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Editors' Note

In this 2017 issue of *New Zealand Population Review*, we thank Ward Friesen and Alison Day for their dedication as editors. With Tahu Kukutai, they oversaw the transition of *NZPR* to a fully digital format in the 2016 issue. We are particularly indebted to Ward who served on the *NZPR* editorial team for nearly a decade. The journal benefits from the continued expertise of editor Tahu Kukutai, who is joined by Bryndl Hohmann-Marriott. Bryndl is a senior lecturer in the Department of Sociology, Gender and Social Work at the University of Otago. A family demographer and sociologist, she received her demographic training as a postdoctoral fellow at the Population Research Institute at Pennsylvania State University and a PhD at the Center for Population Dynamics at Arizona State University. At Otago, Bryndl's research focuses on childbearing and her teaching on quantitative social research methods. She and Tahu are very pleased to be a part of the journal as it continues on its journey to a fully digital format. As with the last issue, this issue will be immediately available for download on the Population Association of New Zealand website. Website functionality for online submission and review is in the process of being developed. As the journal broadens its focus, we welcome contributions on all population-related issues, including empirical studies, theory and policy analysis.

The current issue offers a New Zealand-specific focus on ethnicity over time. Homeownership rates differ starkly by ethnicity, and the rates for Māori and Pacific peoples are declining. Rosemary Goodyear uses Census data to investigate co-occuring trends over time. The complexity of ethnic identity is developed by Polly Atatoa Carr, Dinusha Bandara, Sarah Berry, Te Kani Kingi, Cameron Grant and Susan Morton, who examined parent and child ethnicities in the *Growing Up in New Zealand* cohort. As increasing numbers of individuals identify with multiple ethnicities, understanding what this means and how to use the information is essential. In the third article, Tahu Kukutai and Moana Rarere examine skewed iwi sex ratios as they answer the question of why Māori women

have increasingly come to outnumber men in the majority of iwi counted by the census.

A core New Zealand industry is observed over time in Natalie Jackson's analysis of dairy farming. Using census data, the demographic characteristics of dairy farmers and employees on dairy farms are detailed. In the final article, Adele Leah and Jacqueline McIntosh look into the future as they project the number of New Zealanders living with disabilities. They evaluate the quality of available data and suggest improvements to data collection and use.

In this issue we also remember Jamie Newell, who was a former president and treasurer of PANZ and a very committed member of the PANZ Council. Jamie's colleagues and friends were deeply saddened by his unexpected passing in 2015. Here Richard Bedford pays tribute to Jamie's multiple talents as a polymath, and traces his career trajectory as a self-taught population researcher with an enduring love of big data, statistical modelling and spatial demography.

Concluding this issue are reviews of two books published in 2016: *Rebooting the regions: Why low or zero growth needn't mean the end of prosperity*, edited by Paul Spoonley, and *Indigenous data sovereignty: Toward an agenda*, edited by Tahu Kukutai and John Taylor.

Tahu Kukutai
Bryndl Hohmann-Marriott

December 2017.

New Zealand Population Review, 43, 3–34.

A Place to Call Home? Declining Home-Ownership Rates for Māori and Pacific Peoples in New Zealand

ROSEMARY GOODYEAR [*]

Abstract

While there has been considerable debate about falling home-ownership rates in New Zealand in recent years, the fact that home ownership has fallen more sharply for our Māori and Pacific populations has largely escaped attention. In 2013, less than half of Māori and Pacific peoples lived in a dwelling owned by their household, compared with just under two-thirds of the total population.

This paper explores ethnic changes in tenure patterns (home ownership and renting) between 1986 and 2013, with a focus on the Māori and Pacific populations. It also notes that this inequality for Māori was a reversal of the situation in the1930s where they had higher home-ownership rates. We explore whether the differing age structure of the Māori and Pacific peoples populations may contribute to their lower home-ownership rates, relative to the general population. Lastly, the paper will discuss some of the consequences of this disparity, particularly in relation to household wealth and housing conditions.

Home ownership is important for several reasons. Firstly, housing is a significant part of family wealth in New Zealand, with home-ownership providing a means to pass on resources between generations. Comparative studies show the amount of family wealth tied up in housing in New Zealand is greater than in many other countries, such as the United Kingdom (Thorns, 1995). In 1990, a New Zealand Planning Council study found that in 1985 around half of all household wealth came from owner occupation (in Thorns, 1995). Subsequently, Statistics New Zealand surveys have reinforced the importance of property as the centre of New Zealanders' net worth. For example, evidence from

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the longitudinal Survey of Family, Income and Employment (SoFIE) (Statistics New Zealand, 2008) shows that family net worth was much higher when property was owned. Property ownership includes holiday homes and investment properties as well as the family home. Researchers have also suggested that housing is increasingly being regarded as a financial asset that can be used flexibly, not just as asset to live in. In a recent publication on home ownership, Laurence Murphy (2014) notes the significant financial and material implications for people as they age if they are not home-owners.

Secondly, health research shows that regardless of cost, housing tenure type affects the health and life expectancy of occupants. This may be partly due to an increased sense of agency – having a sense of greater control over one's circumstances – and to factors such as tenure insecurity and housing quality (Howden-Chapman & Wilson, 1999). Renting is associated with greater residential mobility (Statistics New Zealand, 2008a, 2015) and evidence shows that frequent moves are detrimental to health and well-being (Howden-Chapman & Wilson, 1999). Recent research from the *Growing Up in New Zealand* study found that children had experienced frequent moves. Private rentals were the "least secure tenure type for families and associated with the greatest likelihood of residential mobility" (Morton et al, 2017, p. 50).

Rental housing in New Zealand tends to be of poor quality (BRANZ, 2012; Statistics New Zealand, 2013, 2015; White, Jones, Cowan, & Chun, 2017). Boston and Chapple (2014) note that living in poor-quality housing particularly affects children because they spend much of their time at home. Older people and people who are immune-compromised are also more vulnerable to poor-quality housing.

Some renting issues could be overcome. For example, economists Eaqub & Eaqub (2015) cite evidence from Europe where government regulations ensure greater stability of tenure and better quality of rental housing. However, they acknowledge that "unless rental conditions are improved, ever larger numbers of New Zealanders will be living the renter's precarious life of uncertainty and hardship" (Eaqub & Eaqub, 2015, p. 80).

Aims

The aim of this paper is to highlight the increasing disparity of home ownership, not just between generations, but for different ethnic groups. This disparity has been missing from the discourse around home ownership and it is time that it is considered. There is a human rights dimension that cannot be ignored, and one that should be considered in a number of policy areas. Stronger legislation around tenure security and housing quality will benefit all renters, but they will have a great impact on the lives of Māori and Pacific New Zealanders as they are overrepresented in rental housing. If home ownership makes a notable difference between either ageing in comparable comfort or experiencing poverty, then it is an issue that should be considered in superannuation policy settings as well. This article also wants to highlight that today's current low home-ownership rates for Māori is a reversal of the situation early in the 20th century.

Data and methods

The data for this article is based on the New Zealand Census of Population of Dwellings. The analysis in this article is largely descriptive, with comparisons made in home-ownership rates over time. There are some issues to consider when making comparisons over time, such as changing classifications and definitions.

Home ownership is derived from household and individual home ownership questions. Information on home ownership has changed over time. In 2001, Statistics New Zealand introduced the individual home ownership question because of the increasing research interest in understanding the characteristics of home owners and renters. In 2006, for the first time, information about houses in a family trust was collected. For the purposes of this analysis, these have been included under the home ownership category. There is good metadata available on data quality and the effects of any changes in questions or collection methodology for recent census years (see Census Information by variable), although metadata for earlier years, particularly pre-1980s, is much less comprehensive.

Ethnicity is derived from the question "What ethnic group or groups do you belong to?" While earlier data about home ownership focused on ethnic households, the concept of an ethnic household has become

increasingly blurred due to increasing proportions of people with multiple ethnicities. One person may have multiple ethnicities, and there may be many ethnicities within a household. Instead, this paper focuses on the tenure status of households and people with Māori and Pacific ethnicity. Age-standardised data on individual home ownership is also included in order to better compare home-ownership rates between ethnic groups. Māori and Pacific peoples have very different age structures, with a much younger median age than people with European ethnicity.

Data from the 1920s to the end of the 1970s is used in order to look at historic home-ownership rates. The ways in which ethnicity has been defined, classified and collected, has changed considerably over time and, therefore, ethnic data is only broadly comparable with significant change to the way the government collected ethnicity between the 1970s and the 1980s.

The New Zealand government has long had an interest in quantifying the number of Māori in New Zealand and also defining the number of other non-Europeans within New Zealand (Howard & Didham, 2005). Enumerators in 1921 were instructed to classify people of mixed race thus: "Those who ranged in degree between half-caste and Māori were to be included with Māoris of full blood", while those between European and half caste would be classed as 'half caste'. The definition did include some aspects of cultural identity. Whether half castes came under the Māori or the general census depended on whether they lived as European or Māori. Any issue of Māori and a 'race alien' were classed as a 'race alien'. In the 1970s the collection of ethnic data changed again and went through iterations in the next three decades. In 1971, the Census asked 'descent origin', and in 1976, the term changed to 'ethnic origin'. The 1986 Census allowed people to list multiple affiliation rather than fractions of affiliation. By 2001, the census asked people "Which ethnic group do you belong to? (Mark the space or spaces which apply to you.". Therefore, the time series proper in this analysis is from 1986.

Historical background

For Māori and Pacific people, the housing tenure situation is complex. While both groups are characterised by lower-than-average home-ownership rates, their situations currently and historically are quite different.

Māori, as the indigenous inhabitants of Aotearoa New Zealand, owned much of the North Island in the late 19th century. As late as 1910, Māori owned around 27 per cent of the North Island, but this fell to 9 per cent by 1939 and was around 4 per cent by the beginning of the 21st century. (See https://nzhistory.govt.nz/media/interactive/maori-land-1860-2000 for Māori land loss between 1860 and 2000; also Maré, Coleman, & Dixon, 2005).

Since the 1990s, there has been an increase in the quantity of land in Māori ownership, and other assets, partly as a result of Treaty of Waitangi settlements (Maré, Coleman, & Dixon, 2005).

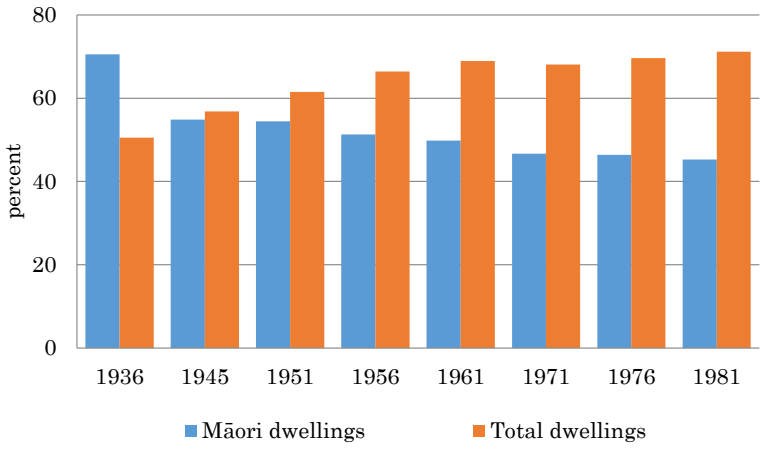
In contrast, Pacific peoples have only been present in New Zealand in large numbers since the 1960s. In 1951, the Census showed that New Zealand had 4539 people with one or more Pacific ethnicities. By 1971 there were 31,149 people born in Pacific countries living in New Zealand and 50,434 people of Pacific ethnicities. While migrants are less likely to own when they first arrive in a country, research has shown that over time the differences between cultural groups disappear, depending on a range of factors such as income, education and marital status (Forrest, 2014, quoted in Murphy, 2014. However, Pacific Island migrants have consistently experienced the worst housing outcomes, particularly in Auckland (Murphy et al., 2003).

Changes in Māori housing tenure before the 1980s

Thorns (1995) showed that home-ownership rates for Māori were higher in the earlier part of the 20th century and declined once Māori urbanised. The 1936 Census recorded that 70.5 per cent of Māori dwellings were owned by occupants, mainly in rural areas. From the 1960s to the 1980s, the Statistics Department defined a dwelling as Māori if the head of the household was “half or more Māori ancestry”, or was “less than half Māori

ancestry" but the majority of the inhabitants were of "half or more Māori ancestry".

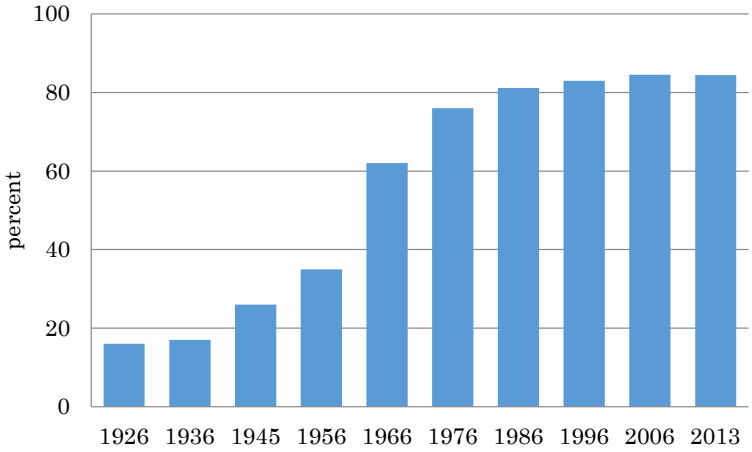
Figure 1: Percentage of Māori dwellings and total dwellings owned, selected census years, 1936–81



Source: Graph is author's own, using data from Statistics New Zealand.
Note: The definition of Māori dwellings varies between census years. Home-ownership rates remained higher in rural areas into the 1970s and 1980s.

Urbanisation was one of the factors leading to a decline in Māori home ownership after the 1930s. Urbanisation occurred rapidly in the mid-20th century. The government encouraged resettlement after World War II as they realised there was insufficient rural land to support the burgeoning Māori population (Pool & Kukutai, 2014). In 1951, the Census noted that only 9.4 per cent of Māori dwellings and 18.7 per cent of the Māori population were in urban areas, but by 1961, 31.1 per cent of Māori dwellings and 33.3 per cent of the Māori population were urban.

Figure 2: Percentage of Māori living in urban areas, selected census years, 1926–2013



Source: Graph is author's own, using data from Statistics New Zealand.

With increasing urbanisation, the Māori home-ownership rate fell to 54.8 per cent by 1945, but housing size had increased. By 1961, home ownership was less than 50 per cent. In 1981, 45.3 per cent of Māori dwellings were owned by their occupants. This figure compares with a home-ownership rate of around 39 per cent for Pacific dwellings.

It is important to note though that while home-ownership rates were higher, some of the housing in rural areas was small and lacking in amenities (Census and Statistics Office, 1950). The condition of some of this rural housing was very poor. Even as late as the 1980s, the Housing Commission reported:

> Māori households in the Tai Rawhiti (East Coast), Tai Tokerau (Northland) and Rotorua/Whakatane areas … have the most serious unmet housing need in the country in terms of the proportion of households suffering acute housing problems and the duration and severity of the problems… Substandard conditions were also widely cited and ranged from houses being condemned, having inadequate sanitation facilities, to lack of power or water connected to the house. Forty years of neglect of Māori housing in rural areas has been compounded by the slowing of the rural urban migration of young Māori and in many places the return of Māori families to their land. (quoted in Saville-Smith & Wehipeihana, 2007 p. 5)

Because of changes in the classification of ethnicity, the figures for Māori are only broadly comparable with Māori data from 1986 onwards.

Māori faced challenges in developing rural land and housing over the 20th century. Since Māori land is communally owned, they experienced issues with obtaining finance for land development and housing, although some government assistance was available (Boston & Chapple, 2014; Schrader, 2013). Waldegrave, King, and Walker (2006) noted other barriers including a lack of financial resources, and knowledge and support around the process of purchasing a home. Māori Land Online shows most Māori land is located in rural areas.

Disparity in home-ownership rates for Māori increased in 1970s

Thorns (in Forrest, 1995) argues that by the 1970s, home ownership was becoming ethnically segregated, with a growing difference between European and Māori or Pacific people. Census data showed continuing declining home-ownership rates among Māori and Pacific peoples and rising home-ownership rates for the rest of the population.

By 1971, for example, the percentage of Māori dwellings that were owned by residents had fallen to 46.7 per cent, compared with a rise to 68.1 per cent in the proportion owned nationally (up from 61.5 per cent in 1951). Rates of home ownership for Māori remained slightly higher in rural than urban areas (51.0 per cent and 44.8 per cent, respectively). Economists Selena and Shamubeel Eaqub (2015) highlight the risk that increasing housing unaffordability could lead to further inequality.

Measuring change in home ownership from the 1980s

From 1986 onwards, we look at changing tenure patterns for Māori and Pacific people, rather than attempting to define a Māori or Pacific household. A person may have more than one ethnicity and households may contain people with different mixes of ethnicity. Māori and Pacific peoples have high rates of multiple ethnicity, particularly children. For example, fewer than one-third of Māori children under five years (30.7 per cent) and fewer than half of Pacific children under five years (41.0 per cent) identified with only one ethnicity. Of particular relevance here is that of the 292,041 children under 5 years who are either Māori or Pacific in the 2013 Census, one in 8 (11.9 per cent) are both Māori and Pacific. We use the 'tenure in household' variable, which has information about whether

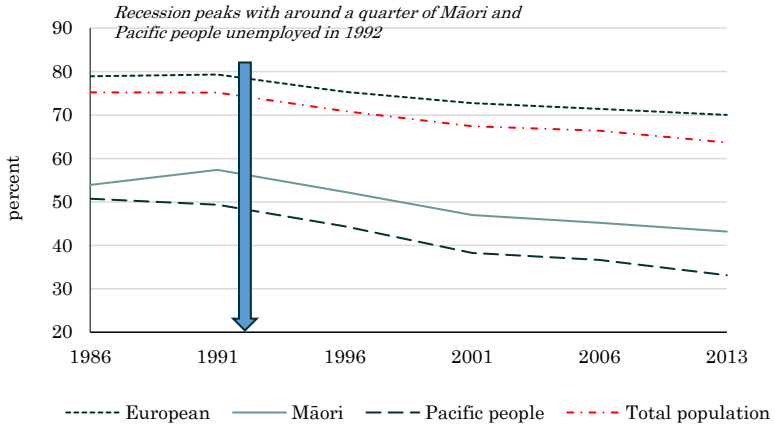
dwellings are owned with or without a mortgage, or in a family trust, or are not owned (rented, rent-free or rental status not specified).

We will look at both household home ownership (whether a member of the household owns the dwelling in which they live) and individual home ownership (whether a person aged 15 or over owned the dwelling in which they lived). Rates for individual home ownership are lower, as for example, a young person aged 15 years who lived in a dwelling owned by their parents should write 'Not owned' to the tenure-holder question because they did not own that dwelling themselves.

Greater decline for Māori and Pacific peoples in owned dwellings than for total population

Figure 3 shows the decline in the proportion of people living in an owner-occupied dwelling occurred at a faster rate for Māori and Pacific peoples than for the total population. While the proportion of people living in an owner-occupied dwelling fell 15.3 per cent between 1986 and 2013, the rates of decline were greater for Pacific peoples (down 34.8 per cent) and Māori (down 20.0 per cent).

Figure 3: Percentage living in owner-occupied dwelling, Māori and Pacific ethnicity and total population, 1986–2013 Censuses



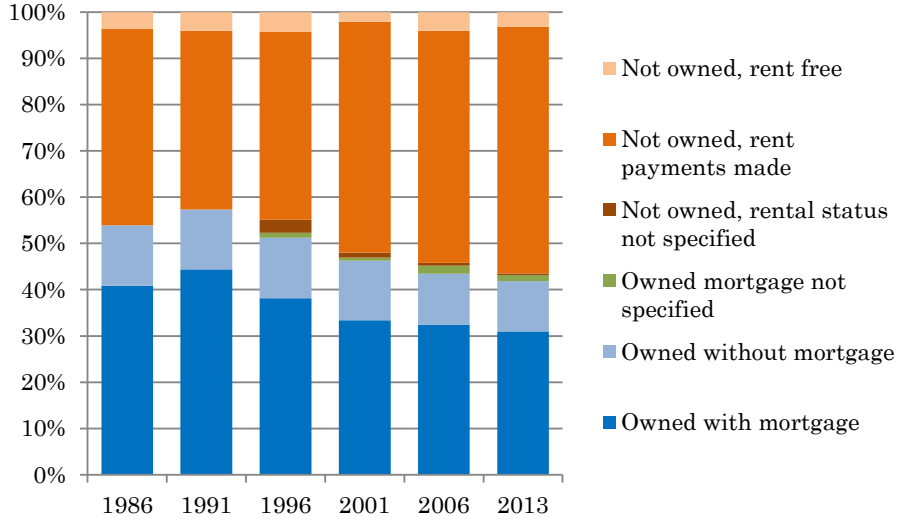
Source: Statistics New Zealand (2016a).
Note: Ethnicity is a total response variable. Owned dwelling relates to the situation of the household and there may be people with more than one ethnicity within a household.

The proportion of people with Māori ethnicity who lived in an owner-occupied dwelling increased slightly between 1986 and 1991. After 1991, this proportion fell. The greatest fall was in the 1990s, when there was a prolonged recession and high rates of unemployment for Māori and Pacific people. These issues will be explored more in a later section. Maré and Dixon note that "Māori economic activity levels were particularly severely affected by the recession and economic reforms of the late 1980s and early 1990s" (2004, p. 7).

Figures 4 and 5 show that the largest decline was in the proportion of Pacific and Māori living dwellings owned with a mortgage. That indicates that fewer households were taking on home ownership as the proportion owned mortgage free also fell.

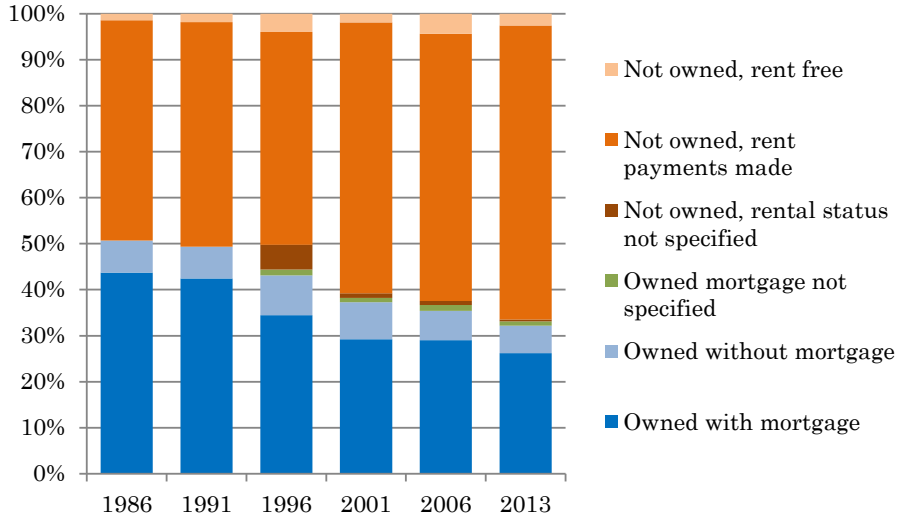
Between 1991 and 1996, the proportion of Māori living in a dwelling owed with a mortgage declined by 14.1 per cent, followed by a 12.4 per cent drop between 1996 and 2001. The decline for Pacific peoples was even greater, at 18.9 per cent and 15.2 per cent, respectively. In contrast, the figures for the European population were −6.2 and −5.5 per cent.

Figure 4: Tenure type for Māori living in households, 1986–2013 Censuses



Source: Statistics New Zealand (2016a).
Note: In 1986, there were no mortgage status or rental status not specified. In 2006 and 2013, dwellings held in a family trust are combined with owned dwellings.

Figure 5: Tenure type for Pacific peoples living in households, 1986–2013 Censuses



Source: Statistics New Zealand (2016a).
Note: In 1986, there were no mortgage status or rental status not specified. In 2006 and 2013, dwellings held in a family trust are combined with owned dwellings.

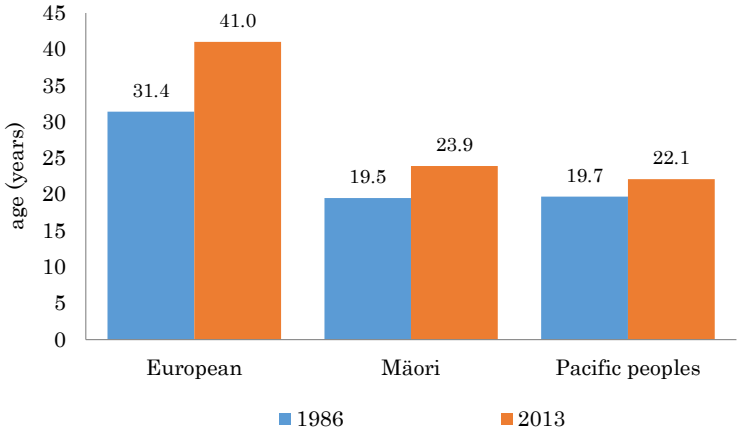
Home-ownership patterns at the individual level

We can also explore changes to tenure patterns at the individual level through the 'tenure holder' variable. This information comes from a census question that asks: "Do you yourself own, or partly own, the dwelling that you usually live in (with or without a mortgage)?"

We know that home-ownership rates tend to rise with age. In the total population, in 2013, less than 5 per cent of people aged 15–24 years said they owned their dwelling, compared with around three-quarters of people aged 55 and over. When using the home-ownership variable, we include an analysis by age – it's possible the much younger age structure of Māori and Pacific peoples could be one factor in their lower home-ownership rates.

This age disparity with the total population has increased slightly over time. Since 1986, the European population has aged at a faster rate than the Māori and Pacific populations. Figure 6 shows the median age for European people rose nine years between 1986 and 2013, compared with just four years for Māori and three years for Pacific people.

Figure 6: Median age for selected ethnic groups, 1986 and 2013 Censuses



Source: Statistics New Zealand.

Māori and Pacific peoples have larger proportional falls in home-ownership even when we standardise for age

One of the factors that contribute to disparities in measures of home ownership is the wide difference in the age structure of the groups being compared. Both the Pacific and Māori populations have a much younger age structure than the total population and this affects comparison of unadjusted rates for individual home-ownership. For example, in 2013, a home-ownership rate not adjusted for age is 28.2 per cent of Māori adults and 18.5 per cent of Pacific adults, contrasting with 50.2 per cent for the adult population. By age standardising, we can show what the rates would have been had these populations had the same age structure as the total population. We find that the age-adjusted Māori rate is 35.0 per cent and the age-adjusted Pacific rate is 24.4 per cent. This shows that while the differing age structure of the Māori and Pacific populations do account for some of the disparity, the dominant causes of such disparity lie elsewhere.

Table 1 shows the differences in the home-ownership rates and percentage change for selected ethnic groups, before and after age standardisation.

Table 1: Differences in individual home-ownership rates and percentage change, before and after age standardisation, 2001–2013

	2001	2001 age-adjusted rate	2013	2013 age-adjusted rate	% change 2001–2013	% change age-adjusted 2001-2013
European	59.7	58.1	56.8	54.6	−4.9	−6.1
Māori	31.7	40.1	28.2	35.0	−11.2	−12.8
Pacific peoples	26.0	32.3	18.5	24.4	−28.9	−24.5
Total people who stated an ethnicity	54.9	..	50.2	..	−8.4	..

Factors that may affect home ownership

What are some of the likely contributing factors for the increasing disparity in home-ownership rates? When we hear discussion about the falling home-ownership rates, sharply rising house prices are regarded as the most significant factor. The Demographia report (2017) most often cites the median multiple as the simple cause of unaffordability although housing researchers such as Laurence Murphy (2014) hold a more complex view. However, while rising house prices are important, they do not explain the reasons for the widening ethnic disparity in home-ownership rates. Why should home-ownership rates fall faster for Māori and Pacific peoples?

In 2010, Housing New Zealand identified some barriers to home ownership for Māori (Flynn, Carne, & Soa-Lafoa'i, 2010). In their *Māori Housing Trends report 2010*, the authors attribute the lower home-ownership rates for Māori to urbanisation, living in higher-cost areas (e.g. the Auckland region), the younger age structure of the population, larger households, lower employment and income levels, intergenerational experience of owning a home, educational achievement, and the wish to live near whānau. This section will examine each of these factors.

Rising house prices

Since the 1980s, house prices have risen substantially, particularly in the housing boom of the early to mid-2000s. The final report of the House

Prices Unit (Department of Prime Minister and Cabinet, 2008) notes, "Real house prices increased by close to 80% between March 2002 and March 2007, around the same increase as was recorded across the entire 1962–2002 period" (p. 20).

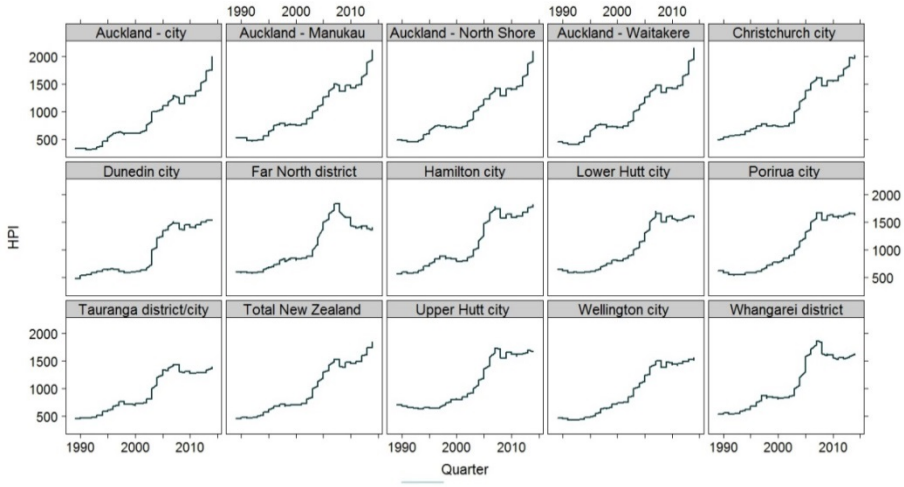
At times this has been well above the increase in household incomes (Eaqub & Eaqub, 2015; Productivity Commission, 2012). The increase in household incomes has also been uneven.

> Between 1982 and 2004, real incomes increased close to 25% for the 90th per centile of earners (the highest 10% of earners), while at the 50th per centile (median income level) real incomes increased around 6%. Real household incomes fell for the lowest 30% of income earners, with the falls coming in the 1982–1996 period. From 1996 to 2004 there were small increases in real household incomes for the lowest 30% of income earners. (Perry, 2007, quoted in Department of Prime Minister and Cabinet, 2008, p. 22)

While this rise in house prices has been associated with a fall in home-ownership rates for all households, Māori and Pacific peoples have experienced sharper declines. The following section looks at house prices from Quotable Value New Zealand.

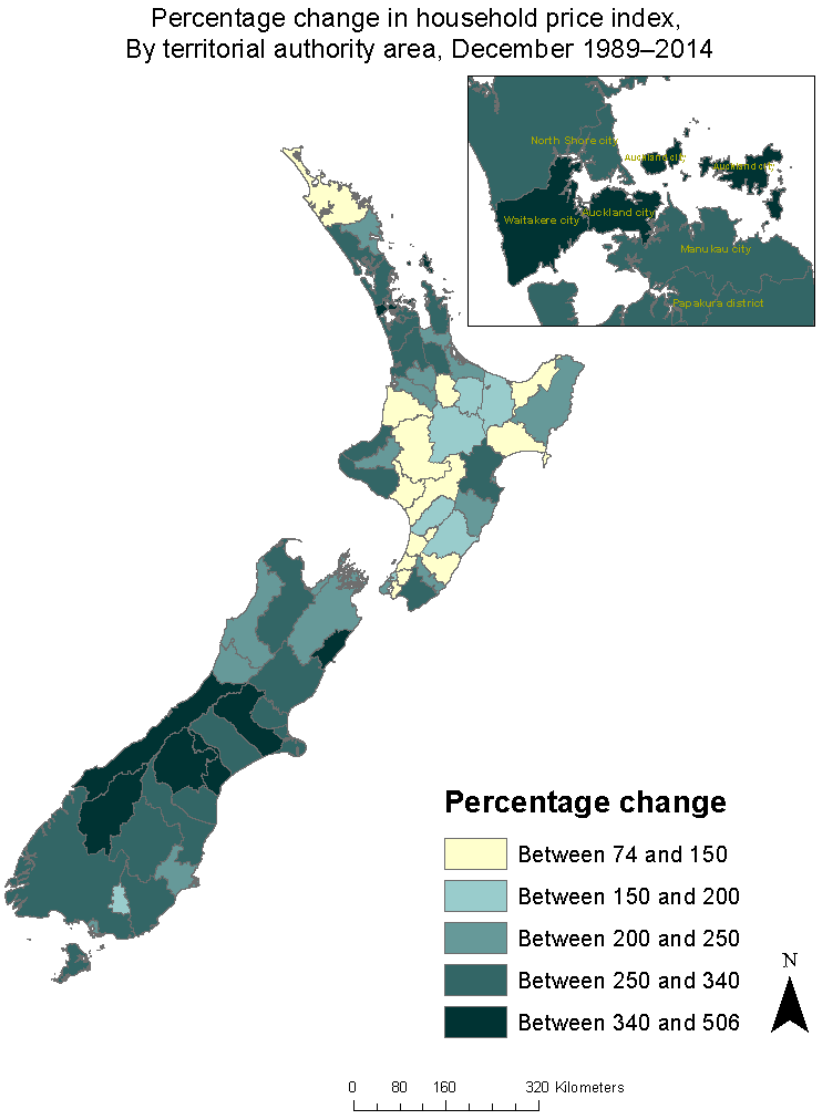
Figure 7 shows the rise in Quotable Value's house price index (HPI) for selected cities and districts, while Figure 8 shows the percentage change in the HPI for all territorial authority areas (using pre-2010 boundaries). Auckland in particular has experienced a prolonged rise in house prices in recent years.

Figure 7: House price index for selected territorial authority areas, 1989–2014



Source: Graphs are author's own, using data from Quotable Value New Zealand.

Figure 8: Percentage change in household price index, by territorial authority area, December 1989–2014



Source: Figure is author's own, using data from Quotable Value New Zealand.

Falling home-ownership rates are not just an Auckland effect

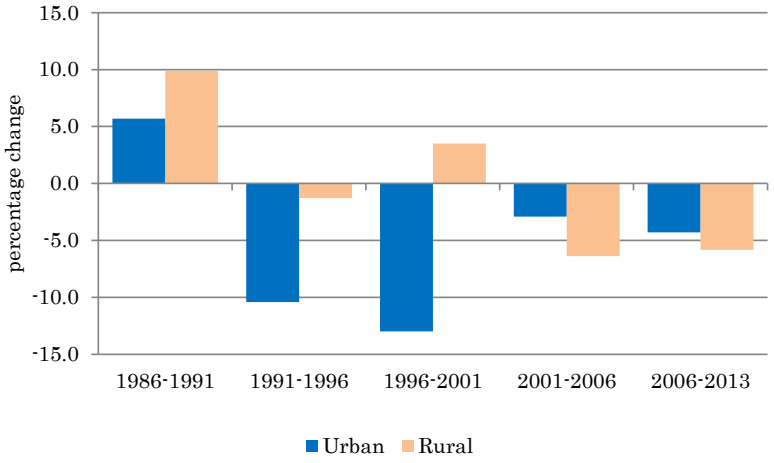
Are prices in Auckland to blame for falling home-ownership rates among Māori and Pacific peoples? While rising house prices, particularly in Auckland, would have impacted on Māori and Pacific home-ownership rates, the evidence suggests that the decline was much more widespread although it did occur more sharply in urban areas. In the following section, we explore change in home-ownership rates by area.

