



**NEW ZEALAND
WORK RESEARCH INSTITUTE**



Quantifying and characterising NZ's transient population

PART 1

Disclaimer

The results in this report are not official statistics, they have been created for research purposes from the Integrated Data Infrastructure (IDI), managed by Statistics New Zealand. The opinions, findings, recommendations, and conclusions expressed in this report are those of the author(s), not Statistics NZ.

Access to the anonymised data used in this study was provided by Statistics NZ in accordance with security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Statistics Act 1975 are allowed to see data about a particular person, household, business, or organisation, and the results in this report have been confidentialised to protect these groups from identification.

Careful consideration has been given to the privacy, security, and confidentiality issues associated with using administrative and survey data in the IDI. Further detail can be found in the Privacy impact assessment for the Integrated Data Infrastructure available from www.stats.gov.nz

February 2017

NZ Work Research Institute

Level 5, 120 Mayoral Drive, Auckland

Phone: +64 9 921 5056

Email: work.research@aut.ac.nz

www.workresearch.aut.ac.nz

Report authors: Professor Gail Pacheco, Dr Nan Jiang and Dr Kabir Dasgupta.

Further Information: gail.pacheco@aut.ac.nz

Contents

| | |
|--|----|
| Executive Summary..... | 3 |
| 1 Introduction | 5 |
| 2 Utilising census 2013 | 7 |
| 3 Comparing the census to address spell information in the IDI | 14 |
| 4 Identifying the population for analysis using IDI | 17 |
| Step (i) Identifying population with residential history in the last three years | 17 |
| Step (ii) Removing non- NZ residents..... | 17 |
| Step (iii) Defining movers and non-movers..... | 18 |
| Step (iv) Profile of movers and non-movers | 21 |
| References | 25 |

Figures

| | |
|--|----|
| Figure 1: Population mobility during 5 years prior to census 2013..... | 7 |
| Figure 2: Population mobility during 1 year prior to census 2013 | 8 |
| Figure 3: Overseas mobility during 5 years prior to census 2013..... | 9 |
| Figure 4: Residential status 5 years prior to census 2013, by ethnic group | 10 |
| Figure 5: Population mobility by educational attainment | 11 |
| Figure 6: Population mobility by income levels | 11 |
| Figure 7: Inter-regional population mobility..... | 12 |
| Figure 8: Population mobility during 5 years prior to census 2013, based on the IDI..... | 15 |
| Figure 9: Population mobility during 1 year prior to census 2013, based on the IDI | 16 |
| Figure 10: Defining movers and non-movers using the IDI | 19 |
| Figure 11: Age distribution for each mobility group..... | 22 |
| Figure 12: Ethnicity distribution for each mobility group..... | 23 |

Tables

| | |
|--|----|
| Table 1: Quantification of movers and non-movers | 20 |
| Table 2: Quantification of T and VT | 20 |
| Table 3: Movement and duration patterns for T and VT | 24 |

Executive Summary

This study is part one of the empirical dive into understanding NZ's transient population. It initially focuses on how mobility patterns have been commonly assessed using census information; and then tackles the feasibility of using newly linked administrative data to quantify the transient population in NZ.

When initially making use of the census (2013), we find high levels of mobility in NZ, with close to half the census population moving in the five years prior; and close to a quarter moving in the one year prior. Disaggregating mobility rates by age, we find (as expected) that young adults have the highest mobility levels (20-24 year olds), while their older counterparts (aged 70-79) have the lowest levels of residential mobility. With respect to ethnicity, Māori were the most likely to have moved in the five years prior to the census. While our findings indicate that those with low levels of educational attainment had lower mobility rates relative to their more educated peers; at the same time, we also find that those on low levels of income are more likely to be on the move. These findings indicate the importance of knowing whether the move was upward or downward (with respect to socioeconomic status).

We then check the mobility rates of the census population based on administrative data sources, to ascertain whether the self-reported census statistics align with address movements recorded via a range of government agencies. We find clear evidence that the mobility patterns provided in the census are an underestimate of the true levels of residential mobility in NZ. For this reason, along with a number of other advantages outlined in the study, we recommend the use of administrative data when empirically investigating the scale of residential mobility in NZ. Additionally, because of the importance of separating out upward versus downward mobility, we construct a framework for placing individuals into relevant populations of interest by using information on the deprivation level of each address spell, in conjunction with data on the frequency of movement.

This permits us to identify the following six populations of interest:

- A. **Non-movers** - individuals without an address change during the last three years
- B. **Low mobility** – individuals that have moved only once during the last three years
- C. **Medium mobility** – individuals that have moved twice during the last three years

Those with high mobility (i.e. moving at least three times in the last three years) are subdivided into the following distinct groups:

- D. **High mobility (upward)** – movements are only towards less deprived areas, or are within low deprived areas (i.e. movements within deprivation index values 1 to 3)
- T. **Transient** – at least one of the multiple residential moves was towards/within a medium deprived area (i.e. deprivation index values 4 to 7)
- VT. **Vulnerable transient** – at least one of the multiple residential moves was towards/within a high deprived area (i.e. deprivation index values 8 to 10)

Based on the most recent data, 4.04% of the NZ population can be classified as VT. This equates to a population size of 155,913. A further 1.29% of the population falls into the T category. In terms of the demographic profile of these individuals, females were more likely to be in the T and VT groupings, relative to the rest of the population. We also found that Māori and Pasifika are over represented in the VT group, with Māori in particular, being three times as likely to be a VT, relative to being a non-mover. Young adults aged 18-23 and 24-29 also had a strong presence in T and VT; as did children aged 5 years and under. While the high likelihood of young adults to be transient is expected (due to changes in jobs, and greater inclination to take labour market risks), the fact that young children under 5 represent close to 13% of the VT group is a troubling statistic, as we know from prior literature, the negative outcomes associated with high levels of residential mobility.

A closer inspection of movement patterns for the groups that were highly mobile also indicated that a significant portion of the VT group often lived in an address for less than 180 days.

While this study has focussed on quantifying the T and VT populations in NZ, we expect to move from quantification to more detailed characterization of the key populations in Part 2 of the project (due in April 2017). In Part 2, we will make use of a wide range of datasets from the IDI to compare the T and VT populations with other groups, especially in terms of their social service usage (e.g. benefits, health and justice etc.). This will ultimately inform the research question of how effective social services are in terms of targeting NZ's vulnerable transient populations.

1 Introduction

Evidence on the scale of residential mobility in NZ is scant at best. There are a handful of relevant studies (see for instance Morton et al (2014); and Clark and Morrison (2012)¹), and an equivalently small number of government reports based on the census from Statistics New Zealand (2001, 2006, and 2013). With the advent of the Integrated Data Infrastructure (IDI) (newly linked administrative datasets, several of which provide information that enables the derivation of residential mobility levels and patterns in NZ), this presents us with an opportune time to revisit and contribute to the sparse literature on this front.

This report follows the literature review² conducted in 2016, which made use of 40 international studies on this topic. The literature review began by tackling the difficult question regarding how to define transience³. While there is no singular definition, much of the literature in the health, economics and social science fields tends to focus on residential mobility. This is because place of residence is the key mode of connection to a neighbourhood, community, social support services, and other forms of social capital⁴. In terms of how residential mobility patterns are actually captured, a determining factor is usually data availability. Most prior studies use either longitudinal birth cohort data from a sub-sample of the population or population-level census data. In this study, we utilise census data as a starting point, and then assess the feasibility of employing the IDI to build the residential mobility portrait for NZ.

