2
Congenital anomalies: other	38	7.6	11.85	5.7
Other perinatal conditions	75	15.0	23.39	11.2
Injury/poisoning	29	5.8	9.05	4.3
Other causes	169	33.8	52.71	25.3
Total post neonatal mortality	668	133.6	208.35	100.0
New Zealand total	1,650	330.0	514.64	

Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset; Note: CVS = Cardiovascular system; CNS = Central Nervous System; SUDI = Sudden Unexplained Death in Infancy; SIDS = Sudden Infant Death Syndrome; Rates per 100,000 live births

New Zealand Trends

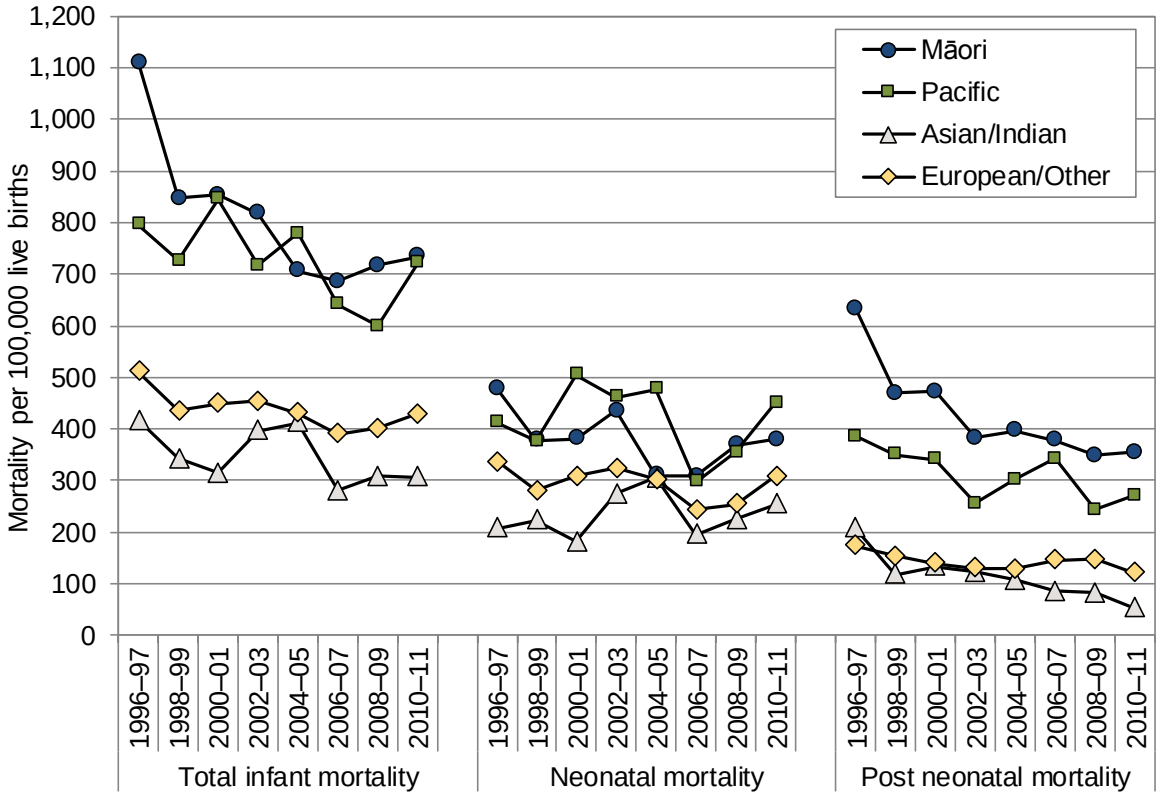
In New Zealand during the 1990s neonatal and post neonatal mortality both declined. While there was some year to year variation during the 2000s, neonatal and post neonatal mortality rates in 2011 were very similar to what they were in the early 2000s (**Figure 42**).

Figure 42. Total infant, neonatal and post neonatal mortality, New Zealand 1990–2011



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

Figure 43. Total infant, neonatal and post neonatal mortality by ethnicity, New Zealand 1996–2011



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

Trends by Ethnicity

In New Zealand during 1996–2011, while there was some year-to-year variation, neonatal mortality was generally higher for Pacific and Māori infants than for European/Other and Asian/Indian infants. Post neonatal mortality remained consistently higher for Māori and Pacific infants than for European/Other and Asian/Indian infants (**Figure 43**).

Distribution by NZDep Index decile, Maternal age, Ethnicity, Gender, and Gestation at birth

Neonatal mortality: In New Zealand during 2007–2011, neonatal mortality was *significantly higher* for Pacific and Māori infants than for European/Other infants, for males, and for those from less deprived to more deprived areas (NZDep deciles 3–10). Rates were also *significantly higher* for preterm babies, and the babies of younger (<20 years) mothers (**Table 13**).

Post neonatal mortality: During 2007–2011, post neonatal mortality was also *significantly higher* for Māori and Pacific infants than for European/Other and Asian/Indian infants, for males, and for those from average to more deprived areas (NZDep deciles 5–10). Rates were also *significantly higher* for preterm babies, and the babies of younger (<20 years) mothers (**Table 13**).

Table 13. Distribution of neonatal and post neonatal mortality by NZ Deprivation Index decile, maternal age, ethnicity, gender, and gestation at birth, New Zealand 2007–2011

Variable	Rate	Rate ratio	95% CI	Variable	Rate	Rate ratio	95% CI
Neonatal mortality							
NZ Deprivation Index decile				Ethnicity			
Deciles 1–2	169.6	1.00		Māori	353.6	1.28	1.11–1.48
Deciles 3–4	251.4	1.48	1.12–1.96	Pacific	386.0	1.40	1.16–1.70
Deciles 5–6	265.4	1.56	1.20–2.04	Asian/Indian	222.1	0.81	0.63–1.03
Deciles 7–8	317.0	1.87	1.45–2.41	European/Other	275.4	1.00	
Deciles 9–10	434.2	2.56	2.01–3.25	Gender			
Maternal age group				Female	276.8	1.00	
<20 years	534.7	1.00		Male	334.2	1.21	1.06–1.37
20–24 years	364.7	0.68	0.55–0.85	Gestation at birth			
25–29 years	274.2	0.51	0.41–0.64	20–36 weeks	2,880.1	36.37	31.37–42.16
30–34 years	235.7	0.44	0.35–0.55	37+ weeks	79.2	1.00	
35+ years	292.0	0.55	0.44–0.68				
Post neonatal mortality							
NZ Deprivation Index decile				Ethnicity			
Deciles 1–2	100.5	1.00		Māori	356.7	2.61	2.20–3.10
Deciles 3–4	115.0	1.14	0.78–1.67	Pacific	271.3	1.98	1.56–2.52
Deciles 5–6	161.9	1.61	1.14–2.28	Asian/Indian	63.4	0.46	0.30–0.72
Deciles 7–8	189.1	1.88	1.36–2.61	European/Other	136.7	1.00	
Deciles 9–10	367.2	3.65	2.70–4.95	Gender			
Maternal age group				Female	177.9	1.00	
<20 years	457.7	1.00		Male	237.1	1.33	1.14–1.55
20–24 years	342.5	0.75	0.59–0.95	Gestation at birth			
25–29 years	179.0	0.39	0.30–0.50	20–36 weeks	833.2	5.93	5.01–7.02
30–34 years	126.2	0.28	0.21–0.36	37+ weeks	140.5	1.00	
35+ years	121.9	0.27	0.20–0.35				

Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset; Note: Rates are per 100,000 live births; Rate ratios are unadjusted; Ethnicity is Level 1 prioritised; Decile is NZDep06

Sudden Unexpected Death in Infancy (SUDI)

New Zealand Distribution and Trends

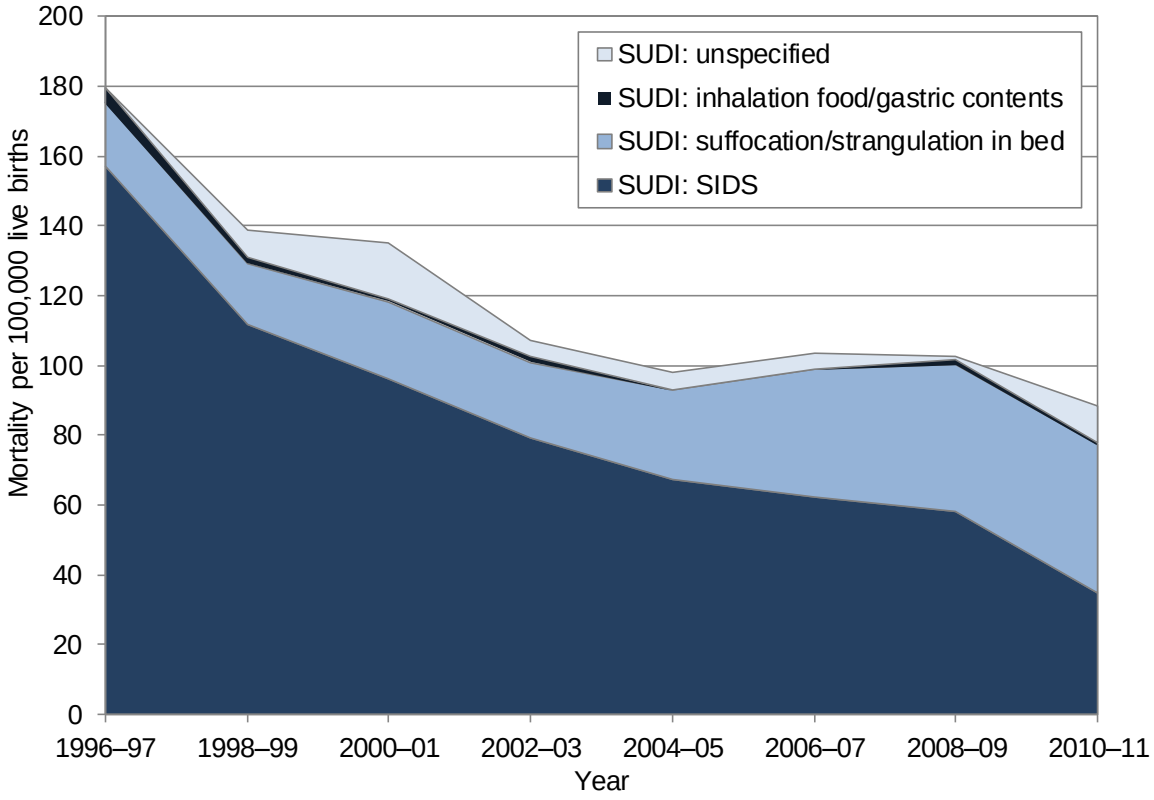
New Zealand Trends

In New Zealand, SUDI rates declined during the late 1990s and early 2000s, but levelled off after 2002–03. When broken down by SUDI sub-type, deaths attributed to SIDS continued to decline throughout 1996–2011, while deaths due to suffocation or strangulation in bed became more prominent as the period progressed. It is unclear, however, whether this represented a diagnostic shift in the coding of SUDI, or whether the sleeping environment made an increasingly greater contribution to SUDI as the period progressed (**Figure 44**).