Differences between rural and urban areas, particularly for Māori

When we look at the distribution of change in tenure type since 1986, it is clear that urban and rural areas followed different patterns. Between 1991 (when home ownership peaked) and 2013, the proportion of Māori living in an owner-occupied dwelling fell by 27.6 per cent in urban areas compared with a 9.9 per cent decrease in rural areas. The percentage of rural Māori living in a dwelling owned by the household increased about 10 per cent between 1986 and 1991, and remained largely unchanged till the 2000s. This contrasts with sharp falls in home ownership in urban areas in the same period. Interestingly, the proportion fell more sharply in smaller urban areas than in the main urban centres.

But between 2001 and 2013, the proportion of rural Māori living in an owner-occupied dwelling fell at a faster rate: by 11.8 per cent, compared with a 7.1 per cent drop in urban areas. This is despite a general ageing of the rural population, relative to urban areas. In 1986, the difference in the median age of Māori in urban and rural areas was just over a year (at 19.2 and 20.6 years, respectively). By 2001, that difference had increased to 2.6 years (median ages being 21.4 and 24.0 years, respectively), and by 2013, there was almost a 4-year gap (at 23.3 and 27.1 years, respectively).

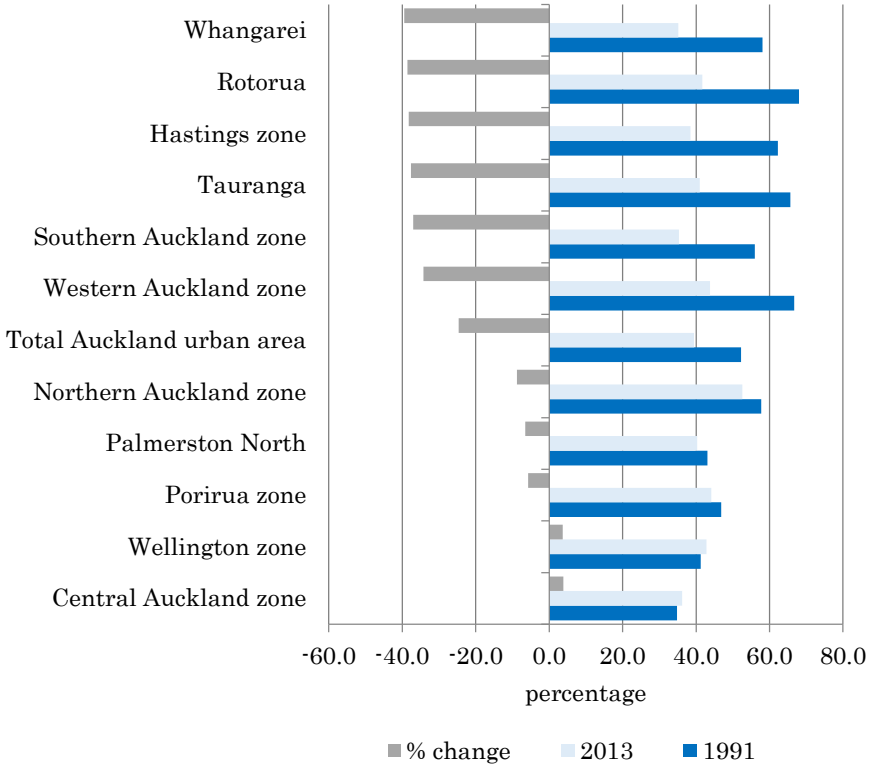
Figure 9: Percentage change in proportion living in owner-occupied dwellings, for Māori ethnicity and urban/rural area, 1986–2013 Censuses



Source: Statistics New Zealand (2016a).

Looking at the largest urban areas gives a more nuanced picture. Contrary to the expectation that declining home-ownership rates for Māori were largely due to their exposure to the Auckland housing market, the proportion of Māori living in owner-occupied dwellings fell most in Whangarei, Rotorua and Tauranga between 1991 and 2013. Home ownership did fall sharply in Southern Auckland (from 56.0 per cent to 35.3 per cent) and Western Auckland zones (from 66.7 per cent to 43.8 per cent).

Figure 10: Percentage living in owner-occupied dwellings and percentage change, by Māori ethnicity and selected main urban areas, 1991 and 2013 Censuses



Source: Statistics New Zealand (2016a).

Table 2 shows that the percentage of Pacific peoples living in an owner-occupied dwelling fell in all large urban centres, with the greatest falls in the Western and Southern Auckland zones. Central Auckland consistently had the lowest proportion of Pacific peoples living in an owner-occupied dwelling in 2013 – just 1 in 4 compared with approximately half of all people living in Central Auckland. In 2013, just under 50,000 Pacific peoples lived in a Central Auckland household.

Table 2: Percentage of Pacific peoples living in an owner-occupied dwelling, by largest urban areas, selected census years 1986–2013

Urban area	1986	1996	2006	2013	Percentage change 1986–2013
	Per cent				
Northern Auckland zone	63.1	48.7	40.7	38.7	−38.6
Western Auckland zone	72.7	57.3	43.5	38.2	−47.4
Central Auckland zone	37.8	32.4	28.0	25.8	−31.8
Southern Auckland zone	58.7	48.1	37.0	32.5	−44.7
Total Auckland urban area	51.9	44.0	35.6	31.9	−38.5
Upper Hutt zone	55.5	54.2	47.2	44.3	−19.9
Lower Hutt zone	46.1	40.9	40.0	38.8	−15.8
Porirua zone	41.4	39.1	35.8	33.9	−18.1
Wellington zone	39.3	37.2	35.8	35.3	−10.3
Total Wellington urban area	42.4	39.7	37.6	36.4	−14.2
Christchurch	53.8	43.1	35.4	33.0	−38.7
Total New Zealand	50.8	44.4	36.7	33.1	−34.8

Source: Statistics New Zealand (2016a).

Home ownership for Māori fell in most territorial authorities between 1986 and 2013

Between 1986 and 2013, the percentage of Māori living in an owner-occupied dwelling fell in most territorial authority areas. The largest falls occurred in Tauranga city (down 38.6 per cent), Carterton district (down 31.0 per cent), Rotorua district (down 30.8 per cent), and Hastings (down 30.0 per cent). Ashburton, Far North district, and Hamilton all fell just over 28 per cent. Figures 9 and 10 show the percentage of Māori living in an owner-occupied dwelling in 1986 and 2013. The same scale has been used to highlight the reduction in rates of home ownership by 2013. In 1986, in eight territorial authorities, around two-thirds or more of people with Māori ethnicity lived in an owner-occupied dwelling. Five of these were in the North Island, including Carterton district, Kapiti Coast, Far North District and Tauranga city. By 2013, the only districts with similar home-ownership rates for Māori were Selwyn and Waimakariri districts.

Figure 9

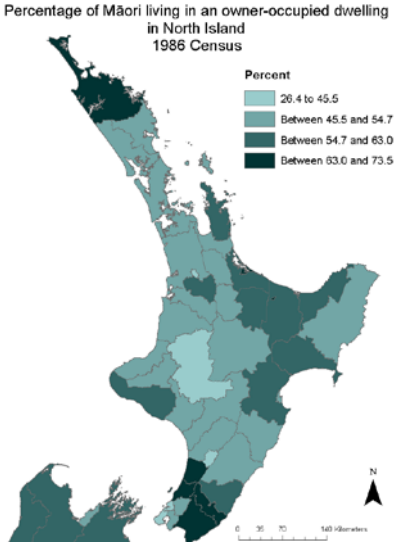
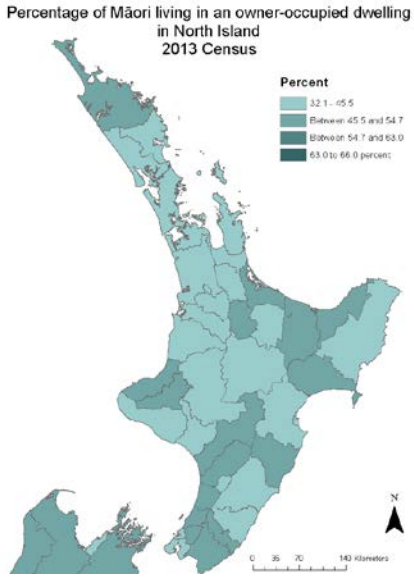


Figure 10



Source: Statistics New Zealand (2016a).

In contrast, the proportion of Māori living in an owner-occupied dwelling increased in Wellington and Porirua cities and some areas in the South Island.

Caution is needed here as some boundaries have changed slightly since 1986. Also, in some territorial authorities, small numbers and higher rates of structural change in populations may skew the data. For example, Selwyn district had 867 people in households with Māori ethnicity in 1986 and 2706 in 2013.

Māori and Pacific people's median income is lower than for population overall

Differences in income between ethnic groups may affect the affordability of home ownership. Past and current income are both important for an individual's ability to access home ownership, but in the census we only have a measure of current income.

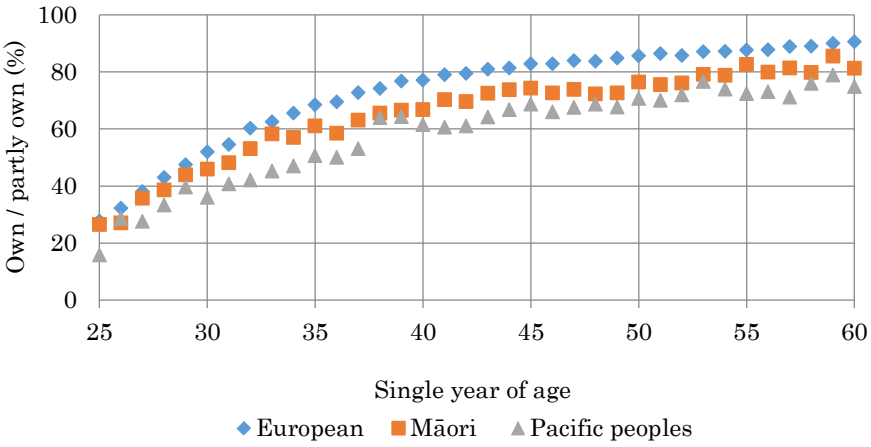
Māori and Pacific peoples tended to have lower median incomes than the total population, whether we look at personal, family or household incomes, and they were more likely to be at the lower end of the

income distribution. Perry shows these populations were proportionately more likely to be income poor, regardless of which measure was used.

> On average over the two surveys HES 2013 and 2014, using the After Housing Costs 60% anchored line measure, 12% of European/Pakeha, 26% of Māori, 25% Pacific and 26% 'Other' were in households with incomes below this line. (Perry, 2015, p. 131)

His figures cover all people in households, including children. Using his figures, smaller proportions of these populations could afford home ownership. Home-ownership rates remain lower for Pacific and Māori even when we compare people of the same age who have a similar income level (see Figure 11).

Figure 11: Individual home ownership for people 25–60 years and earning $70,001+, by selected ethnic group, 2013 Census



Source: Statistics New Zealand (2016a).
Note: Ethnicity is a total response variable, so people may be counted more than once.

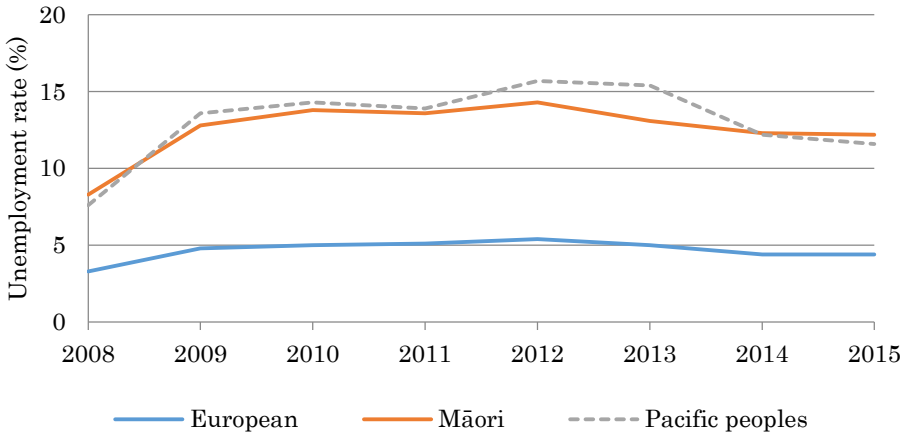
Higher unemployment rates for Māori and Pacific people

Higher unemployment rates and lower incomes for Māori and Pacific peoples affect the ability of individuals and households to own a home long term. Applicants require ongoing work security and sufficient income to save a deposit and be granted approval for a mortgage.

Data from the Household Labour Force Survey (HLFS) shows unemployment peaked in 1992, with rates for Māori and Pacific peoples at over 25 per cent. Since 1992, unemployment rates for Pacific peoples and Māori have consistently been nearly three times the rate for European people (Ministry of Social Development, 2010).

Figure 12 shows that unemployment rates also increased more sharply for Māori and Pacific peoples after the global financial crisis of 2008 and have remained high. For example, in the September 2015 quarter of the HLFS, the unemployment rate for Māori was 12.9 per cent and 13.1 per cent for Pacific people. This compares with a total unemployment rate of 6.0 per cent.

Figure 12: Unemployment rates for European, Māori and Pacific peoples, year ended December 2008–15

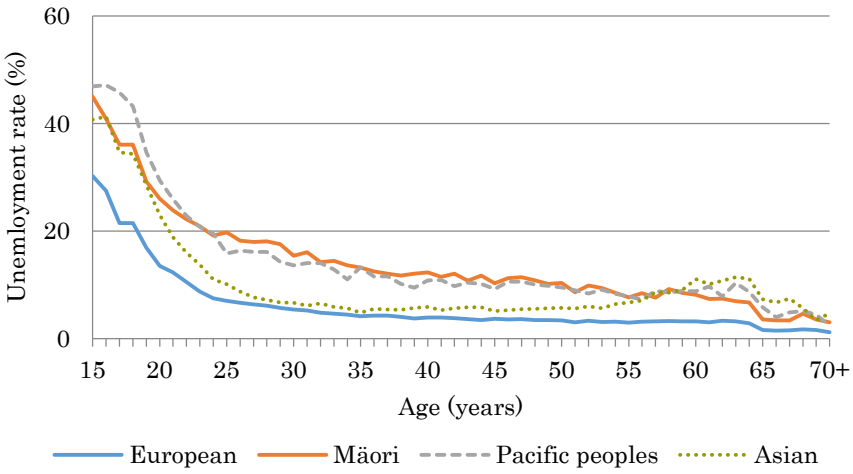


Source: Statistics New Zealand, Household Labour Force Survey.
Note: Ethnicity is a total response variable, so people may be counted more than once.

Since unemployment is higher among young people, the younger age structure of Māori and Pacific peoples contributes to their high unemployment. However, across all age groups, unemployment was still higher for Māori and Pacific peoples in 2013. When we adjust the unemployment rate to take into account the much younger age structure of the Māori and Pacific peoples populations, the rates were almost double those of the general population (just over 13 per cent compared with 7 per cent for the population who stated their ethnicity.

Figure 13 shows unemployment by single year of age for selected ethnic groups (from the 2013 Census). Although the census is not New Zealand's official measure of unemployment, it lets us look at unemployment in greater detail than a sample survey.

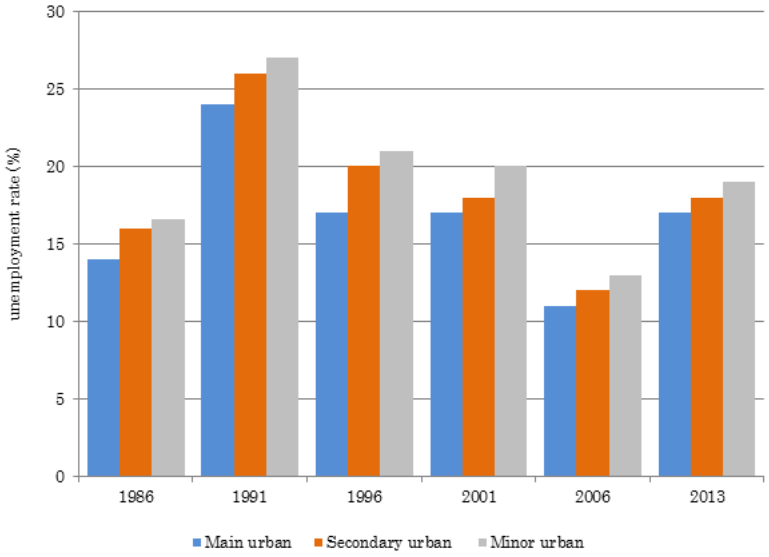
Figure 13: Unemployment rate by single year of age, for selected ethnic groups, 2013 Census



Source: Statistics New Zealand.
Note: Ethnicity is a total response variable, so people may be counted more than once.

Māori unemployment rates for 1986 to 2013 were also consistently higher in smaller urban centres (those with populations between 1000 and 29,999), particularly in the North Island. See Figure 14.

Figure 14: Unemployment rates for Māori, North Island urban areas, 1986-2013 Censuses



Source: Statistics New Zealand.

Larger households and greater proportions of one-parent families may affect affordability of owning

Pacific peoples are more likely to live in larger households than other ethnic groups. This is due mainly to having larger families, more multi-family households, and more intergenerational households (Statistics New Zealand, 2012). More than one-quarter of Pacific peoples (27.9 per cent) lived in a household with seven or more people, compared with just 5.6 per cent of the total population. The pressure of more people in a household can reduce affordability and the ability to purchase housing.

One-parent families have lowest home-ownership rates

Home ownership depends on household resources. By household composition, we find a difference in home-ownership rates – households with more than one person in employment are more likely to be able to afford to own a dwelling. Single parents tend to experience the greatest

rates of poverty and lowest income of any household type. The 2013 Census showed that one-parent families, and 'other multi-person households' had the lowest rates of home ownership (37.4 per cent and 34.7 per cent, respectively).

However, the census is a snapshot and does not indicate the past circumstances of a family or household. Analysing changes in people's movement into (and out of) home ownership over time would be useful future research.

For example, someone in a one-person household may have been part of a couple where, for example, one partner has died or moved out. A household with only a couple could have previously included children. Home ownership could also depend on past resources – a retired couple may have a low income currently but have paid off their mortgage when their income was higher.

There is considerable variation in household composition and in family type for different ethnic populations. For example, a higher proportion of Māori and Pacific peoples live in one-parent-with-children households than other ethnic groups.

When we look at home-ownership rates for different household composition types we still see an ethnic disparity. For example, 47.4 per cent of people with European ethnicity in a one-parent family household (without other people) lived in a dwelling owned, or partly owned, by their household. This compares with 21.9 per cent of Māori and 16.4 per cent of Pacific people.

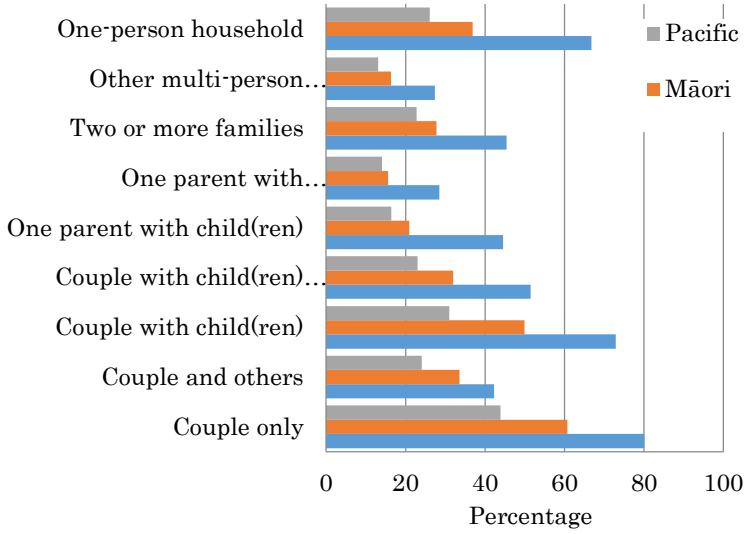
Figure 15 excludes people under 25 years for this analysis because of the ethnic populations' differing age structures. When we consider individual home ownership, the ethnic disparity remains. In 2013, 20.9 per cent of Māori, and 16.4 per cent of Pacific peoples aged 25+ and living in a one-parent-with-children household owned their dwelling. This compares with 44.5 per cent of people with European ethnicity.

Table 3: Household composition, for people in households, by selected ethnic group, 2013 Census

Household composition	Māori		Pacific peoples		Total	
	Number	%	Number	%	Number	%
Couple only	47,820	8.4	11,208	3.9	770,331	19.7
Couple only & other person(s)	13,311	2.3	4,815	1.7	109,023	2.8
Couple with child(ren)	204,966	36.1	105,837	37.2	1,548,702	39.7
Couple with child(ren) & other person(s)	31,110	5.5	28,251	9.9	168,183	4.3
One parent with child(ren)	101,508	17.9	35,649	12.5	354,039	9.1
One parent with child(ren) & other person(s)	45,927	8.1	18,264	6.4	123,576	3.2
Two or more family household	67,995	12.0	67,452	23.7	290,955	7.5
Other multi-person household	24,252	4.3	6861	2.4	183,006	4.7
One-person household	31,299	5.5	5868	2.1	354,501	9.1
Total stated	568,185	100.0	284,205	100.0	3,902,325	100.0
Household composition unidentified	399	…	249	…	125,535	…
Total	568,587	…	284,454	…	4,027,860	…

Source: Statistics New Zealand.
Note: excludes absentees. All cells are randomly rounded to base 3.
Symbol: … not applicable

Figure 15: Percentage of individuals aged 25+ years who owned/partly owned their dwelling, by household composition and selected ethnic group, 2013 Census



Source: Statistics New Zealand (2016a).

When we just look at individual home ownership by family type and adjust for the age structure of the population, again disparities remain. In 2013, the unadjusted homeownership rate for Māori adults in one parent families was 12.1 per cent. When adjusted by age, it rises to 15.7 per cent. For Pacific peoples in one-parent families, the two rates were 9.6 per cent and 12.1, respectively.

Non-demographic factors may affect home ownership

Factors other than household composition may also affect home-ownership rates for Māori and Pacific people. Although research has largely concentrated on difference in home ownership for Māori, factors identified may be common to both groups.

While age, employment and income level are likely to be influential, these factors alone are not sufficient to explain all the difference in home-ownership rates – some non-demographic influences may also exist. For example, Flynn et al. (2010) note that Māori home-ownership rates were lower than those for Europeans across all income

levels. They suggest that lack of intergenerational experience of home ownership may influence the rates.

Conclusion

Since 1991, New Zealand has experienced falling home-ownership rates. However, Māori and Pacific peoples have had greater falls in home ownership, at both individual and household levels. While the proportion of all people living in a dwelling they own has fallen 15.3 per cent by 2013, the decline was much greater for Pacific peoples (down 34.8 per cent and Māori (down 20.0 per cent). The disparity in home ownership between ethnic groups has, therefore, increased over time even when rates have been standardised by age.

The fall in home ownership is occurring at the same time as a rise in the price of housing, which began rising relative to incomes in the 1990s (Eaqub & Eaqub, 2015), lower incomes for Māori and Pacific people, and greater exposure to factors such as higher unemployment. The decline was sharpest in the 1990s, particularly for households with mortgages, suggesting that adverse economic conditions were an important factor. Social factors might also be influential, such as lack of intergenerational experience of home ownership and, potentially, discrimination.

We thought exposure to Auckland's housing market might be important in the sharp decline in home ownership. However, we found that overall, home ownership for Māori and Pacific peoples was lower than for most other ethnicities and had declined throughout New Zealand. Very few areas showed an upward trend in home ownership.

This decline in home ownership has occurred alongside a change in the structure of the rental housing market. Before the 1990s, a high proportion of people, particularly Māori, lived in rent-free housing. More Māori and Pacific peoples also lived in social housing, with income-related rents making this a very affordable option. Since 1990, increasing exposure to the private rental market, with its higher costs, has affected affordability, as data from the Household Economic Survey shows.

Renting is not just a phenomenon of youth; many people rent all their lives. In 2013, much higher proportions of children of Māori and Pacific ethnicity were living in rental housing than in 1986.

Rental housing tends to be of poorer quality and people in rental properties move more frequency. Moving through many schools can affect children's development. As Eaqub and Eaqub (2015) and others suggest, work to improve both the quality and security of rental housing would have tremendous benefit for the population of renters.

What are the consequences of lower home-ownership rates? In New Zealand, much wealth is traditionally held in property. The decline in home ownership among Māori and Pacific peoples could affect their ability to accumulate wealth and pass it on to the next generation. Studies on wealth in New Zealand have shown considerable disparity between ethnic groups. The release of statistics from the 2014/15 Net Worth Survey also showed that even when adjusted for age, there was a considerable difference in net worth, with Māori and Pacific peoples having an age-adjusted net worth of $23,000 and $12,000, respectively, compared with $160,000 for the total population (Statistics New Zealand, 2016b). Because home ownership has declined at a greater rate for Māori and Pacific peoples than for the population as a whole, their existing disparity in wealth may increase.

This article shows that ethnic disparities in home-ownership rates have increased over time. In 1991, around half of Pacific peoples (49.3 per cent) and over half of Māori (57.4 per cent) lived in an owned dwelling. In 2013, around 4 out of 10 Māori and 3 out pf 10 Pacific peoples were living in a dwelling owned by their household. Rates for Māori and Pacific peoples had fallen faster than for the total population.

This report has highlighted the disparities in home-ownership rates for Māori and Pacific peoples and how these have increased over time. These ethnic disparities highlight the need for nuanced policies for both promoting home ownership and supporting renters. There is a need for further research to identify both barriers that are faced by different ethnic groups in achieving home ownership, as well as the development of targeted solutions.

Note

1 This paper is an adaptation of the author's paper *Changes in home-ownership patterns in New Zealand 1986–2013 with a particular focus on Māori and Pacific people* (Statistics New Zealand, 2016a).

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Ethnic Identification Complexity across Generations: Evidence from Growing Up in New Zealand

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SUSAN MORTON

Abstract

The expression of ethnic identification is fluid and complex, with important connections to social, political and historical context. Measuring and monitoring ethnicity data is at the same time critical for demonstrating population well-being, policy effectiveness, intervention delivery, and equity. This paper details ethnic identification patterns within the unique *Growing Up in New Zealand* dataset. Ethnic identification within this cohort demonstrates important complexity, and increased diversification in just one generation. Where parents were dual or multi-ethnic, we find important differences between how they expressed their own prioritised ethnic identity and how they would be prioritised in administrative data sources. We confirm that there are a number of possible options for considering ethnicity data outputs in *Growing Up in New Zealand* analyses, all with potential advantages and disadvantages. We also recommend that a critical understanding of the dynamic nature of ethnic identification is most likely to effect appropriate interpretation, and in turn meaningful policy and programme response.

The term ethnicity generally refers to the characterisation of a group of people who identify with and are perceived by others as having shared belonging, such as common parentage or ancestry, shared history, religion, nationality, traditions, and cultural traits such as language, beliefs, values, music, dress and food (Bradby, 2003; Cokley, 2007; Phinney, 1990; Roberts et al., 1999). Ethnic identification is a

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declaration (or documentation) of an individual's ethnicity or ethnicities, usually with respect to predefined categories. Ethnic identification is not fixed; rather, it is multi-dimensional, dynamic and essentially subjective – influenced particularly by the social and historical context of its description as well as the method of data collection (Cornell & Hartmann, 1998; Ford & Harawa, 2010; Liebler, 2004; Roth, 2005).

The complexity of ethnic identification presents challenges to the ability to consistently define, conceptualise and measure ethnicity data (Burton, Nandi, & Platt, 2010; Cokley, 2007). Within the New Zealand context, ethnicity data and disparity between ethnic groups have been critical concepts since before the signing of the Treaty of Waitangi in 1840, and they remain so today.

Racial characteristics such as by 'blood quantum' or direct ancestry were the basis of most early statistics on ethnicity in New Zealand. The concept of 'race' was utilised until the New Zealand Census in 1951 when the term was modified to 'descent' (but remained largely based on racial characteristics). Individuals with more than one racial group were described as people of 'half-caste' descent, and were reported in the data as ethnic fractions; (e.g. "3/4 Māori and 1/4 European") (Kukutai & Didham, 2009; Treliving, 2001). In the 1970s, there was a shift in terminology to self-defined ethnicity, or 'ethnic origin', which subsequently became 'ethnic group' in the 1990s (Callister, Didham, Potter, & Blakely, 2007)

Currently, the New Zealand Statistical Standard for Ethnicity (Statistics New Zealand, 2005) defines an ethnic group as a group of people who have some or all of the following characteristics:

- a common proper name
- one or more elements of common culture, which need not be specified, but may include religion, customs or language
- a unique community of interests, feelings and actions, a shared sense of common origins or ancestry, and
- a common geographic origin.

These standards recognise that (where possible) ethnicity should be self-identified, and so research participants should be able to identify with more than one ethnic group (Friedman, Cohen, Averbach, & Norton, 2000; Laws & Heckscher, 2002; Mays, Ponce, Washington, & Cochran, 2003), and ethnic information should be collected at the most detailed level of the ethnicity classification possible (Statistics New Zealand, 2005).

Within epidemiology, a clear understanding of the population context for ethnicity data is particularly critical. Central to epidemiological research is analysis of how health outcomes differ between population groups in order to monitor progress and advantage, measuring the risk of discrimination and disadvantage, describing the burden and outcomes for communities, and targeting effective interventions to improve outcomes and equity. Recognition of the complexity of classification of ethnic identification, difficulties in the statistical allocation of dual and multi-ethnic individuals, and changes in methods for ethnicity data measurement can result in a number of problems with these epidemiological comparisons between ethnic groups, across time and populations as well as within the population. For example, New Zealand ethnic-specific health statistics (including mortality rates) have in the past included significant undercounting of Māori and Pacific populations due to numerator/denominator bias resulting from inaccurate and inconsistent ethnicity data collection (Ajwani, Blakely, Robson, Bonne, & Tobias, 2003; Cormack & McLeod, 2010; Ministry of Health, 2004).

Some ethnicity data within the health sector, or within other sectors that have an important influence on population health, remain criticised as being inaccurate, and potentially misinterpreted. Changes in the statistical processes for analysing those who self-identify with multiple ethnicities has also resulted in inconsistencies across time and between collections.

There is, therefore, a growing need to examine how ethnic groups are defined for use in epidemiological research, to accurately interpret whether these categorisations are appropriately representative, and to ensure and examine similarities and differences between groups of people within diverse context (Ford & Harawa, 2010). An appropriate understanding of how ethnicity data is collected and measured is critical for any epidemiological research that is interested in monitoring comparative well-being, equity or the effectiveness of programmes and interventions.

The aims of the *Growing Up in New Zealand* longitudinal cohort study (Morton et al., 2013) include to describe developmental trajectories and identify sensitive periods in development for children in New Zealand today, to understand the causal pathways that lead to particular developmental outcomes for children, and to inform future policy

development in New Zealand to improve outcomes and equity for all children and their families. The collection of ethnicity data, and its clear presentation and interpretation, is a critical component of meeting these aims.

This paper focuses on the collection of ethnicity data from the mothers, partners and children in *Growing Up in New Zealand*. This study provides unique opportunities to consider the ethnic identification patterns of parents having children in New Zealand today, and to describe the changes in ethnic identification patterns between the parental and child generations. Because this study has asked participants to describe their ethnic identification patterns at a detailed level, and has asked multi-ethnic parents to self-prioritise their own ethnic identification, analyses of the *Growing Up in New Zealand* ethnicity data provide a unique insight into the complexity of ethnic identification patterns as well as how adults prioritise their ethnic identification within the context of this longitudinal study. Furthermore, this paper compares and contrasts various possible ethnic identification outputs for the cohort participants: total response, single-combined, and prioritised. These baseline analyses are important for future cross-sectional and longitudinal work on the *Growing Up in New Zealand* data.

Methods

Using multiple strategies, pregnant women were invited to participate in *Growing Up in New Zealand* if they had an estimated birth date between 25 April 2009 and 25 March 2010, and were living within a geographic area defined by the Auckland, Counties-Manukau, or Waikato District Health Board regions in the North Island of New Zealand (Morton et al., 2013). The study region was chosen because it contained an ethnically diverse birth cohort that would be broadly applicable to the diversity of current New Zealand births without the need for over-sampling or weighting by ethnicity. The sample size for the cohort was sufficient to provide adequate power to undertake complex analyses of interlinked developmental trajectories over time across the whole cohort as well as within ethnic subgroups (Morton et al., 2013).

The recruited pregnant mothers and the resulting main cohort of 6853 children are generally comparable to New Zealand national birth

statistics, especially in relation to key parameters such as maternal age and parity, maternal ethnicity, and area-level deprivation (Morton et al., 2014). In addition to the pregnant women, 4401 of their partners (predominantly biological fathers of the cohort children) agreed to participate in this longitudinal study. The cohort profile has been described in further detail in Morton et al. (2013).

The data for the analyses reported here were collected by face-to-face computer-assisted personal interviews (CAPI) conducted independently with the pregnant women and their partners. This paper presents data based on three questions asked independently of both mothers and partners during the antenatal interview:

1. Which ethnic group or groups do you belong to?
2. Which is your main ethnic group; that is, the one you identify with most?
3. Which ethnic group or groups will your child belong to?

Participants were asked to respond at the most detailed level possible for each question, with response options on a showcard. The response options provided a list of 33 ethnicities, with the ability for participants to indicate alternative 'other' ethnicities in addition to those listed. The 33 ethnicities listed align with those provided by Statistics New Zealand at Level 3 of a four-level, hierarchical national ethnic classification system (Statistics New Zealand, 2012) (Table 1).

In addition to the Level 3 ethnicities, the study list included Fijian Indian as a specific response option (this is a Level 4 ethnicity and was included because of the size of this population and their distinction from the 'Other Indian' category).

For questions 1 and 3, as many responses as were determined necessary by each participant were recorded and analysed. A 'New Zealander' ethnicity was recorded as an answer when stated by the participants, and was available on the CAPI for interviewers to record each response, but was not shown to participants on the response list.

For the purposes of this publication, analyses of child ethnic identification focus on that described by the mother.

Ethical approval for the antenatal data collection wave (DCW) of the project was obtained from the Northern Y Regional Ethics Committee in August 2008. All descriptive analyses were conducted using SAS software (version 9.3, SAS Institute, Cary, NC, US).

Table 1. Ethnic identification levels, New Zealand (adapted from Statistics New Zealand, 2005)

Statistics NZ ethnic category level	Notes
Level 1 6 categories	Consists of European, Māori, Pacific Peoples, Asian, Middle Eastern, Latin American, African (MELAA), and Other. This level is commonly recommended to be used as output variables.
Level 2 21 categories	Asian and Pacific Peoples categories further broken down into more specific ethnic groups; for example, Chinese, Indian; Samoan, Cook Islands Maori.
Level 3 33 categories	33 categories (excluding residual categories of 'not further defined') The European group is further broken down (to include, for example, Italian and German) and further Asian and Pacific ethnic groups are listed; for example, Japanese, Korean, Niuean, and Tokelauan.

Results

Ethnicity identified by parents, and expected ethnicity for children

The parents of the *Growing Up in New Zealand* cohort were asked to identify their own ethnic group or ethnic groups, and where they identified with more than one ethnic group, they were asked to describe their main ethnicity, being the one that they identify with the most. Parents were also asked to identify, while pregnant, their child's expected ethnicity.

Overall, participants in the study identified with the following ethnic groupings, at Level 1 of the Statistics New Zealand hierarchy. Note that people could identify with more than one ethnicity; hence these numbers sum to more than 100 per cent.

- European: 4210 mothers (62 per cent of all mothers), 2963 partners (67 per cent) and 4149 (67 per cent) children
- Māori: 1260 mothers (18 per cent of all mothers), 649 partners (15 per cent) and 1487 (24 per cent) children
- Pacific: 1160 mothers (17 per cent of all mothers), 586 partners (13 per cent) and 1321 (21 per cent) children
- Asian: 1092 mothers (16 per cent), 638 partners (15 per cent) and 1000 (16 per cent) children
- MELAA: 169 mothers (2 per cent of all mothers), 108 partners (2 per cent) and 184 (3 per cent) children, and

- Other (including 'New Zealander'): 143 mothers (2 per cent of all mothers), 162 partners (4 per cent) and 450 (7 per cent) children.