The studies within the literature review focussed on populations with high levels of residential mobility and either described the characteristics of these populations, or attempted to measure the impacts of high levels of mobility on well-being, health and educational outcomes. Our review illustrated that mobility in and of itself does not necessarily indicate negative future outcomes. It is often likely that the drivers of mobility are important determinants of later outcomes. It was also shown that the direction of the move was important – with upward mobility often associated with good outcomes and representing positive change; and downward mobility associated with mixed outcomes, and dependent on the driver(s) of the move(s). These results highlighted that any empirical analysis that aims to define and quantify transience should include information on not just the frequency of the move, but also the direction. We follow this approach in the empirical framework constructed in this study, and provide more details on this front in Section 4.

The aim of this study is to quantify NZ's transient population. To do so, Section 2 begins with the most common tool utilised (to date) in describing mobility patterns in NZ – census data.

¹ This study utilised the survey of dynamics and motivation for migration survey, which was run by Statistics NZ in 2007.

² Available on request.

³ See Table 2 in the literature review, which provides a typology of the definitions of transience.

⁴ Note that this is not the case for homeless individuals, where the literature in this space tends to use the term transience, rather than residential mobility.

The 2013 census is the most recent in NZ, and therefore we start with this data to describe residential mobility patterns along a number of dimensions: by age group, ethnicity, educational attainment, income level, time period (mobility in last year or last five years), and region. We also contrast these patterns with information from earlier census waves to identify any particular trends over time.

In Section 3 we introduce the newly linked administrative data from Statistics NZ which permits a new avenue for tracking an individual's residential mobility. This data source (the IDI) includes address notification data (since 2000) with prioritised address history information for all individuals who have resided in NZ. We begin our use of this data by initially trying to replicate the census figures, i.e. producing mobility patterns for the five years prior, and one year prior to 2013. Our hypothesis is that the address notification table will provide higher estimates of mobility relative to the census, as the latter is subject to any measurement error introduced via self-reporting.

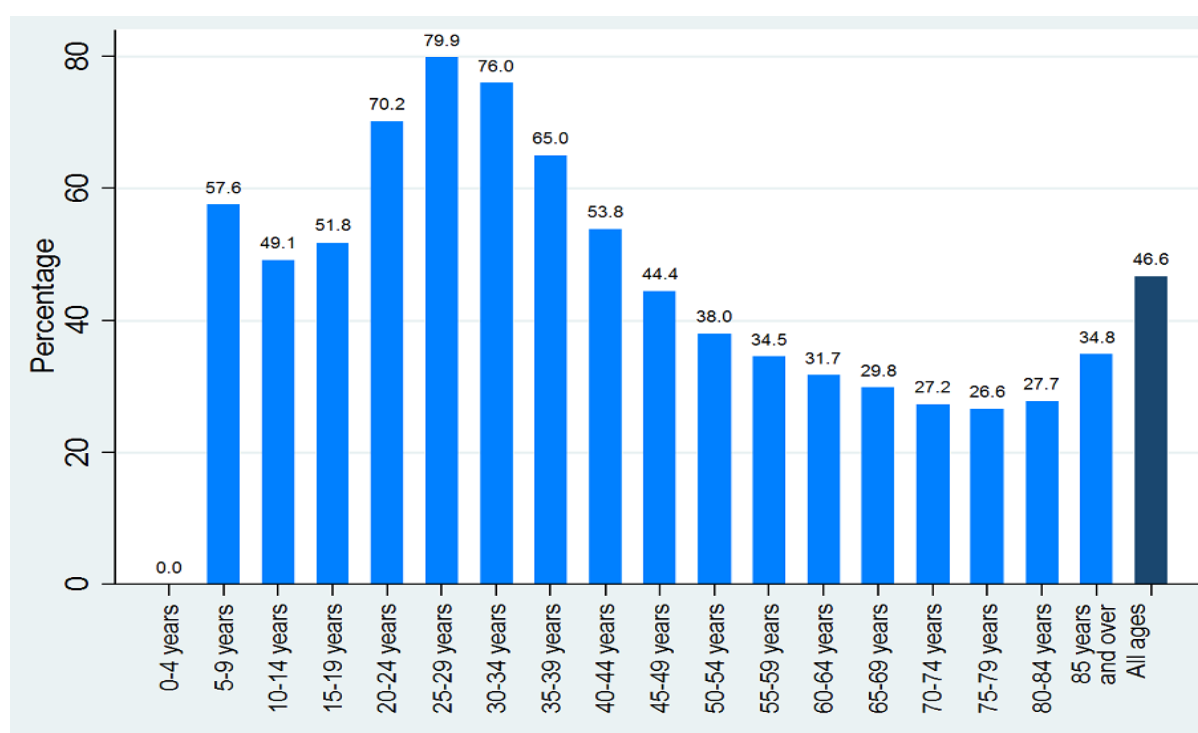
In Section 4, we focus on only the address notification data from the IDI and make use of the latest data available up to July 2016. We combine this data with deprivation index information regarding each address spell to construct a framework for producing our key populations of interest: non-movers, low mobility, medium mobility, high mobility (upward), transient, and vulnerable transient.

This study concludes with a brief summary of some of the demographic characteristics for the different populations of interest. We delve into a range of other characteristics (such as justice, welfare, unemployment status, etc) in our forthcoming study, due at the end of April 2017.

2 Utilising census 2013

According to unit record information from the 2013 census, and as shown in Figure 1, nearly half of the population (46.6 percent)⁵ had moved (at least once) in the five years preceding. The mobile population is estimated by the number of people who were either living at a different address, were overseas, or had no fixed abode five years prior to the census date. It is evident that the adult population aged 20 to 40 experienced higher levels of mobility compared to other age groups. In particular, those aged 25 to 29 were the most mobile group (79.9%) and those aged 75 to 79 were the least mobile group (26.6%). Young adults are more susceptible to labour market uncertainties (such as changes in employment opportunities with economic conditions) and are more likely to undertake labour market risks (quitting old jobs and applying for new jobs). These factors often contribute to their high mobility relative to other age groups.

Figure 1: Population mobility during 5 years prior to census 2013



Note: Source – 2013 Census. Author's compilation.

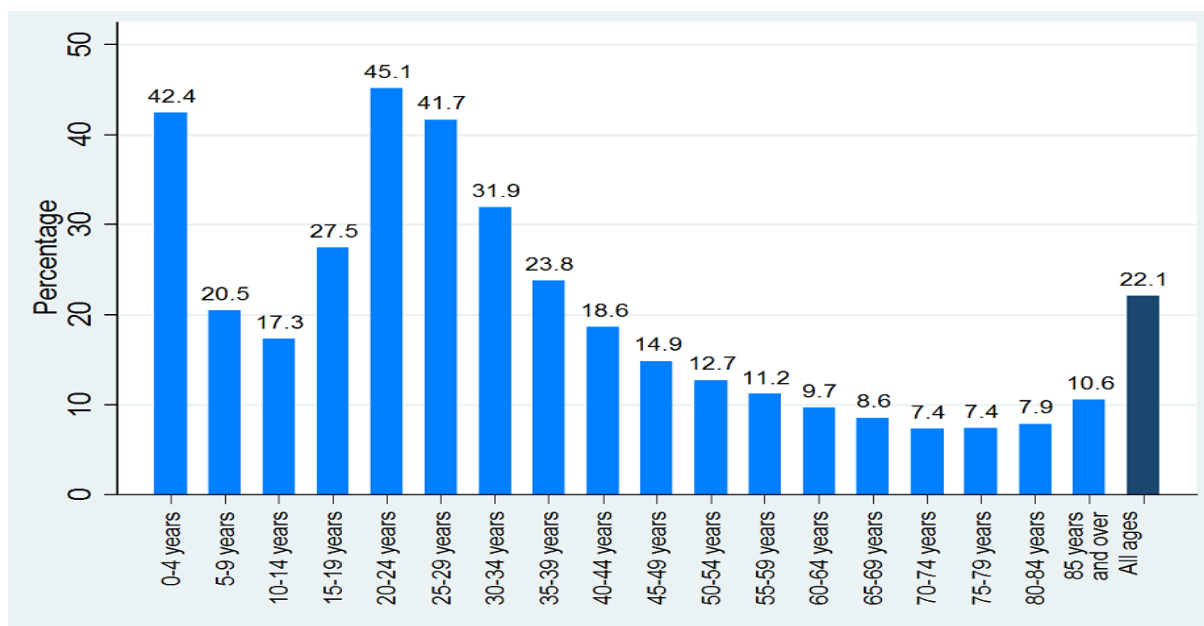
The age-specific mobility patterns in the period 2008-2013 mirror those from the 2006 census (Statistics New Zealand, QuickStats About Population Mobility, 2007). The most mobile group