Distribution by Age

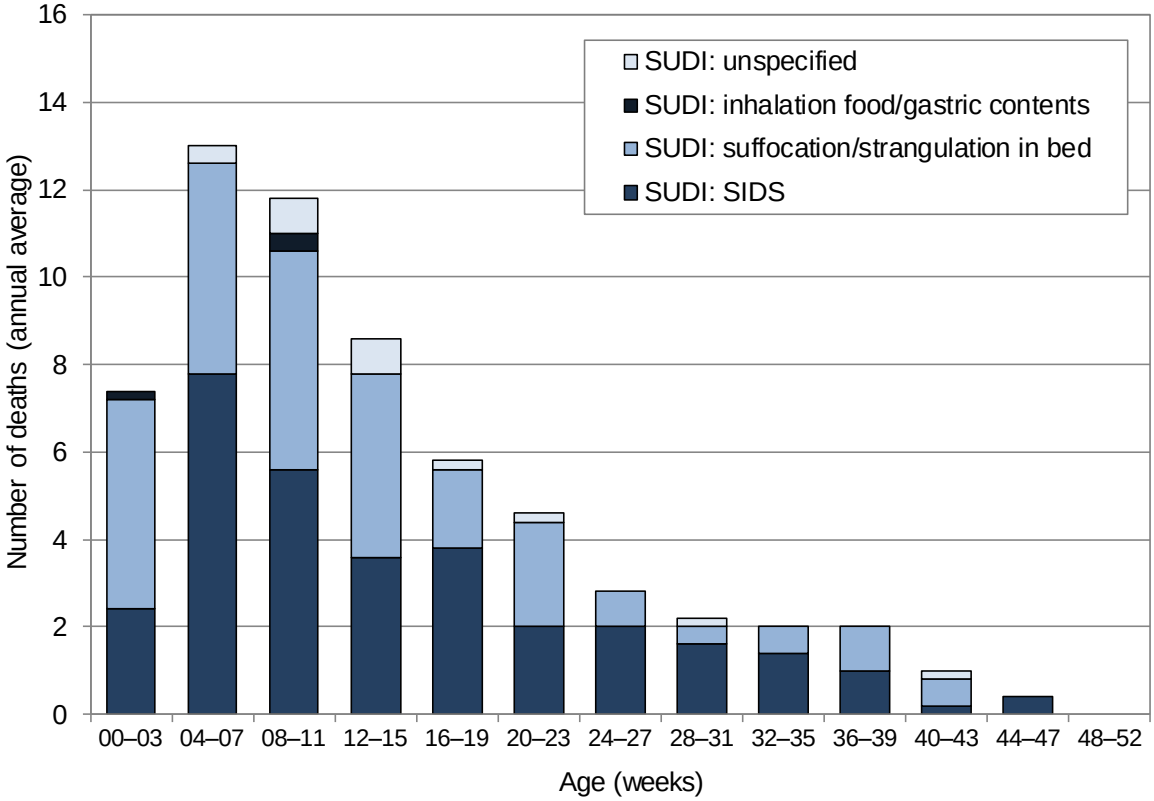
In New Zealand during 2007–2011, SUDI mortality was highest in infants 4–7 weeks, followed by those aged 8–11 weeks, and then those 12–15 weeks of age. Suffocation or strangulation in bed accounted for 64.9% of all SUDI deaths in those aged 0–3 weeks, and 36.9% of SUDI deaths in those aged 4–7 weeks (**Figure 45**).

Figure 44. Sudden Unexpected Death in Infancy by type, New Zealand 2000–2011



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

Figure 45. Sudden Unexpected Death in Infancy by type and age in weeks, New Zealand 2007-2011



Source: National Mortality Collection

Distribution by NZDep Index decile, Maternal age, Ethnicity, Gender and Gestation at birth

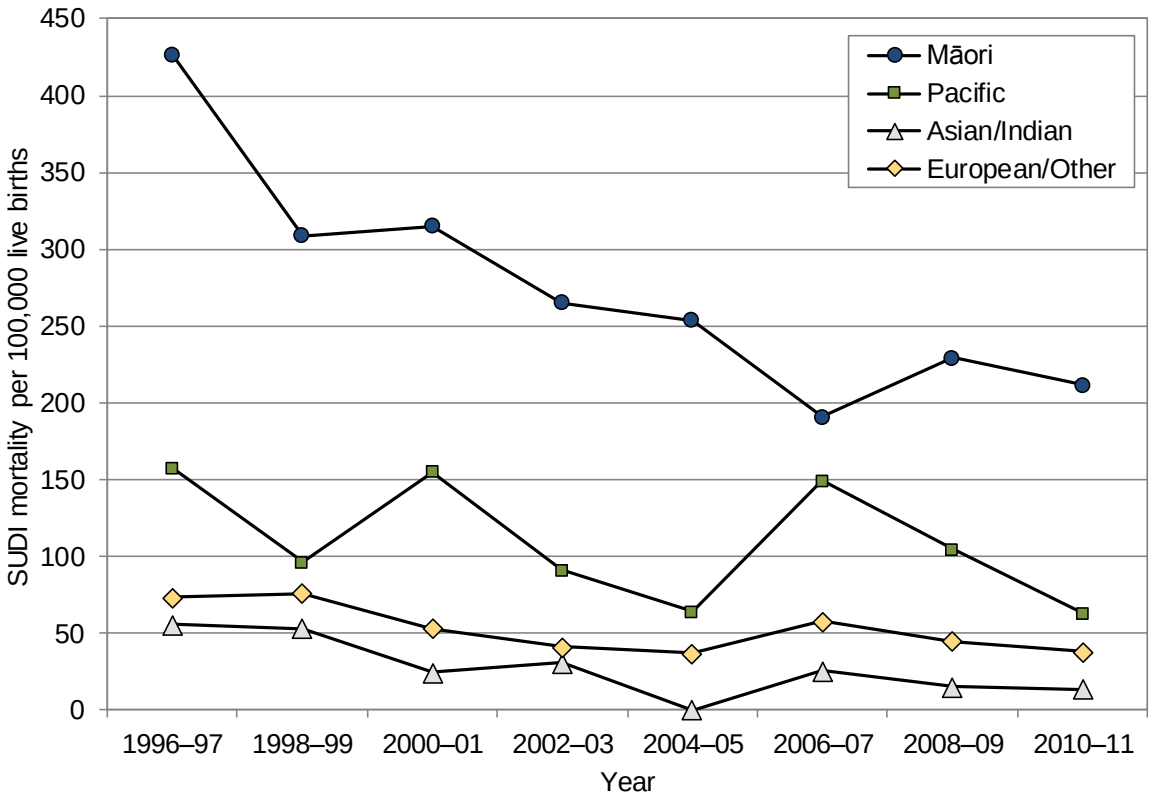
In New Zealand during 2007–2011, SUDI rates were *significantly higher* for Māori and for Pacific infants than for European/Other and Asian/Indian infants (**Table 14**). Similar ethnic differences were seen during 1996–2011 (**Figure 46**). SUDI rates were also *significantly higher* during 2007−2011 for those from more deprived areas (NZDep deciles 7–10), for babies that were male, or were preterm, and for the babies of younger (<20 years) mothers (**Table 14**).

Table 14. Distribution of Sudden Unexpected Death in Infancy by NZ Deprivation Index decile, maternal age, ethnicity, gender, and gestation at birth, New Zealand 2007–2011

Variable	Rate	Rate ratio	95% CI	Variable	Rate	Rate ratio	95% CI
Sudden Unexpected Death in Infancy							
NZ Deprivation Index decile				Ethnicity			
Deciles 1–2	33.5	1.00		Māori	211.3	4.70	3.58–6.17
Deciles 3–4	35.1	1.05	0.53–2.05	Pacific	95.1	2.12	1.41–3.19
Deciles 5–6	60.1	1.79	1.00–3.23	Asian/Indian	14.4	0.32	0.13–0.80
Deciles 7–8	104.8	3.13	1.83–5.36	European/Other	44.9	1.00	
Deciles 9–10	184.8	5.52	3.30–9.22	Gender			
Maternal age group				Female	76.4	1.00	
<20 years	295.2	1.00		Male	114.6	1.50	1.19–1.89
20–24 years	183.2	0.62	0.46–0.84	Gestation at birth			
25–29 years	77.4	0.26	0.19–0.37	20–36 weeks	232.6	3.04	2.27–4.08
30–34 years	42.5	0.14	0.10–0.21	37+ weeks	76.5	1.00	
35+ years	36.9	0.12	0.08–0.20				

Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset; Note: Rates are per 100,000 live births; Rate ratios are unadjusted; Ethnicity is Level 1 prioritised; Decile is NZDep06

Figure 46. Sudden Unexpected Death in Infancy by ethnicity, New Zealand 1996–2011



Source: National Mortality Collection; Note: Ethnicity is Level 1 prioritised

INJURIES ARISING FROM THE ASSAULT, NEGLECT, OR MALTREATMENT OF CHILDREN

Introduction

Child maltreatment has been defined as any act of commission or omission by a parent or other caregiver that results in harm, potential for harm, or threat of harm to a child. Child abuse (acts of commission) includes physical, sexual and emotional abuse, and fabricated or induced illness. Child neglect (acts of omission) includes failure to: provide for a child's physical and emotional needs; obtain necessary medical or dental care; ensure a child has access to education; provide adequate supervision, and prevent exposure to violent environments [71]. Child abuse and neglect have both short term and lifelong physical, psychological, and behavioural consequences for individuals and consequences for society. Survivors of childhood sexual abuse are at risk for a wide range of medical, psychological, behavioural, and sexual disorders [72]. Studies on child abuse or neglect and subsequent mental and physical health outcomes suggest a causal relationship between non-sexual child maltreatment and a range of mental disorders, suicide attempts, drug use, and risky sexual behaviour [73].

Most child maltreatment is perpetrated by parents or guardians, many of whom were themselves maltreated as children [73,74]. Poverty, sole parenthood, the presence of a non-biological parent in the household, mental health problems, domestic violence, and alcohol and drug abuse increase the probability of abusive parenting [73,74]. Characteristics that make a child more difficult to care for than usual, for example crying a lot, having a "difficult temperament", or being disabled, may increase a child's risk of being maltreated, especially where there are other demographic or family risk factors [75].

A UNICEF report on child maltreatment deaths from 1994 to 1998 ranked New Zealand near the bottom in the OECD [76] with a rate of 1.2 deaths per 100,000 children under 15 years, double the OECD median. Over the period 2002–2012 New Zealand's rates of child death due to assault have not improved [68].

The following section reviews hospital admissions and mortality from injuries arising from the assault, neglect, or maltreatment of children aged 0–14 years using information from the National Minimum Dataset and the National Mortality Collection.