Table 2 presents more detailed information on ethnic identification and self- prioritisation, along with the more detailed expected ethnic identification of the *Growing Up in New Zealand* children (as described by their mothers). To maintain anonymity, only the five most frequent ethnic identities within each of the broad categories (and/or where there are more than 50 mothers with this ethnic identification) are provided. There were fewer than 10 mothers and partners who stated that they did not know their ethnic identification, or preferred not to answer this question.

Table 2. Mother and partner ethnicity, child ethnicity (as described by mother) of the *Growing Up in New Zealand* participants

Ethnic classification*	Mothers†			Partners†			Child†	
	All identified ethnicities *N* = 6822 *n*§ (%)	Identify only with this ethnicity *n* (row %)	Self-prioritised this ethnicity *n* (%‡)	All identified ethnicities *N* = 4401 *n*§ (%)	Identify only with this ethnicity *n* (row %)	Self-prioritised this ethnicity n (%‡)	All identified ethnicities *N* = 6182 *n*§ (%)	Identified only with this ethnicity *n* (row %)
European								
NZ European	3616 (53)	2532 (70)	538 (50)	2549 (58)	1813 (71)	433 (59)	3968 (64)	2038 (51)
British and Irish	433 (6)	201 (46)	38 (16)	415 (9)	172 (41)	46 (19)	457 (7)	<10 (2)
Dutch	87 (1)	<10** (9)	<10 (4)	64 (2)	12 (19)	<10 (8)	91 (2)	(0)
Australian	82 (1)	34 (41)	15 (31)	62 (1)	28 (45)	<10 (26)	90 (2)	<10 (2)
German	64 (1)	14 (22)	<10 (2)	39 (1)	<10 (18)	<10 (6)	71 (1)	<10 (3)
Other European	295 (4)	133 (45)	47 (29)	176 (4)	76 (43)	22 (22)	252 (4)	12 (5)
Māori								
Māori	1260 (18)	465 (37)	318 (40)	649 (15)	206 (32)	145 (33)	1487 (24)	260 (17)
Pacific Peoples								
Samoan	516 (8)	341 (66)	74 (42)	287 (7)	183 (64)	46 (44)	682 (11)	207 (30)
Tongan	317 (5)	246 (78)	18 (25)	157 (4)	119 (76)	14 (37)	394 (6)	151 (38)
Cook Islands Maori	234 (3)	131 (56)	34 (33)	85 (2)	39 (46)	20 (43)	319 (5)	47 (15)
Niuean	108 (2)	41 (38)	17 (25)	44 (1)	17 (39)	<10 (26)	150 (2)	<10 (4)
Other Pacific Peoples	40 (1)	11 (28)	11 (38)	25 (1)	11 (44)	<10 (7)	48 (1)	<10 (19)
Asian								
Indian¶	450 (7)	393 (87)	24 (42)	308 (7)	268 (87)	20 (50)	427 (7)	259 (61)

Ethnic classification*	Mothers†			Partners†			Child†	
	All identified ethnicities *N* = 6822 *n*§ (%)	Identify only with this ethnicity *n* (row %)	Self-prioritised this ethnicity *n* (%‡)	All identified ethnicities *N* = 4401 *n*§ (%)	Identify only with this ethnicity *n* (row %)	Self-prioritised this ethnicity n (%‡)	All identified ethnicities *N* = 6182 *n*§ (%)	Identified only with this ethnicity *n* (row %)
Fiji Indian	158 (2)	138 (87)	<10 (15)	109 (3)	90 (83)	<10 (16)	139 (2)	75 (54)
Other Indian	292 (4)	255 (87)	11 (30)	199 (5)	178 (89)	10 (48)	288 (5)	184 (64)
Chinese	314 (5)	257 (82)	12 (21)	169 (4)	137 (81)	<10 (19)	298 (5)	119 (40)
Filipino	103 (2)	90 (87)	<10 (23)	53 (1)	52 (98)	<10 (100)	93 (2)	46 (49)
Sri Lankan	33 (<1)	28 (85)	<10 (20)	22 (<1)	18 (82)	<10 (50)	28 (<1)	13 (46)
Other Southeast Asian	54 (1)	37 (69)	<10 (24)	22 (<1)	14 (64)	<10 (25)	56 (1)	12 (21)
Other Asian	58 (1)	48 (83)	<10 (50)	38 (1)	32 (84)	<10 (33)	48 (1)	29 (60)
MELAA								
Middle Eastern	54 (1)	39 (72)	<10 (53)	46 (1)	27 (59)	<10 (26)	71 (1)	26 (37)
Latin American/ Hispanic	53 (1)	40 (75)	<10 (38)	26 (1)	21 (81)	<10 (80)	57 (1)	<10 (16)
African	65 (1)	40 (62)	<10 (28)	37 (1)	22 (59)	<10 (40)	61 (1)	27 (44)
Other								
New Zealander	114 (2)	47 (41)	34 (51)	150 (3)	78 (52)	37 (51)	431 (7)	108 (25)
Other ethnicity	29 (<1)	<10 (31)	<10 (20)	12 (<1)	<10 (42)	<10 (57)	20 (<1)	<10 (15)

* Aligned closely to Statistics New Zealand Level 3 hierarchy.
† For mother and partner, this is self-identified ethnicities; for the child, it is ethnicities identified by the mother.
‡ % of those who identify with this ethnicity and other ethnicities; i.e. total-only.
§ Multiple response(s) will total to more than 100%.
¶ Indian (Statistics New Zealand Level 3 category) includes both Fiji Indian and Other Indian (Level 4).
** Cell sizes fewer than *n* = 10 are reported as '<10'.

Within the Level 1 'European' grouping, 3616 mothers (86 per cent [3616/4210] of European mothers, and 53 per cent of all mothers), 2549 partners (86 per cent [2549/2963] of European partners and 58 per cent of all partners) identified at least one of their ethnicities as New Zealand (NZ) European. Of the parents that described their ethnicity as NZ European, 70 per cent of mothers and 71 per cent of partners described this as their only ethnicity. The remaining 30 per cent of NZ European parents identified both with the NZ European ethnicity and other ethnicities. For these parents, 50 per cent of mothers (n = 538) and 59 per cent of partners (n = 433) identified their NZ European ethnicity as their main (self-prioritised) ethnicity. Mothers also identified 3968 children (96 per cent of the 4149 European children and 64 per cent of all the *Growing Up in New Zealand* cohort) as NZ European. Approximately one half of NZ European children were identified only as NZ European (Table 2). The next most common 'European' ethnicities for mothers, partners and children (in order of decreasing frequency) were British and Irish, Dutch, Australian, German, South Slav and Italian.

Within *Growing Up in New Zealand*, 1260 mothers (18 per cent) and 649 partners (15 per cent) described their ethnicity as Māori (Table 2). Of these, over one third of mothers (37 per cent) and 32 per cent of partners identify only as Māori. Of the parents who identify as Māori and also identify with (an) other ethnicity/ethnicities, 40 per cent of mothers (n = 318) and 33 per cent of partners (n = 145) prioritised Māori as their main (self-prioritised) ethnicity (Table 2). At this data collection wave there are 1487 children (24 per cent of the cohort) who are identified (by their mother) as Māori. Less than one-fifth of Māori children (n = 260) were identified only as Māori.

For mothers, partners and children within the Pacific ethnic group, the most common Pacific ethnicities described were: Samoan (44 per cent [516/1160] of Pacific mothers, 49 per cent [287/586] of Pacific partners and 52 per cent [682/1321] of Pacific children); Tongan (27 per cent of Pacific mothers, 27 per cent of Pacific partners and 30 per cent of Pacific children); and Cook Islands Maori (20 per cent of Pacific mothers, 15 per cent of Pacific partners and 24 per cent of Pacific children). Approximately two-thirds of Samoan mothers and partners identified as only Samoan, and for those parents with mixed-Samoan ethnic identification, approximately 40 per cent identified their Samoan ethnicity as their main ethnicity. Over

three-quarters of Tongan parents (78 per cent of mothers and 76 per cent of partners) identified as only Tongan, and for those parents with mixed-Tongan ethnic identification, one-quarter of mothers (n = 18) and 37 per cent of partners (n = 14) identified their Tongan ethnicity as their main ethnicity. Cook Islands Maori parents were less likely than Samoan or Tongan parents to describe their Cook Islands ethnicity as their only ethnicity (56 per cent of Cook Islands mothers and 46 per cent of Cook Islands partners identified only with this ethnicity). There were 1321 children identified within a Level 1 Pacific ethnic group by their mothers. Over 680 children are identified as Samoan, with 30 per cent of these children identified only as Samoan; 38 per cent of the 394 children identified as Tongan are identified only as Tongan; and of the 319 children identified as Cook Islands Maori, 15 per cent (n = 47) are identified only as Cook Islands Maori.

Within the broader Asian ethnic group, Indian (Fijian Indian and Other Indian) and Chinese were the most common Asian ethnicities described for mothers, partners and children. These specific ethnicities were identified by over 40 per cent of the parents within the Asian grouping, and over 60 per cent of these children. Filipino was an identified ethnicity for over 100 mothers (2 per cent) in *Growing Up in New Zealand*. The Fijian Indian, Other Indian, Filipino and Chinese parents were highly likely to describe their Asian ethnicity as their only ethnicity (82–87 per cent of these mothers identified only with this Asian ethnicity, and 81–98 per cent of partners identified only with this ethnicity). There were 1000 children who were identified by their mothers with at least one of their ethnicities within the Asian grouping. Of these children, 61 per cent of Indian children, 54 per cent of Fijian Indian, 64 per cent of Other Indian, 40 per cent of Chinese, and 49 per cent of Filipino children were identified by their mothers only with this Asian ethnic group.

These analyses found that 1 per cent of all mothers and partners described their ethnicity as either Middle Eastern, Latin American or African (this forms the broad Level 1 'MELAA' group defined by Statistics New Zealand). Each of these ethnicities is also described as the ethnicity for 1 per cent of the *Growing Up in New Zealand* children. While the majority of mothers (62–75 per cent) describe their own MELAA ethnicity as their only ethnicity, their children's MELAA ethnicity was described as the child's only ethnicity for 16 per cent of Latin American/Hispanic

children, 37 per cent of Middle Eastern children, and 44 per cent of African children.

There were 114 mothers (2 per cent of all mothers) and 150 partners (3 per cent) who described at least one of their ethnicities as 'New Zealander'. Of these parents, 41 per cent of mothers and 52 per cent of partners describe New Zealander as their only ethnicity. For both parents, half of those who identify as New Zealander and (an)other ethnicity/ethnicities prioritise New Zealander as their main ethnicity. A greater proportion of children were described as New Zealanders compared with parents, with 431 (7 per cent) of children identified as having New Zealander as at least one of their ethnicities. One-quarter of these children are described only within the New Zealander ethnic group.

Single-combined ethnic identification

Growing Up in New Zealand data provides the ability to consider ethnic identification at Level 1 of the Statistics New Zealand hierarchy (European, Māori, Pacific, Asian, MELAA and Other), where each participant is counted once within a single group, or where each participant identified multiple Level 1 ethnicities (also known as 'single-combined' ethnic identification). Overall, at Level 1, 84 per cent of mothers, 85 per cent of partners and 67 per cent of children have a single ethnic identification.

As described in Table 3, when considering single or combined Level 1 ethnicities, the most common combination of ethnic groups for parents was European/Māori (619 mothers, 9 per cent of all mothers; and 355 partners, 8 per cent of all partners), European/Pacific (128 mothers, or 2 per cent; and 89 partners, also 2 per cent) and Māori/Pacific (72 mothers, 1 per cent; and 37 partners, 0.8 per cent).

Table 3. Single-combined ethnic identification of the *Growing Up in New Zealand* mothers, partners and children (as described by mother)

	Mother *n* (col %)*	Partner *n* (col %)	Child *n* (col %)
European only	3245 (48)	2394 (54)	2577 (42)
Māori only	465 (7)	206 (5)	260 (4)
Pacific only	852 (13)	404 (9)	581 (9)
Asian only	970 (14)	573 (13)	524 (8)
MELAA only	127 (2)	75 (2)	63 (1)
Other only	56 (1)	83 (2)	112 (2)
European and Māori	619 (9)	355 (8)	764 (12)
European and Pacific	128 (2)	89 (2)	214 (3)
European and Asian	42 (1)	19 (<1)	179 (3)
European and MELAA	24 (<1)	24 (1)	60 (1)
Māori and Pacific	72 (1)	37 (1)	160 (3)
Pacific and Asian	15 (<1)	15 (<1)	26 (<1)
Other 2 groups	84 (1)	74 (2)	333 (5)
3 or 4 groups	115 (2)	48 (1)	326 (5)
Total	**6814**	**4396**	**6179**

* For mother and partner, this is self-identified ethnicities; for the child, it is ethnicities identified by the mother.

At this broad level of ethnic identification, children were less likely to be identified within a single ethnic group, and a greater proportion of children are identified with more than one ethnicity compared with their parents. However, the use of Level 1 categories under-represents the number of dual and multi-ethnic participants because responses that fall within the same Level 1 category (such as those identified as Samoan and Tongan) are only counted once.

Figure 1A. The number of ethnicities identified by the *Growing Up in New Zealand* mothers at Level 1 vs Level 3 Statistics New Zealand categorisation

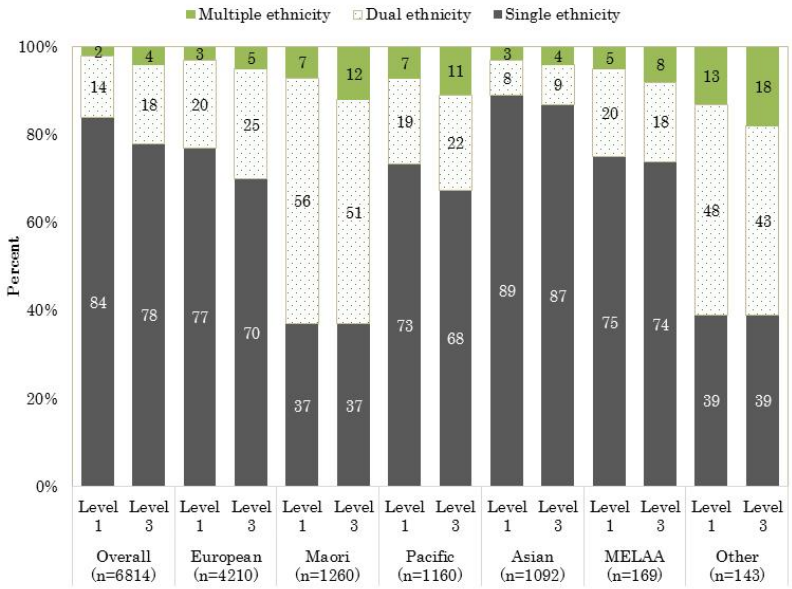
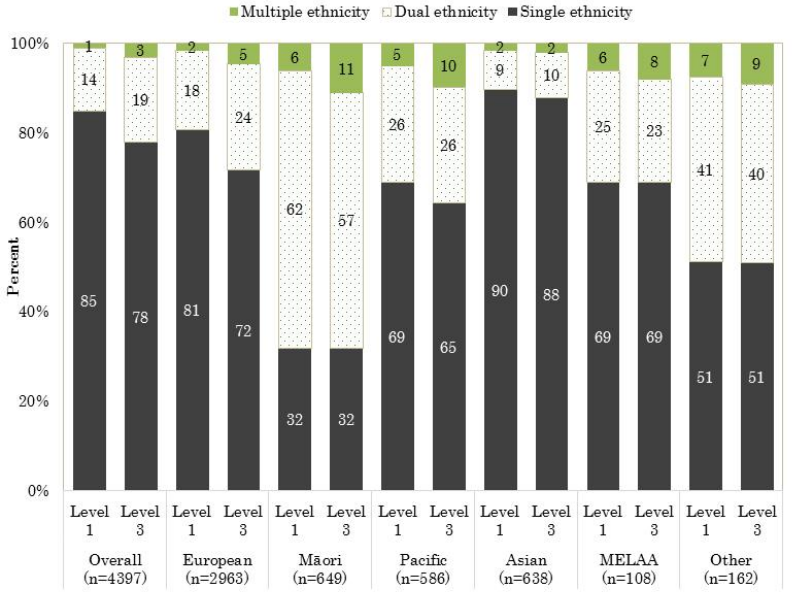


Figure 1B. The number of ethnicities identified by the *Growing Up in New Zealand* partners at Level 1 vs Level 3 Statistics New Zealand categorisation



Not surprisingly, the ethnic identification of all participants is more diverse when more detailed ethnicity categories are considered: 78 per cent of mothers (n = 5331) identify with one Level 3 ethnic group, and 22 per cent of mothers (n = 1483) identify with two or more ethnic groups at Level 3. The pattern for the partners is similar: 78 per cent of partners (n = 3428) identify with only one ethnic group at the more detail level of ethnic identification, and 22 per cent of partners (n = 969) identify with two or more ethnic categories at Level 3.

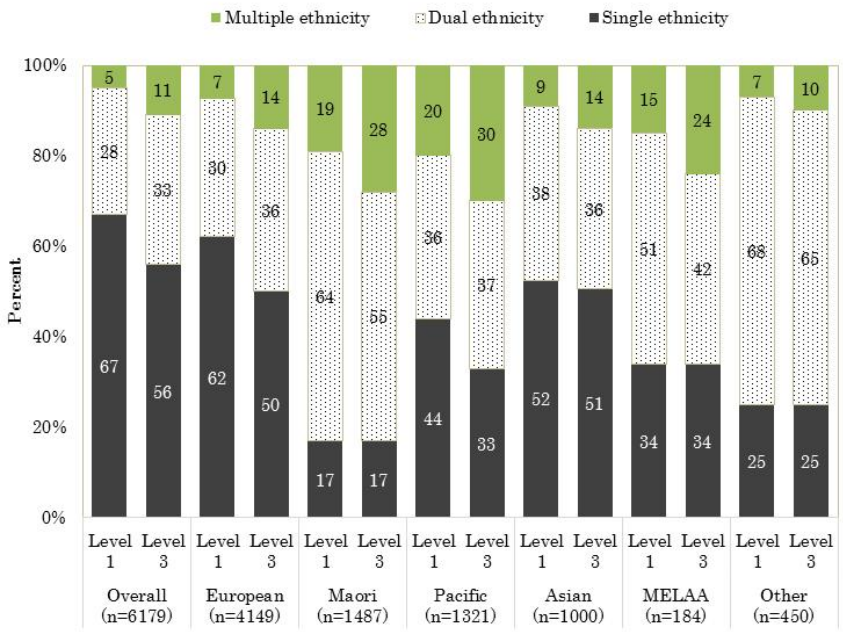
The proportion of participants with multiple ethnicities described differs according to ethnic identification (Figure 1A (mothers) and 1B (partners)). The greatest proportion of single ethnic group identification at Level 1 is seen in the Asian ethnic group, with 89 per cent of all Asian mothers and 90 per cent of all Asian partners describing their Asian ethnicity as their only ethnicity at Level 1 and a similar proportion of parents identifying with only one Asian ethnicity at the more detailed level described. Those who identify within the European and Pacific ethnic groups are more likely to identify with multiple ethnicities. While 77 per cent (n = 3245) of European mothers and 81 per cent (n = 2394) of European partners identify their European ethnicity as their only ethnicity at Level 1, 70 per cent (n = 2949) of mothers and 72 per cent (n = 2124) of partners describe single ethnic group identification at Level 3. Within the Pacific ethnic group, 73 per cent (n = 852) of Pacific mothers and 69 per cent (n = 404) of Pacific partners describe identification with only one Level 1 Pacific ethnicity, while 68 per cent (n = 786) of mothers and 65 per cent (n = 378) of partners identify with one Level 3 ethnicity.

Multiple ethnic identification for children

The children of *Growing Up in New Zealand* are more likely to be identified as dual or multi-ethnic, compared with their parents. Overall, 67 per cent of children are expected to identify (by their mothers) within one Level 1 ethnicity, 28 per cent of children are identified in two ethnic groups, and 5 per cent are identified with three or more of these broad ethnic categories. At the more detailed categorisation of ethnic groups, a much greater proportion of children (44 per cent) are expected to identify with more than one group (Figure 2). Children who are identified as Māori are most likely to also be identified with other ethnicities (83 per cent are dual or multi-ethnic); two thirds of Pacific children are identified as dual or

multi-ethnic when their more detailed ethnic identification is considered; and approximately half of Asian children (at both the broad ethnic group and more detailed identification) are dual or multi-ethnic – as previously seen, parental identification for children of more than one within-group Asian ethnicity was uncommon.

Figure 2. Number of child ethnicities (Level 1 and Level 3) identified by the *Growing Up in New Zealand* mothers



The most common *within* ethnic grouping multi-ethnic identification for European children were those identified as New Zealand European and British and Irish (n = 371; 6 per cent of all children), Dutch (n = 83, 1 per cent), Australian (n = 76) and German (n = 46). The most common within ethnic grouping multi-ethnic combinations for Pacific children were Samoan and Cook Islands Maori (n = 80), Samoan and Tongan (n = 69), Samoan and Niuean (n = 57), and Tongan and Cook Islands Maori (n = 44).

Parental self-prioritisation of ethnicity

The 1096 mothers and 657 partners who identified with more than one ethnicity were asked which ethnicity was their main ethnicity; that is, the

one they identified with the most. The selection of these self-prioritised ethnicities, compared with total ethnic groups, are presented in Table 4, separately for mothers and partners.

Table 4. Mother and partner self-identified ethnic group(s) and self-prioritised ethnicity, when multiple ethnicities available

	n	Most commonly identified main ethnicity (row %)	Second most commonly identified main ethnicity (row %)
Mother			
European and Māori	619	Māori (61%)	European (39%)
European and Pacific Peoples	128	Pacific (66%)	European (33%)
Māori and Pacific Peoples	72	Māori (68%)	Pacific (32%)
European and Asian	41	European (63%)	Asian (37%)
European and MELAA	24	MELAA (54%)	European (46%)
Pacific Peoples and Asian	14	Pacific (79%)	Asian (32%)
Partner			
European and Māori	351	Māori (51%)	European (49%)
European and Pacific Peoples	89	Pacific (60%)	European (40%)
Māori and Pacific Peoples	37	Māori (73%)	Pacific (27%)
European and Asian	19	European (79%)	Asian (41%)
European and MELAA	24	European (54%)	MELAA (46%)
Pacific Peoples and Asian	15	Pacific (87%)	Asian (15%)

Of the parents who identified with the combination of 'European and Māori' ethnic groups, a larger proportion of mothers (61 per cent, 95 per cent confidence interval (CI) = 57–65 per cent) identified their prioritised ethnicity as Māori than identified as European. 'European and Māori' partners were equally likely to identify their prioritised ethnicity as European or Māori. Of the parents who identified their ethnic groups as 'European and Pacific', a larger proportion of mothers (66 per cent, 95 per cent CI = 58–75 per cent) and partners (60 per cent) identified their prioritised ethnicity as Pacific than as European. Of those parents who identified as 'Māori and Pacific', mothers (68 per cent, 95 per cent CI = 57–78 per cent) and partners (73 per cent, 95 per cent CI = 57–85 per cent) were more likely to identify their prioritised ethnicity as Māori rather than

their Pacific ethnic identification. For parents who identified as 'European and Asian', their European ethnic identification was most likely to be prioritised over their Asian identification, particularly for partners (79 per cent prioritised their European ethnicity, 95 per cent CI = 57–91 per cent).

Discussion

This paper presents baseline information from a dataset that has collected detailed, self-identified and self-prioritised ethnic identification information independently from multiple members of a large number of the same families over time. This is a unique source of information that can be used to examine the complications and dynamics of ethnic identification. The principal discussion points of these analyses relate to the significant ethnic diversity of the new generation of New Zealand children (much more so than their parental generation), and the self-prioritisation of ethnic identification for those who identify with more than one ethnic group. These findings confirm that ethnicity data – critical for policy development, delivery and analysis as well as the objectives of the *Growing Up in New Zealand* study – is increasingly complex. In turn, these findings have implications with respect to research analyses and outputs when using *Growing Up in New Zealand* ethnicity variables in order to appropriately consider the complexity of the ethnicity concept and provide appropriate interpretation. Furthermore, these analyses contribute more broadly to discussions on the subject of ethnicity and our understanding of the identity of our children.

Ethnic diversity

Increasing ethnic diversification of New Zealand (and indeed globally) is a recognised phenomenon (as discussed in Khawaja, Boddington, & Didham, 2007) due to contributions from high immigration, ethnically diverse partnerships, and changing identification patterns. The ethnic diversity demonstrated in these analyses of the *Growing Up in New Zealand* participants is expected given the population context. It has already been demonstrated that one in three of the children of the cohort have at least one parent who was not born in New Zealand (Morton, 2012), and the recruitment area for *Growing Up in New Zealand* included the 'superdiverse' Auckland region.

This paper has also demonstrated the expected increasing ethnic diversity from the parent to the child generation: 28 per cent of both mothers and partners in this longitudinal study identify as dual or multi-ethnic, and one-third of children are described with dual or multiple ethnicities when the broad Level 1 ethnicity categories are considered. Similarly, in 2008 birth registration data, approximately one-quarter of babies registered were identified as belonging to more than one Level 1 ethnic group (Boddington & Didham, 2009). However, this broad view hides the important intra-group diversity. For example, 44 per cent of Pacific children are only Pacific at the Level 1 output, while 33 per cent of Pacific children are identified as only their Pacific ethnic group in the more detailed analysis. Those children who are diverse within the Pacific group, such as those who are identified as Samoan and Niuean, are lost from analyses involving only the broad ethnic identification. Furthermore, the sample size of *Growing Up in New Zealand* is able to demonstrate that this intra-group diversity is not patterned in the same way for each ethnic group. Use of aggregated Level 1 ethnicity data is standard for statistical modelling and analytical outputs in epidemiological studies such as *Growing Up in New Zealand.* Suggestions to apply statistical weightings, or to subsample to cohort, are also often focused on aggregated ethnic groups. This paper argues that a critical understanding of this data is required to ensure that all manipulations and interpretations are a valid reflection of both identification (and therefore significance for families) and diversity.

Māori parents in *Growing Up in New Zealand* are the most likely (over 60 per cent) to identify with more than one ethnicity, and over 80 per cent of Māori children were identified as mixed ethnicity. High ethnic diversity has been previously noted for Māori children in birth registration (Boddington & Didham, 2009) and Māori youth (Kukutai, 2007), and more than half of Māori in the 2013 Census were found to identify with two or more ethnic groups (Statistics New Zealand, 2014). This diversity reflects the history of miscegenation in New Zealand, a bias towards Māori identification, and the relationship between ethnic identification for Māori with non-devisable whakapapa (Khawaja, Boddington & Didham, 2007; Kukutai, 2007; Howard & Didham, 2007)

Ethnic data options within Growing Up in New Zealand

The important ethnic diversity described in this paper has implications for the use of a 'total response' ethnic identification variable in *Growing Up in New Zealand* analyses, where each participant is counted in each of their identified ethnic categories. The advantages of this output approach include providing a more specific reflection of each participant's identification patterns. In addition, each ethnicity is treated with equal statistical value, and the size of each ethnic group can be described more accurately (particularly if detailed ethnic identification is required). However, this paper demonstrates that there are also important challenges to be understood with the total response output, particularly for analyses and interpretation of child ethnic identification data. The high proportion of multi-ethnic cohort participants counted in all groups to which they have identified result in ethnic group sums that are much greater than the total subject population. Since there was no maximum number of ethnicities allowed in the *Growing Up in New Zealand* questionnaire, single children in a 'total response' ethnic identification variable, if Level 3 ethnic categories are considered, could be included up to seven times (the maximum number of detailed ethnicities identified). This also differs from the current three ethnicities maximum diversity captured in most health (and other) data sets (Khawaja, Boddington, & Didham, 2007; Ministry of Health, 2004), therefore requiring a greater understanding of the ability to accurately compare cohort data with national denominator datasets. Furthermore, multiple ethnicity is not clear in total response data, and ethnic groups with high proportions of mother, partners and children identified with more than one ethnicity will bias the analyses.

An alternative option is for participants to be described in mutually exclusive categories at a broad ethnic description ('single-combined'), such as each Level 1 ethnicity only (e.g. Māori only), Māori/European, Pacific/European, Pacific/Asian, Asian/European (Statistics New Zealand, 2004). An example of this 'single-combined' output is provided in Table 2. An advantage of this presentation, in comparison with the total response approach, is that each participant is included only once in the ethnic group described. This, therefore, facilitates statistical modelling. A disadvantage of this approach, however, also demonstrated here, is that a relatively large sample is required in order to consider differences between these groups (Callister, Didham, & Potter, 2005; Didham, 2005). While the

Growing Up in New Zealand sample size is much larger than previous longitudinal child development studies conducted in New Zealand, relatively small cell sizes still result in some of these output categories (such as Pacific/Asian), and the output options remain numerous. Furthermore, if more detailed statistical modelling is required, and/or more detailed ethnic groups are to be considered (as this paper has demonstrated), even smaller cell sizes result. Finally, and as discussed earlier, important detail is lost (such as intra-ethnic group diversity) when considering broad Level 1 ethnic groups.

Prioritisation of ethnic identification

The third option, in common use to support ethnic data analysis and presentation clarity, is to eliminate all but one ethnic identification where a priority is assigned to those with multiple responses.

In 1993, Statistics New Zealand (then the Department of Statistics) employed a system of ethnic group prioritisation, where each ethnic group was assigned a priority ranking. People who identified with mixed ethnicities could be assigned to only one of their ethnicities. The highest prioritisation value was assigned to Māori ethnicity so that those who identify with multiple ethnicities, including Māori, are then counted only as Māori (and not counted within their other identified ethnic groupings). Second priority was assigned to those who identify with any Pacific ethnicity (with prioritisation of the more specific Pacific identities ordered from the smallest resident population in New Zealand to the largest), then Asian, then any other non-European ethnicity. Final prioritisation was assigned to those with any European ethnicity. Prioritised response outputs were retained in the 1996 Statistical Standard for Ethnicity (Statistics New Zealand, 1996).

In 2004, however, the review of the measurement of ethnicity in official statistics recommended discontinuation of prioritisation as a standard output (Statistics New Zealand, 2004) because of the increase in individuals (particularly youth) identifying with more than one ethnic group, and the inability of this process to reflect the relevance and validity of self-identified multiple ethnicities and the overlap of ethnicities within data sets (Callister, Didham, Potter & Blakely, 2007). A review of the impact of prioritisation on the ethnicity data from the 1991, 1996 and 2001

Censuses found that the population percentage underestimated by prioritised ethnic counts, compared with total responses, was as high as 29.5 per cent for Pacific children under the age of 15 years in the 2001 census (Statistics New Zealand, 2006). The same Statistics New Zealand review of ethnicity data also recommended exploring the potential of asking people themselves to prioritise their main ethnicity when they identify with more than one ethnic group (Statistics New Zealand, 2004), with the recognition that selection of more than one ethnic group does not typically signal a similar sense of affiliation with all of the groups (Kukutai & Callister, 2009).

We have been able to consider this little-researched area of ethnicity self-prioritisation, using a unique data set. We found that those parents who identified as European and Māori were more likely to prioritise their Māori identity over their European, particularly mothers. This finding is in contrast to a study of New Zealand youth by Kukutai and Callister (2009), who found that 74 per cent of multi-ethnic youth were able to self-prioritise their main ethnic group, and the majority of European and Māori youth chose European (55 per cent) over Māori (44 per cent) when asked to self-prioritise. However, it does align with other analyses we have conducted that consider the transmission of ethnic identification from parent to child. Here we found that many parents in mixed Māori-European families emphasised the Māori ethnicity of their child, and, therefore, appear to particularly value their Māori ethnicity (Atatoa Carr, Kukutai, Bandara & Broman, 2017).

Reservations have been described about the use of self-described 'main' ethnicity to output ethnicity data (Kukutai & Callister, 2009). We would also like to caution data users who are considering only using this 'self-prioritised' ethnic identification output for *Growing Up in New Zealand* analyses. Despite the 2004 recommendation to discontinue the prioritisation of those who identify multiple ethnicities, this practice remains common in the analysis of a number of administrative datasets in New Zealand, particularly those collected within the health sector. There are important differences between the self-prioritised ethnic identification patterns shown in this paper and the administrative prioritisation process – overall less than 70 per cent agreement between approaches for the mixed ethnicity parents of *Growing Up in New Zealand*. If externally prioritised, using the Statistics New Zealand process, 40 to 50 per cent of

mothers and partners who identify as European and Māori would be prioritised as Māori, despite identifying their European ethnicity as their main ethnicity. Approximately 30 per cent of mothers and partners who identify as Māori and Pacific self-prioritise their Pacific ethnicity (while they would be prioritised as Māori). For those who identify as Asian and European, parents were most likely to self-prioritise as European, whereas they would administratively be prioritised as Asian.

It is important to consider the validity and utility of the administrative prioritisation process, and also to carefully critique any analyses that may compare *Growing Up in New Zealand* prioritised output with administrative data sources that may have been treated differently. Any prioritisation process retains only part of the information on identification provided, and does not always (in some cases less than 50 per cent) retain their own self-identified priority group – introducing a potentially misleading and subjective element to the analyses. Furthermore, the output from prioritised ethnicity data results in alterations to the population size of both the 'receiver' and 'donor' ethnic groups. The sample sizes of these groups, considered in Table 4 at Level 1, were too small to review self-prioritisation at a more detailed ethnic identification. However, similar issues arise for prioritisation of the more detailed ethnic groups.[1]

Conclusion

In this paper we consider the construct of ethnicity within the diversity of the new generation of New Zealand children, provide a better understanding of the complexity of multi-ethnic data and its potential use, describe the baseline demographic data of *Growing Up in New Zealand*, and provide a case study for the collection and representation of ethnic identification information in child cohort studies.

It is important to note the distinction between ethnic identification (what people say about their ethnicity) and ethnic identity (how people think about their ethnicity) (see Liebler, 2004). The analyses presented here cannot make assumptions regarding the meaning that participants assign to the terms 'ethnicity', 'ethnic group', 'belong' or 'main ethnicity'. It is likely that participants will interpret this question differently, in terms of race, nationality, ancestry, origins or other related concepts.

Furthermore, it is recognised that ethnic identification is dependent on collection method, design and delivery as well as participants' perception of the process and purpose for the collection. Therefore, it cannot be assumed that the ethnic identification patterns described here connect directly to participants' underlying ethnic identity. To explore this area, as well as how ethnic identification of the *Growing Up in New Zealand* participants develops and changes over time, further analyses of the multidimensional culture and identity constructs collected with this cohort are required.

Despite these limitations, a clear understanding of the ethnicity data collected in *Growing Up in New Zealand*, as well as knowledge of the implications of different ethnicity variables, analyses and outputs available, is critical for all data users, and indeed any researchers interested in child development in New Zealand.

Total response outputs reflect more accurately participants' self-identification yet should not be interpreted without critical understanding. Total response outputs could even be considered at Level 3 (where privacy and confidentiality issues do not arise) given the significant diversity of this generation of New Zealanders, particularly within the Pacific grouping. Where methodological constraints require mutually exclusive categories, then the single-combined response outputs, or prioritised responses, should be considered and contrasted. Where comparison with national or alternative data sources is useful, then there should be clear understanding of the differences between ethnic identification variables in each source. Self-prioritised ethnic identification could better describe affiliation or belonging, and may be more useful when considering specific associations with outcomes of interest, such as access to resources.

There is unlikely to be a perfect method by which to consider ethnic identification within *Growing Up in New Zealand* data analyses, that examines ethnic-specific data across the range of developmental domains, determines whether ethnicity variables are contributors to developmental trajectories or are proxy measure(s) for other important and modifiable influences, and that meaningfully and accurately describes outcomes over time, as well as across a range of family and environmental contexts. However, this paper provides options to consider the validity and the implications of ethnicity data variables, and suggests that analyses should

be multiple, tailored, and iterative, in order to provide the most relevant answers to specific research questions.

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Iwi Sex Ratios in the New Zealand Population Census: Why are Women So Dominant?