⁵ In comparison, in Australia, 41.7% percent of residents had moved in the five years prior to the 2011 census (Australian Bureau of Statistics, 2012)

in the earlier census was also 25 to 29 year olds (83.9%), and the least mobile group was also 75 to 79 year olds.

Census information can also be used to identify mobility in the year prior to the survey. Specifically, individuals residing at their current address for less than a year as of the census date (March 5, 2013). Figure 2 indicates that those aged 20 to 24 had the highest propensity to be mobile (45.1%), while those aged 70 to 79 were the least mobile group (7.4%). Overall, 22.1% reported to be residing at their current residential address for less than a year prior to the 2013 census. One interesting observation from Figure 2 is the apparent high mobility rate among children aged 0 to 4 (42.4%). However, it should be noted that this is likely an overestimate. This is because for those that are aged under one year, they will be classed as living at their address for less than one year, regardless of whether they have moved in that one year or if they have been at the same address since birth. Given that 39% of the 0 to 4 year age category is below the age of one, we must treat the mobility information from the census for this age group with caution.

Figure 2: Population mobility during 1 year prior to census 2013

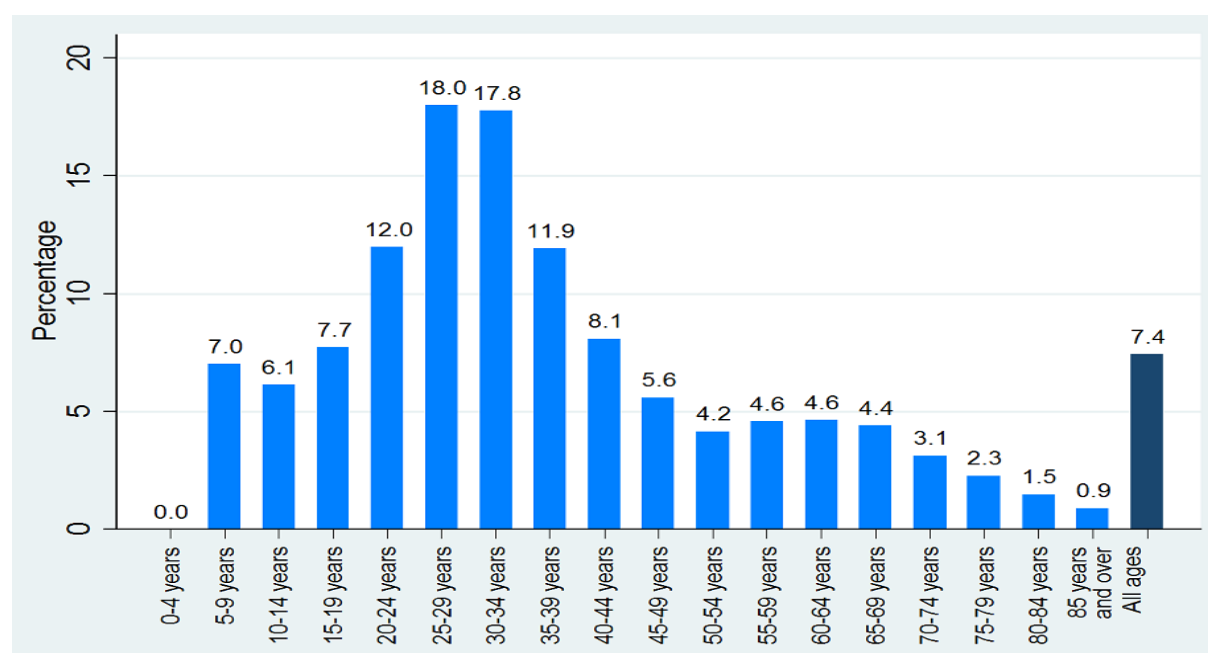


Note: Source – 2013 Census. Author's compilation

It is worth noting that when contrasting the information presented in Figures 1 and 2 relative to prior census waves that the aggregate level of mobility appears to have declined. For instance, the proportion of the usually resident population that moved at least once in the year prior to the census was 22.1% in 2013, and the comparable figures in the 2006 and 2001 census were 24.8% and 24.2% respectively. Additionally, more than half the population have changed their usual residence at least once in the last five years for both the 2006 and 2001 census (57.7% and 55.4% respectively), and the comparable figure was substantially lower at 46.6% in 2013.

Figure 3 below reports on overseas mobility patterns by age group using the 2013 census. In total, 7.4% of the population were living overseas 5 years prior to the census. This figure is lower relative to the comparable one for 2006 (9.4%). As expected, those within the age range of 25 to 34 years were more likely to be living overseas 5 years ago. Australia and the UK appear to be the major foreign destinations for overseas experience of the returning New Zealanders, especially for young adults. This might be due to some of the immigration-friendly visa and travel policies New Zealand has with respect to the two countries such as the Trans-Tasman travel arrangement (Australia), Working Holiday Scheme (UK), and UK Ancestry visa.