Data Source and Methods

Definition

1. *Hospital admissions for injuries arising from the assault, neglect, or maltreatment of children 0–14 years*

2. *Deaths from injuries arising from the assault, neglect, or maltreatment of children 0–14 years*

Data Source

1. Hospital admissions

Numerator: National Minimum Dataset: Hospital admissions for children (0–14 years) with a primary diagnosis of injury (ICD-10-AM S00–T79) and an external cause code of intentional injury (ICD-10-AM X85–Y09) in any of the first 10 external cause codes. As outlined in Appendix 3 in order to ensure comparability over time, all cases with an emergency department specialty code (M05–M08) on discharge were excluded, as were admissions with a primary diagnosis outside of the ICD-10-AM S00–T79 injury range

Denominator: NZ Statistics NZ Estimated Resident Population

2. Mortality

Numerator: National Mortality Collection: Deaths in children (0–14 years) with a clinical code (cause of death) of intentional injury (ICD-10-AM X85–Y09)

Denominator: NZ Statistics NZ Estimated Resident Population

Notes on Interpretation

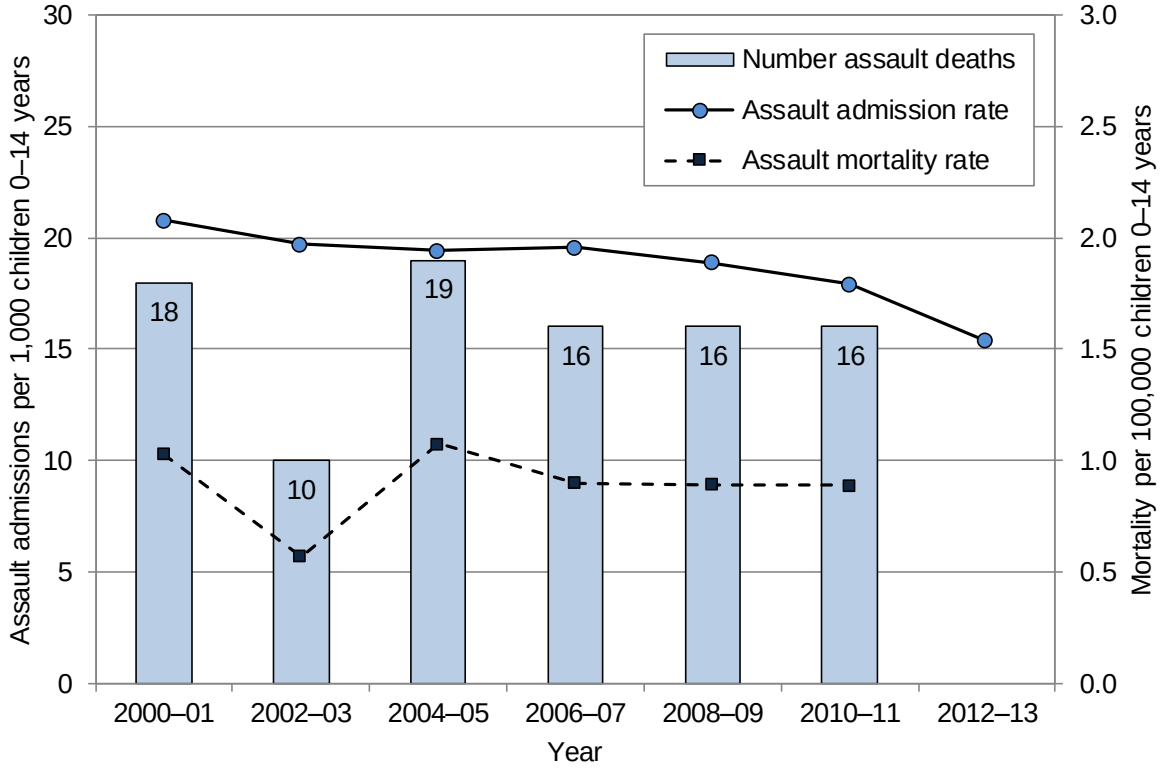
The limitations of the National Minimum Dataset are discussed at length in **Appendix 3**. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data.

New Zealand Distribution and Trends

New Zealand Trends

In New Zealand during 2000–2013, hospital admissions for injuries arising from the assault, neglect, or maltreatment of children declined gradually, while mortality during 2000–2011 remained relatively static. On average during 2000–2011, approximately 8 children per year died as a result of injuries arising from assault, neglect, or maltreatment (**Figure 47**).

Figure 47. Hospital admissions (2000–2013) and deaths (2000–2011) due to injuries arising from the assault, neglect, or maltreatment of New Zealand children aged 0–14 years



Source: Numerator: *Admissions*: National Minimum Dataset (emergency department cases excluded); *Mortality*: National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population; Note: numbers of deaths are per two year period

Distribution by Age and Gender

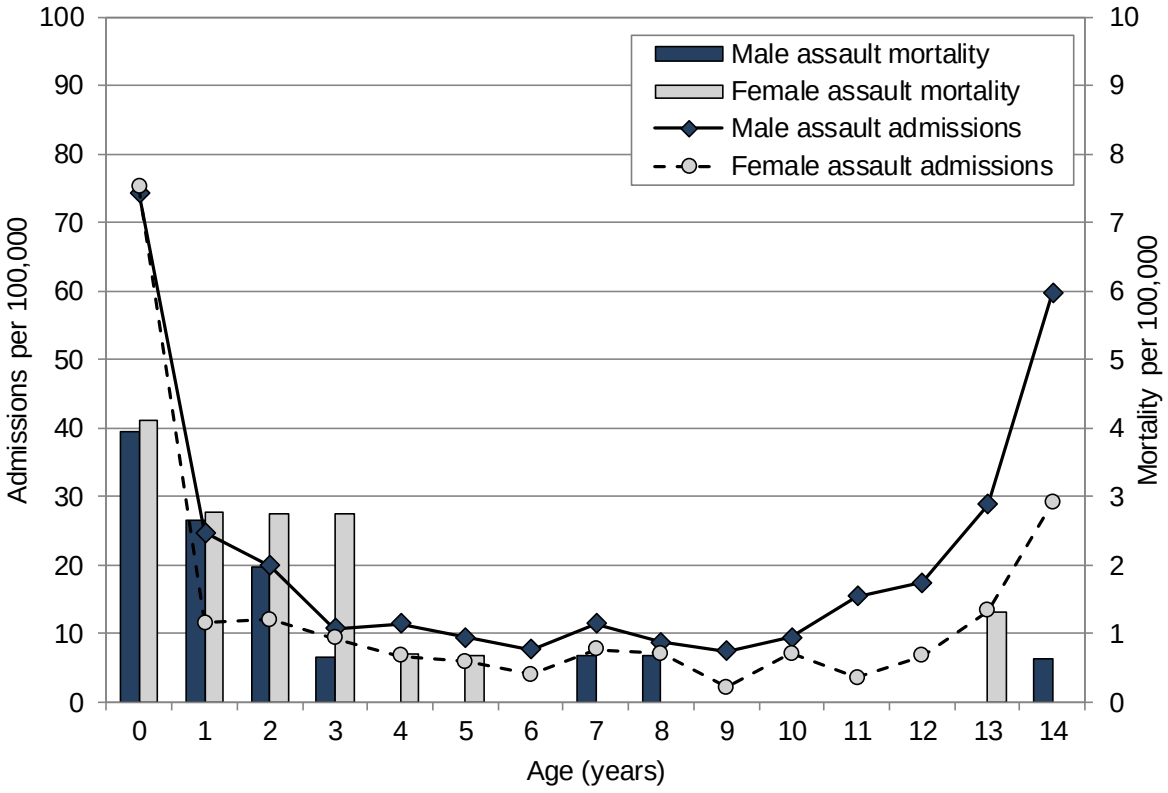
In New Zealand during 2009–2013, hospital admissions for injuries arising from the assault, neglect, or maltreatment of children exhibited a U-shaped distribution with age, such that rates were higher for infants aged less than one year and for those over eleven years of age. In contrast, mortality was highest for infants less than one year, followed by those aged one and two years (**Figure 48**).

The gender balance for admissions was relatively even during infancy and early childhood, however, admissions for males became more predominant as adolescence approached (**Figure 48**).

Trends by Ethnicity

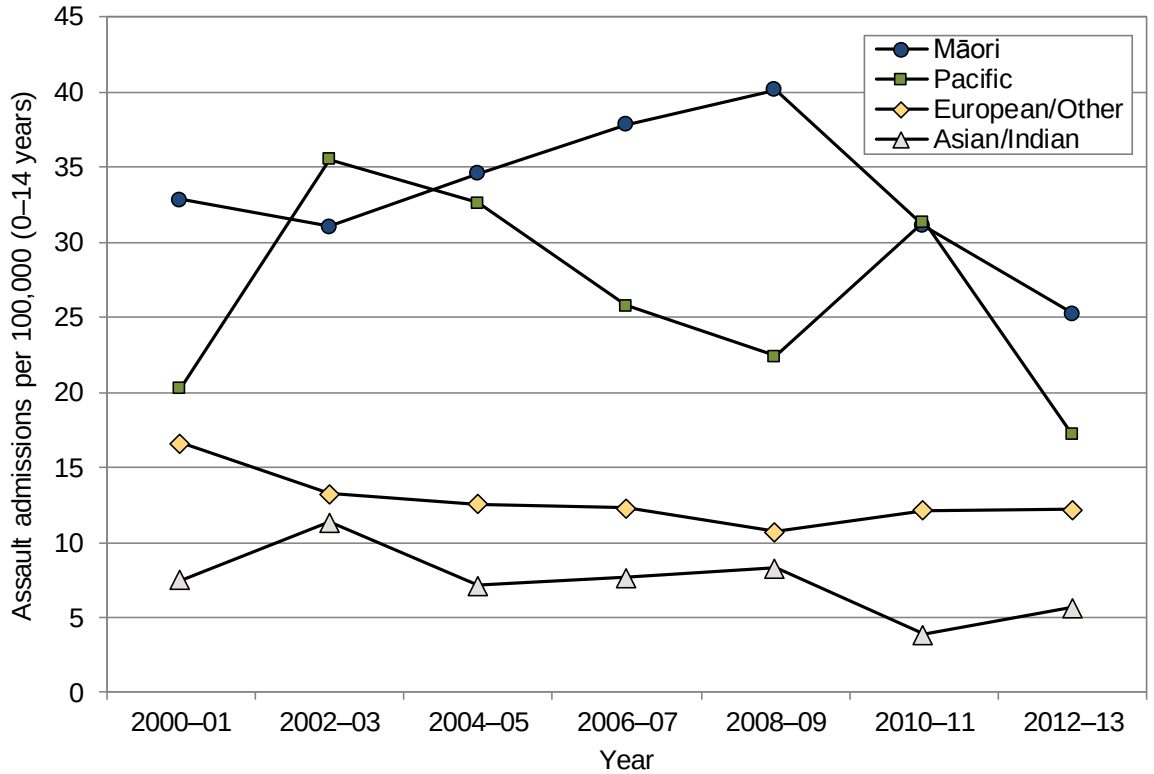
In New Zealand during 2000–2013, hospital admissions for injuries arising from assault, neglect, or maltreatment were consistently higher for Māori and Pacific children than for European/Other and Asian/Indian children. While rates for European/Other children declined during this period, rates for Māori children increased during the early-to-mid 2000s, but declined during 2010–2013. In contrast, admissions for Pacific children also declined during the early-to-mid 2000s, but increased in 2010–2011 before declining again in 2012–2013 (**Figure 49**).