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Abstract

Recent census-based studies of iwi (tribal) population growth have revealed a high degree of volatility that cannot be explained by demographic factors alone. Although focused on a small number of iwi, these studies have shown that changing patterns of identification are an important driver of iwi population growth, and that the propensity to identify with an iwi appears to be much stronger among Māori women than men. Thus, the vast majority of iwi in the census have far more females than males, and female domination has increased over time. This paper describes the key features of female-favoured iwi sex ratios in the census and explores possible explanations. Focusing on sex ratios for the ten largest iwi, we find that female domination is highest in the 25–44 age group, and that this pattern is consistent over time. Further analysis shows that Māori women aged 25–34 years are more likely than their male counterparts to know detailed aspects of their pepeha (tribal identity), to explore whakapapa (genealogy) and to speak te reo Māori. Our results underscore the importance of Māori women as cultural connectors within their whānau, as well as in a broader iwi context.

Recent census-based studies of iwi (tribal) population growth have revealed a high degree of volatility that cannot be explained by demographic factors alone (Kukutai & Rarere, 2013, 2015; Rarere, 2012). Although focused on a small number of iwi, these studies have shown that changing patterns of identification are an important driver of iwi population growth, and that the propensity to identify with an iwi appears to be much stronger among Māori women than Māori men.

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Consequently, the vast majority of iwi in the census have far more females than males, and female domination has increased over time.

This paper describes the key features of female-favoured iwi sex ratios in the context of the census and explores possible explanations. While gendered differences in migration and mortality feature prominently in the demographic literature on sex ratios, we also consider more culturally grounded explanations that emphasise the role of Māori women in sustaining identity and culture, and the particular ways in which this might play out in the census context. We preface our analysis with a brief discussion of skewed sex ratios internationally and in Aotearoa New Zealand, as well as the wider context within which iwi identities are formed and expressed.

Background

Skewed sex ratios

The sex ratio is a common measure used to describe the balance between males and females in a population. The balance between sexes may seem like a relatively banal aspect of human demography but skewed sex ratios have major social, economic and political consequences. Many studies have shown that, in the absence of external intervention, the sex ratio at birth (the number of male live births for every 100 female births) is consistently male favoured, with 105–107 male births for every 100 female births (Hesketh & Xing, 2006). However, providing that there is equal access to nutrition and health care, females generally come to outnumber males due to lower mortality across all age groups. Despite this, there are many countries in the world where males greatly outnumber females due to practices arising from systematic 'son preference'. These practices include pre-natal sex selective screening and abortion, post-natal neglect and unequal access to health care. The number of 'missing females' due to these factors has been estimated at between 90 and 100 million, with the highest number occurring in the Indian subcontinent (Hesketh & Xing, 2006; Sen, 1992). An excess supply of men in these countries has been linked to spouse shortages, lower fertility, and higher levels of violence and antisocial behaviours.

In contrast to concerns over 'missing females' in developing countries, low sex ratios in some wealthy countries such as Aotearoa New

Zealand have given rise to a rather different scenario, that of 'missing men' (Bedford, Callister, & Didham, 2010; Callister, Didham, & Bedford, 2006). This term, and others such as 'man drought' (Salt, 2008), refer to the imbalance between men and women in the prime working and family-formation ages of 20–49 years. In Aotearoa New Zealand, the number of women relative to men at ages 20–49 years has been increasing since the 1980s, and the imbalance is more marked than in other wealthy industrialised countries (Callister, Didham, & Bedford, 2006). In the United States, the sex ratio at ages 20–49 years is 1.00 (2010 Census); this compares with 0.98 in Canada and Australia (2016), and 0.92 in Aotearoa New Zealand (2013).

Female-favoured sex ratios among those of prime working age in Aotearoa New Zealand have been attributed to several factors including gendered differences in under-enumeration and migration, and inconsistencies in how census and arrival/departure data are recorded. Men, along with young adults and Māori and Pacific peoples, are more likely than other population groups to be missed from the census (Statistics New Zealand, 2007, 2014). Permanent and long-term (PLT) migration losses also tend to be higher for males than females at those ages, and gains higher for females than for males (Bedford, Callister, & Didham, 2010). In addition, female migrants at peak working ages are more likely than men to be recorded as short-term migrants and to then stay longer than intended, resulting in 'unexpected' gains of women (Bedford, Callister, & Didham, 2010).

In Aotearoa New Zealand, the balance of males and females also varies significantly by ethnicity. Sex ratios at prime working ages are much more female dominated for Māori than for other major ethnic groups (Callister, Didham, & Bedford, 2006),[1] and sex ratios for many iwi are even more skewed. Indeed, in some iwi, the excess of women at peak working ages matches the excess of men in parts of India where the phenomenon of 'missing women' has been most extreme. The dynamics are, of course, quite different and, in the context of Aotearoa New Zealand, have little to do with gender differences in mortality. Rather, female domination in census-based iwi counts is likely to reflect historical, political and cultural factors that shape contemporary expressions of tribal belonging, as well as the relatively fluid and open character of the census as a forum for self-identification. We discuss this in more detail below.

The changing context of iwi identification

Nowadays 'Māori' is the term most often used to reference indigenous peoples in Aotearoa New Zealand, but it is a relatively recent label, only emerging in the 19th century amidst increasing contact with tauiwi (immigrants) (Broughton, 1993). In pre-colonial times, identity was rooted in genealogical connection, typically expressed in terms of three distinct but overlapping kinship units: whānau (family group), hapū (kinship family groups) and iwi (larger kinship groups, often now referred to as tribes). Hapū consisted of a number of related whānau groups and were the most significant independent political units, exercising mana motuhake (authority) over a defined territory (Taonui, 2012), As Ballara (1998) notes, hapū and iwi were fluid entities: "...the Māori political and social system was always dynamic, continuously modified like its technology in response to such phenomena as environmental change and population expansion" (p. 21).

This inherent dynanism, coupled with frequent migratory movements, made early colonial census taking challenging. Iwi have a long history of being quantified and qualified in the census, with the earliest census of iwi undertaken in 1874. (For a detailed overview of iwi enumeration in the census, see Kukutai, 2012).[2] The census provided a ready forum within which to monitor the size, distribution and material circumstances of tribes as part of the colonial government's attempt at statecraft. Many iwi viewed censustaking with suspicion, perceiving it to be linked with taxation or conscription. Census enumerators observed that tribes linked with the Kīngitanga (Māori King Movement) were especially resistant to being counted (Kukutai, 2012). After the 1901 census, iwi enumeration ceased. Divested of much of their land and living in rural poverty, iwi were perceived as far less of an economic and political threat and the impetus for government surveillance waned.[3]

It was another 90 years before iwi were once again counted in the census with the introduction of a self-identified iwi question in the 1991 census. The government of the day was pursuing a pathway of 'devolution' through the Runanga Iwi Act 1991 which included the transfer of limited responsibilities and service functions to iwi. The collection of iwi data was integral to the Act and though the legislation was repealed soon after its passage, the legacy of centralised corporate structures remained (Barcham

1998). The 1980s and 1990s were periods of significant iwi reinvigoration, stimulated, in part, by the progression of settlements between iwi and the Crown over its historic wrongdoings. Although the Waitangi Tribunal was set up in 1975 in response to Māori political pressure and activism, changes in 1985 enabled it to investigate claims of Treaty breaches dating back to 1840. In 1995, the Office of Treaty Settlements was established to negotiate the settlement of historical Treaty claims, superceding the Treaty of Waitangi Policy Unit in the Department of Justice. Since that time, more than 100 Waitangi Tribunal claims reports have been published and, by 2015, 68 directly neogtiated settlements had been completed, with many more outstanding (Office of Treaty Settlements, 2015, p. 21).

While the history of Māori enumeration has been about the imposition of state categories to drive state development agendas, how individuals choose to respond is influenced by a range of factors. These include the revitalisation of Māori and iwi identities, changes in the broader political context incuding settlement processes described above, economic incentives and opportunities, and the gradual de-stigmatising of Māori identity and culture. Patterns of identifcation also reflect the high level of cultural and socio-economic diversity among Māori. At times, this diversity has been oversimplified into binary categories of 'iwi Māori' and 'urban Māori'. Such binaries are misleading in that they imply that urban Māori cannot also be connected to their iwi. In reality, not only are the vast majority of Māori both iwi affiliated and living in urban areas,[4] but the increased propensity to identify with an iwi in the census has been most pronounced among city-dwelling Māori (Kukutai, 2013).

Contemporary iwi growth trajectories are complex and somewhat unpredictable. A recent study by Kukutai and Rarere (2013) analysed growth trajectories for four iwi (Ngāi Tahu, Waikato, Ngāti Awa, Tūhoe) between 1991 and 2006, and found marked variation in growth rates between iwi, and over time. In most instances, iwi birth cohorts increased rather than decreased in size and gains from 'new' members were especially marked among children, the middle-aged and women. Growth patterns did not appear to be directly linked to the timing of settlements with the Crown, nor iwi size. For example, the growth trajectories of Waikato and Ngāi Tahu differed greatly, despite being the first iwi to reach directly negotiated settlements with the Crown around the same time.

It is important to recognise that the concepts and processes employed to define iwi membership in the census varies greatly from those used in iwi registers. A growing number of iwi have established eletronic membership registers as a precursor to, or condition of, settlement. Whereas iwi affiliation in the census is based solely on self-identification (at least for adults), registers usually require some form of external recognition, along with information about whakapapa (for example, the names of grandparents and great-grandparents), and hapū and marae affiliation (Walling et al., 2009). Moreover, while individuals can and do change their responses to the iwi question in the census, they are very unlikely to de-register with an iwi once enrolled. These contextual differences often mean that the size and age-sex structure of an iwi vis- à -vis the census can vary significantly from its enrolled population (see, for example, Walling et al. 2009). This paper is solely concerned with census-based iwi enumeration; the balance of males and females on iwi registers is beyond the scope of our analysis. It may well be that skewed sex ratios are not a feature of iwi-controlled registers because of the conceptual and procedural differences. Thus, it would be inaccurate to try to generalise our observations beyond the census context. We note, however, that many iwi lack the internal capability and resources to generate their own whole-of-iwi statistics and are heavily dependent on the population census for their informational needs. As such, understanding identification patterns in the census context is an important starting point for a wider discussion on how iwi statistics can inform good decision making to advance tribal well-being and development aspirations.

Methods

The data used in this paper are extracted from the New Zealand Census of Population and Dwellings obtained from Statistics New Zealand via their website or custom data. Iwi responses are coded and reported on using a two-tier classification (rohe and iwi) used in the Iwi Standard Classification (hereafter, refered to as the classification; Statistics New Zealand, 2009). New iwi categories have been added over time and, at the time of the 2013 Census, the classification had 128 categories (excludes Level 1 rohe categories). Iwi data are outputted using the total response method, meaning that individuals are counted in all groups with which they identify. As such, the sum of all iwi exceeds the sum of Māori descendants reporting an iwi affiliation. In cases where hapū or waka are self-reported, a codefile is used to assign these responses to an iwi grouping or waka confederation respectively. Hapū that affiliate to more than one iwi are assigned to a separate category.

Both the question wording and response categories of the iwi question changed between 1991 and 2006. In 1991, the two-part question asked respondents of Māori descent if they knew their iwi and those ticking "yes" were prompted to write in the name of their *main* iwi. Those stating a main iwi could then indicate up to two other iwi with which they had strong ties (Statistics New Zealand, 1998). At the request of Māori, the main iwi prompt was dropped in 1996 and the question simply asked if respondents knew the names of their iwi, with space to write up to six iwi names and rohe. In 2001, the number of write-in spaces reduced to five, and a supplementary list of iwi from the classification was included in the help notes accompanying the census questionnaire. The question and format were retained in 2006 and 2013.[5] In 1996, just over 27 per cent of those stating an iwi reported two or more iwi. By 2006, the share had increased to nearly 40 per cent (Kukutai & Rarere, 2015).

Our analysis employs the standard sex ratio (males to females), by functional age group, as well as cohort analysis. For the latter, we track changes in the size of the five-year birth cohorts by sex across two inter-censal periods, 1996–2001 and 2001–2006. In theory, indigenous populations such as Māori are closed to spatial migration because there is no source country outside of Aotearoa New Zealand that can provide a long-term source of augmentation. In reality, Māori have high levels of

international mobility and, until very recently, this produced net migation losses in most years, particularly to Australia (Bedford et al., 2010; Kukutai & Pawar, 2013). Given this, iwi birth cohorts should decrease over time as a consequence of mortality and out-migration, and so any increase can thus be attributed to net increases through changing patterns of identification.

Results

Table 1 shows census sex ratios for the iwi-identified population, which comprises people of Māori descent who reported at least one iwi, as well as for the Māori Ethnic Group (MEG) and total New Zealand population. We also show the median sex ratio across all of the 120 or so individual iwi recognised in the official classification.[6]

Females outnumbered males in all groups and all years, but the imbalance was much more evident for iwi, and became more marked from 2001 onwards. In 1991, there were 97 males for every 100 females of Māori ethnicity, which mirrored the ratio for the total New Zealand population. For the iwi-identified population, there was 96 males per 100 females. By 2013, however, there were only 93 Māori males per 100 Maori females, and for the iwi-identified population, the ratio had dropped to 89 males per 100 females. The median sex ratio across all iwi was lower still, at just 85 males per 100 females. These differences are not due to an imbalance in sex ratios at birth. Māori male births have outnumbered Māori female births since at least 1997, with ratios ranging from 1.03 to 1.09.

Table 1. Sex ratios for iwi-identified population, total New Zealand and Māori ethnic group, 1991–2013

Population	1991	1996	2001	2006	2013
Total New Zealand	0.97	0.97	0.95	0.95	0.95
Māori ethnic group	0.97	0.97	0.96	0.95	0.93
Iwi (people stated)	0.96	0.93	0.91	0.90	0.89
Iwi (iwi stated, median)	0.94	0.91	0.87	0.85	0.85
	(n = 97)	(n = 90)	(n = 97)	(n = 100)	(n = 101)
Don't know iwi	1.01	1.03	0.94	0.93	0.92

Source: Statistics New Zealand, Census of Population and Dwellings, various years.

Focusing on the aggregate iwi-dentified population is a useful starting point, but also has limitations given the tremendous intra-iwi variation in popuation size, structure and growth. An analysis of the 100-plus iwi in the census is impractical thus we limit our focus to the 10 largest iwi shown in Table 2. These iwi varied significantly with respect to size, growth, composition, asset base, public profile and settlement histories. Table 2 shows the population size and recent intercensal growth of these 10 iwi along with the MEG, iwi-identified and total New Zealand. comparator groups.

In most periods, the number of Māori reporting at least one iwi affiliation exceeded the intercensal growth of the MEG and total national population. In terms of individual iwi, the growth trajectories varied tremendously in size and direction. In some periods, some iwi declined in size, while others stagnated or increased substantially. To illustrate, between 1991 and 1996, the largest iwi (Ngāpuhi) only increased by just under 3 per cent while Ngāti Kahungunu ki te Wairoa grew by more than 50 per cent. Between 1996 and 2001, the number of Ngāti Kahungunu ki te Wairoa increased even more dramatically, by more than 300 per cent. This was due to increased identification, rather than demographic behaviour per se, and seems to have been partly driven by changes in classification practices. Between 1996 and 2001, the number of individuals classified as 'Ngāti Kahungunu – region unspecified' nearly halved, from 40,380 to 24,729, and there were also significant increases for Ngāti Kahungunu ki Heretaunga and Ngäti Kahungunu ki Wairarapa. At the same time, three new Ngāti Kahungunu iwi categories were introduced.

Over the entire period, the iwi that grew the least in relative terms was Ngāpuhi, at just over one-third. This is unsurprising given its much larger base size – in 1991, Ngāpuhi was nearly twice the size of the next largest iwi. Between 2006 and 2013, growth was low to modest for all iwi, suggesting that future iwi population growth (at least for the ten largest iwi) may begin to stabilise.

Table 2: Growth rates of 10 largest iwi, Maori ethnic group, iwi-stated and total New Zealand population, 1991–2013

Number	1991	1996	2001	2006	2013
Total New Zealand	3,373,926	3,618,303	3,737,280	4,027,947	4,242,048
Māori	434,847	523,371	526,281	565,329	598,605
Iwi identified (stated)	*368,655*	*425,745*	*454,479*	*512,325*	*535,941*
Ngā Puhi	92,973	95,451	102,981	122,214	125,601
Ngāti Porou	48,525	54,219	61,701	71,907	71,049
Ngāi Tahu	20,304	29,133	39,180	49,185	54,819
Waikato	22,230	23,808	35,781	33,429	40,083
Ngāti Tūwharetoa	24,069	28,998	29,301	34,674	35,877
Ngāti Maniapoto	21,936	23,733	27,168	33,627	35,361
Tūhoe	24,522	25,917	29,259	32,670	34,887
Ngāti Kahungunu ki Te Wairoa	2,271	3,465	14,661	20,982	21,060
Te Rarawa	5,916	8,133	11,526	14,892	16,512
Ngāti Awa	9,798	11,304	13,044	15,258	16,182
Intercensal growth (%)					
%	**1991–96**	**1996–01**	**2001–06**	**2006–13**	**1991–2013**
Total New Zealand	7.2	3.3	7.8	5.3	25.7
Māori	20.4	0.6	7.4	5.9	37.7
Iwi identified (stated)	*15.5*	*6.7*	*12.7*	*4.6*	*45.4*
Ngā Puhi	2.7	7.9	18.7	2.8	35.1
Ngāti Porou	11.7	13.8	16.5	−1.2	46.4
Ngāi Tahu	43.5	34.5	25.5	11.5	170.0
Waikato	7.1	50.3	−6.6	19.9	80.3
Ngāti Tūwharetoa	20.5	1.0	18.3	3.5	49.1
Ngāti Maniapoto	8.2	14.5	23.8	5.2	61.2
Tūhoe	5.7	12.9	11.7	6.8	42.3
Ngāti Kahungunu ki Te Wairoa	52.6	323.1	43.1	0.4	827.3
Te Rarawa	37.5	41.7	29.2	10.9	179.1
Ngāti Awa	15.4	15.4	17.0	6.1	65.2
[Iwi low-high]	[2.7–52.6]	[1.0–323.1]	[−6.6–43.1]	[−1.2–19.9]	[35.1–827.3]

Source: Statistics New Zealand, Census of Population and Dwellings, various years.

Turning to sex ratios, Table 3 shows that between 1991 and 2013, sex ratios varied substantially between iwi and became more unbalanced over time. In 1991, when the iwi question was first re-introduced, all iwi sex ratios were below one. Waikato and Ngāti Kahungunu ki te Wairoa had the lowest ratio at 89 and 88 males per 100 females. Ngāpuhi and Tūhoe had the highest sex ratios at 96 males per 100 females. By 2013, all iwi except Tūhoe had sex ratios below 0.90 and the lowest was 0.82 (Ngāti Kahungunu ki te Wairoa). The biggest decline in the ratio of males to females was for Te Rarawa, which went from 94 males per 100 females in 1991 to just 83 males per 100 females in 2013. By no means was the pattern observed in Table 2 unique to large iwi. By 2001, 97.9 per cent of all iwi recorded more females than males,[7] and in 2013 only four iwi recorded sex ratios above one: Patukirikiri, Ngāti Tama ki Te Upoko o Te Ika, Ngāti Hei, and Te Kawerau. Of these iwi, the largest had just over 500 affiliates.

Table 3: Sex ratios of ten largest iwi in 2013, 1991–2013

Iwi	1991	1996	2001	2006	2013
Ngā Puhi	0.96	0.92	0.90	0.89	0.88
Ngāti Porou	0.94	0.91	0.89	0.89	0.87
Ngāi Tahu	0.95	0.90	0.86	0.86	0.86
Waikato	0.89	0.90	0.88	0.86	0.87
Ngāti Tūwharetoa	0.94	0.90	0.89	0.86	0.86
Ngāti Maniapoto	0.94	0.90	0.89	0.87	0.84
Tūhoe	0.96	0.93	0.91	0.90	0.90
Ngāti Kahungunu ki Te Wairoa	0.88	0.88	0.85	0.85	0.82
Ngati Awa	0.94	0.91	0.87	0.87	0.86
Te Rarawa	0.94	0.90	0.87	0.84	0.83
Total iwi identified	*0.96*	*0.93*	*0.91*	*0.90*	*0.89*

Source: Statistics New Zealand, Census of Population and Dwellings, various years.

As noted earlier, studies of female-favoured sex ratios for Aotearoa New Zealand generally have revealed significant age differences, with male deficits more apparent at the peak working and family formation ages. Table 4 shows age-specific sex ratios for the aggregate iwi-identified population, as well as for the MEG. In all years, iwi sex ratios varied significantly by age, with the excess of females to males most evident at ages 25–44 years. In each year, the ratio of men to women aged 25–44

years in the iwi identified population was considerably lower than for Māori at the same ages. Thus, in 2001 there were only 80 males for every 100 females aged 25–44 years in the iwi-identified population, compared with 88 males per 100 females at those ages in the MEG. In 2013, the respective ratios declined further to 77 and 83 males per 100 females. Sex ratios were also unbalanced at older ages (65+ years) where gendered differences in survivorship are likely to have a greater impact. In all years, sex ratios for tamariki in the iwi-identified population exceeded one suggesting that parents did not make gender distinctions when identifying their children with an iwi.

Table 4: Age-specific sex ratios for iwi-identified population and Māori ethnic group, 2001–2013

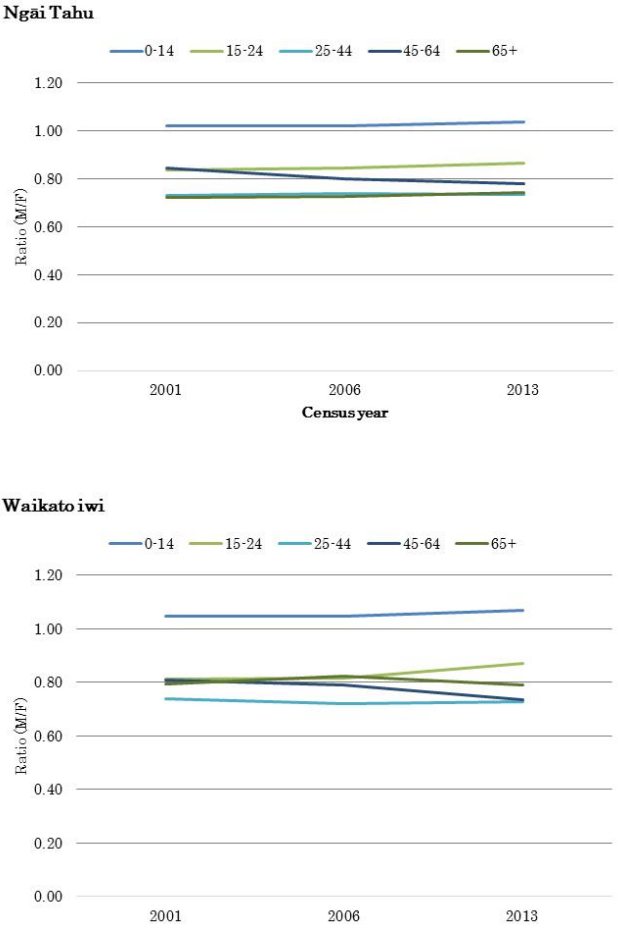
Age groups	2001	2006	2013
Iwi identified population			
0–14	1.04	1.04	1.05
15–24	0.88	0.87	0.90
25–44	**0.80**	**0.79**	**0.77**
45–64	0.89	0.86	0.82
65+	0.81	0.81	0.81
Total	**0.91**	**0.90**	**0.89**
Māori ethnic group			
0–14	1.05	1.06	1.05
15–24	0.96	0.95	0.97
25–44	**0.87**	**0.86**	**0.83**
45–64	0.94	0.90	0.87
65+	0.83	0.83	0.82
Total	**0.96**	**0.95**	**0.93**

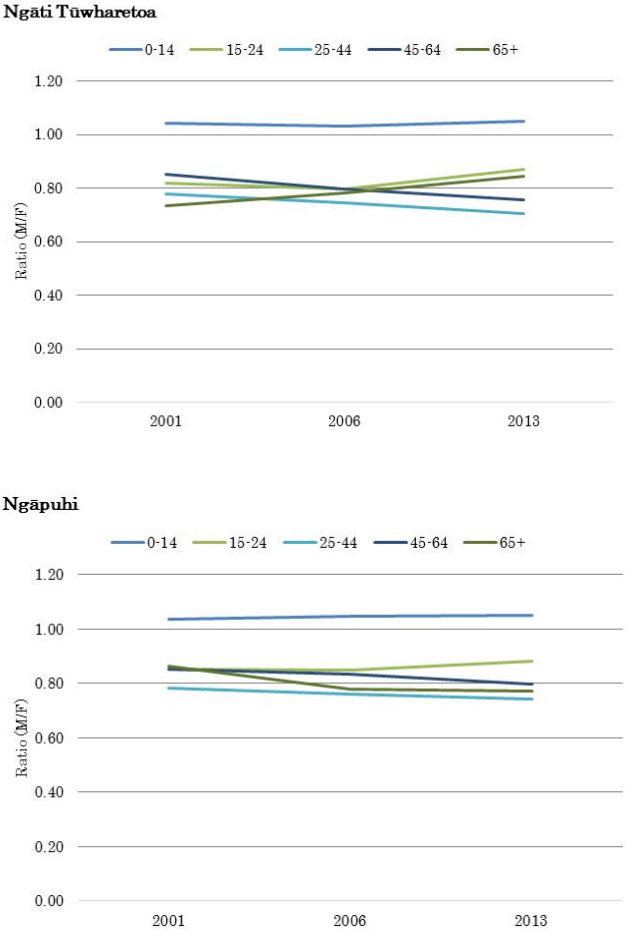
Source: Statistics New Zealand, Census of Population and Dwellings, various years .

To what extent is the pattern of female domination in the aggregate iwi-identified population also reflected in sex ratios of specific iwi in the census? Figure 1 shows age-specific sex ratios for four of the ten largest iwi – Ngāi Tahu, Waikato, Ngāpuhi and Ngāti Tūwharetoa. As with the aggregate iwi population, sex ratios are male favoured (above one) at the youngest ages, and then become clearly female dominated. In all three census years and for all four iwi, the excess of females to males was

most evident at ages 25–44 years, followed by 45–64 years. For each iwi, the magnitude of female domination at ages 25–44 years was remarkably consistent over time. Of the four iwi, Ngāti Tūwharetoa had the lowest ratio of men to women at 25–44 years, with just 71 men per 100 women in 2013. The majority of Māori women at these ages are parents with dependent children. Only about one in ten Māori women have not given birth to a child by age 44, which is much lower than the level of childlessness among New Zealand-born non-Māori women (Boddington & Didham, 2009). Until 2012, age-specific fertility rates for Māori women peaked at 20–24 years, but then shifted upwards to 25–29 years (compared with 30–34 years for non-Māori women).

Figure 1: Age-specific sex ratios for Ngāi Tahu, Waikato, Ngāti Tūwharetoa and Ngāpuhi, 2001–2013





Source: Statistics New Zealand, Census of Population and Dwellings, various years.

Given that iwi sex ratios have major age-related patterns, we tracked five-year birth cohorts of males and females across the 1996, 2001 and 2006 censuses to identify changes in patterns of identification for specific cohorts as they passed through a small window of their life cycle. For consistency, we again focus on Ngāi Tahu, Waikato, Ngāpuhi and Ngāti Tūwharetoa.

We begin with Waikato and Tūwharetoa, both of which had similar overall sex ratios across the focal period, but very different growth trajectories. Between 1996 and 2001, the overall number identifying as Waikato increased by 50 per cent. As Figure 2 shows, the increase was steeper for females than for males at all ages up to 49 years (in 2001), with

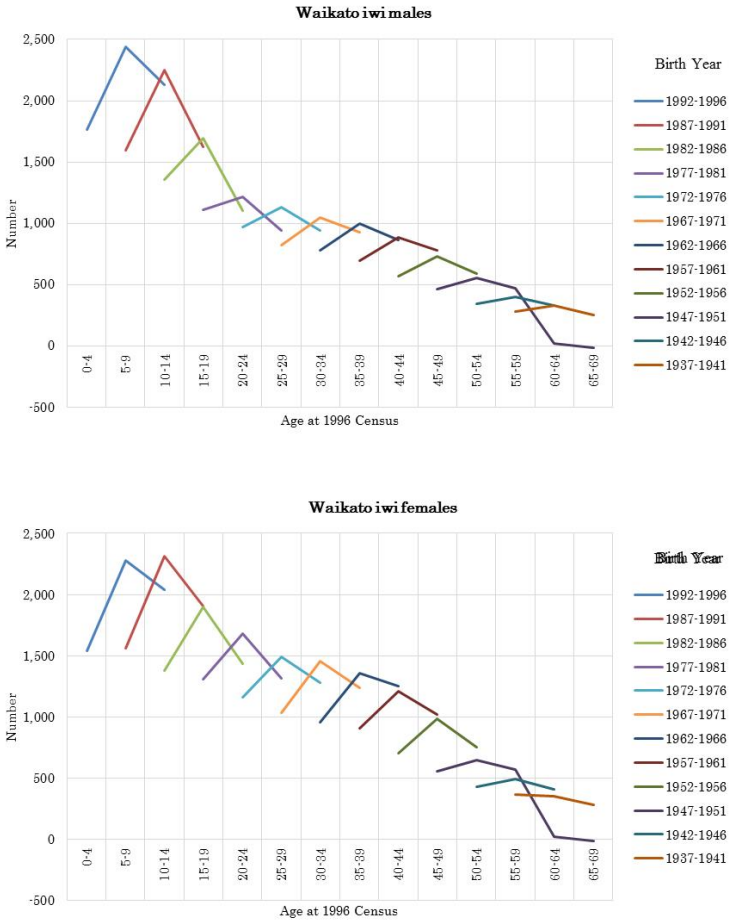
differences especially marked for those aged 15–19 and 25–34 years. Thus, for the 1967–1971 cohort who were aged 25–29 years in 1996, the number of women affiliated with Waikato iwi increased by 41 per cent by 2001, while the number of males in that birth cohort only increased by 28 per cent. Similarly, for the 1977–1981 cohort who were aged 15–19 years in 1996, the number of women affiliated with Waikato iwi increased by 28 per cent by 2001, but the number of males in that cohort only rose by 9 per cent. Between 2001 and 2006, the overall number of Waikato declined by 6.6 per cent but the losses were steeper for males, especially those aged 15−24 years.

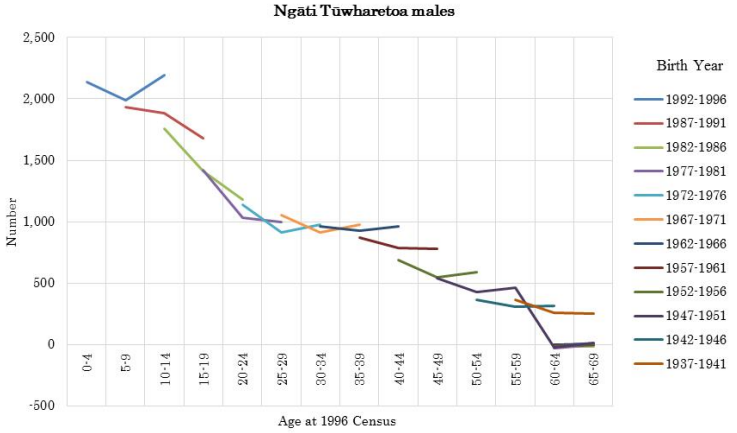
The age pattern for Ngāti Tūwharetoa was somewhat different. Between 1996 and 2001, the overall number only increased by 1 per cent, which was due entirely to births as every cohort decreased in size. The decline was most marked for boys who, in 1996, were aged between 10 and 19 years. The number of Ngāti Tūwharetoa males aged 15−19 in 1996 (born between 1977−1981) decreased by 28 per cent by the time they reached 20−24 years; for their female counterparts, the reduction was significantly smaller at 18 per cent. Between 2001 and 2006, Ngāti Tūwharetoa increased by 18 per cent overall but the gains were greater for females, and the number of males again declined upon reaching ages 15−24 years (in 2006).

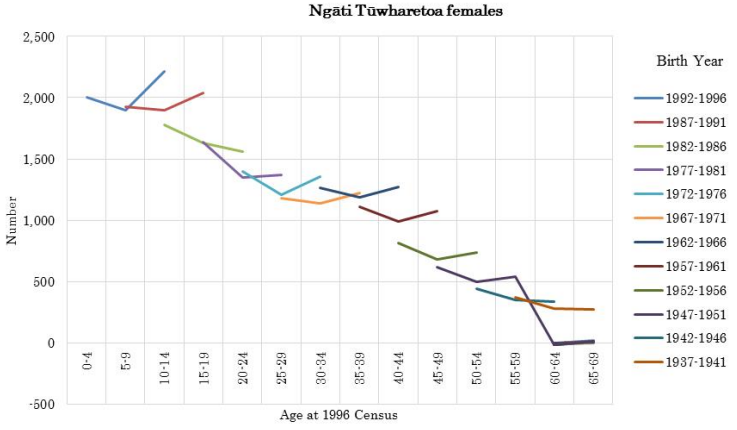
The pattern of greater male losses upon reaching ages 15−24 is also evident with Ngāpuhi and Ngāi Tahu. Thus, while Ngai Tahu increased by 35 per cent between 1996 and 2001, and by 26 per cent between 2001 and 2006, male birth cohorts tended to decrease when reaching ages 15−24 years whereas the number of females in those birth cohorts tended to increase. Thus, the number of males born between 1982−1986 who identified as Ngai Tahu declined by 10.6 per cent upon reaching age 20−24, but the number of Ngai Tahu women in the same birth cohort increased by nearly 2 per cent.

A similar pattern of amplified losses among males upon reaching ages 15−24 years is also evident for Ngāpuhi.

Figure 2: Changes in five-year birth cohorts for select iwi, by sex, 1996, 2001 and 2006 censuses




Ngāti Tūwharetoa males
2,500
2,000
1,500
1,000
500
0
-500
Number
0-4
5-9
10-14
15-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
Age at 1996 Census
Birth Year
1992-1996
1987-1991
1982-1986
1977-1981
1972-1976
1967-1971
1962-1966
1957-1961
1952-1956
1947-1951
1942-1946
1937-1941


Ngāti Tūwharetoa females
2,500
2,000
1,500
1,000
500
0
-500
Number
0-4
5-9
10-14
15-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
Age at 1996 Census
Birth Year
1992-1996
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1977-1981
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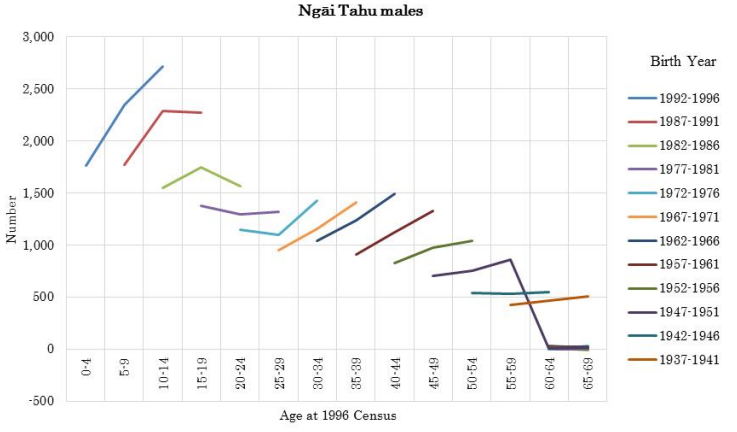
1962-1966
1957-1961
1952-1956
1947-1951
1942-1946
1937-1941


Ngāi Tahu males
3,000
2,500
2,000
1,500
1,000
500
0
-500
Number
0-4
5-9
10-14
15-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
Age at 1996 Census
Birth Year
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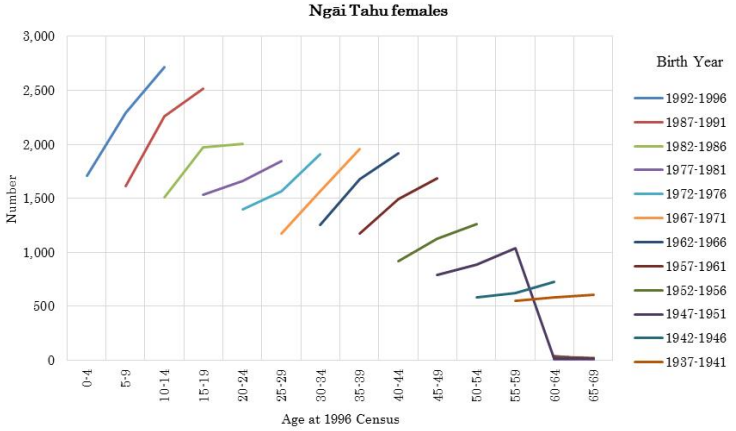
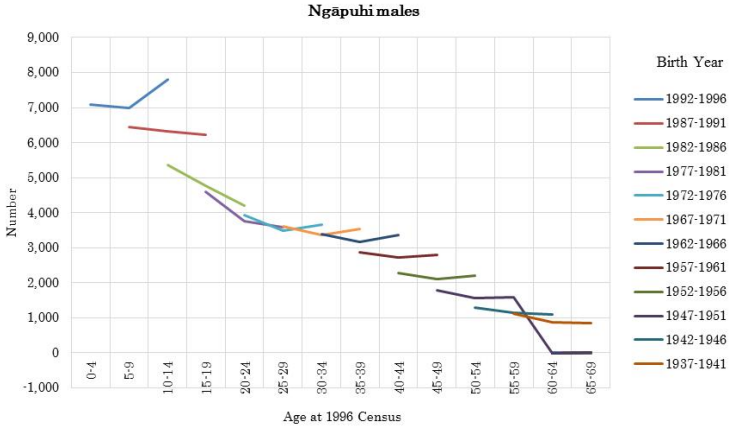
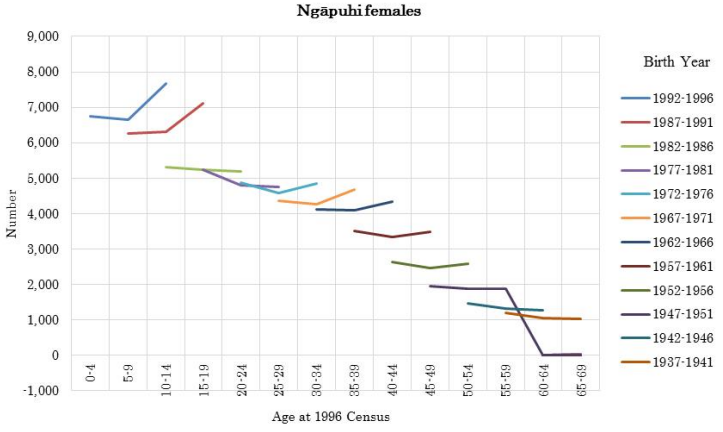
1942-1946
1937-1941







Source: Statistics New Zealand, Census of Population and Dwellings, various years.