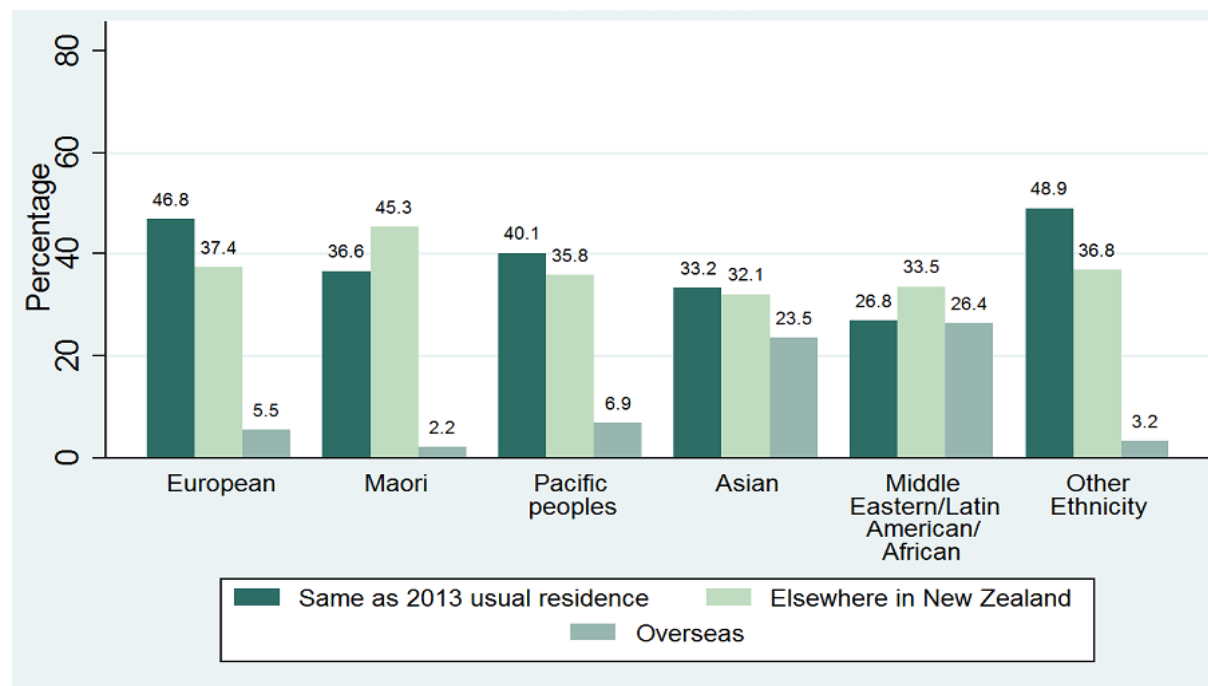
Figure 3: Overseas mobility during 5 years prior to census 2013



Note: Source – 2013 Census. Author's compilation

Figure 4 provides mobility patterns disaggregated by ethnic groups. People identifying with the Māori ethnic group were the most likely to have been living elsewhere in New Zealand five years prior to the 2013 census (45.3%). People identifying with the European ethnic group and Other ethnicity group were the least likely to have moved since 2008 (46.8% and 48.9% respectively). It is also useful to note that compared to the 2006 census, a higher proportion of people within each ethnic group reported to be at the address (as of March 5, 2013) they were residing five years ago. This is consistent with the earlier findings that mobility levels have decreased between the last two census waves.

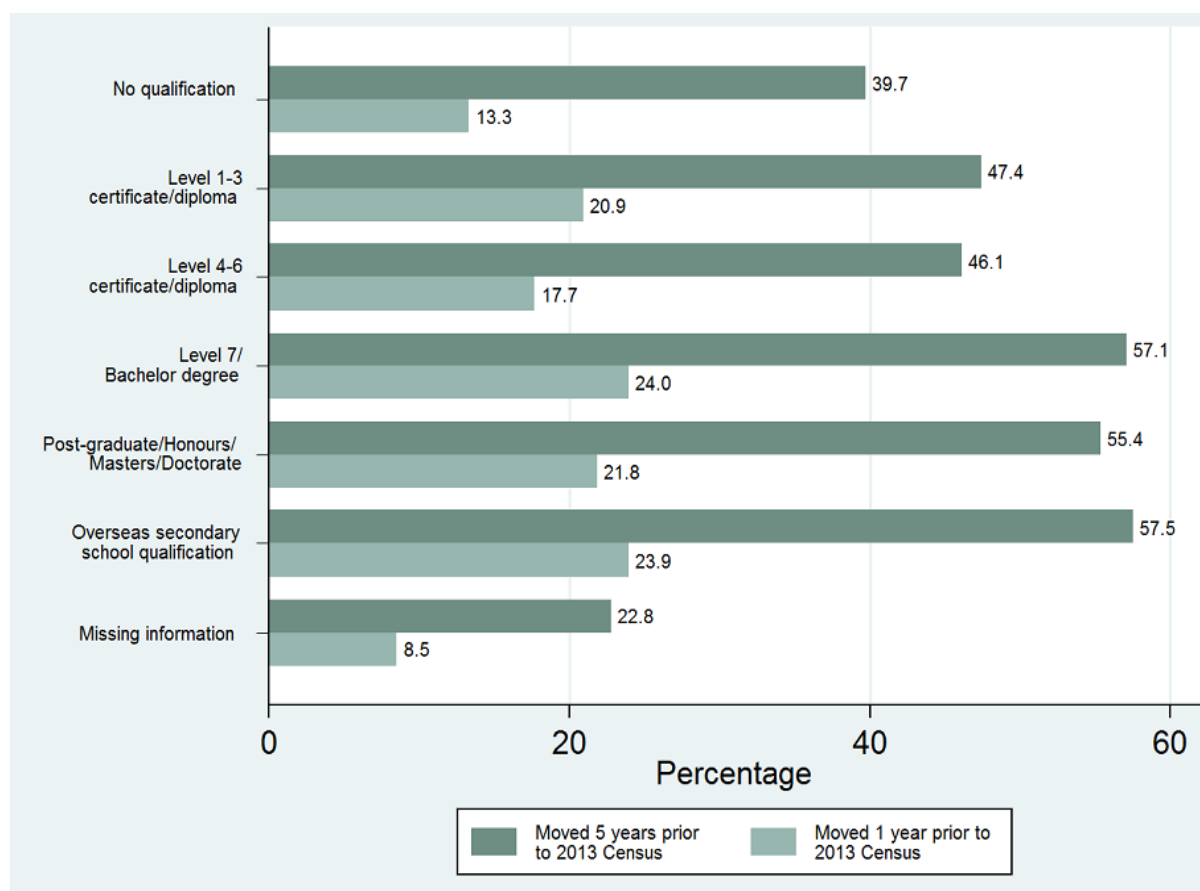
Figure 4: Residential status 5 years prior to census 2013, by ethnic group



Note: Source – 2013 Census. Author's compilation

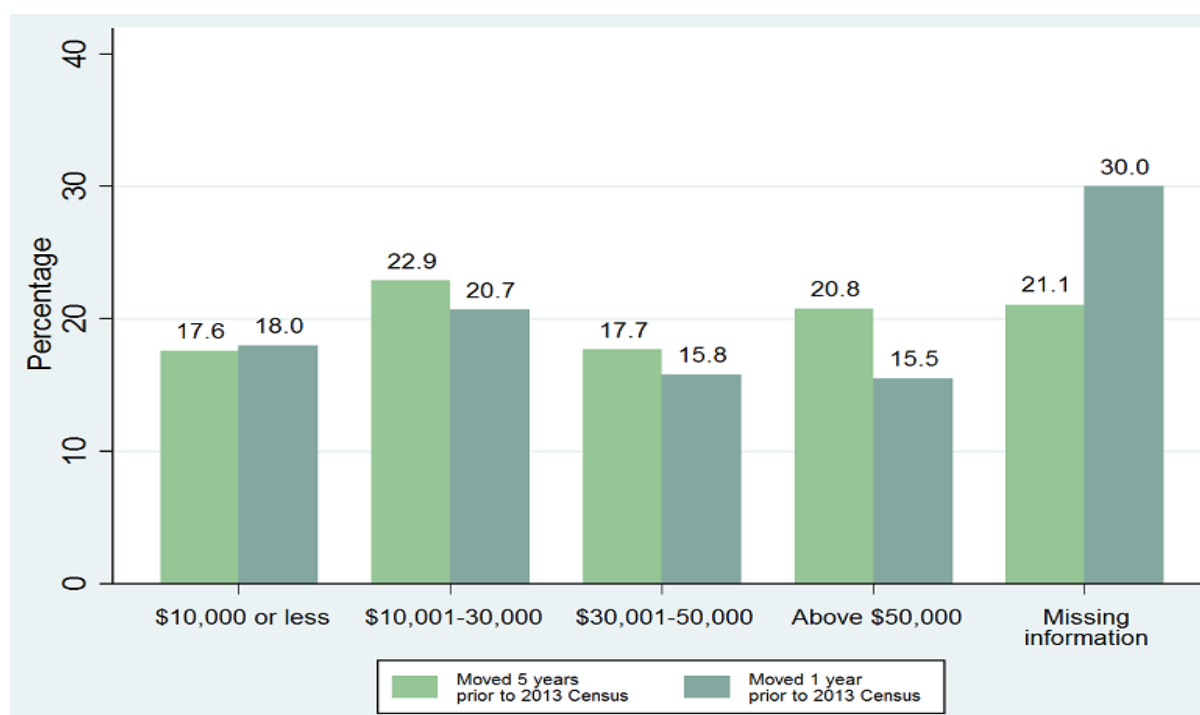
Education can play an important role in a person's decision to move (Machin, Salvanes, & Pelkonen 2012; Reeves & Howard 2013). In this context, we utilise the 2013 census data to view the mobility patterns of the population by their educational background. Figure 5 presents the results of this empirical analysis for the working-age population (16-65 years). The mobility rates are calculated by estimating the proportion of people who moved five years and one year prior to the 2013 census within each educational attainment level. Individuals with missing educational information and no qualification were the least likely to move in the preceding five years (22.8% and 39.7% respectively). In comparison, people with overseas secondary school qualifications, graduate level or equivalent degrees (Bachelor's/ Level 7 diploma), and post-graduate degrees (Post-graduate Honours/ Masters/ Doctorate) had the highest mobility rates during the five years prior to 2013 census (57.5%, 57.1%, and 55.4% respectively).