Figure 48. Hospital admissions (2009–2013) and deaths (2007–2011) due to injuries arising from the assault, neglect, or maltreatment of New Zealand children by age and gender



Source: Numerator: *Admissions*: National Minimum Dataset (emergency department cases excluded); *Mortality*: National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population

Figure 49. Hospital admissions for injuries arising from the assault, neglect, or maltreatment of children aged 0–14 years by ethnicity, New Zealand 2000–2013



Source: Numerator: National Minimum Dataset (emergency department cases excluded); Denominator: Statistics NZ Estimated Resident Population; Note: Ethnicity is level 1 prioritised

Distribution by NZDep Index Decile, Ethnicity and Gender

In New Zealand during 2009–2013, hospital admissions for injuries arising from the assault, neglect, or maltreatment of children were *significantly higher* for males and for those from average to more deprived (NZDep deciles 3–10) areas. Admissions were also *significantly higher* for Māori and Pacific children than for European/Other children, and *significantly lower* for Asian/Indian children (**Table 15**).

Table 15. Hospital admissions for injuries arising from the assault, neglect, or maltreatment of children aged 0–14 years by NZDep Index decile, ethnicity and gender, New Zealand 2009–2013

Assault, neglect, or maltreatment admissions							
Children 0–14 years							
Variable	Rate	Rate ratio	95% CI	Variable	Rate	Rate ratio	95% CI
NZ Deprivation Index decile				Prioritised ethnicity			
Deciles 1–2	4.41	1.00		Māori	31.24	2.60	2.23–3.03
Deciles 3–4	8.97	2.04	1.37–3.02	Pacific	23.39	1.95	1.55–2.44
Deciles 5–6	15.48	3.51	2.45–5.04	Asian/Indian	6.51	0.54	0.37–0.79
Deciles 7–8	21.89	4.97	3.52–7.02	European/Other	12.01	1.00	
Deciles 9–10	31.52	7.16	5.12–10.0				
Gender							
Female	13.45	1.00		Male	21.18	1.57	1.36–1.82

Source: Numerator: National Minimum Dataset (emergency department cases excluded); Denominator: Statistics NZ Estimated Resident Population; Note: Rate is per 100,000; Rate ratios are unadjusted; Ethnicity is level 1 prioritised; Decile is NZDep06

Nature of the Injury Sustained

During 2009–2013, the head was the most common site for injuries sustained as the result of the assault or neglect. For those aged 0–4 years, 59.3% of their injuries were to the head with the largest proportion being traumatic subdural haemorrhages and superficial head injuries. For children aged 5–9 years, 39.3% of their injuries were to the head, and were more commonly superficial. The next most common site was the abdominal/lower back/spine/pelvis area followed by the upper limb. For children aged 10–14 years, 55.5% of injuries were to the head, the most common being fractures of the skull or facial bones. The next most common site of injury for this age group was the upper limb (**Table 16**).

Table 16. Nature of injuries arising from assault, neglect, or maltreatment in hospitalised children 0−14 years by age group, New Zealand 2009–2013

Primary diagnosis	Number: total 2009−2013	Number: annual average	Rate per 100,000	Percent
Assault, neglect, or maltreatment				
Children aged 0–4 years				
Traumatic subdural haemorrhage	88	17.6	5.78	22.7
Superficial head injury	76	15.2	4.99	19.6
Fracture skull or facial bones	16	3.2	1.05	4.1
Other head injuries	50	10.0	3.28	12.9
Injuries to thorax (including rib fractures)	5	1.0	0.33	1.3
Injuries to abdomen, lower back, and pelvis	26	5.2	1.71	6.7
Injuries to upper limb	30	6.0	1.97	7.8
Fractured femur	16	3.2	1.05	4.1
Other injuries to lower limb	8	1.6	0.53	2.1
Maltreatment	42	8.4	2.76	10.9
Other injuries	30	6.0	1.97	7.8
Total	387	77.4	25.42	100.0
Children aged 5–9 years				
Superficial head injury	20	4.0	1.34	18.7
Fracture skull or facial bones	3	0.6	0.20	2.8
Concussion	3	0.6	0.20	2.8
Other head injuries	16	3.2	1.07	15.0
Injuries to abdomen, lower back, and pelvis	20	4.0	1.34	18.7
Injuries to upper limb	14	2.8	0.94	13.1
Other injuries to lower limb	6	1.2	0.40	5.6
Maltreatment	8	1.6	0.54	7.5
Other injuries	17	3.4	1.14	15.9
Total	107	21.4	7.19	100.0
Children aged 10–14 years				
Fracture skull or facial bones	61	12.2	4.06	20.9
Concussion	37	7.4	2.46	12.7
Superficial head injury	24	4.8	1.60	8.2
Other head injuries	40	8.0	2.66	13.7
Injuries to thorax (including rib fractures)	10	2.0	0.67	3.4
Injuries to abdomen, lower back, and pelvis	22	4.4	1.46	7.5
Injuries to upper limb	48	9.6	3.19	16.4
Fractured femur	3	0.6	0.20	1.0
Other injuries to lower limb	12	2.4	0.80	4.1
Maltreatment	11	2.2	0.73	3.8
Other injuries	24	4.8	1.60	8.2
Total	292	58.4	19.42	100.0

Source: National Minimum Dataset (emergency department cases excluded), Denominator: Statistics NZ Estimated Resident Population

APPENDICES AND REFERENCES

APPENDIX 1: METHODS USED TO DEVELOP THE CHILD POVERTY MONITOR

This appendix provides an overview of the methodology used to develop the Child Poverty Monitor that was used originally for the New Zealand Children's Social Health Monitor.

Rationale for the Child Poverty Monitor Indicators

The precursor to the Child Poverty Monitor was the Children's Social Health Monitor which arose from the work of a group of health professionals responding to the deteriorating economic conditions in New Zealand and Australia in the late 2000s. Coming from a range of organisations[1] with an interest in child health this Working Group was concerned about the impact of the recession on child wellbeing. The Group formed in early 2009 and discussed a set of indicators with which to monitor this impact: the types of indicators that might be included and the criteria by which individual indicators should be selected. As a result of these discussions, the Children's Social Health Monitor was developed, comprising two sets of indicators:

1. *To monitor prevailing economic conditions:* Ideally, indicators would capture different facets of economic wellbeing (e.g. in a recession several quarters of negative growth (*GDP*) may precede upswings in unemployment rates, which in turn will influence the number of children reliant on benefit recipients.
2. *To monitor children's wellbeing:* Ideally indicators would respond relatively quickly (e.g. months to small number of years) to family's adaptations to deteriorating economic conditions (e.g. hospitalisations for poverty-related conditions) and would provide an overview of family wellbeing from a variety of different perspectives.

The Expert Advisory Group: solutions to child poverty

In 2012, the Children's Commissioner established the Expert Advisory Group on Solutions to Child Poverty (EAG).He gave the EAG the task of providing him with realistic, pragmatic and effective solutions to address child poverty in the short term and in the longer term. In their report *Child Poverty in New Zealand: Evidence for Action* [2], the EAG recommended that governments adopt a strategic framework for addressing child poverty issues and ensuring accountability for outcomes. They stated that the framework should include the enactment of legislation requiring the measurement of child poverty, the setting of short and long term poverty reduction targets, and the establishment, monitoring and reporting of various child poverty related indicators [2].

Indicator Selection Criteria

The working group decided to gather good quality routinely collected data able to provide complete population coverage. This was to ensure the indicator set was methodologically robust and could be consistently monitored over time. A set of selection criteria were established against which candidate indicators were scored. The selection criteria included:

Conceptual Criteria

Criteria for Indicators to Monitor Prevailing Macroeconomic Conditions

1. Internationally recognised and reported measure of economic performance/wellbeing

[1]The Paediatric Society of New Zealand, the Population Child Health Special Interest Group of the Royal Australasian College of Physicians, the New Zealand Child and Youth Epidemiology Service, TAHA (the Well Pacific Mother and Infant Service), the Māori SIDS Programme, the Kia Mataara Well Child Consortium, the New Zealand Council of Christian Social Services, and academics from the Universities of Auckland and Otago

2. Should impact on at least one facet of children's wellbeing (i.e. the pathway(s) via which it impacts on children's wellbeing should be relatively well understood, or an association between the indicator and wellbeing documented in the literature)
3. Likely to change in response to a recession (i.e. months to small number of years)

Criteria for Indicators to Monitor Children's Health and Wellbeing

1. The condition is likely to be influenced by family's physical adaptations to worsening economic conditions (e.g. saving on heating to pay for food, moving in with family to save on rent)
2. The condition is likely to be influenced by family's psychological adaptations to worsening economic conditions (e.g. increased family conflict in response to financial stress)
3. The condition exhibits a socioeconomic gradient (e.g. rates are higher in more deprived areas)
4. The condition is likely to respond to changing economic conditions in the short to medium term (e.g. months to 1–2 years)

Data Quality Criteria

Data Quality Criteria (for either of the above indicator categories)

1. Needs to be routinely collected
2. Available at the national level (i.e. complete coverage of target population)
3. Updated at least annually (although quarterly preferable)
4. Availability of consistent time series data going back several years (i.e. standard and stable method of data collection)
5. Distribution can be broken down by e.g. ethnicity, socioeconomic status, region

Selection of the Baseline Indicator Set

In mid-2009 a long list of candidate indicators (selected by means of a scan of the available literature, email consultation with child health networks, and the suggestions of Working Group members) were then scored against each of these criteria by Working Group members and other health professionals (n=20). Those scoring the indicators were also asked to select a Top Five Economic and Top Five Health and Wellbeing Indicators for inclusion in the Children's Social Health Monitor. The resulting Top Five Economic and Wellbeing indicators (as determined both by criteria scoring and priority ranking) were:

Economic Indicators:

Gross Domestic Product

Income Inequality

Child Poverty

Unemployment Rates

The Number of Children Reliant on Benefit Recipients

Child Health and Wellbeing Indicators:

Hospital Admissions with a Social Gradient

Mortality with a Social Gradient

Infant Mortality

Hospital Admissions and Mortality from Non-Accidental Injury

Methodology for Developing the Hospital Admissions and Mortality with a Social Gradient Indicator

While the top five economic indicators and a number of the child health and wellbeing indicators already had established methodologies, the hospital admissions and mortality with a social gradient indicator had to be developed specifically for the Children's Social Health Monitor. The methodology used to develop this indicator is outlined below:

Hospital Admissions

In considering which conditions should be included in the analysis of hospital admissions with a social gradient, the 40 most frequent causes of hospital admission in children aged 0–14 years (excluding neonates) were reviewed, and those exhibiting a social gradient (a rate ratio of ≥1.8 for NZDep deciles 9–10 vs. deciles 1–2; or for Māori, Pacific or Asian vs. European children) were selected. A small number of conditions with rate ratios in the 1.5–1.8 range were also included, if they demonstrated a consistent social gradient (i.e. rates increased in a stepwise manner with increasing NZDep deprivation) and the association was biologically plausible (the plausibility of the association was debated by Working Group members).