While we have only analysed a small subset of the 100+ iwi counted in the classification, the results confirm that gendered patterns of identification are the key factor underlying increasing female domination of tribes in the census context, and that these vary by age. There are two main points to note about the patterns. One is that when Māori males move into young adulthood (15–24 years), and are at an age when they are likely to be self-completing their census form, they are far less likely than Māori women to retain their iwi affiliation. The other is that Māori women reaching their thirties are more likely to retain their iwi affiliation, or to become newly affiliated. This cohort analysis is helpful for understanding how iwi sex ratios become more unbalanced over time through cumulative and complex processes of identification that are both gendered and life cycle related.

Towards an explanation of female-favoured iwi sex ratios in the census

Before exploring the factors underlying gendered patterns of iwi identification in the census, we consider how migration, mortality and under-enumeration might contribute to unbalanced iwi sex ratios. Because Aotearoa New Zealand does not collect ethnicity on passenger arrival and departure cards, there is no direct way of estimating Māori permanent long-term migration (PLT), and the extent of Māori male losses through migration. However, we are able to look at age-specific sex ratios for Māori migrants resident in Australia where most of the Māori diaspora live. If Māori men dominate migration flows to Australia, then sex ratios should be male favoured for the New Zealand-born Māori population resident there.

In the 2011 Australian census, sex ratios for New Zealand-born Māori were male favoured for all five-year age groups 0–29 years (1.00 to 1.11), but female favoured at all ages from 30–54 years (0.88 to 0.99, Kukutai & Pawar, 2013, Table 4). The greater number of Māori women at peak working ages may partly reflect the higher propensity of Māori women resident in Australia to report Māori ancestry in the Australian census (compared with their Māori male counterparts), as well as sex-selective migration. For the non-Maori New Zealand-born population

resident in Australia, there were more women than men in every five-year age group over 25 years in 2011 (Kukutai & Pawar, 2013, Table 4).

Another factor linked to female-favoured sex ratios in the census is the higher likelihood of men being missed from the census. In 2011, the net undercount for Māori was 6.1 per cent which was double the 2006 Māori undercount. Young adults (aged 15–29 years) had the highest net undercount (4.8 per cent) of all age groups, and males were slightly more likely to be undercounted that females (2.6 compared with 2.1 per cent). The post-enumeration results reported by Statistics New Zealand (2014) do not report undercounts for Māori by age or/and sex, so we cannot quantify the level of Māori male under-enumeration at peak working ages. That said, the differences cannot be so large as to explain the marked female-favoured sex ratios and increasing female dominance over time. Likewise, while Māori male mortality exceeds female mortality at all ages, and increases at the middle ages, gender differentials in mortality cannot account for the dearth of men at peak working ages, nor the major differences across iwi (unless one was prepared to believe that there are large inter-iwi differences in mortality). To summarise, migration, under-enumeration and mortality will together account for some of the skewed sex ratios within iwi, but cannot explain the greater sex imbalance within iwi by comparison with the general Māori population, nor the very substantial inter-iwi variation documented here. A more plausible explanation lies in the existence of a gendered 'identification gap'.

To what extent does this identification gap in the census context reflect a broader phenomenon in which Māori women are more likely to be engaged with aspects of Māori identity and culture? Traditionally women play a significant role in developing and sustaining the cultural, social and economic lives of Māori communities and in the intergenerational transmission of identity and culture (Jahnke, 1997; Mikaere, 1994; Ruwhiu, 2009). Māori women were guardians and transmitters of mātauranga Māori (traditional knowledge), evident in the range of waiata composed by women and handed down intergenerationally (Te Awekotuku, 1991; Mikaere, 2003). Within the context of Te Ao Māori, the roles and responsibilities associated with nurturing future generations inevitably include nurturing and sustaining identity. According to Ruwhiu, "In child rearing practices women provided the foundation of knowledge about whakapapa via oriori, waiata and motherly guidance. This all assisted

with the child's sense of attachment and belonging as well as their identity and cultural characteristics" (Ruwhiu, 2009, 24). In more recent times, women were the driving force behind Māori langauge revitalisation through kōhanga reo and kura, and other Māori development initiatives. It is not difficult to see how these forms of leadership could include the revitalisation of iwi identity, not only in public political contexts but also in intimate spheres and within broader whānau relationships.

If female-favoured sex ratios are indicative of a broader role of Māori women as bearers of identity, then we might expect to see gender differences in other indicators of Māori identity beyond the census. The 2013 Māori Social Survey, Te Kupenga,[8] asked a wide range of identity questions, including knowledge about pepeha, specifically knowledge about one's hapū, ancestral maunga (mountain), awa (river) and marae. Pepeha place individuals within a broader context of whakapapa relationships to people and place, and are an important way of establishing connections with others. At Māori gatherings, it is common for those present to share their pepeha as part of whakawhanaungatanga (the process of establishing a relationship) before beginning any discussion of the topic or issue at hand.

Table 5 shows the distribution of responses to the pepeha question by sex. For all of these indicators, women are significantly more likely to report knowing some aspect or all aspects of their pepeha. Women are also more likely than men to have discussed or explored some aspect of their whakapapa in the past 12 months.

When data on tribal identity and whakapapa are disaggregated by both age and sex (see appendices, Tables A1a and A1b), the biggest gender identification gap is again at ages 24–34 years which are peak childbearing years: between 57 and 64 per cent of Māori women aged 25–34 years reported that they knew their hapū, maunga or awa, whereas for men at those ages, it was only 50 to 54 per cent. Women at those ages were also more likely than men to engage with whakapapa (63 compared with 53 per cent for men, see appendices, Table A1b). It is not clear whether these gender differences reflect cohort differences (for those born between 1979–1988 at the early stages of the kōhanga reo movement), age differences (brought about, for example, by entry into family formation ages), or a combination of the two. There is also a large gender gap in reported knowledge of pepeha at ages 45–54 years.

Table 5: Knowledge of pepeha (tribal identity), by sex, Te Kupenga 2013 (%)

Know ā	Males	Females
Iwi (tribe)	87.6	90.2
Hapū (subtribe)	52.7	56.9
Maunga (mountain)	54.5	62.1
Awa (river)	52.8	59.2
Waka (canoe)	49.6	55.0
Tupuna (ancestor)	51.8	58.1
None of these	9.8	8.5
All these	36.7	43.8
Marae tupuna (ancestral marae)	69.2	71.8
Discussed or explored whakapapa	57.6	63.2

Source: Statistics New Zealand, Te Kupenga Māori Social Survey, 2013.
Note: among those aged 15 and over.

Finally, we consider whether gender differences exist with respect to reported te reo Māori ability. In the 2013 Census, the share of Māori females able to have a daily conversaton in teo reo exceeded the male share by a modest margin at all ages under 40 years (Table 6). These gendered differences were even more prononced in Te Kupenga, which asked more detailed questions about te reo ability. In the 2013 survey, Māori women were significantly more likely to report that they could speak te reo Māori 'very well', 'well' or 'fairly well' (25.4 women compared with 19.3 per cent men), and the differences were especially marked at younger ages. Thus, while 19 per cent of Māori men aged 25–34 years could speak te reo fairly well to very well, for Māori women at those ages, the share was 30 per cent.

Table 6. Percentage able to speak by age and sex, 2013 Census and Te Kupenga 2013

Age group (years)	Male	Female
2013 Census [1]		
0–4	13.0	13.5
5–9	16.4	17.7
10–14	17.3	20.6
15–19	18.1	20.8
20–24	18.6	21.2
25–29	20.3	23.7
30–34	21.0	24.3
35–39	20.7	22.9
40–44	21.1	21.3
45–49	21.9	21.9
50–54	24.1	23.6
55–59	25.5	25.0
60–64	29.4	27.6
65–69	35.3	31.0
70–74	39.8	38.3
75+	43.1	43.1
All ages	20.0	21.8
2013 Te Kupenga [2]		
15–24	16.4	26.4
25–34	18.9	30.3
35–44	19.8	23.1
45–54	17.3	20.2
55+	26.8	26.6
All ages	19.3	25.4

Source: Statistics New Zealand, 2013 NZ Census of Population; Te Kupenga Māori Social Survey.
Note: Te Kupenga data for adults aged 15 years and older.
(1) Able to have a daily converation in te reo; (2) Able to speak te reo 'very well', 'well' or 'fairly well'.

This descriptive analysis underscores the importance of Māori women as cultural connectors and suggests that the gendered patterns of identification producing skewed iwi sex ratios in the census are part of a broader gendered identity dynamic within Te Ao Māori (Māori society).

Concluding remarks

In this paper we explored the possible influence of gendered patterns of mortality, migration and under-enumeration on iwi sex ratios, along with more culturally grounded explanations that emphasise the role of Māori women in sustaining identity and culture. It is clear that the dominance of women in census counts of iwi result from an 'identification gap' in which Māori women are more willing to express an iwi affiliation, rather than a reflection of gender differences in underlying demographic behaviour (e.g. higher Māori male mortality or out-migration). While there are more females than males in the wider Māori population, the magnitude of the difference is far smaller than what we have observed here for iwi.

Findings from Te Kupenga suggest that this greater willingness of Māori women to affiliate with an iwi also carries over into other aspects of identity including knowledge of pepeha and engagement with whakapapa. We note that while Te Kupenga respondents were not required to provide the specifics of their pepeha (e.g. to name their hapū, maunga, etc.), it is highly unlikely that the difference is due to Māori women systematically overstating their own knowledge. We see much promise in future work that theorises and explores, in more depth than we have been able to here, the gendered aspects of iwi identity and identification.

Given that we have focused solely on nationally representative surveys controlled by the government, we cannot speculate on whether skewed sex ratios are also a feature of iwi registers. The context of identification in iwi registers is quite different from the census, both in terms of the conceptual basis of belonging and the processes involved. It may well be that gendered differences in the expression of identity are more likely to emerge in settings that are relatively open to expressions of self-identification, such as the census, rather than in contexts where some form of external validation of membership or belonging is required. There are also procedural differences between the census and iwi registers that might lead to different patterns of identification. Anecdotally, we know that it is not uncommon for individuals, particularly mothers and grandmothers, to register other whānau members. If Māori women do take a more active role in assisting their whānau members to get registered, this could result in balanced sex ratios within a registered popuation.

A point raised by our study is that it is vitally important to understand the strengths and limitations of different data sources, and the implications for their use. With respect to sex ratios, an iwi with a major deficit of males in the census as well as among its registered beneficiaries would be justifiably worried about issues of future sustainability, equity (e.g. resource allocation), succession planning, and engagement and outreach. If substantial numbers of men were 'missing' from a registered iwi population, then it would be advisable for governing bodies to try to identify the reasons why and to develop appropriate responses. An iwi that had a deficit of males in the census but balanced sex ratios in their registered population might be less concerned about those issues, but would have to be careful about how they used census data to inform their responses to registered members. For example, Māori girls and women tend to have higher education levels than their same-age male counterparts. Thus, female dominant iwi in the census would need to be careful about generalising their census education profile to their registered population.

Currently most iwi are in a form of data dependency where they are heavily reliant on official statistics, and the census in particular, for demographic and socio-economic data. It is vitally important that the Government meets its Treaty obligations to provide timely, accurate, relevant and accessible data to iwi, and is knowledgeable and transparent about any of the shortcomings therein.

Notes

1 For the Aotearoa New Zealand-born population.

2 There were a number of early missionary and colonial enumerations of iwi prior to 1874, but none of these were considered an official census.

3 By 1930, Māori retained only 6 per cent of the land in New Zealand (Office of Treaty Settlements, 2015, p. 10).

4 In the 2013 Census, 83 per cent of Māori descendants (all ages) reported at least one iwi; in the 2013 Māori Social Survey Te Kupenga (adults 15+ years), 89 per cent of respondents reported that they knew their iwi. Te Kupenga does ask whether respondents are enrolled with an iwi but Statistics New Zealand does not make data for all Te Kupenga variables

freely available on its website.

5 The standard and classification was reviewed again in 2016–2017 and is available from http://m.stats.govt.nz/methods/classifications-and-standards/current-classifications-and-standards-review/review-statistical-standard-iwi.aspx

6 The sex ratio for the iwi-identified population is the ratio of all male Māori descendants who reported at least one iwi to all female Māori descendants who reported at least one iwi. The median sex ratio for all iwi is the median value in a ranked list of sex ratios for all of the 100+ individual iwi recognised in the classification. Those who identify multiple iwi were counted in every iwi with which they identify.

7 Specifically defined iwi categories only; i.e. excludes 'Not further defined/undefined' groupings.

8 Te Kupenga is nationally representative survey of just over 5500 respondents aged 15 years and older who identified as Māori by descent, ethnicity or both.

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Appendices

Table A1a: Percentage of Māori who know their pepeha, by age and sex, 2013

	Male	Female	Diff
Iwi (tribe)			
15–24	85.1	89.4	4.3
25–34	83.8	90.8	7.1
35–44	90.4	90.3	−0.1
45–54	90.7	91.4	0.7
55+	89.2	89.7	0.5
Hapū (subtribe)			
15–24	39.0	45.4	6.4
25–34	50.0	56.9	6.9
35–44	59.6	57.3	−2.3
45–54	55.8	62.4	6.6
55+	66.7	66.4	−0.3
Maunga / mountain			
15–24	48.1	58.9	10.8
25–34	53.8	64.2	10.5
35–44	59.6	62.1	2.6
45–54	54.7	62.4	7.7
55+	60.2	63.6	3.3
Awa / river			
15–24	44.8	53.9	9.1
25–34	50.0	60.6	10.6
35–44	58.5	59.2	0.7
45–54	53.5	61.3	7.8
55+	61.3	61.7	0.4
Waka / canoe			
15–24	39.6	46.1	6.5
25–34	46.3	56.0	9.7
35–44	58.5	56.3	−2.2
45–54	50.0	59.1	9.1
55+	60.2	58.9	−1.3
Tipuna /ancestor			
15–24	40.9	43.3	2.4
25–34	46.3	56.0	9.7
35–44	58.5	62.1	3.6
45–54	54.7	64.5	9.9

	Male	Female	Diff
55+	65.6	70.1	4.5
All of these			
15–24	24.7	31.2	6.5
25–34	32.5	42.2	9.7
35–44	43.6	43.7	0.1
45–54	37.2	47.3	10.1
55+	48.4	49.5	1.1

Source: Statistics New Zealand, Te Kupenga, Importance of culture, by tribal identity, by age group and sex.

* RSE range from 5.6–7.7 for females; 5.6–10.3 males (whakapapa)

Table A1b: Percentage of Māori who have discussed or explored whakapapa in last 12 months, by age and sex, 2013

	Male	Female	Diff
15–24	48.3	55.1	6.8
25–34	53.3	62.8	9.5
35–44	64.2	64.6	0.4
45–54	64.1	69.9	5.8
55+	63.8	66.9	3.1

Source: Customised Te Kupenga data provided by Statistics New Zealand.

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New Zealand's Dairy Farmers from a Demographic Perspective, 1996–2013

NATALIE JACKSON *

Abstract

This paper examines change in the social structure and characteristics of New Zealand's dairying workforce from 1996 to 2013. The analysis shows a substantial shift in the occupational structure, the numbers of 'self-employed with no employees' almost halving and of paid employees almost doubling, alongside a minor reduction in the number of employers. It also paints a picture of a reinvigorating industry in terms of overall increase in numbers employed, a slower rate of workforce ageing, a greater increase in the proportion overseas-born than for the national workforce, and increasing qualification levels. However, it also shows that farmers, especially younger employees, have experienced a substantially greater increase in hours worked than their all-occupation counterparts. This increase is not only at odds with improving skill levels, but may present the farming industry with an increasing challenge to sustainability, as the structural ageing of both local and overseas workforces drives greater competition for labour and skills, and thus equitable workforce conditions.

It will come as no surprise that industrial and technological change are continually changing the face of New Zealand's dairy farming industry, and with it, its social structure. Highly visible among these changes has been the relatively recent shift from small owner/sharemilker units to large multi-employee operations.[1] But another less visible change is adding a new dimension and a challenge that will seriously test the industry, both in terms of its ability to find the future workforce it needs, and to ensure succession of farm ownership in New Zealand hands: population ageing (Fairweather & Mulet-Marqis, 2009).

This paper takes a demographic, as opposed to economic, perspective, outlining the story of the industry's changing social structure around the changing demography of its dairy farmers and dairy farm

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workers. It begins by dispelling one demographic myth – the popular perception of New Zealand's dairy farmers as being 'old'. In 2013, the nation's dairy farmers/farm workers had a median age of 40.6 years, somewhat younger than the 43.7 years of the total New Zealand employed workforce (Statistics New Zealand, 2015). As shown below, this differs by employment status, such as employer or employee, but in all cases, farmers remain younger than their all-occupation counterparts. Nor has the dairy farmer population been ageing as fast as the national workforce, partly because of a recent influx of younger dairy farm employees, and partly because fewer older farmers remain in the occupation compared with their counterparts in the national workforce.

The dairy industry nevertheless faces significant challenges from population ageing, not from within the occupation of dairy farmer itself, but from the general ageing of the workforce in which it will increasingly compete for its employees. This raises an associated issue, namely, the long hours worked by farmers, a challenge once accommodated by farm workers aspiring to farm ownership, but which may be less acceptable to those for whom farm ownership may never be an option – and with whom the long-term sustainability of the industry is likely to rest (Wilson & Tipples, 2008).

It must also be clarified that measuring and talking about trends in the number of dairy farmers sounds a simple enough task until one comes to do it (Tipples & Wilson, 2005, p. 41; Wilson & Tipples, 2008, p. 3). This is primarily because of the way in which New Zealanders refer to the dairy 'industry' when talking about dairy farmers, when often what is being referred to is the 'occupation' of dairy farmer. Industry data include all those who work in an industry, which, for dairy farming, includes a large number of 'off-farm' occupations: 25 per cent of those working in the dairy industry in 2013 were neither dairy farmers nor dairy farm workers (see Table 1). Occupational data provide a better look at what is occurring in 'the industry', and are the focus of this paper (by comparison with Jackson (2013), where the unit of analysis was those employed in the industry). Changes over time in the way in which occupations are classified in the census still limit the development of a detailed time-series analysis. For example, the lowest level of disaggregation, level 5, combines both dairy farmers and dairy farm workers. Fortunately, these data are available by employer/employee status, and are separated accordingly in

much of the analysis below. The point regarding data limitations is made because in New Zealand we collect reams of data on cow, sheep and deer numbers, but we know very little about those who do the farming, a problem elaborated by Wilson and Tipples (2008).

The data in this paper are drawn from the New Zealand Census of Population and Dwellings. This is the only source of comprehensive data on New Zealand's dairy farmers and dairy farm workers. Broad trends are analysed across four censuses: 1996, 2001, 2006 and 2013. This 22-year period is sufficient to capture key changes, most notably the recent upturn in employment in the industry, just beginning when Wilson and Tipples (2008) undertook their detailed 2006 study. For more detail on dairy farmers, however, the analysis is necessarily limited to just the last three censuses.

The analysis begins with a brief look at trends in numbers employed in the dairy industry, and employed as dairy farmers/dairy farm workers. The shift from relatively small sharemilker units to large multi-employee operations, and the related change in the employment status of dairy farmers, is then examined. This is followed by analysis of the structural ageing of the dairy farmer/dairy farm worker population, where we see increasing numbers at older ages and fewer at younger ages, although as noted above this needs to be compared with the ageing of the workforce in general (Jackson, 2013). To provide support for the argument that little can be done to reverse the ageing of either the dairy farmer workforce or the workforce in general, the section includes a brief outline of the broader context of demographic change. Country of birth of farmers is then examined, confirming general perceptions that the overall increase in numbers is not being driven by those of New Zealand birth, but rather, by those born overseas – a change that may have important implications for future succession and dairy farm ownership in New Zealand hands. Plausibly related, the proportion of dairy farmers with post-school qualifications is examined, focusing on the two regions in which the industry is seeing the greatest growth. Finally, we turn to the hours worked by farmers, to see if organisational and technological change is resulting in a less labour-intensive life – or, if not, may be a potential source of resistance to entering/remaining in the industry. A brief consideration of the extent to which these changes may interact conclude the paper.[2]

Dairy industry versus dairy farmer/farm worker occupation

In 1996, there were approximately 29,958 dairy farmers/dairy farm workers, and they accounted for 85 per cent of the 35,289 people employed in the dairy industry. By 2006, dairy farmer numbers had fallen to 24,795 and they accounted for 74 per cent of the 33,501 employed in the industry.

Between 2006 and 2013, numbers increased for both groups, reflecting an abrupt reversal of prior trends, although the numbers for dairy farmers/dairy farm workers remain below the number in 1996. Dairy farmer/dairy farm worker numbers increased to 26,769 (+1782, 7.2 per cent), and those employed in the dairy industry increased to 36,177 (+2676, 8 per cent).

Thus, while the industry-level data provide a useful approximation of what is going on in terms of the social structure of the industry,[3] the industry-occupation comparison tells two equally interesting stories: first, that one-quarter of those employed in the dairy industry are not dairy farmers or dairy farm workers, as opposed to 15 per cent in 1996; and second, that the recent increase in dairy industry employment (2006–2013) has been mirrored in employment by dairy farmer/dairy farm worker occupation.

Table 1: Numbers employed in dairy cattle farming industry and as dairy farmers/dairy farm workers by occupation, 1996, 2001, 2006, 2013

	1996	2001	2006	2013
Industry A103: Dairy cattle farming[1]	35,289	35,052	33,051	36,177
Occupation 61211: Dairy farmer / Dairy farm worker[2]	29,958	26,331	24,795	26,577
Dairy farmer / Dairy farm worker (%)	84.9	75.1	74.0	73.5

Source: Author/Statistics New Zealand customised databases (2014a, 2014b).
1. 157 industries enumerated at the 3-digit level (ANZSIC96 V4.1).
2 563 occupations enumerated at the 5-digit level (NZSCO99).

Between 1996 and 2006, the dairy industry had fallen from 8th to 16th in terms of size (of 157 industries enumerated at the 3-digit level), but by 2013 had returned to 11th position. Similarly, the occupation of dairy farmer/dairy farm worker ranked 9th of 563 occupations in 2001, 18th in 2006 and 15th in 2013.

Status in employment

In order to examine a range of variables, such as employment status, this section draws on a different occupation database to that in Table 1 and is available for the period 2001–2013 only.

In 2001, the single largest group of those employed in the occupation of dairy farmer/dairy farm worker were 'self-employed with no employees' (n = 10,062). At that time, they outnumbered dairy farm employers by 1755, and paid employees by 3684. By 2013, this situation had completely reversed, with employers (n = 7983) outnumbering the 'self-employed with no employees' (n = 5310) by 2673, and paid employees (n = 11,748) outnumbering them by 6438.

As can be seen from Figure 1, however, perhaps the most profound shift is that while the number of self-employed have almost halved, and the number of paid employees increased by 84 per cent, the number of employers has declined (3.9 per cent). The number of unpaid dairy farm workers has remained almost static, but there has clearly been a big change in who the average New Zealand dairy farmer is.

Figure 1: Dairy farmer/dairy farm worker occupation, number by employment status 2001, 2006, 2013

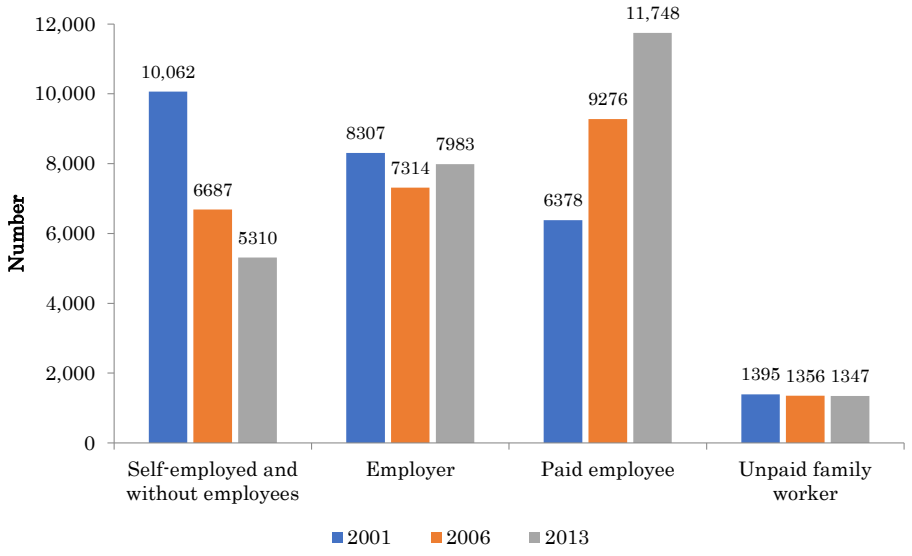


Table 2 confirms this distributional shift. In 2001, self-employed dairy farmers with no employees accounted for 38.5 per cent of those employed as dairy farmers or dairy farm workers, and were the single largest category; by 2013, this had fallen to just 20.1 per cent, the third largest category. Although not growing numerically, employers have remained at around 30–32 per cent, and second largest in terms of share, while paid employees have increased their share from 24 per cent to 44 per cent, and moved from the third largest to largest category.

Table 2: Dairy farmer/dairy farm worker occupation, by percentage distribution in each employment status 2001, 2006, 2013

	2001	2006	2013
Self-employed and without employees	38.5	27.1	20.1
Employer	31.8	29.7	30.3
Paid employee	24.4	37.7	44.5
Unpaid family worker	5.3	5.5	5.1
Total stated	26,145	24,633	26,388
Total employed (includes status not stated)	26,331	24,795	26,580

Source: Author/Statistics New Zealand customised database (2014b) Occupation (NZSCO99).

Workforce ageing

In 2001, the average (mean) age of New Zealand's dairy farmers/dairy farm workers was 40.5 years; in 2013, it was 41.0 years (Table 3), an increase of just 1.2 per cent—somewhat lower than that for the average age of the national workforce which increased from 40.0 to 43.2 years (+8 per cent). As Table 3 shows, average age differs by employment status, with both self-employed farmers with no employees, and farmers who are employers, somewhat older than paid employees; however, in each category, dairy farmers/farm workers are younger than their counterparts in the total New Zealand workforce. This situation is at odds with a general perception of farmers as relatively 'old'.

The reason for the slower rate of ageing among dairy farmers/dairy farm workers is a relative influx at younger ages, and a smaller increase at older ages, than is the case nationally. The underlying data (Appendix A) indicate that between 2001 and 2013, numbers employed in dairy farming at 15–24 years of age increased by 20 per cent (669 people, see Table 4 below) while 15–24-year-olds employed in all other occupations combined grew by just 0.2 per cent. At 65+ years, numbers employed in dairy

farming grew by 31 per cent (321 people, Table 4, while those in all other occupations combined almost doubled (+190 per cent). The situation was similar for all employment statuses. For example, the numbers of self-employed/without employees and employer dairy farmer numbers aged 65+ years increased by 23.8 and 27.2 per cent respectively, while their counterparts in all other occupations combined increased by 130 and 144 per cent.

Table 3: Dairy farmer/dairy farm worker occupation, by mean age in each employment status (%) (2001, 2006, 2013)

	2001	2006	2013
Dairy farmers/dairy farm workers			
Self-employed and without employees	42.8	43.9	46.9
Employer	44.7	45.2	46.4
Paid employee	31.1	32.4	34.1
Unpaid family worker	42.2	44.3	46.7
Total stated	40.5	40.0	41.0
Total employed (includes status not stated)	40.5	40.0	41.0
Total NZ Workforce			
Self-employed and without employees	46.2	47.5	49.8
Employer	45.9	47.0	49.4
Paid employee	38.1	39.2	41.4
Unpaid family worker	45.4	47.5	50.0
Total stated	39.9	40.9	43.1
Total employed (includes status not stated)	40.0	41.0	43.2

Source: Author/Statistics New Zealand customised database (2014b) Occupation (NZSCO99).
Note: These means are calculated on broad age group data and are thus an approximation. Median age would have been preferable, but the underlying data were in inconsistent age bands.

When the trends are disaggregated across two periods, 2001–2013 and 2006–2013 (Table 4), we see that the above-noted turnaround between 2006 and 2013 was inconsistently experienced by the different employment statuses and age groups. For example, reflecting the overall trend, the decline in total numbers self-employed with no employees slowed, from 33.5 to 20.6 per cent between 2001 and 2006, and 2006 and 2013 respectively, while employer numbers increased (+9.2 per cent) where they had previously been falling (−12 per cent). However, the number of paid employees increased more across the earlier than latter period (+45.4 and +26.6 per cent, respectively), despite the later increase in numbers per se remaining very similar. Similarly, the slowing of the rate of decline in the

number of self-employed with no employees across the 2006–2013 period manifested at 55–64 and 65+ years of age as in an increase in numbers, while the number of employers increased for all but one broad age group. For paid employees, the slowing in the rate of increase occurred only for those aged less than 55 years. Together these trends indicate some 'resettling' of the farming social structure, with employer numbers increasing in the latter period to accommodate the larger numbers of paid employees, and a small number of older farmers plausibly returning to, or taking on, self-employment. The increase in the number of older paid employees also indicates a degree of 'career' employment as opposed to previous transitioning to ownership.

Table 4: Dairy farmer/dairy farm worker occupation, change by employment status and broad age group, disaggregated by period 2001–2013 and 2006–2013

Age Group	15–24	25–44	45–54	55–64	65+	Total change (*N*)	Total (% change)
2001–2006							
Self-employed and without employees	−66	−2244	−675	−357	−30	−3372	−33.5
Employer	9	−759	−81	−147	−21	−999	−12.0
Paid employee	654	1686	378	150	27	2895	45.4
Unpaid family worker	−30	−105	33	42	15	−45	−3.2
Total stated	570	−1419	−345	−312	−9	−1515	−5.8
Total employed (includes status not stated)	567	−1413	−354	−321	−15	−1536	−5.8
Change (%)	17.0	−10.5	−6.4	−10.8	−1.5	...	−5.8
Contribution to change (%)	36.9	−92.0	−23.0	−20.9	−1.0	−100.0	...

(continued on next page)

Age Group	15–24	25–44	45–54	55–64	65+	Total change (*N*)	Total (% change)
2001–2006							
Self-employed and without employees	−39	−1326	−222	90	117	−1380	−20.6
Employer	27	−21	183	342	141	672	9.2
Paid employee	114	1569	480	261	45	2469	26.6
Unpaid family worker	−9	−123	51	42	33	−6	−0.4
Total stated	87	99	495	738	339	1758	7.1
Total employed (includes status not stated)	102	99	504	738	336	1779	7.2
Change (%)	2.6	0.8	9.7	28.0	33.0	...	7.2
Contribution to change (%)	5.7	5.6	28.3	41.5	18.9	100.0	...
2001–2013 (total)							
Self-employed and without employees	−105	−3570	−897	−267	87	−4752	−47.2
Employer	36	−780	102	195	120	−327	−3.9
Paid employee	768	3255	858	411	72	5364	84.1
Unpaid family worker	−39	−228	84	84	48	−51	−3.6
Total stated	657	−1320	150	426	330	243	0.9
Total employed (includes status not stated)	669	−1314	150	417	321	243	0.9
Change (%)	20.1	−9.8	2.7	14.1	31.1	...	0.9
Contribution to change (%)	275.3	−540.7	61.7	171.6	132.1	100.0	...

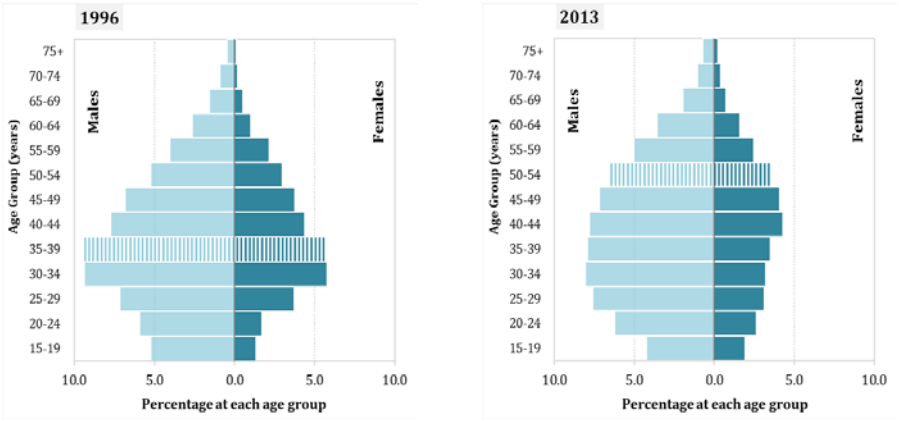
Source: Author/Statistics New Zealand customised database (2014b) Occupation (NZSCO99).

The changing age structure of the occupation is further illustrated in Figure 2 (top panel), and is compared with that for the total New Zealand workforce (lower panel). To assist interpretation, the movement of the cohort born 1957–61 through the age structure is depicted by the lighter shaded bars. The increasingly relative youth of the occupation is clearly visible. In 1996, both categories had just on 56 per cent aged younger than 40 years. In 2013, this had fallen to 48 per cent for the dairy farmer/dairy farm worker occupation and 41 per cent for the total

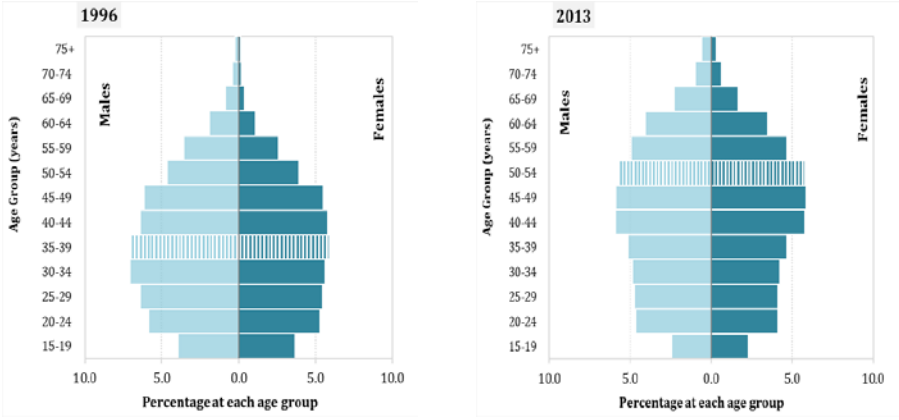
workforce (see also Wilson & Tipples, 2008, p. 9 on the previous underrepresentation of younger workers in the dairy industry).