Figure 5: Population mobility by educational attainment



Note: Source – 2013 Census. Limited to the working age population (16-65 years of age). Author's compilation

Figure 6: Population mobility by income levels

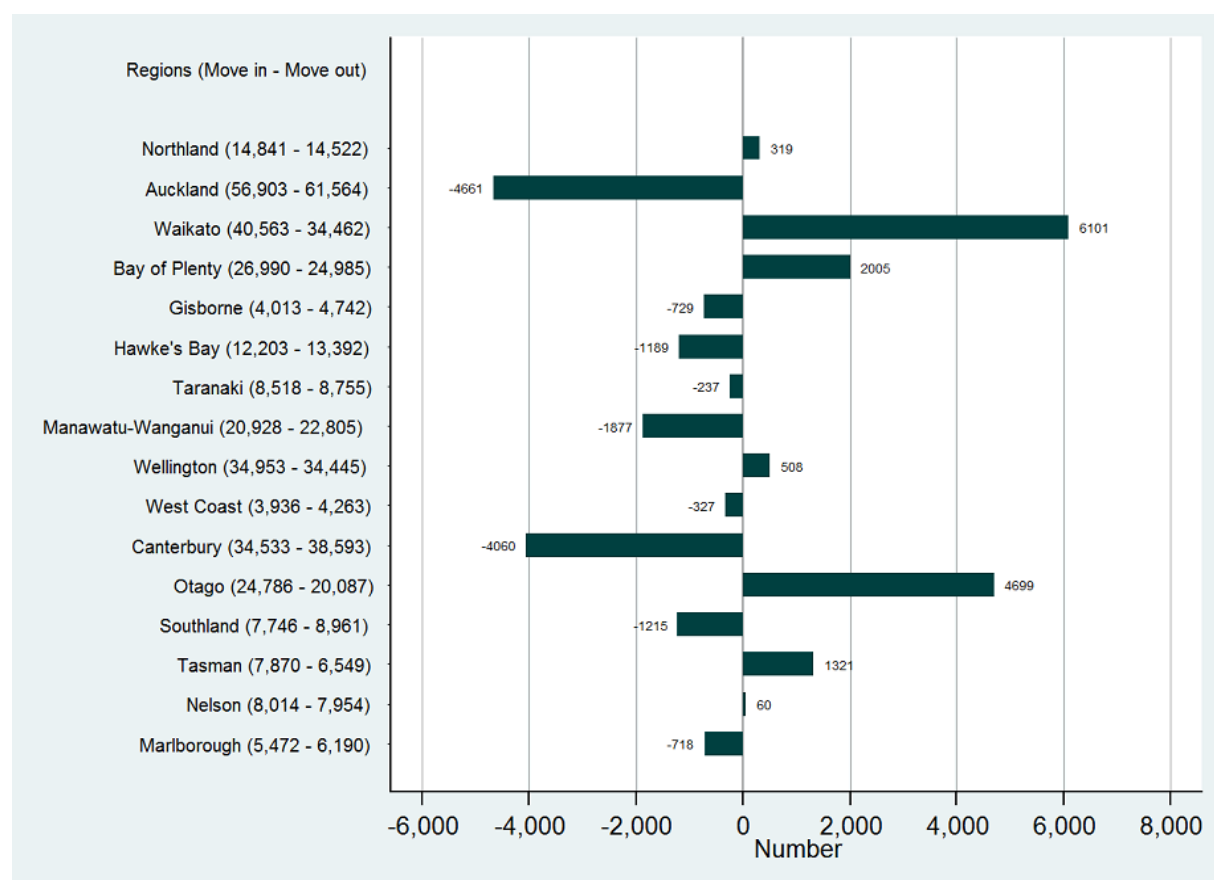


Note: Source – 2013 Census. Author's compilation

Figure 6 presents the income profile of movers. Putting aside those with missing information, the income group with the highest proportion of movers was those with annual personal income between NZD 10,000 and 30,000 (22.9% movers).

When interpreted simultaneously, Figures 5 and 6 illustrate the complex mix of movers in NZ. There appear to be many movers with high levels of education, and also a greater propensity to be moving if at a lower income bracket. These complexities are likely to be teased out in Section 4 when we focus not just on the frequency of move, but also the direction, to separate out cases of upward versus downward mobility.

Figure 7: Inter-regional population mobility



Note: Source – 2013 Census. Author's compilation

Finally, using individuals' current regional council location (as of 2013 Census) and their regional council location five years prior, Figure 7 provides inter-regional migration statistics (to compare with the 2006 figures provided in the literature review). Net regional migration for a particular regional council is estimated by deducting total outflows (number of people moving out) from total inflows (number of people moving in), and only considering movements within NZ. Net regional migration gains were observed for seven regional councils (Northland, Waikato, Bay of Plenty, Wellington, Otago, Tasman, and Nelson). Waikato had the highest net migration gain (6,101) of all the regions and Nelson had the least net gain (60).

Auckland recorded the most losses with number of people moving out of the region exceeding the total number of inflows by 4,661. Taranaki had the lowest net migration loss (237).

In comparison to the previous census wave, Canterbury stands out as a region of interest. During the five years preceding the 2006 census, Canterbury had the highest net migration gain of all the regions. However, this trend was reversed for the 2013 census, as shown in Figure 7, whereby Canterbury recorded the second highest net migration loss (4,060). This is likely attributed to the 2011 Christchurch earthquake.

3 Comparing the census to address spell information in the IDI

One of the overarching objectives in this study is to assess whether newly linked administrative data from the IDI⁶ can help in better understanding and quantifying residential mobility patterns across NZ. Given that a lot of mobility information is often reported publicly using the census (as illustrated in section 2), we need to know how the census information compares to information available from administrative sources. Census information is self-reported and may suffer reporting bias due to recall difficulty.