Inclusion and Exclusion Criteria

Neonatal hospital admissions (<28 days) were excluded on the basis that these admissions are more likely to reflect issues arising prior to/at the time of birth (e.g. preterm infants may register multiple admissions as they transition from intensive care (NICU) → special care nurseries (SCBU) → the postnatal ward), and respiratory infections/other medical conditions arising in these contexts are likely to differ in their aetiology from those arising in the community.

For medical conditions, only acute and arranged hospital admissions were included, as Waiting List admissions are likely to reflect service capacity, rather than the burden of health need (e.g. the inclusion of Waiting List admissions would result in a large number of children with otitis media and chronic tonsillitis (who were being admitted for grommets and tonsillectomies) being included, and the demographic profile of these children may be very different from children attending hospital acutely for the same conditions).

For injury admissions, filtering by admission type was not possible, as a number of DHBs admitted injury cases under (now discontinued) ACC admission codes, making it difficult to distinguish between acute and waiting list admissions in this context. In accordance with other reports produced by the NZ Child and Youth Epidemiology Service (NZCYES), all injury cases with an Emergency Department Specialty Code (M05–M08) on discharge were excluded as a result of inconsistent uploading of Emergency Department cases across DHBs (see **Appendix 3** for further detail). This differential filtering however means that it is not possible to accurately compare the magnitude of the social gradients between the medical condition and injury categories, as they were derived using different methodologies (and social differences in Emergency Department vs. primary care attendances for minor medical conditions may have accounted for some of the social gradients seen). No such differential filtering occurred for mortality data, however (see below), and thus the magnitude of the social differences seen in this context is more readily comparable.

Mortality

In the case of mortality, because in many instances, the number of deaths from a particular condition was insufficient to calculate reliable rate ratios by NZDep and ethnicity, the Rate ratios derived from the analysis of hospital admission data were used to denote category membership. The most frequent causes of mortality in those 0–14 years (excluding neonates) were reviewed however, in order to ensure that no additional conditions making a large contribution to mortality had been missed by the analysis of hospital admission data. This identified two further conditions (which by analysis of mortality of data met rate ratio criteria); deaths from drowning and Sudden Unexpected Death in Infancy, which were then included in the coding algorithms (for both hospital admissions and mortality data). A number of deaths were also identified, which were attributed to issues arising in the

perinatal period (e.g. extreme prematurity, congenital anomalies), but in order to preserve consistency with previous exclusion criteria (i.e. the exclusion of conditions arising in the perinatal period) these were not included in coding algorithms.

APPENDIX 2: STATISTICAL SIGNIFICANCE TESTING

Understanding Statistical Significance Testing

Inferential statistics are used when a researcher wishes to use a sample to draw conclusions about the population as a whole (e.g. weighing a class of 10 year old boys, in order to estimate the average weight of all 10 year old boys in New Zealand). Any measurements based on a sample, however, even if drawn at random, will always differ from that of the population as a whole, simply because of chance. Similarly, when a researcher wishes to determine whether the risk of a particular condition (e.g. lung cancer) is truly different between two groups (smokers and non-smokers), they must also consider the possibility that the differences observed arose from chance variations in the populations sampled.

Over time, statisticians have developed a range of measures to quantify the uncertainty associated with random sampling error (e.g. to quantify the level of confidence we can have that the average weight of boys in our sample reflects the true weight of all 10 year old boys, or that the rates of lung cancer in smokers are really different to those in non-smokers). Of these measures, two of the most frequently used are:

P values: The p value from a statistical test tells us the probability that we would have seen a difference at least as large as the one observed, if there were no real differences between the groups studied (e.g. if statistical testing of the difference in lung cancer rates between smokers and non-smokers resulted in a p value of 0.01, this tells us that the probability of such a difference occurring if the two groups were identical is 0.01 or 1%. Traditionally, results are considered to be statistically significant (i.e. unlikely to be due to chance) if the probability is <0.05 (i.e. less than 5%) [77].

Confidence Intervals: A 95% Confidence Interval suggests that if you were to repeat the sampling process 100 times, 95 times out of 100 the confidence interval would include the true value. In general terms, if the 95% confidence intervals of two samples overlap, there is no significant difference between them (i.e. the p value would be ≥0.05), whereas if they do not overlap, they can be assumed to be statistically different at the 95% confidence level (i.e. the p value would be <0.05) [77].

The Use of Statistical Significance Testing in this Report

In the preparation of this report a large range of data sources was used. For the purposes of statistical significance testing, however, these data sources can be considered as belonging of one of two groups: Population Surveys and Routine Administrative Datasets. The relevance of statistical testing to each of these data sources is described separately below:

Population Surveys: A number of indicators in this report utilise data derived from national surveys (e.g. the 2009 New Zealand Tobacco Use Survey), where information from a sample has been used to make inferences about the population as a whole. In this context statistical significance testing is appropriate, and where such information is available in published reports, it has been incorporated into the text accompanying each graph or table. In a small number of cases, however, information on statistical significance was not available in published reports, and in such cases any associations described do not imply statistical significance.

Numbers and Rates Derived from Routine Administrative Data: A large number of the indicators in this report are based on data derived from New Zealand's administrative datasets (e.g. National Minimum Dataset, National Mortality Collection), which capture information on all of the events occurring in a particular category. Such datasets can thus be viewed as providing information on the entire population, rather than a sample and as a

consequence, 95% confidence intervals are not required to quantify the precision of the estimate (e.g. the number of leukaemia deaths in 2003–2007 although small, is not an estimate, but rather reflects the total number of deaths during this period). As a consequence, 95% confidence intervals have not been provided for any of the descriptive data (numbers, proportions, rates) presented in this report, on the basis that the numbers presented are derived from the total population under study.

Rate ratios Derived from Routine Administrative Data: In considering whether statistical significance testing is ever required when using total population data Rothman [78] notes that if one wishes only to consider descriptive information (e.g. rates) relating to the population in question (e.g. New Zealand), then statistical significance testing is probably not required (as per the argument above). If, however, one wishes to use total population data to explore biological phenomena more generally, then the same population can also be considered to be a sample of a larger super-population, for which statistical significance testing may be required (e.g. the fact that SUDI in New Zealand is 5 times higher in the most deprived (NZDep deciles 9–10) areas might be used to make inferences about the impact of the socioeconomic environment on SUDI more generally (i.e. outside of New Zealand, or the 5 year period concerned)). Similarly, in the local context the strength of observed associations is likely to vary with the time period under study (e.g. in updating 5-year asthma admission data from 2004–2008 to 2006–2010, rate ratios for Pacific children are likely to change due to random fluctuations in annual rates, even though the data utilised includes all admissions recorded for that particular 5-year period). Thus in this report, whenever measures of association (i.e. rate ratios) are presented, 95% confidence intervals have been provided on the assumption that the reader may wish to use such measures to infer wider relationships between the variables under study [78].

The Signalling of Statistical Significance in this Report

In order to assist the reader to identify whether tests of statistical significance have been applied in a particular section, the statistical significance of the associations presented has been signalled in the text with the words *significant*, or *not significant* in italics. Where the words *significant* or *not significant* do not appear in the text, then the associations described do not imply statistical significance or non-significance.

APPENDIX 3: THE NATIONAL MINIMUM DATASET

Introduction

The National Minimum Dataset (NMDS) is New Zealand's national hospital discharge data collection and is maintained by the Ministry of Health (the Ministry). The information contained in the dataset has been submitted by public hospitals in a pre-agreed electronic format since 1993. Private hospital discharges for publicly funded events (e.g. births, geriatric care) have been submitted electronically since 1997. The NMDS was implemented in 1993, and contains public hospital information from 1988 [79]. Information in the NMDS includes principal and additional diagnoses, procedures, external causes of injury, length of stay and sub-specialty codes; and demographic information such as age, ethnicity and usual area of residence.

The NMDS is useful for monitoring children's hospital admissions, predicting future health service demand, and planning new services and interventions. However, there are a number of issues to take into account when interpreting information from the NMDS. Many of these issues arise from regional differences in the way data are reported to, or coded in, the NMDS. These include:

1. Differences in the way DHBs report their Emergency Department (ED) cases to the NMDS and how this has changed over time.
2. The changeover from the ICD-9 to ICD-10 coding system and irregularities in the way in which diagnoses and procedures are allocated ICD codes.
3. Changes in the way ethnicity information has been recorded over time.

This Appendix considers the first two issues, while the third is considered in **Appendix 6**, which reviews the way ethnicity information is collected and coded in the health sector.

Differences in the Reporting of ED Cases to the NMDS

Historically there have been differences in the way DHBs have reported their ED events to the NMDS, which pose challenges for the interpretation of hospital admission data. This section provides a brief overview of how DHBs have been reporting their ED cases to the NMDS, as well as the different settings DHBs use to assess children presenting acutely with medical conditions. The rationale for the NZ Child and Youth Epidemiology Service's (NZCYES) approach to the analysis of hospital admissions is then presented before the potential impacts of inconsistent reporting of ED cases to the NMDS on trends in hospital admissions for children are considered.

Defining Hospital Admissions

In New Zealand, a hospital admission is defined as a hospital event with a treatment time of more than three hours (this is referred to as the three hour rule). Treatment time is counted from when the patient first sees the doctor (or other health professional) rather than when they first arrive in ED [79].

Admissions that meet the three hour rule are sometimes subdivided into: day cases (or day patients) where the patient is admitted and discharged (routinely/alive) on the same day, and inpatient events where the patient spends at least one (mid)night in hospital [80]. Other DHBs, however, include all cases meeting the three hour rule in their definition of an inpatient event (personal communication Ministry staff).

Note: Throughout this report, the term hospital admission has been used in preference to hospital discharge in the description of child hospitalisation.