Figure 2: Age structure (percentage in each age-sex group), 1996 and 2013, dairy farmers/dairy farm workers and total New Zealand employed workforce

Dairy farmer/Dairy farm worker (61211)



Total New Zealand employed workforce



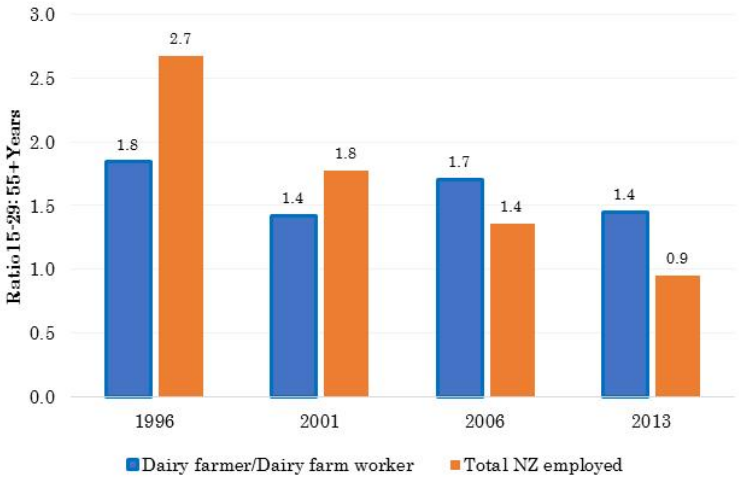
Source: Author/Statistics New Zealand (2015) Occupation (NZSCO99 v1.0)
Note: The shaded bars indicate the movement of the cohort born 1957–61 through the age structure.

The average dairy farmer/farm worker today is thus younger than his/her counterpart in the total employed New Zealand workforce, and the gap between them has been increasing (as it has also for other occupations reliant on physical labour). A useful summary index when comparing industries and occupations is the labour force 'entry:exit ratio', which

compares the number of people at entry age (here 15–29 years) to those in the 'retirement zone', 55+ years. (They do not all retire, but numbers employed do begin to diminish quite rapidly from age 55, as can be seen in Figure 2, and indicated for each employment status in Table 4 above). Indeed, Jackson (2013, pp. 86–87) identified that older dairy farmers were more likely than their other occupation counterparts to leave the industry, beyond 50 years of age.

Reflecting the above trends, Figure 3 shows that the ratio of 'entrant age' dairy farmer/dairy farm workers to those aged 55+ years has fallen from 1.8 (18 entrants per 10 in the 'retirement zone') in 1996, to 1.4 (14 per 10) in 2013, while that for its total New Zealand employed workforce counterpart has fallen from 27 per 10 in 1996 to 9 per 10 in 2013.

Figure 3: Ratio of employed people aged 15–29 years to those aged 55+ years, 1996, 2001, 2006, 2013, dairy farmers/dairy farm workers and total New Zealand employed workforce



Source: Author/Statistics New Zealand (2015) Occupation (NZSCO99 v1.0).

Broader demographic context

Underlying data (not shown here) show that the 15–24-year-old population potentially available to enter New Zealand's labour force has recently declined in size, due to declining birth rates and numbers in the mid- to late 1990s. Growth at these ages is projected to resume shortly, in part due

to an increase in birth numbers between 2002 and 2010, which will arrive at labour market entry age between 2018 and 2026 (see Churchill, Denny, & Jackson, 2014, on Australia), and in part to currently strong net international migration. However, neither trend is expected to be experienced evenly across the country, with almost two-thirds of territorial authority areas projected to have fewer people aged 15–24 in 2043 than in 2013 (Jackson, 2016). At the same time, numbers in the retirement zone are steadily increasing and their continued increase is 100 per cent guaranteed. For the next 20 years, a successively larger cohort will enter the retirement zone each year, to be 'replaced' by a successively smaller cohort.

These trends – implying a demographically tight labour market – have implications for all industries and occupations, especially dairy farming with its now younger-than-average age structure. This is because the number of migrants that would be required to offset structural ageing is substantially greater than any migration gains New Zealand has ever experienced, and is likely to. For example, if the total fertility rate were to remain at replacement level (2.1 births per woman – it is currently just above 1.8), if life expectancy at birth reached the highest levels assumed by Statistics New Zealand (around 95 years), and if annual net migration was 100,000 per year (almost seven times Statistics New Zealand's current medium assumption of 15,000), the population in 2068 would number 12.5 million, but 24.2 per cent would be aged 65+ years, compared with just under 27 per cent if annual net migration was 15,000 (Jackson & Cameron, 2017). Migration is not a panacea for structural ageing, particularly if all should remain permanently: migrants also grow old.

Moreover, once internal migration is included, migration trends in New Zealand result in the vast majority of towns and rural centres becoming structurally older, rather than younger (Jackson & Brabyn, 2017, pp. 28–29). Between 1976 and 2013, 85 per cent of towns and 79 per cent of rural centres became older as the result of migration, leaving just 15 per cent of towns and 21 per cent of rural centres gaining a youthful impact. This is because migration is highly age-selective. Young migrants leaving an area both hollow out the age structure and remove their reproductive potential (that is, their 'replacement' capacity), accelerating structural ageing, while older migrants moving in add to both the numbers and proportions at older ages, further accelerating the process. While New

Zealand in total is relatively young on the world stage, with just on 15 per cent aged 65+ years, by 2013, 41 per cent of towns and 29 per cent of rural centres had greater than 20 per cent of their populations aged 65+ years (Jackson & Brabyn, 2017, p. 29), and this number can only increase.

We can thus anticipate increasing competition for the labour of young and old alike. The dairy industry is already increasingly reliant on overseas migrants to supplement its workforce (Wilson & Tipples, 2008), so we now examine the composition of those employed in the occupation of dairy farmer/dairy farm worker in terms of country of birth (Table 5). Dairy farmer cohorts contain much smaller proportions of overseas-born than their all-industry workforce counterparts, although in neither case can overseas-born be interpreted as recent migration, as some may have moved to New Zealand in childhood (Jackson, 2013, p. 90). In 2013, 27.6 per cent of New Zealand's employed workforce was overseas-born, up from 19 per cent in 1996. For dairy farmers/dairy farm workers the proportion in 2013 was 13.3 per cent, up from 7.6 per cent in 1996; however, the increase in the overseas-born percentage of dairy farmers/dairy farm workers is much greater than that for the total employed population (Table 5).

The situation also differs quite markedly by region, so it is useful to narrow the focus to just those regions where dairy farming is especially prominent. Table 5 shows that the overall increase in numbers employed in dairying 1996–2013 has not been shared evenly by region; numbers have grown since 1996 in just five regions: Hawke's Bay, Canterbury, Otago, Southland and West Coast, while declining elsewhere. (Note that the totals in Table 5 differ slightly to those in Table 1 due to different databases.)

In 2013, the percentage of overseas-born dairy farmers/dairy farm workers in Canterbury, Otago and Southland was relatively high, and had increased to a greater extent than elsewhere. Notably in these regions, dairying has taken on a much more commercial orientation, and may reflect the accompanying conversion of sheep and beef farms to large dairying operations, as opposed to 'family farms' expanding. The underlying data by age (see Figure 4) show that the increased proportion of overseas-born employed as dairy farmers/dairy farm workers is pronounced across all age groups, but particularly at 25–39 years, particularly in the Canterbury and Southland regions. The data confirm

the diary industry's increasing reliance on international migrants as a source of labour. Along with the emerging demographically tight New Zealand labour market discussed earlier, the data suggest that the dairy industry will face further increases in competition for local labour as population ageing unfolds.

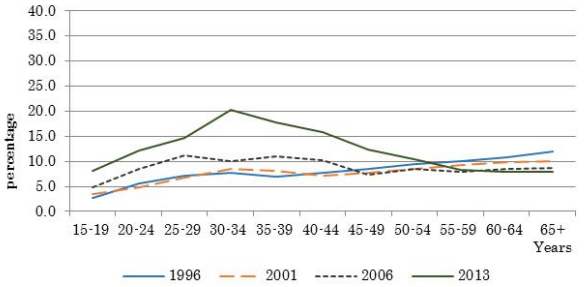
Table 5: Numbers employed and percentage overseas-born, New Zealand dairy farmers/dairy farm workers, by region, 1996–2013

Region	Total numbers employed				1996-2013 Change (%)	Percentage overseas-born				1996-2013 Change (%)
	1996	2001	2006	2013		1996	2001	2006	2013	
Auckland	1362	963	705	612	−55.1	8.1	8.4	10.6	11.8	44.4
Bay of Plenty	2052	1572	1389	1380	−32.7	7.0	6.9	7.1	8.3	17.7
Canterbury	1425	1848	2172	3567	150.3	6.1	8.3	14.4	24.5	300.9
Gisborne	27	24	15	18	-33.3	0.0	0.0	20.0	16.7	…
Hawke's Bay	141	225	261	246	74.5	6.4	6.7	9.2	14.6	129.3
Manawatu-Wanganui	2307	2076	2016	1992	−13.7	4.9	5.2	4.9	6.5	31.1
Marlborough	180	174	120	135	−25.0	8.3	3.4	10.0	13.3	60.0
Nelson	18	21	9	9	−50.0	0.0	0.0	0.0	0.0	…
Northland	2874	2235	1758	1755	−38.9	7.9	7.7	7.2	7.9	−0.9
Otago	633	876	957	1281	102.4	7.6	6.2	9.7	17.3	128.5
Southland	1029	1365	1623	2478	140.8	9.6	9.9	14.6	23.7	146.6
Taranaki	4737	3984	3594	3171	−33.1	4.7	4.6	4.3	4.9	5.0
Tasman	429	378	342	351	−18.2	6.3	6.3	9.6	9.4	49.4
Waikato	11,094	9198	8409	8082	−27.1	9.5	9.2	10.3	12.3	29.1
Wellington	627	573	480	450	−28.2	7.2	7.3	6.9	10.7	48.6
West Coast	741	666	747	801	8.1	8.5	8.1	8.4	9.4	10.1
Total NZ (Dairying 611211)	29,679	26,178	24,603	26,340	−11.3	7.6	7.6	9.0	13.3	73.9
Total NZ Employed Workforce	1,630,809	1,714,155	1,964,631	1,979,448	21.4	19.2	19.8	23.9	27.6	43.9

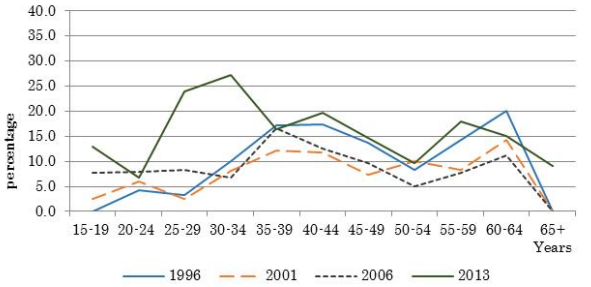
Source: Author/Statistics New Zealand (2017b), Occupation (NZSCO99.)

Figure 4: Percentage of overseas-born dairy farmers/dairy farm workers by age, Total New Zealand, and Otago, Canterbury and Southland regions, 1996–2013

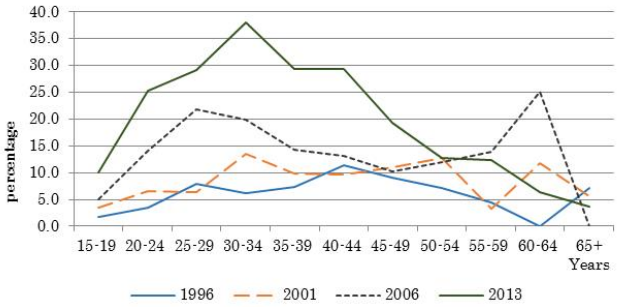
Total New Zealand



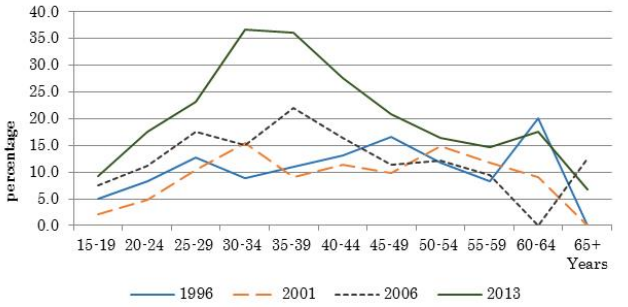
Otago region



Canterbury region



Southland region



Source: Author/Statistics New Zealand (2017b), occupation (NZSCO99) 61211 Dairy farmer, Dairy farm worker.

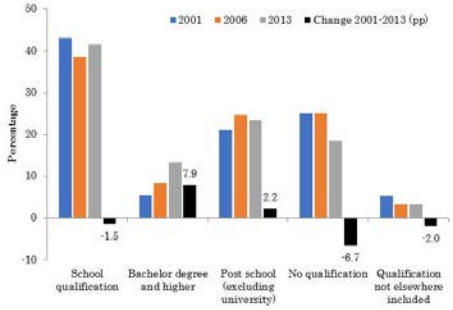
Qualifications

We now turn briefly to the qualifications of those employed in the dairy industry, to see if they are also changing alongside the industry's rejuvenation and importation of labour.

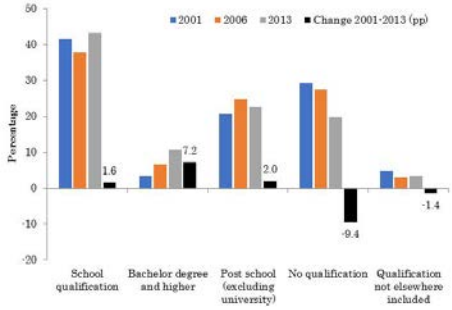
Figure 5 narrows the analysis down to just the two regions experiencing the greatest growth in numbers employed in the industry – Canterbury and Southland – and again to just those employed as dairy farmers/dairy farm workers. In both regions, the occupational data show a notable reduction in the proportion with no qualifications across the period 2001–2013: −9.4 per cent for Canterbury and −6.7 per cent for Southland. Both regions also saw similar increases in the proportions holding a bachelor's degree or higher: +7.9 per cent for Canterbury and +7.2 per cent for Southland. For Southland, both 'other qualification' categories (school and post-school qualifications) also increased, while for Canterbury there was a small decline in the proportions holding a school qualification only (−1.5 per cent), plausibly reflecting the increase at higher qualification levels (the data sum to 100 for each year). These patterns were mirrored, but at a lower level, by dairy farmers/dairy farm workers elsewhere in New Zealand, indicating that the average farmer in this increasingly technologically smart industry has, or needs, higher qualifications than in the past, with Canterbury and Southland leading the field (see Wilson and Tipples (2008) for a more detailed study of the period 2001–2006).

Figure 5: Percentage of dairy farmers/dairy farm workers by highest qualification 2001, 2006, 2013, and change (%) between 2001 and 2013, Canterbury and Southland regions

Canterbury region



Southland region



Hours of work

Finally, given the technological and social change in New Zealand's dairy industry implicit in the above story, it is of interest to examine whether the historically recorded long working hours of farmers have also changed. These data are also only available for the period 2001–2013.

The data not only show no reduction in working hours, but a generalised increase which is particularly notable for younger employees, and which stands in stark contrast to those in all other occupations combined (hereafter 'all other occupations'). Figure 6 shows that across the period 2001–2013, dairy farmers and dairy farm workers were consistently less likely than those employed in all other occupations to work fewer than 49 hours per week, and substantially more likely to work more than 50 hours per week. While the proportion working more than 50 hours per week has declined (from 63.2 to 60.7 per cent), the disparity has increased: in 2013, dairy farmers/dairy farm workers were more than three times as likely to work more than 50 hours per week than those in all other occupations, up from 2.9 times as likely in 2006 and 2.7 times as likely in 2001 (see Table 6).

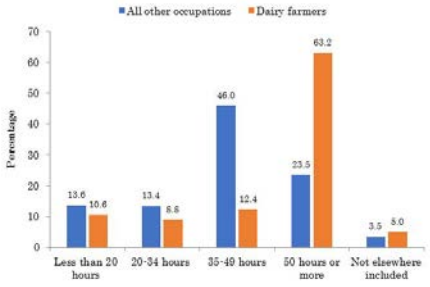
For those employed as 'paid employees' (Figure 7), the ratio is even higher and has increased by a greater margin. In 2013, a paid employee dairy farmer/dairy farm worker was four times as likely as his/her all other occupation counterpart to work more than 50 hours per week, up from 3.4 times as likely in 2006, and 3.1 times in 2001. Interestingly also, in both 2001 and 2006, the proportion of those working more than 50 hours per week on dairy farms was lower for paid employees than for the total employed in the occupation, implying that those who were either self-employed or employers were then working greater hours, and that this situation has reversed.

Figures 6 and 7: Average hours worked per week, dairy farmers/dairy farm workers, by employment status, compared with their counterparts in all other occupations combined, 2001, 2006, 2013

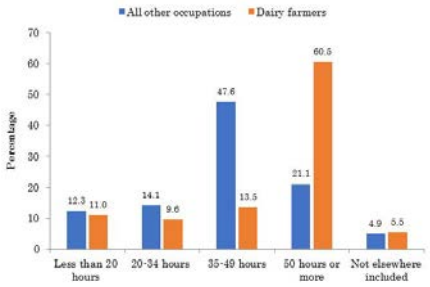
Figure 6

All employment statuses

2001



2006



2013

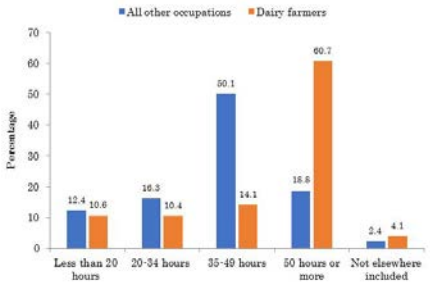
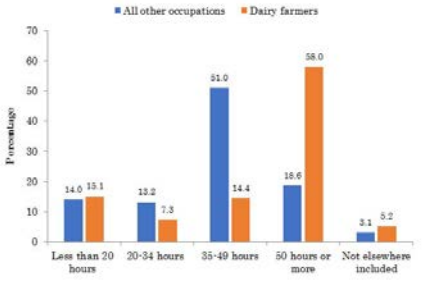


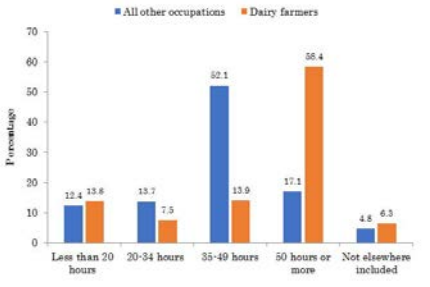
Figure 7

Paid employees

2001



2006



2013

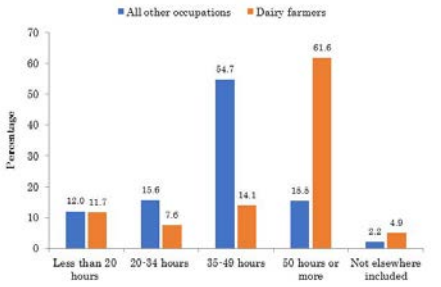


Table 6: Relative average hours per week, dairy farmers/dairy farm workers and all other occupations (combined), by employment status, 2001, 2006, 2013

	2001		2006		2013		Ratio Dairy Farmers/Dariy Farm Workers:All Other Occupations		
Hours worked per week	All other occupations	Dairy farmers/ dairy farm workers	All other occupations	Dairy farmers/ dairy farm workers	All other occupations	Dairy farmers/ dairy farm workers	2001	2006	2013
Total employed									
Less than 20 hours	13.6	10.6	12.3	11.0	12.4	10.6	0.8	0.9	0.9
20–34 hours	13.4	8.8	14.1	9.6	16.3	10.4	0.7	0.7	0.6
35–49 hours	46.0	12.4	47.6	13.5	50.1	14.1	0.3	0.3	0.3
50 hours or more	23.5	63.2	21.1	60.5	18.8	60.7	2.7	2.9	3.2
Not elsewhere included	3.5	5.0	4.9	5.5	2.4	4.1	1.4	1.1	1.7
Number	1,606,740	26,331	1,848,276	24,795	1,872,222	26,580	…	…	…
Total paid employees									
Less than 20 hours	14.0	15.1	12.4	13.8	12.0	11.7	1.1	1.1	1.0
20–34 hours	13.2	7.3	13.7	7.5	15.6	7.6	0.6	0.6	0.5
35–49 hours	51.0	14.4	52.1	13.9	54.7	14.1	0.3	0.3	0.3
50 hours or more	18.6	58.0	17.1	58.4	15.5	61.6	3.1	3.4	4.0
Not elsewhere included	3.1	5.2	4.8	6.3	2.2	4.9	0.1	1.3	2.2
Number	1,257,471	6378	1,460,847	9276	1,494,162	11,748	…	…	…
Total self-employed, no employees									
Less than 20 hours	13.2	6.9	13.2	6.4	15.6	7.9	0.5	0.5	0.5
20–34 hours	16.7	8.0	19.0	9.6	22.6	12.4	0.5	0.5	0.5
35–49 hours	30.8	12.2	32.8	14.4	33.4	15.6	0.4	0.4	0.5
50 hours or more	35.1	68.6	30.1	65.0	25.6	60.8	2.0	2.2	2.4
Not elsewhere included	4.3	4.4	4.9	4.6	2.8	3.2	0.0	0.9	1.1
Number	193,389	10,062	217,242	6687	219,648	5310	…	…	…

	2001		2006		2013		Ratio Dairy Farmers/Dariy Farm Workers:All Other Occupations		
Hours worked per week	**All other occupations**	**Dairy farmers/ dairy farm workers**	**All other occupations**	**Dairy farmers/ dairy farm workers**	**All other occupations**	**Dairy farmers/ dairy farm workers**	**2001**	**2006**	**2013**
Total employers									
Less than 20 hours	5.0	8.2	5.3	8.3	5.3	7.7	1.6	1.6	1.5
20–34 hours	8.9	9.6	10.0	10.8	11.4	11.6	1.1	1.1	1.0
35–49 hours	26.7	11.4	30.0	12.4	33.6	13.6	0.4	0.4	0.4
50 hours or more	56.6	66.3	51.0	64.3	47.8	64.6	1.2	1.3	1.4
Not elsewhere included	2.8	2.8	3.7	4.1	1.9	2.5	0.0	1.1	1.3
Number	117,537	8,307	131,316	7,314	118,107	7,983	…	…	…

Source: Statistics New Zealand (2014b).

So, what of dairy farm employers? Figure 9 shows that dairy farmer employers of all ages combined were in 2013 also a little less likely to work more than 50 hours per week than in 2001, the percentage falling from 66.3 per cent to 64.6 per cent. Nevertheless in 2013, dairy farm employers were still more likely than either their dairy farming employee (61.6 per cent) or self-employed/no employee (60.8 per cent) counterparts to be working more than 50 hours per week (Table 6). They were also 1.4 times more likely to be working more than 50 hours per week than their all occupation counterparts, up from 1.3 times as likely in 2006 and 1.2 times as likely in 2001.

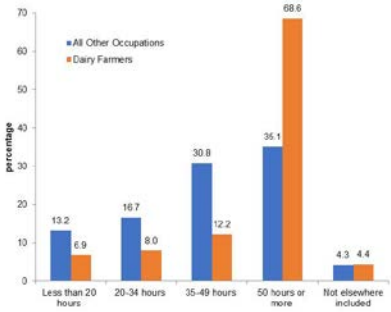
The disparities are thus much lower for dairy farmer employers than for the other farming employment statuses, but have nevertheless also increased over time. At the other end of the scale, dairy farm employers also comprise an anomalous group in being more likely than their all occupation counterparts to be working fewer than 34 hours per week, but again this margin has reduced over time. The sum outcome is that there is no respite from long working hours on attaining the status of dairy farmer employer; rather, working hours increase.

In all cases, these findings point to dairy farmer/dairy farm workers of all employment statuses working increased hours *vis-à-vis* their all occupation counterparts, despite underlying technological and organisational change in the farming sector, and, for most employment statuses, this pertains to an increase in hours in absolute terms as well.

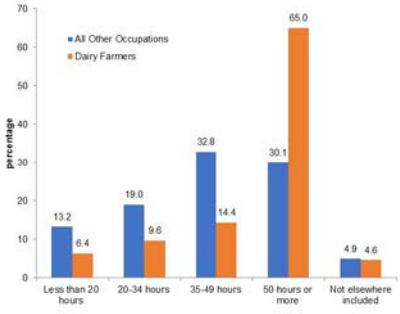
But it is the trends by age that provide the most sobering look at dairy farmer working hours, relative to all other occupations. In 2013 a 15–24-year-old dairy farm paid employee was 5.6 times more likely than his/her all occupation counterpart to work more than 50 hours per week, up from 4.7 times more likely in both 2001 and 2006 (Table 7 and Figure 10). At 25–44 years, a dairy farm paid employee was 4.2 times as likely as his/her all occupation counterpart to work more than 50 hours per week, up from 3.1 times in 2001 and 3.6 times in 2006 (Figure 11 and Table 8). In the former case, the absolute proportion of young dairy farm employees working more than 50 hours remained almost the same (at just under 55 per cent), whilst in the 25–44 years age group, the proportion was both higher and had increased, 62.9 to 68.0 per cent.

Figure 8: Average hours worked per week by dairy farmers/ dairy farm workers who are self-employed with no employees, compared with their counterparts in all other occupations combined, 2001, 2006, 2013

2001



2006



2013

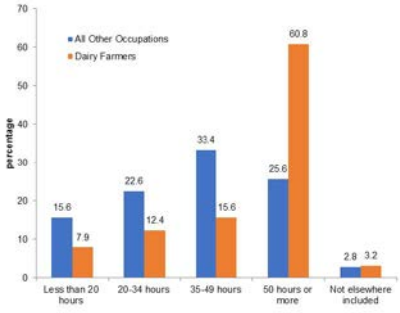
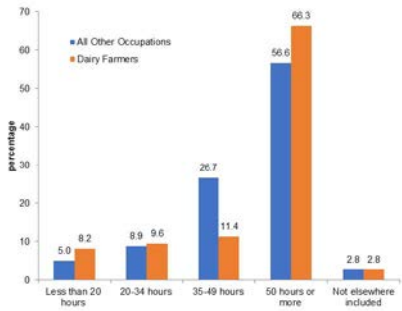
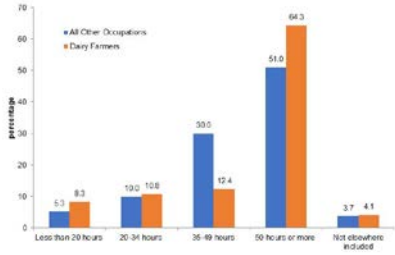


Figure 9: Average hours worked per week by dairy farmers/ dairy farm workers who are employers, compared with their counterparts in all other occupations combined, 2001, 2006, 2013

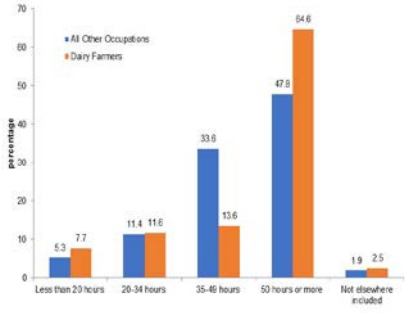
2001



2006



2013



Source: Author/ Statistics New Zealand (2014b).

These disparities are worth thinking about when the lack of young New Zealand recruits to the industry is bemoaned. Given the fact that so few are likely to attain the status of farm owner, the investment in social terms may not be considered worthwhile. From a demographic perspective, it is also perhaps no wonder that we hear of young farmers finding it increasingly difficult to find partners and raise families.

Table 7: Relative average hours per week, 15–24-year-old dairy farmers/dairy farm workers and all other occupations (combined), by employment status, 2001, 2006, 2013

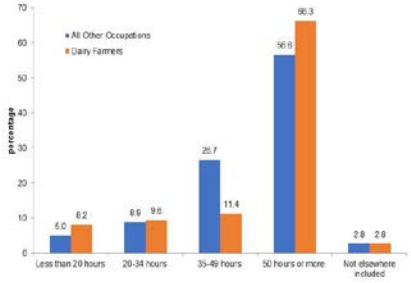
	2001		2006		2013		Ratio Dairy Farmers/Dariy Farm Workers:All Other Occupations		
Hours worked per week (15 to 24 years)	**All other occupations**	**Dairy farmers/ dairy farm workers**	**All other occupations**	**Dairy farmers/ dairy farm workers**	**All other occupations**	**Dairy farmers/ dairy farm workers**	**2001**	**2006**	**2013**
Total									
Less than 20 hours	28.5	23.7	25.7	24.2	28.6	22.1	0.8	0.9	0.8
20–34 hours	11.6	7.4	12.1	7.5	15.5	7.9	0.6	0.6	0.5
35–49 hours	43.8	10.9	43.7	11.1	42.8	11.2	0.2	0.3	0.3
50 hours or more	11.9	51.8	11.3	49.3	10.0	53.0	4.4	4.4	5.3
Not elsewhere included	4.2	6.1	7.2	8.0	3.1	5.7	1.5	1.1	1.8
Number	252,048	3,333	293,520	3,900	252,582	4,002	…	…	…
Paid employee									
Less than 20 hours	28.2	21.6	25.5	22.6	28.3	20.2	0.8	0.9	0.7
20–34 hours	11.5	6.6	12.0	7.2	15.5	7.8	0.6	0.6	0.5
35–49 hours	44.9	11.7	44.5	11.3	43.6	11.8	0.3	0.3	0.3
50 hours or more	11.5	54.4	10.9	51.2	9.7	54.9	4.7	4.7	5.6
Not elsewhere included	3.9	5.6	7.1	7.7	2.9	5.2	0.1	1.1	1.8
Number	239,802	2,718	281,013	3,372	240,939	3,486			
Self employed, no employees									
Less than 20 hours	21.7	4.1	18.6	3.8	24.2	2.6	0.2	0.2	0.1
20–34 hours	13.0	8.1	14.6	9.6	17.7	10.3	0.6	0.7	0.6
35–49 hours	31.5	10.8	32.4	15.4	33.6	12.8	0.3	0.5	0.4
50 hours or more	27.6	73.0	25.4	63.5	20.6	69.2	2.6	2.5	3.4
Not elsewhere included	6.2	4.1	9.1	9.6	3.9	5.1	0.0	1.1	1.3
Number	5,211	222	5,865	156	5,496	117			

Hours worked per week (15 to 24 years)	2001		2006		2013		Ratio Dairy Farmers/Dariy Farm Workers:All Other Occupations		
	All other occupations	Dairy farmers/ dairy farm workers	All other occupations	Dairy farmers/ dairy farm workers	All other occupations	Dairy farmers/ dairy farm workers	2001	2006	2013
Employer									
Less than 20 hours	10.9	6.5	9.6	11.8	15.7	9.3	0.6	1.2	0.6
20–34 hours	9.5	9.7	9.6	8.8	11.7	7.0	1.0	0.9	0.6
35–49 hours	30.2	9.7	33.3	5.9	34.5	7.0	0.3	0.2	0.2
50 hours or more	42.6	67.7	40.1	67.6	34.2	74.4	1.6	1.7	2.2
Not elsewhere included	6.5	6.5	6.8	5.9	4.0	2.3	0.1	0.9	0.6
Number	1,014	93	1,278	102	975	129	…	…	…

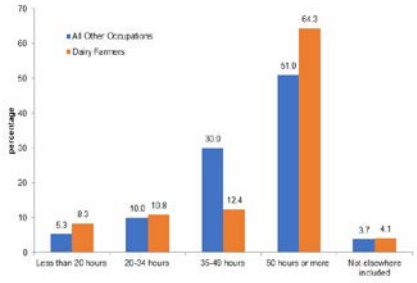
Source: Statistics New Zealand (2014b).

Figure 10: Average hours worked per week, dairy farmers/dairy farm workers aged 15–24 years who are employees, compared with their counterparts in all other occupations combined, 2001, 2006, 2013

2001



2006



2013

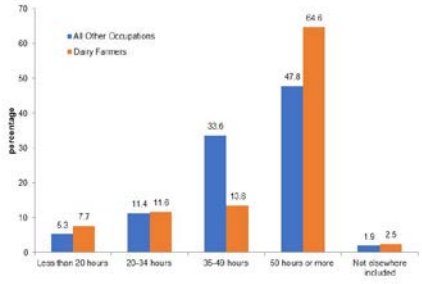
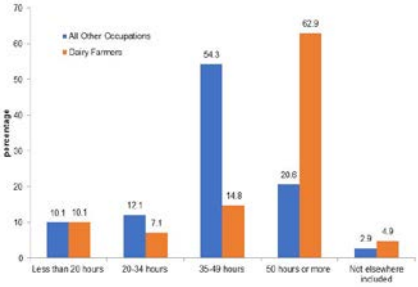
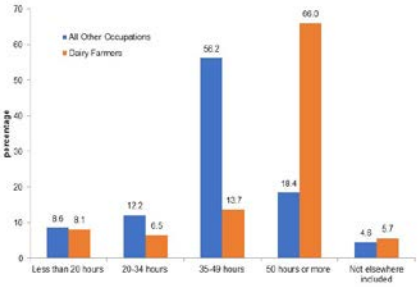


Figure 11: Average hours worked per week, dairy farmers/dairy farm workers aged 25–44 years who are employees, compared with their counterparts in all other occupations combined, 2001, 2006, 2013

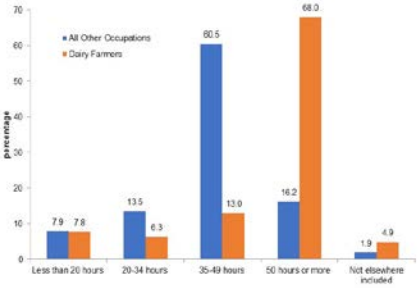
2001



2006



2013



Source: Author/ Statistics New Zealand (2014b).

The ratios (between dairy farmers and all occupations) reduce in magnitude as age increases, but are also consistent in increasing over time (data available in Appendices B1 to B3). Only at 65+ years has the ratio fallen, a dairy farm employee aged 65+ years in 2013 being just 3.2 times as likely as his/her all occupation counterpart to be working more than 50 hours, down from 4.0 times as likely in 2001. However, with almost 30 per cent of older farm employees still working more than 50 hours per week, the difference is uninspiring.

The story by age is equally unvarying for those who are self-employed with no employees. Numbers at 15–24 years are too low to warrant discussion, although the higher hours worked by self-employed dairy farmers are consistent over time. At 25–44 years in 2013, more than two-thirds of such farmers were working more than 50 hours per week, 2.6 times more likely than their all occupation counterparts, up from 2.2 times more likely in 2006 and twice as likely in 2001 (Table 8 above). The ratios for those aged 45–54 and 55–64 years in 2013 follow suit, both being twice as likely as their all occupation counterparts to work more than 50 hours per week, up from 1.8 times more likely in 2001 (Appendices B1 and B2). In absolute terms, almost two-thirds of those aged 25-44 years and over half of those aged 45–54 years worked more than 50 hours per week in 2013. Again, only at 65+ years is there any divergence from the trend, with over one-third of self-employed farmers/farm workers with no employees in 2013 still working more than 50 hours per week. The numbers mean that self-employed farmers/farm workers with no employees are still twice as likely to be working these long house as their all occupation counterparts, but the ratio has declined slightly since 2001 (Appendix B3).