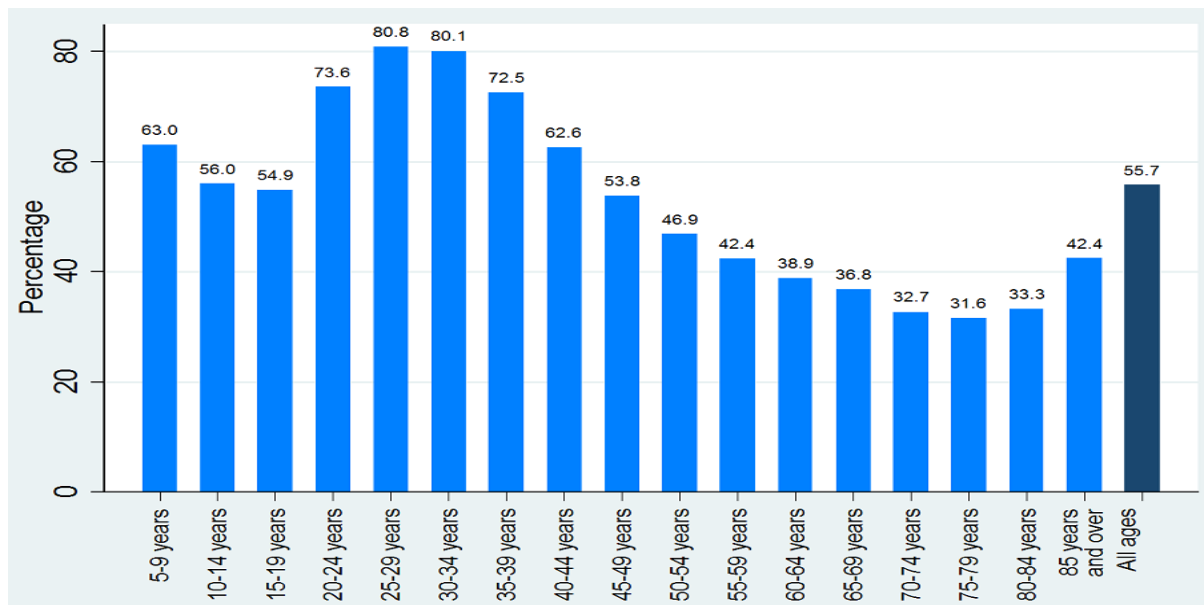
The IDI contains address history for all individuals with unique Statistics NZ personal identifiers (i.e. `snz_uid`). Statistics NZ merges address information from all sources, and provides a full list of every geocoded address and address change associated with the NZ population.

Our priori hypothesis was that the address information from the IDI may reveal a higher proportion of movers relative to the figures produced by the 2013 census. The following analysis utilises the address data to track people's mobility during the period covered by the 2013 census (March 6, 2008- March 5, 2013). To do so, we first linked all census respondents with the address table in the IDI using their unique identifier. 93.3% (4.06 million individuals) of those that provided data in the 2013 census were also in the address table. Based on this matched population we then reproduced the mobility patterns for the five years, and one year preceding the census date – this allows a direct comparison of whether the figures reported by individuals in their census forms match their administrative records.

Figure 8 provides the five-year mobility rates of the matched population disaggregated by age groups. It appears that our expectations have been realised, with the address table from the IDI indicating a higher rate of mobility across all age groups. For instance, while the census information in Figure 1 suggested that 46.6% of the total population had moved at least once in five years prior to the census, the address information puts that figure at 55.7%. What is broadly similar to the census data is the pattern by age distribution – i.e. that people aged 20 to 24 had the highest mobility rate (80.8%), while those aged 75 to 79 were the least mobile group (31.6%).

⁶ A full description of the background to the IDI can be found at Statistics New Zealand (2017).

Figure 8: Population mobility during 5 years prior to census 2013, based on the IDI

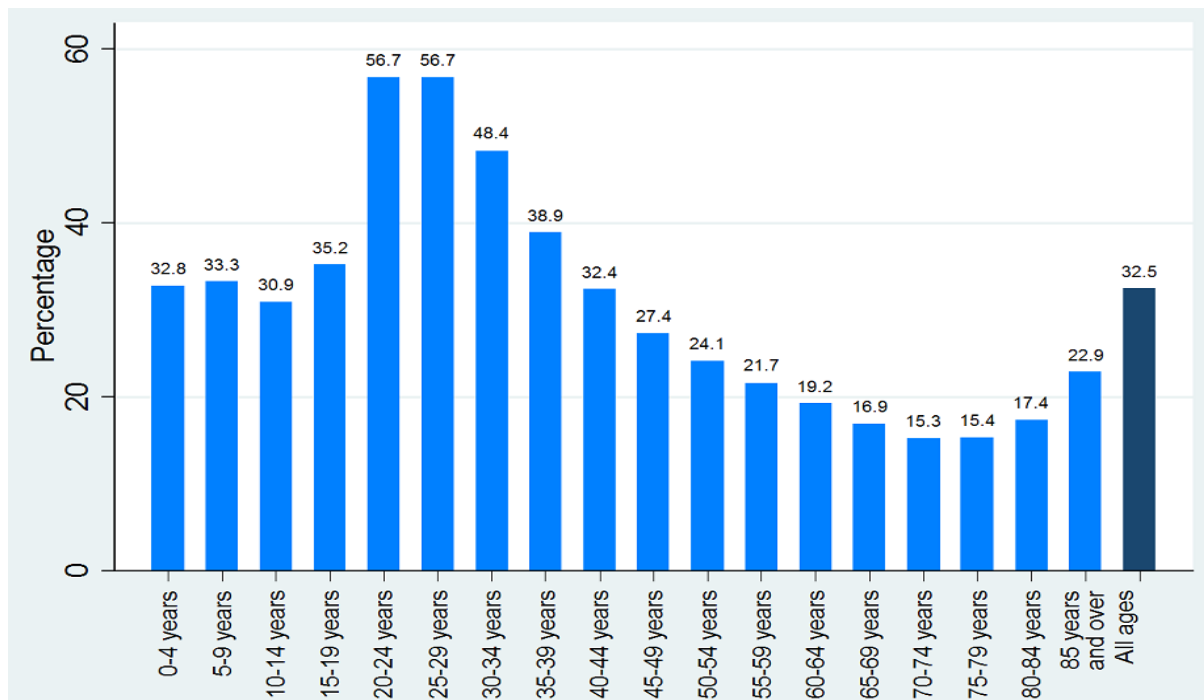


Source: Address table in IDI. Author's compilation.

Next, we repeated this analysis to focus on movements in the year prior to the 2013 census – i.e. reproducing Figure 2 with address data from the IDI. The results (shown in Figure 9 below) illustrate once again that mobility rates are higher based on administrative data, when compared to self-reported information from the census. For instance, 32.5% of the total population moved during the one-year period prior to the 2013 based on the address data, and the comparable figure from the census data was 22.1%.

The one age category where the mobility rate is actually lower when sourced from the address table, relative to the census data is 0 to 4 years old. As mentioned earlier, this could be because the census estimate for those aged under one year cannot separate actual movers from those living at the same address for less than a year because they are less than a year old. This illustrates an additional advantage of the address table data in the IDI, such that we can clearly ascertain start and end dates of each address spell.

Figure 9: Population mobility during 1 year prior to census 2013, based on the IDI



Source: Address table in the IDI. Author's compilation.

Based on the information presented above we have clear signals to suggest that census mobility rates underestimate residential mobility in NZ. We therefore focus solely on the address table information from the IDI in the next section, and define (and subsequently quantify) our relevant populations of interest.