Regional Differences in the Reporting of ED Cases

Regional variations in the way DHBs report their ED day cases to the NMDS include the following:

1. During the mid-1990's, the Starship Children's Hospital (which provided inpatient services to the Auckland and Waitemata DHBs) started reporting ED events if the total time in the ED (including waiting time) exceeded 3 hours rather than reporting only ED events where treatment time exceeded 3 hours [80]. Following advice from the Ministry this practice ceased in January 2005. However, it took several years for the hospital to begin reporting its ED cases consistently again as changes in recording practice (i.e. recording the time of first treatment by a doctor rather than time of first triage) took time to implement. This resulted in large variations in rates in the Auckland and Waitemata DHBs during the mid-1990s to early 2000s.
2. In a number of DHBs, ED cases have been assigned the health specialty code of the consulting doctor on discharge, even though the patient was discharged directly from ED (e.g. a child with a fracture seen by an orthopaedic registrar in ED receiving an orthopaedic specialty code instead of an ED one). This practice has varied both over time and by region and makes the identification of ED cases using the health specialty code on discharge difficult. A separate ED identifier code was introduced in 2007, but adoption by DHBs has been variable (personal communication Ministry staff).
3. The way DHBs manage the assessment of paediatric medical cases also varies around the country. In the large Auckland DHBs, the majority of children can access acute paediatric care via specialist paediatric EDs, which are staffed by specialist paediatric staff. In other parts of the country, children are either assessed in paediatric assessment units (PAUs, often attached to the paediatric ward), or sent to the general paediatric ward for review. During 2008–2012, the proportion of admissions for medical conditions with a social gradient receiving an ED specialty code varied markedly by DHB. It was highest in the large Auckland DHBs (range 25%–50%) which see the majority of their children in specialist paediatric EDs, and lowest in those DHBs that assess most children on the paediatric ward (e.g. 0%–7% in some smaller DHBs).
4. Analysis of medical day cases (where the child is admitted and discharged the same day) also suggest that many non-Auckland DHBs were assessing these cases in a non-ED setting and assigning them a paediatric medical specialty code on discharge, rather than simply failing to report their ED cases to the NMDS. In an analysis of 2008–2012 data, over 85% of day case admissions for medical conditions with a social gradient in the South Island had a non-ED specialty code on discharge, as compared to only 10% in the Auckland DHB.
5. While the three hour rule has remained unchanged, to address inconsistency, the Ministry implemented a new directive in July 2009 that made it mandatory for DHBs to report ED cases meeting the three hour rule. While most DHBs (including all of the Auckland DHBs and many medium sized and smaller DHBs) were reporting their ED cases consistently prior to this time or do not appear to have changed their practice during the past decade, in a small number of DHBs there was an abrupt increase in the reporting of ED cases from 2009. In most cases, the number of additional cases reported was relatively modest, however the staggered increase in reporting from 2009 resulted in a gradual increase in the number of admissions in subsequent years.

The Ministry's Approach to Inconsistent ED Reporting

To minimise the impact of the inconsistent reporting of ED cases, the Ministry utilises a set of filters that aim to create comparability between regions, and over time, when analysing trends in hospital admission data. While these filters vary with the work being undertaken, the majority exclude short stay ED events. For example:

1. In its Hospital Throughput Reports [81], the Ministry excluded all cases where: the admission and discharge date were the same (length of stay = 0), AND the patient was discharged alive, AND the health specialty code on discharge was Emergency Medicine (M05, M06, M07, and M08).
2. In a review of hospitalisations for intentional self-harm [82], the Ministry excluded all hospital admissions with a health specialty code on discharge of Emergency Medicine (M05, M06, M07, and M08) AND a length of stay of less than two days.
3. When monitoring ambulatory sensitive hospital admissions, the Ministry has traditionally excluded all ED short stay cases from its analysis (personal communication Ministry staff).

Limitations of the Ministry's ED Filters in the Paediatric Context

For children's medical admissions however, excluding all ED day cases from the analysis is problematic as:

1. The desire to manage children in a developmentally appropriate healthcare environment that is separate from sick adults [83] has led to a plurality of acute assessment practices around the country. As previously discussed, this includes the use of specialist paediatric emergency departments in larger centres, PAUs attached to children's wards in many regional centres, and the fast tracking of children to the general paediatric ward in some smaller DHBs. Applying the Ministry's ED day case filters in this context excludes a high proportion of the workload of the three Auckland DHBs that assess much of their acute caseload in the specialist ED setting. However, the same filters include the workload of those DHBs that undertake similar acute assessments in a ward based setting. When ED cases are excluded, paediatric admissions for medical conditions with a social gradient in the Waitemata and Auckland DHBs fall well below those of New Zealand's other DHBs.
2. The majority of medical admissions in children are for acute onset infectious and respiratory diseases of relatively short duration. Exclusion of those with a length of stay of 0 days (as per some Ministry filters) means that those children who begin their treatment late at night and are discharged in the early hours of the following morning are included as hospital admissions, whereas those who begin their treatment in the morning and are discharged in the evening are excluded, even though they may have a similar or longer length of stay. (Note: Some Ministry filters exclude admission with a length of stay of 0 or 1 day in an attempt to address this issue).
3. Historically, concerns have been expressed about the high costs of after-hours primary care [84], with some families potentially bypassing after hours services in favour of the ED, which is free. Analysis of children's ED presentations for minor medical conditions may be one way of monitoring improvements/emergent barriers in family's access to primary care (particularly in those DHBs which have been reporting their ED cases to the NMDS consistently over time). The exclusion of ED cases from time series analysis however, precludes the identification of emerging concerns in this area.

NZCYES' Approach to the Analysis of Hospital Admission Data

Given the plurality of approaches (specialist ED, PAU, general paediatric ward) to the assessment of children requiring acute paediatric care, the NZCYES has from the outset chosen to include all ED day cases in its analysis of hospital admissions for medical conditions. The NZCYES believes that this provides the best comparison of the workload of DHBs of differing sizes around the country. However, in light of its concerns about inconsistencies in the reporting of ED cases to the NMDS, the NZCYES has always included an appendix in its reports to alert readers to these issues so that trend data can be interpreted with these concerns in mind.

For injuries, the NZCYES has adopted the Ministry's practice of filtering out ED cases based on the hypothesis that the processes for injury assessments is relatively consistent around the country (e.g. children presenting to ED with a fracture may be more likely to be assessed by ED staff, or by an orthopaedic registrar in ED, than to be sent to the ward for paediatric review). On this basis, filtering out ED cases is less likely to disproportionately discount the workload of the Auckland DHBs.

Further research is required to confirm this hypothesis. However, analysis of hospital admission data for 2008–2012 found that excluding ED cases resulted in paediatric medical admission rates in the Auckland and Waitemata DHBs being much lower than those of other DHBs. Including these cases resulted in rates that were somewhat higher. In contrast, for injuries, exclusion of ED cases resulted in admission rates that were a little lower than the NZ rate, whereas the inclusion of ED cases resulted in rates that were much higher. One possible interpretation of these differences is that the exclusion of ED cases in the context of injury admissions may not disproportionately discount the work of the large Auckland DHBs to the same extent as it does for medical admissions.

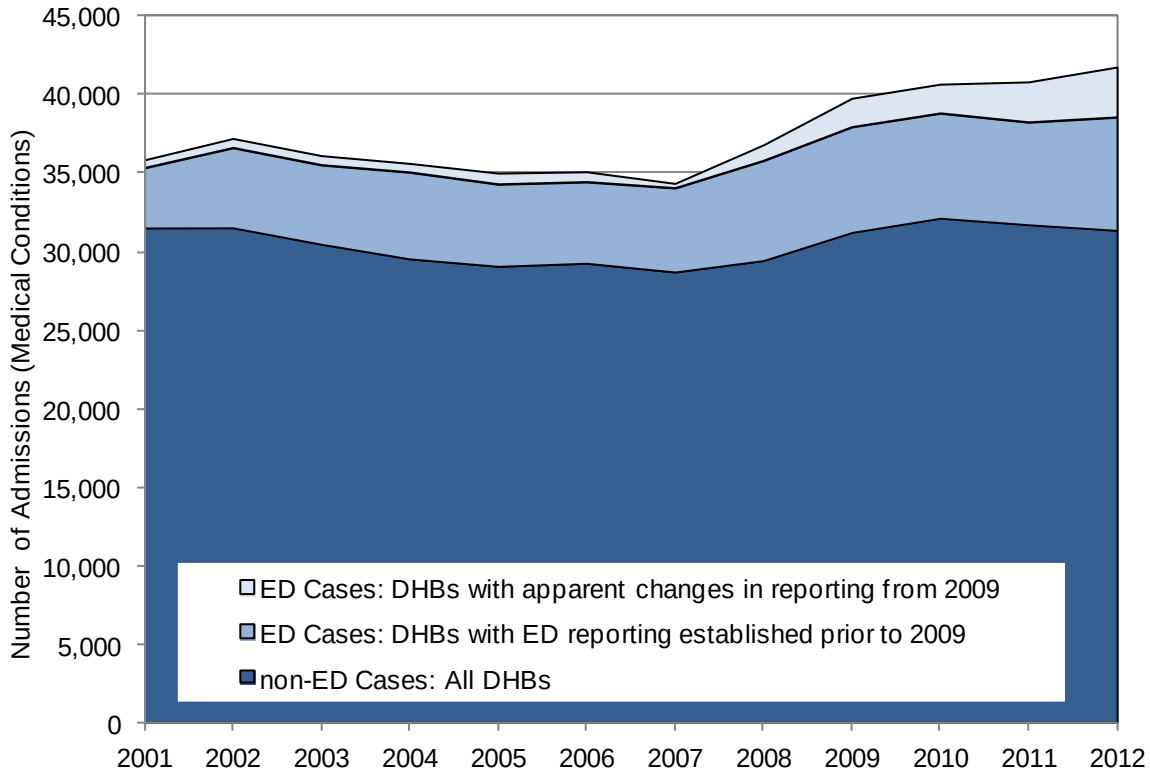
Implications for Interpretation

While the inclusion of ED cases is thought to provide the most meaningful comparison across DHBs, it has a number of implications for time series analysis. **Figure 50** shows trends in children's hospital admissions for medical conditions with a social gradient during 2001–2012. In this figure, admissions have been broken into three groups: 1) non-ED cases (e.g. those discharged with a paediatric medical/surgical specialty code); 2) ED cases in DHBs that consistently reported their ED cases prior to 2009 or where reporting did not change in or after 2009; 3) ED cases in DHBs where an abrupt increase in reporting was evident in or after 2009. Analysis suggests that:

- In the early 2000s, the correction of the historical under-reporting of ED cases by a number of Auckland and Upper North Island DHBs may have contributed to the increase in hospital admissions for medical conditions between 2000 and 2002.
- During 2002–2007, the declines seen in medical admissions may have been greater, had not a number of small to medium sized DHBs begun to report their ED cases more comprehensively.
- Since 2009, the correction of the under-reporting occurring in the remaining DHBs may have contributed to some of the rise seen in ED admissions. This in turn may have steepened the rate of increase in overall admissions seen during 2009-2012.
- Between 2007 and 2012, non-ED admissions and ED admissions in DHBs already reporting their ED cases consistently, rose from 34,054 to 38,608 (an increase of 4,554) while ED admissions in DHBs who appeared to change their reporting practices from 2009 rose from 271* to 3,206 (an increase of 2,935) (*2007 was an unusually low year due to a reporting anomaly in one DHB, with admissions averaging around 500-600 per year in the years immediately prior to 2007).
- It is difficult to determine how much of the increase in ED admissions in DHBs who changed their ED reporting practices in or after 2009, was due to the change in reporting practice and how much was due to a real rise in ED presentations. However,

if the rate of increase in ED admissions during 2007–2012 for DHBs who did not change practice was applied to the DHBs that did, an additional 490 admissions might have been expected during this period. This is much lower than the 2,935 additional admissions seen (a net excess of 2,445 admissions).