Table 8: Relative average hours per week, 25–44-year-old dairy farmers/dairy farm workers and all other occupations (combined), by employment status, 2001, 2006, 2013

	2001		2006		2013		Ratio Dairy Farmers/Dariy Farm Workers:All Other Occupations		
Hours worked per week (25 to 44 years)	**All other occupations**	**Dairy farmers/ dairy farm workers**	**All other occupations**	**Dairy farmers/ dairy farm workers**	**All other occupations**	**Dairy farmers/ Dairy farm workers**	**2001**	**2006**	**2013**
Total									
Less than 20 hours	10.5	8.9	9.2	8.5	8.7	8.1	0.8	0.9	0.9
20–34 hours	12.4	8.1	12.7	8.5	14.1	8.3	0.7	0.7	0.6
35–49 hours	49.4	11.2	51.8	12.1	56.4	12.4	0.2	0.2	0.2
50 hours or more	24.6	67.3	21.6	65.9	18.7	67.3	2.7	3.0	3.6
Not elsewhere included	3.2	4.5	4.7	5.0	2.1	3.9	1.4	1.1	1.9
Number	769,293	13,431	811,800	12,018	744,432	12,117	…	…	…
Paid employee									
Less than 20 hours	10.1	10.1	8.6	8.1	7.9	7.8	1.0	0.9	1.0
20–34 hours	12.1	7.1	12.2	6.5	13.5	6.3	0.6	0.5	0.5
35–49 hours	54.3	14.8	56.2	13.7	60.5	13.0	0.3	0.2	0.2
50 hours or more	20.6	62.9	18.4	66.0	16.2	68.0	3.1	3.6	4.2
Not elsewhere included	2.9	4.9	4.6	5.7	1.9	4.9	1.7	1.3	2.5
Number	621,702	2,817	662,916	4,503	624,246	6,072	…	…	…
Self-employed, no employees									
Less than 20 hours	12.8	6.8	12.6	6.2	14.3	6.4	0.5	0.5	0.4
20–34 hours	15.4	7.5	17.6	8.8	20.6	9.3	0.5	0.5	0.5
35–49 hours	32.1	11.6	34.5	13.4	36.7	14.0	0.4	0.4	0.4
50 hours or more	35.7	70.1	30.2	67.0	26.0	67.6	2.0	2.2	2.6
Not elsewhere included	3.9	4.1	5.0	4.4	2.4	2.8	1.0	0.9	1.1
Number	82,557	5736	84,075	3,492	71,037	2,166	…	…	…

Hours worked per week (25 to 44 years)	2001		2006		2013		Ratio Dairy Farmers/Dariy Farm Workers:All Other Occupations		
	All other occupations	Dairy farmers/ dairy farm workers	All other occupations	Dairy farmers/ dairy farm workers	All other occupations	Dairy farmers/ Dairy farm workers	2001	2006	2013
Employer									
Less than 20 hours	6.0	8.4	6.4	9.1	5.7	7.7	1.4	1.4	1.4
20–34 hours	9.5	8.4	10.3	9.4	11.3	10.2	0.9	0.9	0.9
35–49 hours	26.1	8.2	30.4	9.2	34.3	10.2	0.3	0.3	0.3
50 hours or more	55.8	71.2	48.9	68.4	46.9	69.5	1.3	1.4	1.5
Not elsewhere included	2.6	2.6	4.0	3.8	1.8	2.3	1.0	1.0	1.3
Number	50,898	4,275	51,765	3,516	38,061	3,495	…	…	…

Source: Statistics New Zealand (2014b)

And of employers by age? Again, numbers at 15–24 years are very low and less robust for detailed consideration; however, it is notable that almost three-quarters of the 129 people denoting themselves as dairy farmer employers in 2013 worked over 50 hours per week, more than double that of their all occupation counterparts, up from 1.6 times more likely in 2001 (Table 7).

At 25–44 years, where employer numbers are somewhat greater (3495 in 2013, having fallen from 4275 in 2001), just under 70 per cent in 2013 were working more than 50 hours per week, a very slight decline over 2001 when 71.2 per cent did so (Table 8). In relative terms, dairy farmer employers were, respectively, 1.3, 1.4 and 1.5 times more likely than their all occupation counterparts to be working more than 50 hours per week in 2001, 2006 and 2013.

The picture is similar at 45–54 and 55–64 years, with two-thirds of 45–54-year-old dairy farmer employers in 2013 working more than 50 hours per week, which is 1.3 times the rate of their all other occupation counterparts, up from 1.1 times as likely in 2001, and 58.0 per cent of those at 55–64 years doing the same, up from 56.5 per cent in 2001, outnumbering their all other occupation counterparts by a factor of 1.2 in 2013 after having been on level footing in 2001 (Appendix B2).

At 65+ years, where, as indicated earlier, there has been some degree of a reduction in hours worked – both relatively and absolutely – we find quite the opposite among older farmer employers. In 2013, 43.3 per cent worked more than 50 hours per week, up from 35.4 per cent in 2001. This has raised their relative likelihood of working longer hours compared with their all occupation counterparts to 1.3 times, whereas, like those aged 55–64 years in 2013, they were on level footing in 2001 (Appendix B3).

Summary and conclusion

On the one hand, New Zealand's dairy industry is climbing back towards its previous high ranking among other industries, as is the occupation of dairy farmer. The composition of its dairying workforce (fewer self-employed, and many more employees managed by a relatively small and slightly diminished number of employers), its population structure (younger than average, and a greater increase in the proportion overseas-

born), and its qualification levels (fewer with no qualifications and more with post-school and graduate qualifications), all paint a picture of a very different 'face of farming' for the 21st century. On the other hand, however, the hours worked by New Zealand's farmers vis-à-vis their 'all other occupation' counterparts are very high in a world which has moved on, in social terms, and this is especially true for the younger age groups.

The dairy industry may, therefore, be particularly challenged by the demographically tight labour market unfolding both on- and offshore. Driven by structural population ageing, which, for the next few decades, will see fewer people at labour market entry age and numbers approaching retirement burgeoning, the trends will see increasing competition for labour and skills, particularly those of youth. Such increased competition implies the need for equitable working conditions.

For both dairy farm owners and the dairy industry in general, there is an urgent need to ponder the longer-term implications of having such a dramatically changed workforce: not only who will work on the farms, but who will eventually buy them?

Notes

1 'Sharemilkers' are those who are paid a percentage of the farm's income from dairying on the basis of predefined inputs. For example, a 50/50 sharemilker owns the herd, is responsible for all the farm work and milking, and pays the majority of production-related costs, for which he/she receives 50 per cent of the farm's income.

2 The paper does not explore additional, and perhaps more fundamental, challenges for the dairy industry and individual dairy farmers, such as the increasing size and cost of today's dairying operations. Undoubtedly these changes will be related to the trends and patterns by age, but are beyond the scope of this paper.

3 Wilson and Tipples (2008, pp.7–8) provide an excellent overview of the likely drivers behind the trends to 2006, such as the continuing shift away from rurally based employment in the primary and secondary sectors to the more urban-based service sector, urbanisation in general, and, over the 1990s and early 2000s, relatively low unemployment resulting in increasing competition for workers between sectors – a situation that is unlikely to resolve as workforce ageing increases.

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Appendix A: Dairy farmers/dairy farm workers by employment status and broad age group, 2001, 2006, 2013, and change 2001–2013 and 2006–2013

	Self-employed and no employees	Employer	Paid employee	Unpaid family worker	Total stated	Not elsewhere included
15–24 years						
2001	222	93	2718	276	3312	3333
2006	156	102	3372	246	3882	3900
2013	117	129	3486	237	3969	4002
Change (%)						
2001–2013	−47.3	38.7	28.3	14.1	19.8	20.1
2006–2013	−25.0	26.5	3.4	3.7	2.2	2.6
25–44 years						
2001	5736	4275	2817	528	13353	13431
2006	3492	3516	4503	423	11934	12018
2013	2166	3495	6072	300	12033	12117
Change (%)						
2001–2013	−62.2	−18.2	115.5	−43.2	−9.9	−9.8
2006–2013	−38.0	−0.6	34.8	−29.1	0.8	0.8
45–54 years						
2001	2487	2211	588	252	5538	5574
2006	1812	2130	966	285	5193	5220
2013	1590	2313	1446	336	5688	5724
Change (%)						
2001–2013	−36.1	4.6	145.9	33.3	2.7	2.7
2006–2013	−12.3	8.6	49.7	17.9	9.5	9.7
55–64 years						
2001	1248	1290	213	183	2931	2961
2006	891	1143	363	225	2619	2640
2013	981	1485	624	267	3357	3378
Change (%)						
2001–2013	−21.4	15.1	193.0	45.9	14.5	14.1
2006–2013	10.1	29.9	71.9	18.7	28.2	28.0
65+ years						
2001	366	441	45	159	1011	1032
2006	336	420	72	174	1002	1017
2013	453	561	117	207	1341	1353
Change (%)						
2001–2013	23.8	27.2	160.0	30.2	32.6	31.1
2006–2013	34.8	33.6	62.5	19.0	33.8	33.0

	Self-employed and no employees	Employer	Paid employee	Unpaid family worker	Total stated	Not elsewhere included
Total all ages combined						
2001	10059	8310	6381	1398	26145	26331
2006	6687	7311	9276	1353	24630	24795
2013	5307	7983	11745	1347	26388	26574
Change (%)						
2001–2013	−47.2	−3.9	84.1	−3.6	0.9	0.9
2006–2013	−20.6	9.2	26.6	−0.4	7.1	7.2

Appendix B1: Average hours per week, 45–54-year-old dairy farmers/dairy farm workers and all other occupations (combined), by employment status, 2001, 2006, 2013

	2001		2006		2013		Ratio Dairy Farmers/Dairy Farm Workers: All Other Occupations		
Hours worked per week (45–54 years)	**All other occupations**	**Dairy farmers/ dairy farm workers**	**All other occupations**	**Dairy farmers/ dairy farm workers**	**All other occupations**	**Dairy farmers/ dairy farm workers**	**2001**	**2006**	**2013**
Total									
Less than 20 hours	8.5	6.6	7.6	6.4	7.8	7.1	0.8	0.8	0.9
20–34 hours	14.4	8.1	15.0	9.4	16.4	11.5	0.6	0.6	0.7
35–49 hours	45.1	12.9	47.6	14.7	51.2	15.8	0.3	0.3	0.3
50 hours or more	29.0	68.1	25.9	65.1	22.3	62.1	2.4	2.5	2.8
Not elsewhere included	3.0	4.1	4.0	4.4	2.2	3.5	1.4	1.1	1.6
Number	361,536	5,574	415,617	5220	440,589	5,724	…	…	…
Paid employee									
Less than 20 hours	8.8	9.2	7.4	9.0	7.3	8.5	1.0	1.2	1.2
20–34 hours	15.1	9.7	15.2	9.6	16.0	9.8	0.6	0.6	0.6
35–49 hours	51.7	18.4	53.6	20.2	56.6	18.9	0.4	0.4	0.3
50 hours or more	21.7	57.7	20.1	55.6	18.0	57.9	2.7	2.8	3.2
Not elsewhere included	2.7	4.6	3.7	5.3	2.0	4.8	1.7	1.4	2.3
Number	257,220	588	302,526	966	333,789	1446	…	…	…
Self-employed, no employee									
Less than 20 hours	9.3	5.7	9.7	4.8	11.5	5.7	0.6	0.5	0.5
20–34 hours	15.8	6.5	18.1	8.6	21.8	12.5	0.4	0.5	0.6
35–49 hours	31.8	11.8	34.2	13.2	35.7	15.1	0.4	0.4	0.4
50 hours or more	39.4	72.3	33.6	69.4	28.3	63.2	1.8	2.1	2.2
Not elsewhere included	3.8	3.7	4.5	4.0	2.6	3.6	1.0	0.9	1.4
Number	56,271	2487	60,846	1812	60,555	1590	…	…	…

Hours worked per week (45–54 years)	2001		2006		2013		Ratio Dairy Farmers/Dairy Farm Workers: All Other Occupations		
	All other occupations	Dairy farmers/ dairy farm workers	All other occupations	Dairy farmers/ dairy farm workers	All other occupations	Dairy farmers/ dairy farm workers	2001	2006	2013
Employer									
Less than 20 hours	3.4	6.1	3.6	5.4	3.7	6.0	1.8	1.5	1.6
20-34 hours	7.2	9.1	8.8	9.6	10.0	11.0	1.3	1.1	1.1
35-49 hours	26.4	12.6	29.5	13.7	34.3	14.4	0.5	0.5	0.4
50 hours or more	60.7	68.7	54.7	67.5	50.2	66.3	1.1	1.2	1.3
Not elsewhere included	2.5	2.5	3.4	3.9	1.8	2.3	1.0	1.2	1.3
Number	40,425	2211	44,124	2130	38,100	2313	…	…	…

Source: Author / Statistics New Zealand (2014b).

Appendix B2: Average hours per week, 55–64-year-old dairy farmers/dairy farm workers and all other occupations (combined), by employment status, 2001, 2006, 2013

	2001		2006		2013		Ratio Dairy Farmers/Workers: All Other Occupations		
Hours worked per week (55– 64 years)	**All other occupations**	**Dairy farmers/ dairy farm workers**	**All other occupations**	**Dairy farmers/ dairy farm workers**	**All other occupations**	**Dairy farmers/ dairy farm workers**	**2001**	**2006**	**2013**
Total									
Less than 20 hours	13.0	9.1	11.0	9.5	10.0	9.0	0.7	0.9	0.9
20–34 hours	16.3	10.9	17.2	13.6	18.3	13.6	0.7	0.8	0.7
35–49 hours	41.6	16.7	43.9	17.7	47.1	19.7	0.4	0.4	0.4
50 hours or more	25.4	57.0	24.1	54.9	22.2	54.4	2.2	2.3	2.5
Not elsewhere included	3.6	6.2	3.9	4.2	2.4	3.2	1.7	1.1	1.3
Number	185,310	2961	263,385	2640	322,827	3378	…	…	…
Paid employee									
Less than 20 hours	13.8	9.9	11.0	13.2	9.3	9.1	0.7	1.2	1.0
20–34 hours	16.8	9.9	17.4	15.7	18.1	11.1	0.6	0.9	0.6
35–49 hours	48.8	31.0	50.2	22.3	53.4	24.0	0.6	0.4	0.5
50 hours or more	17.5	43.7	17.9	45.5	17.2	51.4	2.5	2.5	3.0
Not elsewhere included	3.1	5.6	3.6	4.1	2.1	3.4	1.8	1.2	1.6
Number	121,443	213	180,105	363	230,505	624	…	…	…
Self-employed, no employee									
Less than 20 hours	13.5	7.7	12.9	7.1	14.0	9.2	0.6	0.5	0.7
20–34 hours	18.5	10.1	20.1	11.1	23.3	14.7	0.5	0.6	0.6
35–49 hours	29.7	14.4	32.1	18.2	32.4	19.0	0.5	0.6	0.6
50 hours or more	33.7	62.0	30.7	58.6	27.5	54.7	1.8	1.9	2.0
Not elsewhere included	4.5	5.8	4.3	4.4	2.9	2.4	0.1	1.0	0.9
Number	37,008	1,248	48,672	891	54,123	981	…	…	…

	2001		2006		2013		Ratio Dairy Farmers/Workers: All Other Occupations		
Hours worked per week (55– 64 years)	**All other occupations**	**Dairy farmers/ dairy farm workers**	**All other occupations**	**Dairy farmers/ dairy farm workers**	**All other occupations**	**Dairy farmers/ dairy farm workers**	**2001**	**2006**	**2013**
Employer									
Less than 20 hours	4.7	9.1	4.5	8.9	4.7	7.3	1.9	2.0	1.6
20-34 hours	8.7	11.2	9.6	14.2	10.5	13.1	1.3	1.5	1.2
35-49 hours	27.9	17.4	29.9	16.8	32.7	19.2	0.6	0.6	0.6
50 hours or more	56.0	56.5	52.6	57.0	50.4	58.0	1.0	1.1	1.2
Not elsewhere included	2.7	2.7	3.4	3.7	1.8	2.6	0.0	1.1	1.5
Number	20,817	1290	27,648	1143	30,261	1485	…	…	…

Source: Author / Statistics New Zealand (2014b).

Appendix B3: Average hours per week, 65+ year-old dairy farmers/dairy farm workers and all other occupations (combined), by employment status, 2001, 2006, 2013

	2001		2006		2013		Ratio Dairy Farmers/Workers: All Other Occupations		
Hours worked per week (65+ years)	**All other occupations**	**Dairy farmers/ dairy farm workers**	**All other occupations**	**Dairy farmers/ dairy farm workers**	**All other occupations**	**Dairy farmers/ dairy farm workers**	**2001**	**2006**	**2013**
Total									
Less than 20 hours	30.8	16.6	27.8	16.5	25.6	18.2	0.5	0.6	0.7
20–34 hours	22.5	20.6	23.8	20.6	25.6	23.7	0.9	0.9	0.9
35–49 hours	22.6	18.6	26.5	21.2	29.9	17.7	0.8	0.8	0.6
50 hours or more	15.5	35.5	15.1	32.4	14.8	34.4	2.3	2.2	2.3
Not elsewhere included	8.7	9.0	6.9	9.1	4.1	5.5	1.0	1.3	1.4
Number	112,326	3006	187,461	2958	214,308	3402	…	…	…
Paid employee									
Less than 20 hours	37.9	13.3	30.9	25.0	25.6	15.4	0.4	0.8	0.6
20–34 hours	21.5	20.0	23.0	25.0	25.4	20.5	0.9	1.1	0.8
35–49 hours	24.2	26.7	30.3	16.7	35.1	23.1	1.1	0.5	0.7
50 hours or more	8.3	33.3	9.6	29.2	10.5	33.3	4.0	3.1	3.2
Not elsewhere included	8.1	13.3	6.2	8.3	3.4	7.7	1.6	1.4	2.3
Number	50,532	135	100,725	213	116,274	234	…	…	…
Self-employed, no employee									
Less than 20 hours	29.3	13.9	27.6	15.2	29.3	20.5	0.5	0.5	0.7
20–34 hours	25.0	20.5	26.9	18.8	28.6	23.2	0.8	0.7	0.8
35–49 hours	20.1	17.2	21.5	20.5	21.8	19.2	0.9	1.0	0.9
50 hours or more	18.4	41.0	17.6	37.5	16.5	32.5	2.2	2.1	2.0
Not elsewhere included	7.3	8.2	6.3	8.0	3.9	5.3	0.1	1.3	1.4
Number	36,126	1071	52,212	981	58,563	1155	…	…	…

Hours worked per week (65+ years)	2001		2006		2013		Ratio Dairy Farmers/Workers: All Other Occupations		
	All other occupations	Dairy farmers/ dairy farm workers	All other occupations	Dairy farmers/ dairy farm workers	All other occupations	Dairy farmers/ dairy farm workers	2001	2006	2013
Employer									
Less than 20 hours	9.4	15.6	9.7	13.6	10.1	14.4	1.7	1.4	1.4
20–34 hours	17.6	19.7	17.5	20.7	18.8	20.9	1.1	1.2	1.1
35–49 hours	30.9	19.7	29.8	22.9	31.4	17.1	0.6	0.8	0.5
50 hours or more	35.3	35.4	37.5	34.3	36.8	43.3	1.0	0.9	1.2
Not elsewhere included	6.7	6.7	5.4	9.3	2.9	4.3	0.1	1.7	1.5
Number	12,867	1281	19,155	1227	21,603	1422	…	…	…

Source: Author / Statistics New Zealand (2014b).

New Zealand Population Review, 43,135-153.

Projecting Disability in New Zealand

ADELE LEAH [*]
JACQUELINE MCINTOSH

Abstract

Disability statistics play a pivotal role in all areas of policy making and practice including the provision of health services and housing, providing valuable information on the lived experience of those with disabilities. Approaches to data collection ideally need to be coordinated and standardised, to enable historical comparability and inform future disability projections. This paper examines the main types and sources of disability data in New Zealand, projects future increases in disability numbers, and emphasises the requirement for more reliable data and a need for greater precision when correlating disability with other factors.

Policies and practices relating to those with disability can be potentially costly and wasteful if developed without rich, valid information on the lived experiences of those with disabilities and their difficulties in undertaking and participating in daily activities. The World Health Organization suggests that "Invalid or incomplete disability data, of the kind often found in the developing world, can be worse than no data at all." (WHO/UNESCAP, 2008, p. 3). In New Zealand, the collection of disability data has not always been coordinated or standardised. Historic data have often been discarded or discontinued, and some key information has not been gathered at all. The decentralised nature of government ministries, and changes in structure and practices, have also impacted on the recording and reporting of disability data, as well as its quality and completeness. For example, until the 1970s, disabled adults were often segregated into large institutions, and children with disability were moved from mainstream education and health services. These

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practices changed in 1975, with the Disabled Persons Community Welfare Act which gave disabled people access to services to help them to stay in the community (Office for Disability Issues, 2016). This changed the method of disability capture, centralising data capture of disability information in the national census.

Currently, the post-censal (and thus nationally representative) Disability Survey is the primary source of information on disabled people in New Zealand. It is also the only survey from which it is possible to derive disability prevalence rates. This paper examines the strengths and weaknesses of the Disability Survey and identifies some of the key issues associated with existing disability statistics. It also develops disability projections for New Zealand that take account of age and ethnicity; such projections have not been previously undertaken. It concludes with a reflection on what these anticipated changes might mean for future approaches to disability policy in New Zealand.

The New Zealand Disability Survey

New Zealand has important obligations to collect high-quality disability data. In 2007, New Zealand signed the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) which required that all subsequent legislation and policy be consistent with the Convention (Office for Disability Issues, 2015a). However, in 2014, New Zealand's Convention implementation was reviewed by a UN Committee and one finding was, "…that government departments, crown entities and local authorities do not always collect and publish disaggregated data on people with disabilities in their annual reports" (United Nations for Human Rights, 2014, p. 8). As a result, a new cross-government and cross-sector group was established jointly by the Office for Disability Issues and Statistics New Zealand to improve data collection and statistics on disability in New Zealand (Office for Disability Issues, 2015b). The Disability Data and Evidence Working Group includes representatives from government agencies, disabled people's organisations, disability sector non-government organisations (NGOs), universities and research institutes, and seeks to identify key information gaps, establish priorities and propose strategies for meeting information needs (Office for Disability Issues, 2015b).

The New Zealand Disability Survey was carried out in 1996, 2001, 2006 and 2013 and collected data on the prevalence, nature, duration and cause of disability in New Zealand (Office for Disability Issues, 2015c). The survey asks a wide range of disability-specific questions to a sample of the disabled population and, like any other self-reporting survey, is subject to sampling variability. Non-sampling errors include mistakes made by respondents (which may be a disabled person or their parent or main caregiver), misinterpretation of the questions asked and errors made in recording the information. However, these errors are common with all surveys of this nature and form part of the international debate regarding methods of estimating disability. Sampling errors acknowledge that different results may have been produced if all people were included in the survey rather than a sample, and as such, the results of the Disability Survey are treated as estimations.

The survey questions were relatively unchanged between the 1996, 2001 and 2006 surveys; however, the 2013 survey was redeveloped to update the content to meet current and emerging needs (Statistics New Zealand, 2014a, p. 16). In any ongoing survey, there is a tension between the desire to maintain historical comparability and to be responsive to emerging concerns and policy issues, so it is important that changes to survey content are carefully considered and noted when analysing data.

Survey sample

Like other post-censal surveys, the sample frame for the Household Disability Survey is drawn from the census. In the 2013 Census, questions 16 and 17 (see Figure 1) were changed in order to better identify disabled people for inclusion in the sample (Statistics New Zealand, 2014a, p. 21). The changes to these questions would appear to encourage more people to identify with a disability. Respondents are no longer expected to compare themselves to others of a similar age and the everyday activities that they may be able to do, but are instead encouraged to consider any difficulties that they have with sight, hearing, touch and learning.

Figure 1: Questions 16 and 17 in the 2006 and 2013 Census of Population and Dwellings

2006 Census	2013 Census
Q16: Does a health problem or a condition you have (lasting six months or more) cause you difficulty with, or stop you doing: • everyday activities that people your age can usually do • communicating, mixing with others, or socialising • any other activity that people your age can usually do, or • no difficulty with any of these.	Q16: Does a health problem or a condition you have (lasting six months or more) cause you difficulty with, or stop you from: • seeing, even when wearing glasses or contact lenses • hearing, even when using a hearing aid • walking, lifting, or bending • using your hands to hold, grasp, or use objects • learning, concentrating, or remembering • communicating, mixing with others, or socialising, or • no difficulty with any of these.
Q17: Do you have any disability or handicap that is long-term (lasting six months or more)? • Yes • No	Q17: Do you have a long-term disability (lasting six months or more) that stops you from doing everyday things other people can do? • Yes • No

The 2013 survey included children and adults living in private households or group homes of fewer than five people (Household Disability Survey) as well as adults living in residential care facilities with five or more long-stay beds (Disability Survey of Residential Facilities). The 2001 and 2006 Housing Disability Survey (HDS) survey samples included an oversample of Māori and Pacific peoples (10,000), whereas in the 2013 survey there was an oversample of Māori (2000) and no oversample of Pacific peoples. The 2001 and 2006 surveys included group homes of fewer than ten people compared with fewer than five people in the 2013 survey. The 2001 and 2006 Disability Survey of Residential Facilities (DSRF) survey samples included facilities with ten or more long-stay beds, and the change to five or more in the 2013 survey has meant that more psychiatric-type care-only facilities are included in the sample (Statistics New

Zealand, 2014a, p. 18). These changes mean that the 2013 data are not comparable with data from 2001 and 2006.

Definition of 'disability'

In the 2006 survey, 'disability' was defined as "any restriction or lack (resulting from impairment) of ability to perform an activity in the manner or within the normal range considered normal for a human being". In the 2013 survey, this definition was changed to "an impairment which has a long-term limiting effect on a person's ability to carry out day-to-day activities". Long-term is classed as six months or longer, and limiting effect refers to a restriction or lack of ability to perform (Statistics New Zealand, 2014a, p. 17). In both surveys, people were not considered to have a disability if an assistive device (such as glasses or crutches) eliminates their impairment.

Statistics New Zealand categorise disability in five broad groups. These remained the same between the 2006 and 2013 surveys:

1. Physical – mobility and/or agility impairments
2. Sensory – a hearing and/or vision impairment
3. Intellectual – adults need support or help from people or organisations, have been to a special school, or receive special education
4. Psychological/psychiatric – adults have a long-term emotional, psychological, or psychiatric condition that causes difficulty with everyday activities, or difficulty communicating, mixing with others, or socialising
5. Other – includes difficulties with speaking, learning, and memory and developmental delay.

Within this classification system, there is potential for misclassification. For example, dementia could conceivably fit within several of these categories.

Other changes in the 2013 survey include the reclassification of agility questions, making the agility/mobility data incomparable with previous surveys (Statistics New Zealand, 2014a, pp. 18–19).

Classification of ethnic group

For the earlier surveys, ethnic group was prioritised, meaning that a person identifying with more than one ethnic group was categorised into a single group (Statistics New Zealand, 2014a, p. 21). By contrast, in the 2013 survey, a person who identified with more than one ethnic group was counted once in each group. For this reason, ethnicity data from the 2013 survey are not comparable with previous surveys, with the exception of Māori ethnicity data. For various reasons, the prioritisation method of assigning multi-ethnic persons to a single ethnic group always prioritised Māori. To illustrate, until 2006 a person who identified as Māori and European, or as Māori and a Pacific ethnicity, was categorised only as Māori (for more about how prioritisation worked, see Didham & Callister, 2012).

The collection and outputting of ethnicity data has been an ongoing concern for the health and disability sector (Cormack & McLeod, 2010). Callister and others have previously argued that while counting and classifying respondents by a single ethnic group may have been useful in the past, more advanced and sophisticated methods of analysing ethnicity data are required in New Zealand, especially in relation to monitoring health disparities (2007). They further suggest that "as international migration continues, and as intermarriage becomes more frequent in most countries, there will be pressure to move from single group race-based measures towards culturally-based complex ethnicity measures" (Callister, Didham, Potter, & Blakely, 2007).

Results from the 2013 Disability Survey

The 2013 survey shows that an estimated 1,062,000 people living in New Zealand identify as having a disability, and the results illustrate the diversity of the disabled population. Overall, the disability rate has increased from 20 per cent in 2001 to 24 per cent in 2013. There are several reasons that might account for the increase. One obvious reason is population ageing, given the higher prevalence of disability among older people. Another reason is the changes to the census questions noted earlier, and perhaps a greater willingness to report having a disability than was the case in the past. Methodological improvements to the survey could also contribute to the higher disability rate in the 2013 survey

(Statistics New Zealand, 2014a, p. 2). Statistics New Zealand advises caution when comparing the 2006 disability rate with 2013, and with previous surveys. The 2006 survey estimated overall disability at 17 per cent of the population, which was lower than the 20 per cent reported in 2001.

As expected, in the 2013 survey, the likelihood of disability increased significantly with age. As Table 1 shows, the proportion of children and those aged 15–44 years with a disability (11–16 per cent) was relatively low compared with those at the older middle ages (45–64 years, 28 per cent). However, it is among those aged at least 65 years that the risk of disability is most pronounced; in 2013, nearly six in ten New Zealanders reported having a disability.

Table 1: Disability rates (%) in New Zealand in 2013 by age group and sex

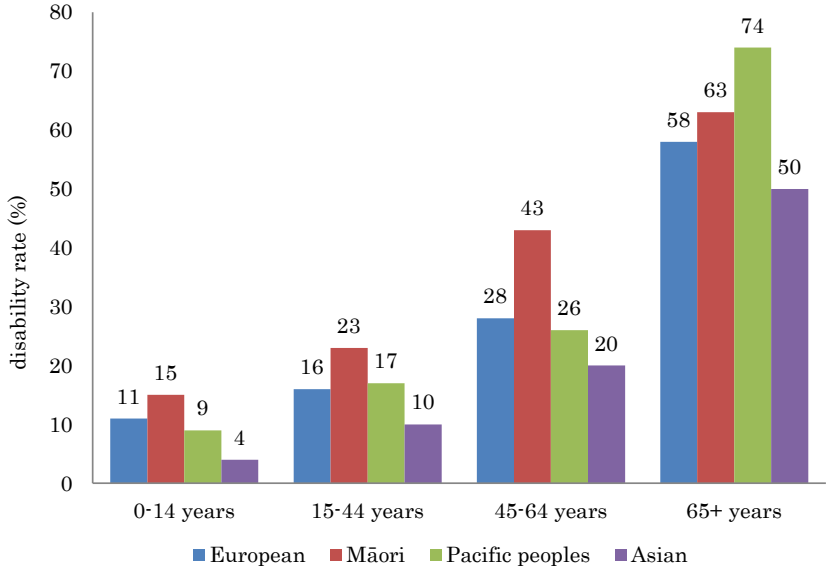
	0–14 years	15–44 years	45–64 years	65+ years	Total pop'n
Male	13	16	28	58	24
Female	8	16	28	60	24
Total	11	16	28	59	24

Source: 2013 Disability Survey (Statistics New Zealand, 2014c).

Although not shown here, types of impairment varied significantly by age. In 2013, physical impairments were the most common form of disability for adults (15 years or over), but were low for children. Sensory impairments were also common in adults, but low for children. An estimated 14 per cent of adults reported a physical impairment, whereas learning, psychological/psychiatric, and speaking difficulties were the three most common impairments for children. Types of impairment are important for policymakers to consider, as each type requires different types of planning and different levels of resource, in terms of health services and housing.

Disability rates also vary by ethnic group, and in the 2013 survey, 26 per cent of Māori identified as disabled, compared with European (25 per cent), Pacific (19 per cent) and Asian (13 per cent). Figure 2 illustrates the disability rates by age group and ethnicity.

Figure 2: Disability rates (%) in New Zealand in 2013 by age group and ethnicity



Source: 2013 Disability Survey (Statistics New Zealand, 2014c).

Figure 2 clearly shows that Māori have a higher disability rate than all other ethnic groups in every age group except the 65+ group. Statistics New Zealand report that, even after adjusting for age structural differences, Māori and Pacific people had still had higher overall disability rates (Statistics New Zealand, 2014b).

Routinely collected administrative data on disability

Beyond the census and the Disability Survey, disability data are also collected by government departments as part of routinely collected administrative data. Such data are typically captured for a specific purpose such as the payment of monetary allowances for disability (Ministry of Health) and the provision of housing (Housing NZ). For example, the Ministry of Health's (MOH) Disability Support Services (DSS) allocates services to disabled people, which include home and community support, carer support, community residential, supported living and respite care (Ministry of Health, 2015a, p. ix). In April 2015, the MOH published a report containing demographic information on clients accessing Ministry-funded DSS as at September 2013 (Ministry of Health, 2015a, p. 2).

Reports of this nature produced by MOH would allow DSS client numbers to be projected, but it is difficult to draw comparisons between the MOH data and the census data, due to the different classifications of disability and the criteria for accessing DSS.

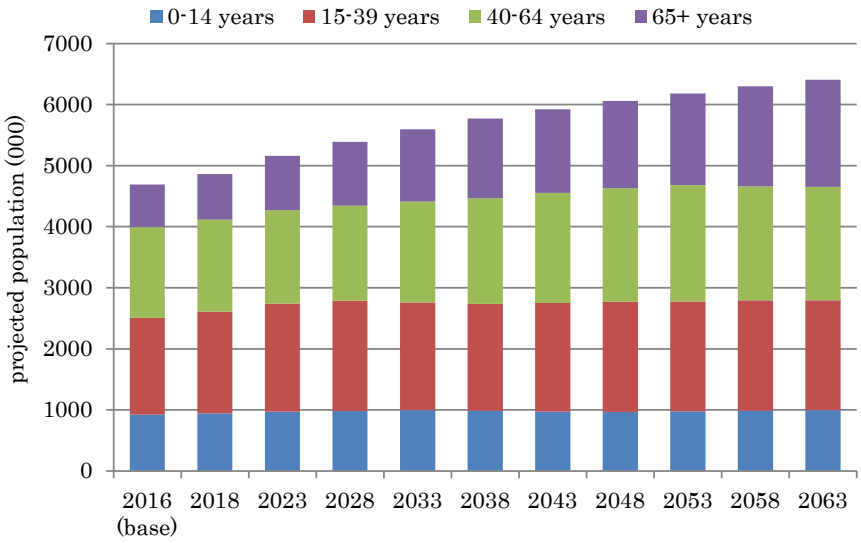
As information requirements are different between government departments, so are strategies for data collection, which either oversimplify or overcomplicate the data when attempting to generate comparisons or capture a larger, richer picture of disability. Despite the weaknesses of the New Zealand Disability Survey, it is the only survey from which it is possible to derive disability prevalence rates and thus is the only survey from which it possible to produce disability projections. Disability projections are considered of paramount importance to policymakers, in order for adequate resources to be allocated to meet future needs.

Projecting future numbers of people with disabilities

The disabled population projections presented below by the authors involve the application of age- and ethnic-specific disability prevalence rates to population projections developed by Statistics New Zealand. Figure 3 shows the national population projections published by Statistics New Zealand in October 2016. These projections were derived using a stochastic method which is relatively new in the context of official statistics. Previously, all projections used a conventional cohort component method which is easier to understand but was unable to statistically deal with 'uncertainty'. As with any sets of projections, the level of uncertainty increases substantially the further the projection population is from the base year (2016).

According to Statistics New Zealand, the projected population (4.69 million in 2016) has a 90 per cent probability of increasing to between 5.29 and 6.58 million in 2043 and to between 5.30 and 7.88 million in 2068 (Statistics New Zealand, 2016a). The median age is also projected to increase from 37.1 years in 2016 to 40 years in the early 2030s, with half of the population being older than 46 years in 2068 (Statistics New Zealand, 2016a, p. 4).

Figure 3: New Zealand population projection using the 50th (median) percentile according to age, from 2016 to 2068.



Source: Statistics New Zealand (2016b).

Population ageing has obvious implications for disability projections. In 2015, the Ministry of Health advised:

> Today people in New Zealand live longer in good health, but spend proportionally more time living with dependency than before. Part of the reason for this trend is the ageing population structure because, with a higher proportion of older people in the population, the proportion of people with functional limitations is likely to be correspondingly higher (Ministry of Health, (2015b, p. 27).