4 Identifying the population for analysis using IDI

The following analysis outlines the construction of our data sample and further to that, the mechanisms / rules used to partition this sample into populations of interest – i.e. non-movers, low mobility, medium mobility, high mobility (upward), transient, and vulnerable transient.

Step (i) Identifying population with residential history in the last three years

The IDI provides a full list of every geocoded address associated with each individual who has resided in NZ since 2000. More specifically, Statistics NZ collects all address change notifications from all sources in the “address notification full” table. This table contains more than 99 million address records covering the period from 01 Jan 2000 to 31 July 2016. Using a set of business rules (available in the IDI wiki data dictionary), the full address table has been limited to a ‘best guess’ list of residential addresses which is called the “address notification” table. This is essentially a prioritized address table which has more than 27 million address events in it.

For the purposes of this study, we wish to concentrate on the three years of most recent data (i.e. 01 Aug 2013 to 31 July 2016), which gives us approximately 11.93 million address records associated with 8.29 million unique individuals. In cases where an individual seems to have the same address in two consecutive address spells, Statistics NZ has recommended collating these spells. This reduces our data sample to 11.88 million address events.⁷

Step (ii) Removing non- NZ residents

We drop all individuals who do not appear to be NZ citizens or residents and/or whose usual country of residence was not NZ during the reference period. We do this by first removing 633,726⁸ individuals with death records (indicated by data from the Department of Internal Affairs - DIA). This left us with 7.66 million unique individuals.

Next, we removed those who do not have NZ citizenship or residence using the “immigration visa application decisions” table. Immigration clients, whose most recent visa application belonged to the ‘temporary’ category, or was for ‘residence’ but not granted before 01 August 2013 were eliminated from our sample. This left us with 4.77 million unique individuals.

We further dropped 1.41 million individuals who left NZ before 01 Aug 2013 and never came back using the “boarder movements” table, and another 530,796 people who spent less than 50% time in NZ during the reference period. This left us with 4.24 million unique individuals.

⁷ 45,819 address records share the same address id of their previous address episode.

⁸ All sample sizes in this study are random rounded to base 3, due to Statistics NZ requirements regarding confidentiality assurance.

Finally, we removed 79,263 individuals who do not have a death record with DIA but a decease date was provided by the Ministry of Health (MOH), and 305,208 babies who were born after the start of our reference period (i.e. 01 August 2013). The final sample equates to 3,858,894 unique NZ-citizens/residents who lived through the entire reference period for our analysis.

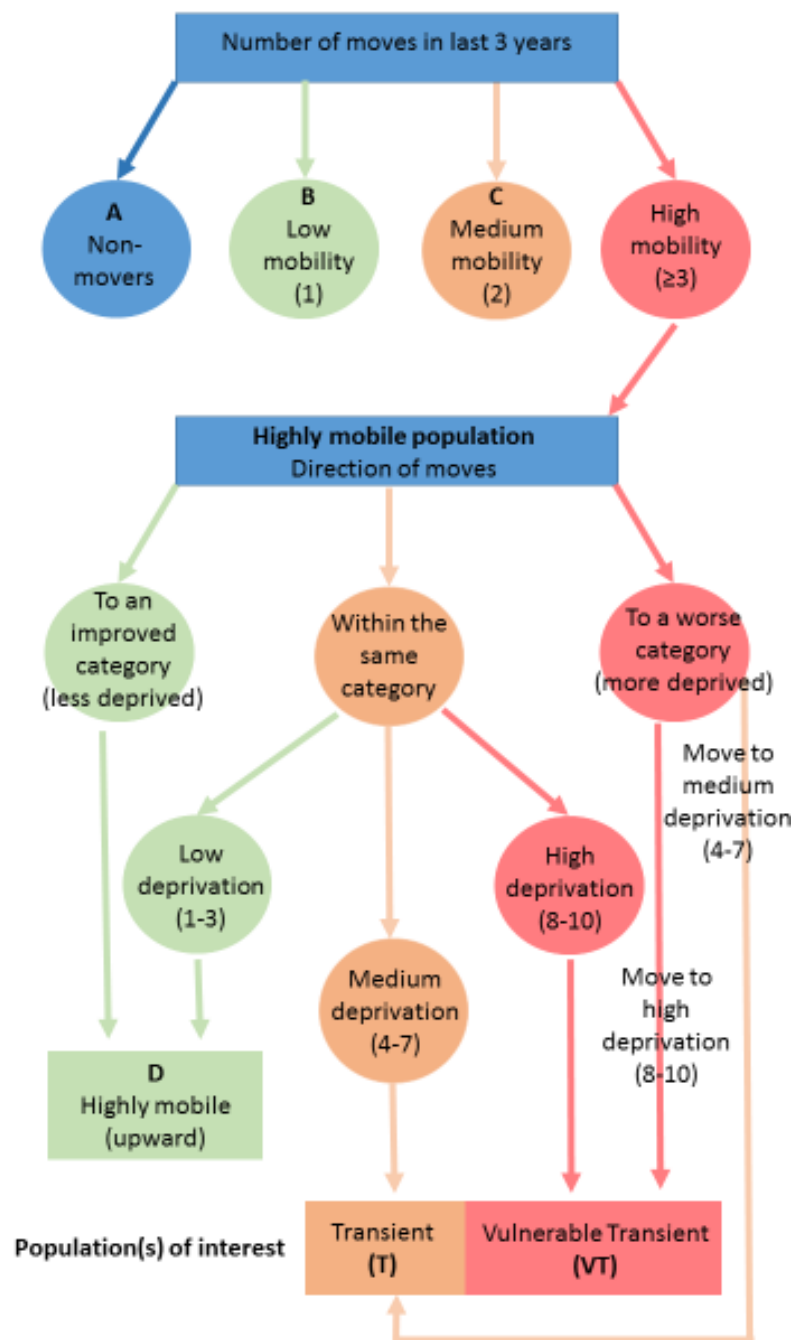
Step (iii) Defining movers and non-movers

We next partition our sample based on how often individuals have moved in the last three years, and whether their moves were to a less or more deprived neighbourhood (or neither). The framework we use is presented in Figure 10 below. The population is first split based on “frequency of moves”, into four outcomes – no, low, medium and high residential mobility. Those that are highly mobile are defined as moving at least three times in the last three years.

The highly mobile population is then broken down based on the direction of their moves. In this context, ‘direction of move’ is not geographic in nature, but rather represents the socioeconomic direction of an individual’s move. For this purpose, we use the deprivation index (i.e. [NZDep2013](#)) for the mesh block corresponding to each address event in our sample. For each address record, an individual will fall into one of three categories, low deprivation (index of 1-3), medium deprivation (index of 4-7), and high deprivation (index of 8-10). There are therefore three possible permutations for an individual’s direction of move – towards a worse category (e.g. low to medium, medium to high, or low to high deprivation); within the same category (e.g. low to low, medium to medium, and high to high deprivation); and towards an improved category (e.g. high to medium, high to low, and medium to low deprivation).

We use a prioritized system to classify each individual’s direction across the three year time frame. The highly mobile population is separated into the following three prioritized categories: (1) An individual is classed as "VT. Vulnerable transient" if any of the moves during our reference time frame were toward high deprivation; and/or within high deprivation (index of 8-10); (2) For those that are not VT, they are classed as a "T. Transient" if they ever moved from a low deprived area to a medium deprived area; or if any of the moves were within medium deprivation (index of 4-7); (3) The remainder are classed as highly mobile (upward).