Figure 50. Hospital Admissions for Medical Conditions with a Social Gradient in Children Aged 0–14 Years by Health Specialty on Discharge and DHB Reporting Practice, New Zealand 2000–2012



Source: National Minimum Dataset; Acute and Arranged Admissions only; ED cases are those with a health speciality code on discharge of M05–M08.

Other potential limitations to take into account when interpreting NMDS data include:

1. The inclusion of ED medical cases may lead to apparently higher admission rates for DHBs that have been reporting all of their ED cases consistently over time or that have been including triage or waiting time in the calculation of the three hour rule, when compared to DHBs that have been under-reporting their ED caseload. However, the extent to which these ED cases have been undercounted is difficult to quantify with many DHBs managing their acute assessments via PAUs or the paediatric ward. As a result, many acute assessments are assigned a M55 Paediatric Medicine specialty code on discharge (as there is no specific code for PAU) making them indistinguishable from other paediatric ward admissions.
2. Conversely, filtering out injury ED cases may have led to apparently lower injury admission rates in those DHBs who manage a higher proportion of their caseload in ED. Further, the resultant injury data are no longer representative of all types of injury presentation in children as they reflect only the more serious end of the spectrum. Finally, the filtered data are unable to provide any insights into changes in families' service access patterns (e.g. primary care cf. ED) for less serious injuries in children, thereby losing its capacity to provide an early warning of a shift in families health seeking behaviour for minor injuries.

2. Data Quality and Coding Changes over Time (ICD-9 and ICD-10)

Change Over from ICD-9 to ICD-10 Coding

From 1988 until June 1999, clinical information in the NMDS was coded using versions of the ICD-9 classification system (ICD-9 CM until June 1995, then ICD-9-CM-A until June 1999). From July 1999 onwards, the ICD-10-AM classification system has been used, although for time series analysis, back and forward mapping between the two systems is possible using pre-defined algorithms [85].

The introduction of ICD-10-AM represented the most significant change in the International Classification of Diseases (ICD) in over 50 years and uses an alphanumeric coding system for diseases in which the first character of the code is always a letter followed by several numbers. This has allowed for the expansion of the number of codes to provide for recently recognised conditions and to provide greater specificity about common diseases (there are about 8,000 categories in ICD-10-AM as compared to 5,000 in ICD-9). While for most conditions there is a reasonable 1:1 correspondence between ICD-9 and ICD-10 codes, for some this may lead to some irregularities in time series analysis [86]. Where possible such irregularities will be highlighted in the text, although care should still be taken when interpreting time series analysis across the 1999–2000 period as some conditions may not be directly comparable between the two coding systems.

Accuracy of ICD Coding

The Ministry has undertaken a number of reviews of the quality of ICD coding in the NMDS. In one audit 2,708 events were audited over 10 sites during a 3 month period during 2001/2002. Overall the audit found that 22% of events required a change in coding, although this also included changes at the fourth and fifth character level. The average ICD code change was 16%, with changes to the principal diagnosis being 11%, to additional diagnoses being 23% and to procedure coding being 11%. There were 1625 external causes of injury codes, of which 15% were re-coded differently [87]. These findings were similar to an audit undertaken a year previously.

While the potential for such coding errors must be taken into consideration when interpreting the findings of this report, it may be that the 16% error rate is an overestimate, as in the majority of the analyses undertaken in this report, only the principal diagnosis (with an error rate of 11%) is used to describe the reason for admission. In addition, for most admissions the diagnostic category (e.g. lower respiratory tract infections) is assigned using information at the 3 digit level (with the 16% error rate also including issues with coding at the 4th or 5th digit level).

3. Ethnicity Information in the NMDS

The reader is referred to **Appendix 6** for a discussion of this issue.

Conclusion

The inconsistencies outlined above tend to make time series analyses based on the NMDS less reliable than those based on Mortality or Birth Registration data (where legislation dictates inclusion criteria and the type of information collected). While using hospital discharge data still remains a valuable and reasonably reliable proxy for measuring the health outcomes of children and young people in this country, the reader is cautioned to take into consideration the issues discussed above, when interpreting the findings outlined in this report.

APPENDIX 4: THE BIRTH REGISTRATION DATASET

Mode of Data Collection

Since 1995 all NZ hospitals and delivering midwives have been required to notify Internal Affairs (within 5 working days of delivery), of the birth of a live or stillborn baby 20+ weeks gestation or weighing >400g. Prior to 1995, only stillborn babies reaching 28+ weeks of gestation required birth notification. Information on the hospital's notification form includes maternal age, ethnicity, multiple birth status, and baby's sex, birth weight and gestational age. In addition, parents must complete a Birth Registration Form within two years of delivery, duplicating the above information with the exception of birth weight and gestational age, which are supplied only on hospital notification forms. Once both forms are received by Internal Affairs, the information is merged into a single entry. This two-stage process it is thought to capture 99.9% of births occurring in New Zealand and cross-checking at the receipting stage allows for the verification of birth detail [20].

Interpretation of Information Derived from the Birth Registration Dataset

Because of the two-stage birth registration process, the majority of variables contained within the birth registration dataset are >98% complete, and cross-checking at the receipting stage (with the exception of birth weight and gestational age) allows for the verification of birth details. In addition, the way in which ethnicity is collected in this dataset confers a number of advantages, with maternal ethnicity being derived from the information supplied by parents on their baby's birth registration form. This has the advantage of avoiding some of the ambiguities associated with hospital and mortality data, which at times have been reported by third parties. Changes in the way ethnicity was defined in 1995 however make information collected prior to this date incomparable with that collected afterwards. For births prior to 1995, maternal ethnicity was defined by ancestry, with those having half or more Māori or Pacific blood meeting ethnic group criteria, resulting in three ethnic groups, Māori, Pacific and non-Māori non-Pacific. For births after 1995 maternal ethnicity was self-identified, with an expanded number of ethnic categories being available and parents being asked to tick as many options as required to show which ethnic group(s) they belonged to. For those reporting multiple ethnic affiliations a priority rating system was introduced, as discussed **Appendix 6** of this report.

Because this dataset captures 99.9% of births occurring in NZ, is >98% complete for most variables, collects self-reported ethnicity in a standard manner and is collated and coded by a single agency, information derived from this dataset is likely to be of higher quality than that derived from many of NZ's other data sources. Limitations however include the relatively restricted number of variables contained within the dataset (e.g. it lacks information on maternal smoking, Body Mass Index or obstetric interventions) and the lack of cross-checking for birth weight and gestational age (which is supplied only on the hospital notification form). The changeover in ethnicity definition during 1995 also prohibits time series analysis by ethnicity over the medium to long term. Finally, since the last report, the Ministry of Health has stopped providing stillbirth data in the Birth Registration Dataset, and thus all analyses based on this set are restricted to live births only. Each of these factors must thus be taken into account when interpreting information in this report that has been derived from the Birth Registration Dataset.

APPENDIX 5: THE NATIONAL MORTALITY COLLECTION

Mode of Data Collection

The National Mortality Collection is a dataset managed by the Ministry of Health which contains information on the underlying cause(s) of death as well as basic demographic data for all deaths registered in New Zealand since 1988. Data pertaining to fetal and infant deaths are a subset of the Mortality Collection, with cases in this subset having additional information on factors such as birth weight and gestational age [88].

Each month the Births, Deaths and Marriages service of the Department of Internal Affairs sends the Ministry of Health electronic death registration information, Medical Certificates of Cause of Death, and Coroner's reports. Additional information on the cause of death is obtained from the National Minimum Dataset (NMDS), private hospital discharge returns, the NZ Cancer Registry (NZCR), the Department of Courts, the Police, the Land Transport Authority (LTSA), Water Safety NZ, Media Search and from writing letters to certifying doctors, coroners and medical records officers in public hospitals. Using information from these data sources, an underlying cause of death (ICD-10-AM) is assigned by Ministry of Health staff using the World Health Organization's rules and guidelines for mortality coding [88].

Data Quality Issues Relating to the National Mortality Collection

Unlike the NMDS, where information on the principal diagnosis is coded at the hospital level and then forwarded electronically to the Ministry of Health, in the National Mortality Collection each of the approximately 28,000 deaths occurring in New Zealand each year is coded manually by Ministry of Health staff. For most deaths the Medical Certificate of Cause of Death provides the information required, although coders also have access to the information contained in the NMDS, NZ Cancer Registry, LSTA, Police, Water Safety NZ and ESR [86]. As a consequence, while coding is still reliant on the accuracy of the death certificate and other supporting information, there remains the capacity for a uniform approach to the coding which is not possible for hospital admissions data.

While there are few published accounts of the quality of coding information contained in the National Mortality Collection, the dataset lacks some of the inconsistencies associated with the NMDS, as the process of death registration is mandated by law and there are few ambiguities as to the inclusion of cases over time. As a consequence, time series analyses derived from this dataset are likely to be more reliable than that provided by the NMDS. One issue that may affect the quality of information derived from this dataset however is the collection of ethnicity data, which is discussed in more detail in **Appendix 6** of this report.

APPENDIX 6: THE MEASUREMENT OF ETHNICITY

The majority of rates calculated in this report rely on the division of numerators (e.g. hospital admissions, mortality data) by Statistics NZ Estimated Resident Population denominators. Calculation of accurate ethnic-specific rates relies on the assumption that information on ethnicity is collected in a similar manner in both the numerator and the denominator, and that a single child will be identified similarly in each dataset. In New Zealand this has not always been the case, and in addition the manner of collecting information on ethnicity has varied significantly over time. Since 1996, however, there has been a move to ensure that ethnicity information is collected in a similar manner across all administrative datasets in New Zealand (Census, Hospital Admissions, Mortality, Births). The following section briefly reviews how information on ethnicity has been collected in national data collections since the early 1980s and the implications of this for the information contained in this report.

1981 Census and Health Sector Definitions

Earlier definitions of ethnicity in official statistics relied on the concept of fractions of descent, with the 1981 census asking people to decide whether they were fully of one ethnic origin (e.g. Full Pacific, Full Māori) or if of more than one origin, what fraction of that ethnic group they identified with (e.g. 7/8 Pacific + 1/8 Māori). When prioritisation was required, those with more than 50% of Pacific or Māori blood were deemed to meet the ethnic group criteria of the time [89]. A similar approach was used to record ethnicity in health sector statistics, with birth and death registration forms asking the degree of Pacific or Māori blood of the parents of a newborn baby/the deceased individual. For hospital admissions, ancestry-based definitions were also used during the early 1980s, with admission officers often assuming ethnicity, or leaving the question blank [90].

1986 Census and Health Sector Definitions

Following a review expressing concern at the relevance of basing ethnicity on fractions of descent, a recommendation was made to move towards self-identified cultural affiliation. Thus the 1986 Census asked the question “What is your ethnic origin?” and people were asked to tick the box or boxes that applied to them. Birth and death registration forms however, continued to use the “fractions of blood” question until 1995, making comparable numerator and denominator data difficult to obtain [89]. For hospital admissions, the move from an ancestry-based to a self-identified definition of ethnicity began in the mid-80s, although non-standard forms were used and typically allowed a single ethnicity only [90].