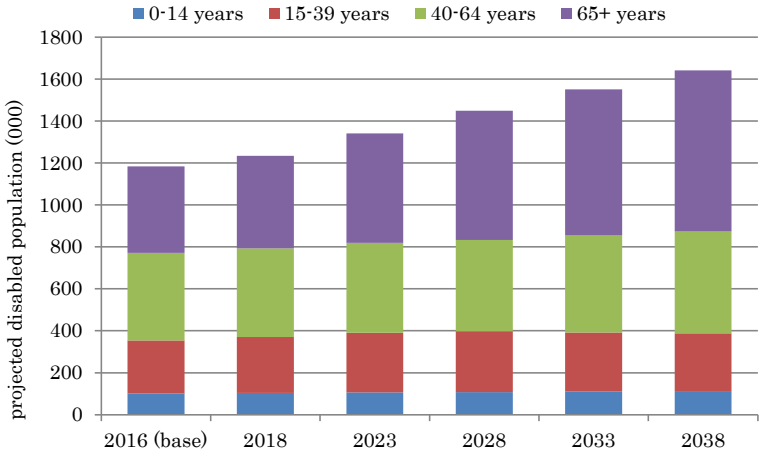
Research shows that the most common physical changes in older persons are "reduction of general mobility, visual ability, and auditory ability" (Kennedy & LaPlante, 1997). International studies have found that disability prevalence among older populations has decreased; however, the rate of severe and chronic conditions that require constant supervision and respite care continue to grow (Schoeni, Freedman, & Wallace, 2001, p. 29). This is especially apparent in the New Zealand census which has recorded an increased prevalence of physical, sensory, and 'other' disability over time, and a decrease in intellectual and psychological disability.

Figure 4 shows the projected number of disabled New Zealanders by age. These numbers were derived by applying the age-specific

prevalence rates from the 2013 Disability Survey to the most recent Statistics New Zealand projections. It assumes that the age-specific prevalence rates observed in 2013 will remain unchanged over the short to medium term covered by the projection period.

The number of disabled people in the 0–14-year age group is projected to increase by 7 per cent between 2013 and 2038, from approximately 101,000 to 108,000. The number of 15–39-year-olds with a disability is projected to increase by 11 per cent (from approximately 253,000 to 280,000) over the same period, and by 16 per cent for the 46–64-year age group. The largest increase in the number of disabled people will be in the 65+-year age group which is projected to increase by 87 per cent from about 412,000 to 769,000. The disability projections in this paper provide a starting point for considering changes in the size and structure of the disabled population. Future work could include more fine-grained analysis which takes account of demographic and social characteristics (e.g. gender) as well as possible changes over time in age-specific prevalence rates.

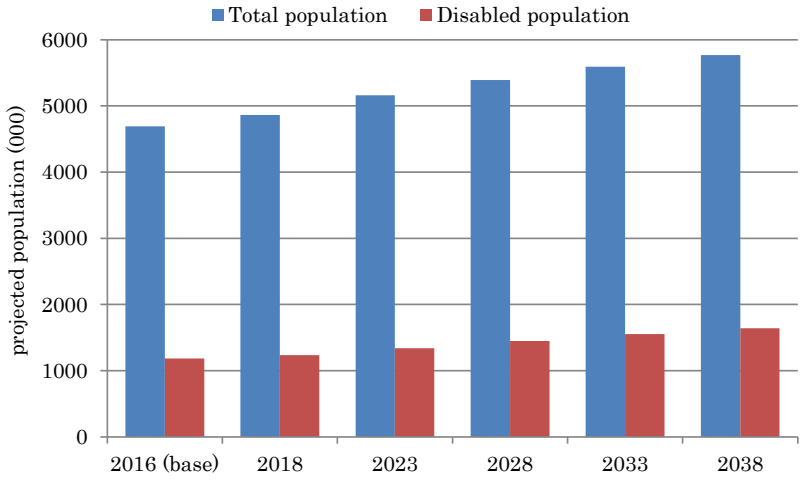
Figure 4: New Zealand disabled population projection according to age, from 2016 to 2038.



Source: Projection computed using population projections from Statistics New Zealand national population projections 2016(base)–2068 issued 19 October 2016 (Statistics New Zealand, 2016b); 50th percentile (median), and disability rates according to age group from Statistics New Zealand 2013 Disability Survey issued 17 June 2014 (Statistics New Zealand, 2014c).

To put these figures in a wider perspective, Figure 5 shows the projected numbers for each broad age group for both the total (New Zealand) population and the disabled population. The total population is projected to increase by 23 per cent between 2016 and 2038, but the disabled population is projected to increase by 39 per cent, with the overall disabled population share increasing from 25 per cent in 2016 to 28 per cent in 2038.

Figure 5: Projected changes in the New Zealnd total population and disabled population, 2016 to 2038.

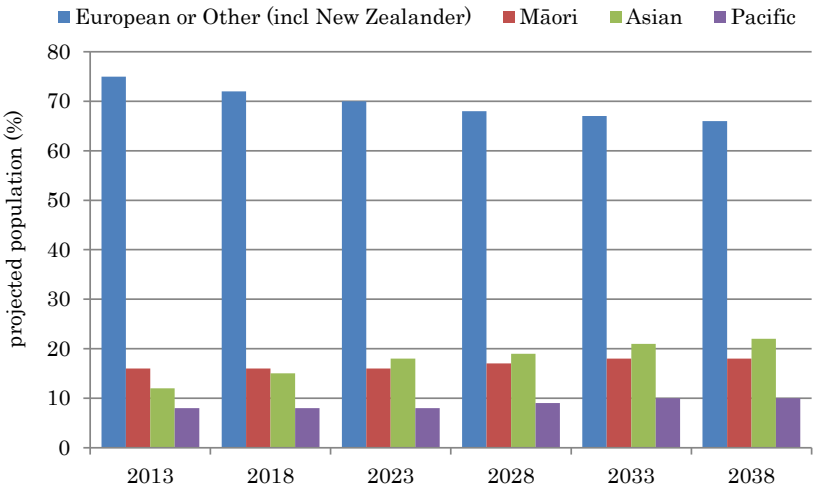


Source: Projection computed using population projections from Statistics New Zealand national population projections 2016(base)–2068 issued 19 October 2016 (Statistics New Zealand, 2016b); 50th percentile (median), and disability rates according to age group from Statistics New Zealand 2013 Disability Survey issued 17 June 2014 (Statistics New Zealand, 2014c).

Disabled projections by ethnic group

Given that disability rates vary significantly by ethnicity, it is important to take account of New Zealand's changing ethnic composition when planning for future changes in the size and structure of the disabled population. Figure 6 shows the Statistics New Zealand ethnic national population projections for the four main ethnic groupings. The key feature is the declining European population proportion and the increase in the Māori, Asian and Pacific population shares.

Figure 6: New Zealand population projection according to ethnic group, from 2013 to 2038



Source: Statistics New Zealand (2017). National ethnic population projections, 2013(base)–2038 (update) issued 18 May 2017.

Table 2 shows the observed and projected numbers for the total and disabled population in 2013 and 2038 respectively, by ethnicity, as well as the disabled population share. The projections were derived using the ethnic- and age-specific prevalence rates from the 2013 Disability Survey and the Statistics New Zealand National Ethnic Population Projections 2013(base)–2038 (median fertility, mortality, migration). For example, the disability rate for the Māori population aged 40–64 years derived from the 2013 Disability Survey was 43 per cent. This rate was then applied to the projected number of Māori aged 40–64 (e.g 234,000 in 2038) to arrive at the projected number of Māori with a disability in 2038. This process was repeated for all ages and ethnic groups. As discussed earlier in this paper, a person may be counted in more than one ethnic group projection due to the total response method of counting people in each ethnic group with which they identify. This means that the ethnic projections cannot be treated as additive.

Table 2 shows that between 2013 and 2038, the total number of individuals identified as European or Other ethnicity is projected to increase by 14 per cent (approximately 3,312,000 to 3,782,000), but that the total number of European or Other individuals with a disability will

increase by 28 per cent (approximately 865,000 to 1,108,000). By comparison, the total number of Māori is projected to increase by 53 per cent (approximately 691,000 to 1,060,000), but the projected increase in the number of Māori with a disability will be much higher at 68 per cent (app approximately 189,000 to 317,000). The Asian population is projected to experience the most growth from approximately 541,000 in 2013, to 1,273,000 in 2038 (135 per cent), with a 217 per cent increase in the number of Asian disabled people. The total population in the Pacific group is projected to increase by 71 per cent (approximately 345,000 to 590,000) between 2013 and 2038, with an 80 per cent increase in the Pacific disabled population (approximately 57,000 to 102,000).

Table 2: Projected increase in numbers with a disability, by ethnic group, and disabled population share, 2013 and 2038

	2013			2038		
Ethnic group	**Total pop'n (000)**	**Disabled pop'n (000)**	**DP as % of the TP**	**Total pop'n (000)**	**Disabled pop'n (000)**	**DP as % of the TP**
European or Other	3312	865	26	3782	1108	29
Māori	691	189	27	1060	317	30
Asian	541	76	14	1273	240	19
Pacific	345	57	16	590	102	17

Source: Projections computed using disability rates according to age group and ethnicity from Statistics New Zealand 2013 Disability survey issued 17 June 2014 (Statistics New Zealand, 2014c), and Statistics New Zealand national ethnic population projections 2013(base)–2038 (update) issued 18 May 2017 (Statistics New Zealand, 2017).

The projections show an increase in the percentage disabled population share in all ethnic groups, with the largest increase being in the Asian group (14 per cent in 2013 to 19 per cent in 2038). The projections are affected by ethnic differences in age structure; in particular, the much older age profile and thus higher occurrence of disability among the European or Other group.

The authors are not aware of any previously published disabled population projections for New Zealand. The disability projections in this paper could be further analysed and developed to include projected numbers of people according to their impairment type(s), which would potentially be of great value to policymakers and practitioners with an interest in disability.

International reporting on disability

The World Health Organization (WHO) estimates that 15 per cent of the world's population have some form of disability and that this figure is rising due to population ageing, the spread of chronic diseases and improvements in the methodologies used to measure disability (World Health Organization, 2011). In New Zealand, Australia is most commonly used as a useful international survey information source, yet the United Kingdom is often the source of policy development (New Zealand Ministry of Foreign Affairs and Trade, 2013).

The Australian Bureau of Statistics carried out the Survey of Disability, Ageing and Carers (SDAC) in 1998, 2003, 2009 and 2012 (Australian Bureau of Statistics, 2015a). The SDAC definition of disability is similar to the Statistics New Zealand definition: "…any limitation, restriction or impairment which restricts everyday activities and has lasted, or is likely to last, for at least six months" (Australian Bureau of Statistics, 2015b). However, compared with Statistics New Zealand, the Australian Bureau of Statistics interviews contained more specific and extensive questions. Although the classification system is slightly different, the general trends were concurrent with those found in the New Zealand dataset – however, the numbers of people with a disability (18.5 per cent of the population reported in the 2012 Australian survey) were significantly less than the 24 per cent reported in New Zealand.

In both New Zealand and Australia, the numbers of disabled people aged 0–64 years are projected to increase slightly, in contrast to a pronounced increase in the number of disabled people over 65 years.

The United Kingdom (UK) government reports that there are "over 11 million people with a limiting long-term illness, impairment or disability" (17 per cent of the total population) (Office for Disability Issues & Department for Work and Pensions, 2014). The most common impairments are those that affect mobility. Almost half (45 per cent) of adults over State Pension age are disabled (Office for Disability Issues & Department for Work and Pensions, 2014). In common with the New Zealand and Australian populations, the UK population is ageing. People aged over 65 years currently form 18 per cent of the total UK population (an increase of 47 per cent since mid-1974) (Office for National Statistics, 2015).

Depending on reporting methods, some developed countries have reported a decline in disability. While there is a lack of empirical data to demonstrate the major reason, it is straightforward to assume that factors could include changes in "education and socioeconomic status, medical care improvements, increased use of aids and equipment, health-related behaviour changes, environmental supports, and reduction in disease and hazardous exposure" (Schoeni, Freedman and Wallace, 2001, p. 12). But it raises the question of whether projections are based largely on rates of disability and whether data has been adjusted for the ageing population.

For disability calculations, future trends cannot be developed from simple national population statistics. The impact of ageing must be taken into consideration and along with it, an increase in life expectancy and decrease in birth rates in developed countries. In the majority of countries, it is clear that the population will continue to grow, and with that growth, the incidences of persons with a disability in the national population is predicted to increase (United Nations Division for Social Policy and Development, 2015). The disability projections for New Zealand show an increasing rate of disability overall, which is different from the constant rate predictions used in Australia and the UK.

Reflection and conclusions

This paper deals with the challenges of utilising current disability information in New Zealand and develops disability projections through extrapolation assuming medium population growth and a continuation of the rate of disease and conditions. The argument for this constraint on projections is twofold: (1) for the sake of scope, and (2) due to the difficulty of predicting and measuring disability. Establishing disability at a single point, let alone forecasting into the future, has been characterised both in New Zealand and overseas by debate over both the validity and the reliability of the disability data. Historically, estimates vary significantly and there is ongoing debate about the drivers, variants and determinants of disability.

Much of the current disability data collection and self-reporting methods, like all surveys of this nature, assume that caregivers and people (such as those with early dementia) are completing the survey accurately and in a meaningful manner. Unlike many surveys, the New Zealand

Disability Survey is currently interviewer-administered, rather than self-administered, potentially increasing its reliability. However, as the population ages, there is a strong imperative to carefully monitor population age structure changes and obtain consistent information. Given the complexity associated with disability and the importance of rich and valid information for those involved with both policy making and practice, greater attention is required in collection and reporting.

For greater accuracy and clarity, categories of disability should be agreed upon and made consistent between the various organisations such as the MOH, the Office for Disability Issues and Statistics New Zealand. At the very least, there should be coordination to avoid confusion, and output categories that reflect the purposes to which the data will be used. A coordinated approach to data collection is required and the recently formed Disability Data and Evidence Working Group could facilitate this through engagement with the disability sector to identify missing data, priorities and strategies for meeting future information needs (Office for Disability Issues, 2015b).

In conclusion, the types of disability we need to prepare for are those that are more common with ageing, such as mobility and agility impairments. However, the ageing population and the nature of their disability is highly complex, with variation by ethnicity, gender and impairment type. Rarely do people with disability fit neatly into a single category with clear boundaries, and a consideration of the complex qualitative social and cultural issues that are related to these quantitative measures is required. Given the projected increase in the number of people with a disability in New Zealand, more comprehensive and reliable data collection is required if satisfactory health services and housing are to be provided.

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New Zealand Population Review, 43, 155-157.

Book Review
Rebooting the regions: Why low or zero growth needn't mean the end of prosperity
Paul Spoonley (Ed.)
Massey University Press. 2016. 256 pages

ETIENNE NEL *

Regional disparities in New Zealand have attracted significant attention in recent years from politicians, economists, welfare agencies and academics. The current roll-out of the Government's Regional Growth Programme and the worrying details of growing regional disadvantage, demographic change and small-town decline discussed by Rashbrooke (2013), Eaqub (2014) and Johnson (2015) have helped to ensure that the current state of the regions in New Zealand is both topical and contentious. Within this context, Paul Spoonley's edited book is a welcome contribution to the growing debates about what the future of non-metropolitan New Zealand holds.

In this work, the editor draws on his extensive knowledge of economic and social change in the country, while simultaneously synthesising the contributions of academics, researchers, council staff and practitioners to present a challenging but thought-provoking overview of the state of the country's regions and their future prospects. The overriding theme in the book is that even though the regions may be experiencing low or zero economic and demographic growth, this need not imply economic collapse as scope remains to 'reboot' the regions, as evidence from places as diverse as Kawerau and Invercargill illustrates. In conveying this message, the editor and chapter authors present us with both side of the proverbial coin – namely, the deep-rooted structural, economic and demographic changes which the regions are experiencing, but the parallel need, backed

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up with case studies, to work with Māori to identify new economic opportunities and to proactively support small-town development.

The book consists of nine chapters which explore various themes of regional and demographic divergence (Spoonley), the realities and impact of population ageing and labour market changes in the regions (Jackson), and income inequality (Alimi et al.). Despite these very real challenges, as chapters based on the experiences of Ruapehu (Kranenburg) and Canterbury (Hart and Davidson) reveal, local innovation and action can arrest decline and breathe new life into struggling centres. At a more thematic level, working with Māori (Simmonds et al.), youth (Henderson), and local government (Cheyne) and managing regional depopulation (McMillan) are all important avenues that can help to stabilise economic and social conditions and promote the search for new development opportunities. The book concludes with a chapter by Spoonley which argues that regions can 'reboot' themselves, but in order to achieve this, they need to put in place strategies to promote future development and to encourage regeneration. There is also a need for vision and leadership at a time of very real change.

The book makes for a very interesting read. At one level, the scale of the changes noted have a sense of being overwhelming, while the challenges raised, particularly with respect to population change, seem insoluble. That said, negative conclusions are challenged by the very striking examples of towns and regions that are seeking home-grown solutions to the changes they are experiencing. Building on a well-established literature from Europe regarding responses to population shrinkage, McMillan usefully explores the reality that population decline may be inevitable and it is incumbent on policymakers to find new ways to proactively manage decline and work towards an alternate vision of the future.

Ideally, it would have been nice to have seen more reflection on how comparable countries – such as Canada and Australia – are managing similar issues and whether New Zealand can learn from their experience. Greater attention might also have been paid to the role of global and national changes, and government policy either as a catalyst for inducing or for arresting regional divergence. Recent policy changes from the Ministries of Business, Innovation and Employment, and Primary

Industries might have enriched the discussion about what is happening in the regions.

This is a timely and significant book which offers both sobering reflection and hope for the non-metropolitan areas in New Zealand. It should be of particular interest to policymakers and advisors, government officials, local leaders and academics.

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New Zealand Population Review, 43, 159–161.

Book Review
Indigenous data sovereignty: Toward an agenda
Tuhu Kukutai and John Taylor (Eds)
ANU Press. 2016.

BARRY SMITH, QSM *

This volume's subject matter, along with its primary aim, is clearly captured in the book's title. It contains a collection of comments regarding forms of data management that recognise a legitimate place for traditional knowledge and indigenous paradigms and epistemologies in data collection, control and use. Certainly, assessments of the implications of newer data environments comprising aggregated information to create what we have come to know as 'big data' have been numerous over recent years. Evaluations have covered matters ranging from information policy and data governance to data administration and the way this influences research design and shapes issues around privacy from both a legal and ethical standpoint. In essence, what this book does very well is survey a range of these concerns but with a clear focus on indigenous contexts appropriately premised on the view that harm is frequently experienced by 'first peoples' whenever others are free to collect, interpret and, more seriously, act upon information generated out of indigenous settings. In terms of this collection, solutions to this less than ideal social policy paradigm are based on the establishment of an agenda for developing and analysing structures and processes that enable collected and collated information to be 'governed' by those who are the subjects of the information.

Including the introduction, there are 16 contributions in this book, divided into four sections. First, it covers the decolonising of indigenous data where of particular interest to many might be Ian Pool's discussion on

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the misuse of data on indigenous peoples. The second section discusses issues around official statistics where three essays analyse the treatment of indigenous data in government statistics and introduce the reader to the concept of indigenous data sovereignty. This fundamental idea is explored in detail in the third and longest section of the book, entitled "Data Sovereignty in Practice". Here, experiences are drawn from Canada, the United States, Australia and Aotearoa/New Zealand that illustrate both the issues and harms associated with status quo arrangements whilst also identifying potential solutions emerging out of compiled experiences in this space. The volume closes with two chapters that contain state agency responses from Australian and New Zealand contexts.

The contributions are well written with key issues clearly identified and described in narratives that more often emphasise description rather than analysis. This is not to undervalue these statements because the stated aim of the volume is to spark conversations about the notion of indigenous data sovereignty both within and outside indigenous environments. That being the case, this collection of comments will serve this purpose admirably, building on what the editors refer to in their introduction as the "origins of a conversation" which references a meeting of international scholars and representatives of indigenous organisations and governments that took place at the Australian National University in Canberra in July 2015. Overall, and under sound editorship, this book makes a very worthwhile contribution to the search for effective data governance arrangements that will have the capacity to maximise the value of indigenous data as a launching pad for improving the socio-economic and cultural well-being of indigenous peoples.

A useful addendum to these conversations would be a thorough analysis of what changes in the characteristics and composition of data bases and their management might mean for the way in which we think about research and research methodology, and the implications for how we will define evidence-based social policy and community development.

The critical matter is that potential changes to the way research and the development of social policy is undertaken as a result of the increasing use of big data (with the associated probability of there being a move away from question-led research) means that the application of effective models of data governance will be essential to protect indigenous peoples from exploitation and harm through an increasing likelihood of the

indiscriminate use of collected data. In other words, this book is both commendable and timely.

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New Zealand Population Review, 43: 163–176.

James (Jamie) Newell: An appreciation 1955–2015

RICHARD BEDFORD, QSO, FRSNZ
LIFE MEMBER, PANZ *

On 28 February 2015, James (Jamie) Oliver Newell died suddenly in Wellington at the age of 60. News of his death came as great shock to his family, his colleagues on the Council of the Population Association of New Zealand (PANZ), of which he was a long-serving member, and an extensive community of population researchers, policymakers, and government officials in New Zealand and Australia. James was widely known and respected for his explorations of statistics relating to population dynamics, and during the week before his untimely death, he was actively engaged in discussions about the future of the New Zealand Census of Population and Dwellings.

In his "Note from the President" in the May 2015 issue of the PANZ *Newsletter*, Dr Andrew Butcher observed that since December 2014, "[W]e have farewelled three giants of demographic research: Graeme Hugo, Andrew Trlin and James Newell. Tributes to all three have been, or will

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be, featured in the *New Zealand Population Review*." My reflections below are a belated appreciation of the extensive contributions James made both through his research as well as his service to New Zealand's diverse community of population specialists.

While the research contributions of scholars like the late Graeme Hugo and Andrew Trlin can be documented in large part by reference to their extensive publication lists, it is not so easy to do this for James. A representative list of reports and published papers that James wrote or contributed to is included at the end of this tribute, but it is not complete. As the self-employed director of his own research organisation from 1988 until he died, James did not have a human resources department requiring him to update his curriculum vitae.

I have not been able to track down a CV for James dated later than 2006 when he was required to produce one for the FRST-funded research "Education Capital, Employment and Missing Men" programme led by Dr Paul Callister, on which we both worked on for three years. I am grateful for the support provided by Tahu Kukutai, Brenda Hall and Arama Rata in the National Institute of Demographic and Economic Analysis (NIDEA) at the University of Waikato in tracking down many of the reports and papers in the attached list.

The making of a polymath, 1984-1999

James was essentially a self-taught population researcher. His undergraduate degree from the University of Otago in the early 1980s was in the sciences and included biology, ecology and mathematics. He completed an MSc with Honours in Environmental Science and Resource Management at the University of Canterbury in 1984. I would have been one of his lecturers in 1983 and 1984 because I was teaching the population component of the graduate resource management programme that had been developed by the late Professor John Hayward as a joint initiative between the University of Canterbury and Lincoln College.

After completing his MSc, James went to work initially as a regional and resource planner in the Strategic Planning Group of the Town and Country Planning Directorate, Ministry of Works and Development (1984–86) and then as a social analyst in the social policy section of the same Directorate and Ministry (1986). One of his contemporaries in the

Town and Country Planning Directorate was the late Jeremy Lowe, a population geographer who probably had a hand in the development of the long-standing interests James was to have in modelling local area labour markets, internal migration, and demographically based service modelling and forecasting. Jeremy's master's thesis in Geography in the mid-1960s had been on defining the functional service areas of urban areas. Arguably one of James's most significant contributions to the literature has been his modelling of functional labour markets – a research interest that preoccupied him from the late 1990s.

At the end of 1986, James headed north to be a regional planner (Social and Community Development) in the Northland United/Regional Council. He was there for two years before becoming an independent scientist/researcher (Newell and Associates, 1988–1990, and from 1990 until he died, Director of Monitoring and Evaluation Research Associates Ltd (MERA)). He also spent six months as a part-time senior lecturer in the University of Auckland's Planning Department during 1989, teaching quantitative planning techniques.

I have not located any specific reports or papers authored by James between 1984 and 1988. A common practice in government departments was to have no direct author attribution on their reports. James would have contributed to several reports during these years, but it is not until he became an independent researcher that he began listing publications in his CV. The earliest publications are two commissioned reports completed in 1989 with other consultants, one on social services for local authorities in West Auckland and one on the development of an equal employment opportunity plan for Waitakere City.

James did a lot of his research with other colleagues, several of whom were working in the private sector. Two of his regular consulting partners were Nick Taylor and James Baines, directors of Taylor Baines and Associates, specialists in social and natural resource research assessment, policy and management. One of James's earliest publications was a report with Nick Taylor for the Ministry of External Affairs (now Ministry of Foreign Affairs and Trade) on land use and agriculture in the Cook Islands – the country where Nick had done his field work for his PhD in Sociology in the late 1970s.

James brought interests in and skills with data manipulation and quantitative analysis to many of the projects where he was a collaborator.

His ability to develop and use large data sets was a skill in high demand in an era when many social scientists were graduating without much background in quantitative analysis. During the late 1970s and 1980s there was a powerful critique of ways in which statistical techniques were being used in social analysis. This resulted in a rapid decline in enrolments in courses teaching quantitative techniques and a consequent decline in the ability of social science graduates to undertake statistical analysis.

Researchers with a good understanding of statistics, as well as an ability to use the programming languages that drove systems such as SAS/STAT software, were in high demand. Drawing on his background in mathematics and an enduring interest in analysis of social statistics using computer programmes, James taught himself to become proficient in the use of SAS software. From the late 1980s, this software was becoming one of the major statistical analysis platforms in Statistics New Zealand, the Department of Labour and the Ministry of Social Development. His 2006 CV states he was a "SAS Quality Analysis Partner".

During the 1990s, James devoted considerable time to developing a comprehensive database of regional demographic information, drawing on previous censuses and other national surveys that contained data that could be geocoded to areas comparable with those used in the census. He was particularly interested in modelling demographic change at the sub-national level and progressively developed skills in the statistical analysis of migration flows – the most variable component of population change in small areas.

A critical challenge facing anyone attempting to develop a consistent set of regional data over time was changes in the classification and the boundaries of regions and territorial local authorities in New Zealand, especially in the late 1980s and early 1990s. In addition, there were changes in occupation and industry classifications as well as the wording of the question on ethnic identity in the census. James persisted with the development of his New Zealand Regional Demographic and Development Modelling System through the 1990s and 2000s. Indeed, it became one of his major preoccupations, especially after the Department of Statistics (now Statistics New Zealand) opened its Data Laboratory facility in Wellington where external users could access unit record data from the census and undertake approved analyses.

Drawing on his in-house database, James began providing local area population forecasts for territorial authorities, as well as for particular age groups of interest, to the Ministry of Education. Between 1995 and 2000, for example, he prepared seven reports on trends in school rolls for different areas as well as on participation in early childhood education. To assist with this work, he developed a New Zealand Regional School Roll Forecasting System in 1995.

Over the same period, James completed reports on Fiji's land information system and Niue's land titling system for the Ministry of Foreign Affairs and Trade, on the development of GIS layers for analysing leisure activity on the Kapiti coast, on evaluating the impact of agricultural change in rural economies and societies in New Zealand, and on the early development of a multi-regional migration model for New Zealand. This was the polymath in action – a self-trained population specialist, skilled in the manipulation of large data sets, interested in and addressing a wide range of social issues.

By the late 1990s, James Newell was one of the go-to people for local area population analysis and projections, analysis of trends in school enrolments and early childhood service provision, changes in New Zealand's rural communities, and the analysis of internal migration in New Zealand. He was an active member of New Zealand's small community of population researchers. It was not surprising, then, that he become a member of the Council of the Population Association of New Zealand (PANZ) in 1999, a role he held in various guises until his death 15 years later.

Contributions to research and professional service (2000–2015)

James was a very active and committed member of the PANZ Council. In addition to roles he performed as president between 2002 and 2005, and treasurer between 2011 and 2014, he played a major role in the shift from paper-based to digital repositories of the *New Zealand Population Review*, the newsletter, and the proceedings of the biennial conferences. He also assisted with development of the Association's website and the associated electronic membership and subscription systems.

The voluntary work James did for PANZ was enormous; he was very generous with his time, his knowledge and his support for the

Association. Successive Council presidents, secretaries and treasurers commented frequently in their annual reports to the Association's AGM on the service James provided.

James was also very generous with the data he accumulated over the years for his New Zealand Regional Demographic and Development Modelling System. I recall numerous occasions when he provided me with time-series data on subsets of the population for particular age, occupation and ethnic groups I was interested in while pursuing my own research on internal migration, regional population change, and transformations in age composition. James was well ahead of the game when it came to developing sophisticated, integrated databases, and his skills in this regard attracted the attention of researchers and policymakers in several government agencies.

The first decade of the 21st century was a particularly productive period for James in terms of his research outputs. He was a member of several research teams funded by multi-year grants from the Foundation for Research, Science and Technology (FRST). He worked with colleagues in the Population Studies Centre at the University of Waikato on the "New Demographic Directions" and "Strangers in Town" programmes, with Taylor Baines Ltd on "Trends in Multiple Job Holding", with Paul Callister, Robert Didham and me on the "Education Capital, Employment and Missing Men" programme, amongst others. James was an anchor for much of the quantitative analysis in these ambitious programmes. The multi-year funding gave him some continuity of income in what was becoming an increasingly competitive world for self-employed research and evaluation specialists.

In addition to his work on FRST-funded programmes, James did contract research for the New Zealand Immigration Service on modelling visa and permit applications, the Labour Market Policy Group on identifying functional labour market areas, the Ministry of Agriculture and Forestry on regional trends in agriculture and rural communities, and the Building Research Capability in the Social Sciences (BRCSS) Network on social science occupations and fields of study. Many of his reports were not published but the attached list gives an insight into the range of issues he covered during the 2000s.

James also presented numerous conference papers to the biennial PANZ conferences, the biennial Labour, Employment and Work

conferences organised by Philip Morrison and colleagues at Victoria University of Wellington, and the annual Pathways conferences organised by the directors of FRST-funded programmes on international migration and diversity at Massey and Waikato universities. In addition, he presented papers regularly at seminars and workshops attended by policymakers and researchers in central government agencies as well as local authorities. James disseminated many of research findings orally and via PowerPoint presentations; the reports and published papers in the attached list represent only a small part of his total research output.

The best summaries of the research James did during the last eight years of his life are contained in entries under the heading "News from Monitoring and Evaluation Research Associates (MERA)" in the PANZ *Newsletter.* Annual reports on his projects and publications appeared regularly in the PANZ *Newsletter* from May 2006 and these can be accessed from Association's website. Those seeking insights into the range of projects James was working on between 2006 and 2014 will find his News entries contain useful, readily accessible summaries.

MERA's report in the May 2006 *Newsletter* contains extended comments on three of the major projects that were to dominate the latter years of his truncated research career. These were: (1) refinements to the local labour market catchment classification he and Kerry Papps had developed for the Department of Labour in 2001; (2) the multiple job holding project led by Taylor Baines Ltd that he contributed to; and (3) the accumulation of education capital he worked on for the Department of Education that later made a significant contribution to the FRST-funded "Education Capital, Employment and Missing Men" programme led by Paul Callister.

The second devastating Christchurch earthquake in February 2011 delayed the Census of Population and Dwellings, scheduled for March 2011, until March 2013. James did a considerable amount of work on the impact of the earthquakes on populations in Christchurch and the wider Canterbury region. Two of the main reports from this work are listed in the references, but there was a lot more research that was reported in seminars for local authorities and public audiences. James was an active member of the New Zealand Association for Impact Assessment and served at different times as its secretary and newsletter editor.

During the second half of 2013, James began updating his various databases with information collected in the 2013 Census of Population and Dwellings. The November 2013 *Newsletter* outlines a series of seminars organised by MERA and scheduled for Christchurch, Auckland and Wellington in December where he reviewed the recently released census data for local authorities. James's skills in the analysis of recent and projected trends in population change were in heavy demand during 2013 and 2014.

It is perhaps fitting that the MERA News item in the November 2014 *Newsletter* (p. 22), published three months before his death, contains reference to what is arguably his greatest research legacy: the analysis of functional labour markets. It is worth reproducing this entry in full because it gives an indication of the effort James put into disseminating the results of his research and a brief insight into what we lost with his untimely death at the end of February 2015.

News from Monitoring and Evaluation Research Associates (MERA)

A 2013 update of the New Zealand labour market catchment analysis has been completed. This work is the fourth in a series of classifications now prepared from the New Zealand (1991, 2001, 2006, 2013 Censuses) and Australia (2006 and 2011 Censuses) travel to work commuting data using a standardised method.

The advantage of using a standardised method is the ability to identify the changes in functional local labour market geography over time, and the potential to identify and compare local economic communities across countries.

Some initial results for Auckland will be presented at a seminar in Auckland on the 25 November:
www.mera.co.nz/projects/Monitoring/GtrAuckland/Seminars/Akld20141125/Akl20141125sum.htm

Some of the major changes over time in local labour market catchments will be presented at the biennial LEW (Labour, Employment and Work) conference in Wellington on 27 November.

A special seminar is also planned in Wellington on the 15 December to present the full 2013 results:
www.mera.co.nz/projects/Monitoring/GtrWellington/Seminars/Wgtn20141215/Wgtn20141215sum.htm

Some comparison of the groupings of similar industrial employment clusters across Australia and New Zealand will be presented at the Australian Population Association biennial conference on 3 December.

James's commitment to disseminating information from his research to audiences that might find his analysis and findings of use in their work could not be faulted. It is not surprising that Alison Reid, one of his long-standing Council colleagues who is a senior researcher in Auckland Council's Research and Evaluation Unit (RIMU), observed in a reply to a recent question I had about James and his Council service: "I miss him! He put so much energy into PANZ. And he was always so generous of spirit."

An unfulfilled dream

James often talked about enrolling for a PhD. Once his interest in an issue or topic was aroused, he would pursue it relentlessly, especially if there were challenges around developing datasets that he could interrogate in ways that stretched his knowledge of statistics and analytical methods. At different times, James explored possibilities of writing a thesis on his insightful analysis of functional labour markets, or on ways of modelling inter-regional migration in New Zealand, or on aspects of rural and regional population dynamics, amongst other topics.

He developed close relationships with staff in the Population Studies Centre (later NIDEA) at the University of Waikato and in the Geography Department at Victoria University of Wellington – there was no shortage of potential supervisors for his proposed research. But he could not afford to move from his research and evaluation consultancy, MERA, to take up a doctoral scholarship with some part-time contract research on the side. That was to prove a major stumbling block to achieving his ambition to complete a doctorate.

James lived on his own and, for the most part, worked from home in Wellington. Life was not always easy for him. Consultancy work by a self-employed researcher rarely produces a continuous income stream. There were times when James's health was not as good as it might have been. I have added these observations simply to provide a bit of balance to some reflections and recollections of a friend and colleague whose work was very much his life. He had very strong connections with his immediate family, but I did not have the opportunity to meet his brother and other close kin at his funeral. I was advised by colleagues who did attend that

there is another side to James's life that his research colleagues really did not know about.

I think many of those who worked closely with James will agree with Alison's observation that "he was always so generous of spirit". My abiding memory of James will always be that when you caught up with him at a conference or on the phone, or went to see him on a research-related matter in Wellington, you needed to have some time up your sleeve. The conversations were always informative, invariably quite lengthy, and frequently led to a new idea about how to make imaginative use of data.

Many of us miss James's infectious enthusiasm; he would have been in his element in the rapidly evolving world of the Integrated Data Infrastructure (IDI), the longitudinal census, and the complexities of analysing 'big data'. The opportunity to work in multidisciplinary teams that span the natural and social sciences in some of the National Science Challenges would also have been appealing. I am sure we would have been able to make good use of his skills, insights and enthusiasm in the "Building Better Homes Towns and Cities" National Science Challenge.

James Newell: Selected journal articles and reports (in chronological order)

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