1991 Census and Health Sector Definitions

A review suggested that the 1986 ethnicity question was unclear as to whether it was measuring ancestry or cultural affiliation, so the 1991 Census asked two questions:

1. Which ethnic group do you belong to? (tick the box or boxes which apply to you)
2. Have you any NZ Māori ancestry? (If yes, what iwi do you belong to?)

As indicated above, however, birth and death registrations continued with ancestry-based definitions of ethnicity during this period, while a number of hospitals were beginning to use self-identified definitions in a non-standard manner [90].

1996 Census and Health Sector Definitions

While the concepts and definitions remained the same as for the 1991 census, the ethnicity question in the 1996 Census differed in that:

- The NZ Māori category was moved to the top of the ethnic categories
- The 1996 question made it more explicit that people could tick more than one box
- There was a new “Other European” category with 6 subgroups

As a result of these changes, there was a large increase in the number of multiple responses, as well as an increase in the Māori ethnic group in the 1996 Census [89].

Within the health sector, however, there were much larger changes in the way in which ethnicity information was collected. From late 1995, birth and death registration forms incorporated a new ethnicity question identical to that in the 1996 Census, allowing for an expansion of the number of ethnic groups counted (previously only Māori and Pacific) and resulting in a large increase in the proportion of Pacific and Māori births and deaths. From July 1996 onwards, all hospitals were also required to inquire about ethnicity in a standardised way, with a question that was compatible with the 1996 Census and that allowed multiple ethnic affiliations [90]. A random audit of hospital admission forms conducted by Statistics NZ in 1999, however, indicated that the standard ethnicity question had not yet been implemented by many hospitals. In addition, an assessment of hospital admissions by ethnicity over time showed no large increases in the proportions of Māori and Pacific admissions after the 1996 "change-over", as had occurred for birth and death statistics, potentially suggesting that the change to a standard form allowing for multiple ethnic affiliations in fact did not occur. Similarities in the number of people reporting a "sole" ethnic group pre- and post-1996 also suggest that the way in which information on multiple ethnic affiliations was collected did not change either. Thus while the quality of information available since 1996 has been much better than previous, there remains some concern that hospitals continue to undercount multiple ethnic identifications and as a result, may continue to undercount Pacific and Māori peoples [90].

2001 Census and Health Sector Definitions

The 2001 Census reverted back to the wording used in the 1991 Census after a review showed that this question provided a better measure of ethnicity based on the current statistical standard [89]. The health sector also continued to use self-identified definitions of ethnicity during this period, with the *Ethnicity Data Protocols for the Health and Disability Sector* providing guidelines which ensured that the information collected across the sector was consistent with the wording of the 2001 Census (i.e. *Which ethnic groups do you belong to (Mark the space or spaces that apply to you)?*)

2006 Census and Health Sector Definitions

In 2004, the Ministry of Health released the *Ethnicity Data Protocols for the Health and Disability Sector* [91] with these protocols being seen as a significant step forward in terms of standardising the collection and reporting of ethnicity data in the health sector [92]. The protocols stipulated that the standard ethnicity question for the health sector was the 2001 Census ethnicity question, with respondents being required to identify their own ethnicity, and with data collectors being unable to assign this on respondent's behalf, or to transfer this information from another form. The protocols also stipulated that ethnicity data needed to be recorded to a minimum specificity of Level 2 (see below) with systems needing to be able to store, at minimum, three ethnicities, and to utilise standardised prioritisation algorithms, if more than three ethnic groups were reported. In terms of outputs, either sole/combination, total response, or prioritised ethnicity needed to be reported, with the methods used being clearly described in any report [91].

The following year, Statistics New Zealand's Review of the Measurement of Ethnicity (RME), culminated in the release of the *Statistical Standard for Ethnicity 2005* [93], which recommended that:

1. The 2006 Census ethnicity question use identical wording to the 2001 Census
2. Within the "Other" ethnic group, that a new category be created for those identifying as "New Zealander" or "Kiwi". In previous years these responses had been assigned to the European ethnic group
3. All collections of official statistics measuring ethnicity have the capacity to record and report six ethnicity responses per individual, or at a minimum, three responses when six could not be implemented immediately
4. The practice of prioritising ethnicity to one ethnic group should be discontinued.

At the 2006 Census, however, a total of 429,429 individuals (11.1% of the NZ population) identified themselves as a New Zealander, with further analysis suggesting that 90% of the

increase in those identifying as New Zealanders in 2006, had arisen from those identifying as New Zealand European at the 2001 Census [94]. In 2009 Statistics NZ amended the Standard to reflect these issues [94] with the current recommendation being that future Censuses retain the current ethnicity question (i.e. that New Zealander tick boxes not be introduced) but that alongside the current standard outputs where New Zealander responses are assigned to the Other Ethnicity category, an alternative classification be introduced which combines the European and New Zealander ethnic groups into a single European and Other Ethnicity category for use in time series analysis (with those identifying as both European and New Zealanders being counted only once in this combined ethnic group [94].

The Current Recording of Ethnicity in New Zealand's National Datasets

In New Zealand's national health collections (e.g. National Minimum Dataset, Mortality Collection and NZ Cancer Registry), up to three ethnic groups per person are stored electronically for each event, with data being coded to Level 2 of Statistics New Zealand's 4-Level Hierarchical Ethnicity Classification System [79]. In this Classification System increasing detail is provided at each level. For example [91]:

- Level 1 (least detailed level) e.g. code 1 is European
- Level 2 e.g. code 12 is Other European
- Level 3 e.g. code 121 is British and Irish
- Level 4 (most detailed level) e.g. code 12111 is Celtic

Māori, however, are identified similarly at each level (e.g. Level 1: code 2 is Māori cf Level 4: code 21111 is Māori).

For those reporting multiple ethnic affiliations, information may also be prioritised according to Statistics New Zealand's protocols, with Māori ethnicity taking precedence over Pacific > Asian/Indian > Other > European ethnic groups [91]. This ensures that each individual is counted only once and that the sum of the ethnic group sub-populations equals the total NZ population [90]. The implications of prioritisation for Pacific groups, however, are that the outcomes of those identifying as both Māori and Pacific are only recorded under the Māori ethnic group.

For those reporting more than 3 ethnic affiliations, the ethnic groups recorded are again prioritised (at Level 2), with Māori ethnicity taking precedence over Pacific > Asian/Indian > Other > European ethnic groups (for further details on the prioritisation algorithms used see [91]. In reality, however, less than 0.5% of responses in the National Health Index database have three ethnicities recorded, and thus it is likely that this prioritisation process has limited impact on ethnic-specific analyses [91].

Undercounting of Māori and Pacific Peoples in National Collections

Despite significant improvements in the quality of ethnicity data in New Zealand's national health collections since 1996, care must still be taken when interpreting the ethnic-specific rates presented in this report, as the potential still remains for Māori and Pacific children and young people to be undercounted in our national data collections. In a review that linked hospital admission data to other datasets with more reliable ethnicity information (e.g. death registrations and Housing NZ Corporation Tenant data), the authors of Hauora IV [95] found that on average, hospital admission data during 2000–2004 undercounted Māori children (0–14 years) by around 6%, and Māori young people by around 5–6%. For cancer registrations, the undercount was in the order of 1–2% for the same age groups. While the authors of Hauora IV developed a set of adjusters which could be used to minimise the bias such undercounting introduced when calculating population rates and Rate ratios, these (or similar) adjusters were not utilised in this report for the following reasons:

1. Previous research has shown that ethnicity misclassification can change over time, and thus adjusters developed for one period may not be applicable to other periods [96].

2. Research also suggests that ethnic misclassification may vary significantly by DHB [96], and thus that adjusters developed using national level data (as in Hauora IV) may not be applicable to DHB level analyses, with separate adjusters needing to be developed for each DHB.

Further, as the development of adjusters requires the linkage of the dataset under review with another dataset for which more reliable ethnicity information is available, and as this process is resource-intensive and not without error (particularly if the methodology requires probabilistic linkage of de-identified data), the development of a customised set of period and age specific adjusters was seen as being beyond the scope of the current project. The reader is thus urged to bear in mind that the data presented in this report may undercount Māori and Pacific children to a variable extent (depending on the dataset used) and that in the case of the hospital admission dataset for Māori, this undercount may be as high as 5–6%.

Ethnicity Classifications Utilised in this Report and Implications for Interpretation of Results.

Because of inconsistencies in the manner in which ethnicity information was collected prior to 1996, all ethnic-specific analyses presented in this report are for the 1996 year onwards. The information thus reflects self-identified concepts of ethnicity. In order to ensure that each health event is only counted once, prioritised ethnic group has been used unless otherwise specified.

APPENDIX 7: THE NZ DEPRIVATION INDEX

The NZ Deprivation Index (NZDep) is a small area index of deprivation, which has been used as a proxy for socioeconomic status in this report. The main concept underpinning small area indices of deprivation is that the socioeconomic environment in which a person lives can confer risks/benefits which may be independent of their own social position within a community [97]. They are thus aggregate measures, providing information about the wider socioeconomic environment in which a person lives, rather than about their individual socioeconomic status.

The NZDep was first created using information from the 1991 census, but has since been updated following each census. The NZDep2013 combines 9 variables from the 2013 census which reflect eight dimensions of deprivation [98] (**Table 17**). Each variable represents a standardised proportion of people living in an area who lack a defined material or social resource (e.g. access to a car, income below a particular threshold), with all 9 variables being combined to give a score representing the average degree of deprivation experienced by people in that area. While the NZDep provides deprivation scores at meshblock level (Statistics NZ areas containing approximately 90 people), for the purposes of mapping to national datasets, these are aggregated to Census Area Unit level (≈1,000–2,000 people). Individual area scores are then ranked and placed on an ordinal scale from 1 to 10, with decile 1 reflecting the least deprived 10% of small areas and decile 10 reflecting the most deprived 10% of small areas [99].

Table 17. Variables used in the NZDep2013 Index of Deprivation

No	Factor	Variable in Order of Decreasing Weight in the Index
1	Income	People aged 18–64 receiving means tested benefit
2	Employment	People aged 18–64 unemployed
3	Income	People living in equivalised households with income below an income threshold
4	Communication	People with no access to a telephone
5	Transport	People with no access to a car
6	Support	People aged <65 living in a single parent family
7	Qualifications	People aged 18–64 without any qualifications
8	Owned Home	People not living in own home
9	Living Space	People living in equivalised households below a bedroom occupancy threshold

The advantage of NZDep is its ability to assign measures of socioeconomic status to the older population, the unemployed and to children (to whom income and occupational measures often don't apply), as well as to provide proxy measures of socioeconomic status for large datasets when other demographic information is lacking. Small area indices have limitations, however, as not all individuals in a particular area are accurately represented by their area's aggregate score. While this may be less of a problem for very affluent or very deprived neighbourhoods, in average areas, aggregate measures may be much less predictive of individual socioeconomic status [97]. Despite these limitations, the NZDep has been shown to be predictive of mortality and morbidity from a number of diseases in New Zealand.

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