Figure 10: Defining movers and non-movers using the IDI



To check the robustness of our results, we also trialled a classification system based on the deprivation index associated with an individual's first and last address events, rather than the prioritized system detailed above. The results for both methods are presented in Table 1.

Table 1: Quantification of movers and non-movers

| Populations of interest | Percentage of population Classification based on: | |
|---------------------------|--|--------------------------|
| | Prioritized system | First and last addresses |
| A. Non-movers | 70.20 | 70.48 |
| B. Low mobility | 16.94 | 17.00 |
| C. Medium mobility | 7.29 | 7.32 |
| D. High mobility (upward) | 0.25 | 1.56 |
| T. Transient | 1.29 | 1.19 |
| VT. Vulnerable transient | 4.04 | 2.44 |

Note: Total population = 3,857,433 under the prioritized system, and 3,842,295 under the alternative classification. The reference period is 01 Aug 2013 to 31 July 2016.

Using the prioritized system results in just over 4% of the population classed as vulnerable transients (VT). A further 1.29% of the population fall into the transient (T) category. In absolute numbers, the combination of these two groups equates to just over 200,000 individuals.

If we base the 'direction of move' for highly mobile individuals solely on the direction between the first and last address in the reference period, then the corresponding proportions for VT and T fall to 2.44% and 1.19%. We should note at this point that in this alternative method, our total sample shrinks by approximately 16,600 individuals because of the inability to utilize other address events if the mesh block(s) of the first and/or last address record(s) are missing an associated deprivation index.

Our analysis thus far is predicated on setting the threshold for high mobility at a minimum of three moves in three years. The next table illustrates what happens to the proportion of the population classified as T (and VT) if that threshold is raised.

Table 2: Quantification of T and VT

| High mobility threshold (Minimum number of moves in 3 years) | Percentage of population classified as: | |
|---|---|------|
| | T | VT |
| 3 moves | 1.29 | 4.04 |
| 4 moves | 0.40 | 2.06 |
| 5 moves | 0.13 | 1.06 |
| 6 moves | 0.04 | 0.56 |
| 7 moves | 0.01 | 0.30 |

Note: These proportions are based on the prioritized classification system. The reference period is 01 Aug 2013 to 31 July 2016.

As expected, as the threshold or our definition of high mobility is raised, the size of the population classified as and VT steadily shrinks. It should however be noted that even when we set the threshold at a minimum of 4 moves in 3 years, this still equates to a sizable population in absolute terms (just under 100,000 individuals). Likewise, at a minimum of 5 moves in 3 years, T and VT combine to equate to just under 50,000 individuals. These are the population in NZ that we would expect to also be experiencing negative outcomes with respect to health, wellbeing and education.

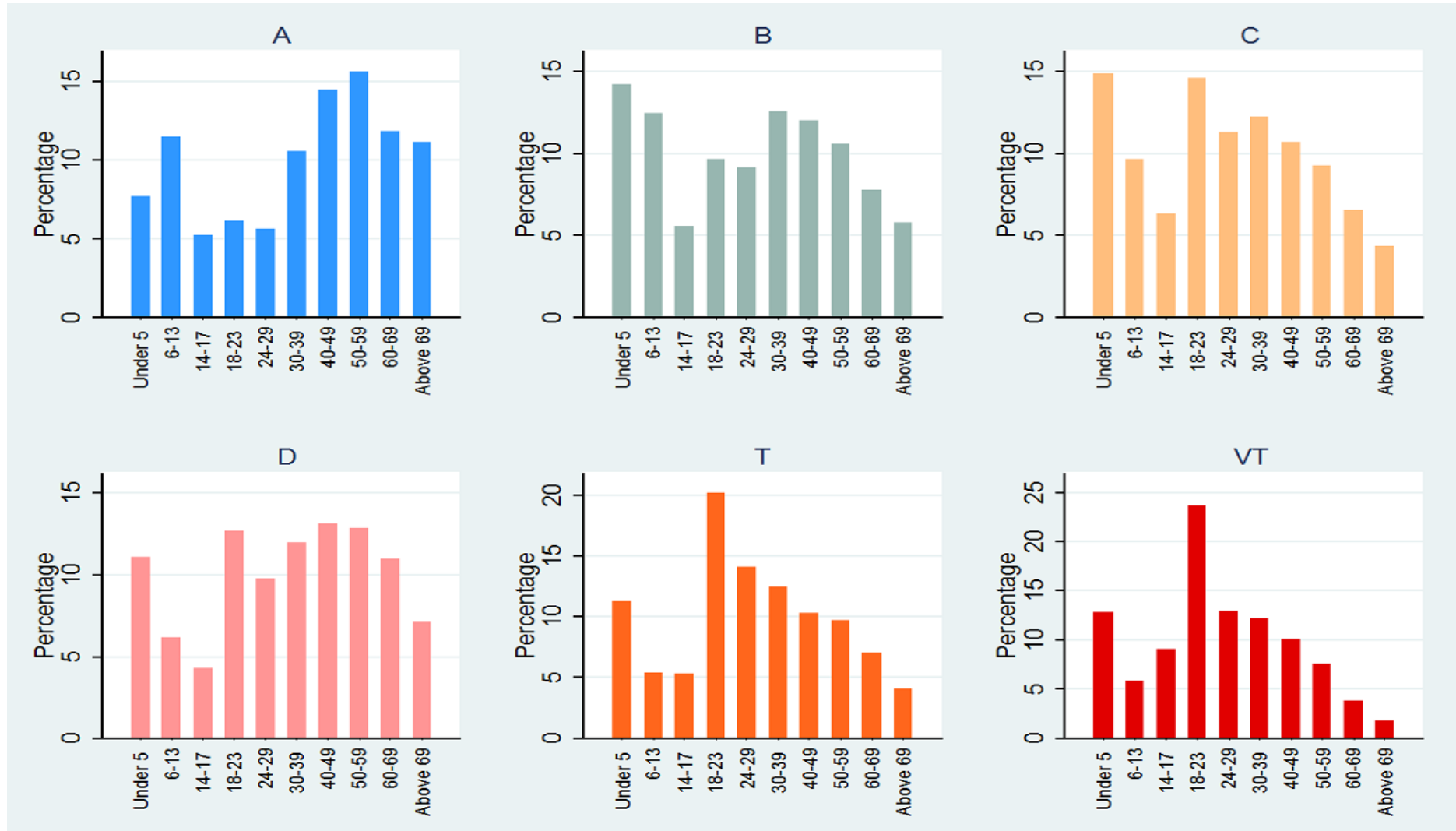
Step (iv) Profile of movers and non-movers

What are the characteristics of our key populations of interest? While this is the focus of the next study (due by the end of April 2017), we have performed some preliminary analysis on this front as a useful conclusion to this report, and a heads up regarding the future direction of this research programme. For this purpose we use information from the 'personal details' table in the IDI to provide a demographic profile of all six population groups (A, B, C, D, T, and VT). This profile is based on the individual's details at the start of the reference period – i.e. at 01 Aug 2013.

In general, we find that there is a higher proportion of females in T and VT, compared to the other groups. More specifically, 59.78% and 54.65% of the T and VT populations respectively are female; while the comparable proportion for the rest of the sample is 50.43%. The age distribution for each mobility group is presented in Figure 11. Young adults aged 18-23 years old have the strongest presence in T (20.20%) and VT (23.7%), followed by adults aged 24-29 years old (13-14%). Worryingly, the next largest grouping in VT is children aged 5 years and under, they represent 12.77% of the VT group. This is a troubling statistic, as we know from the prior literature in this space that children benefit from having a stable residence and established community connections.

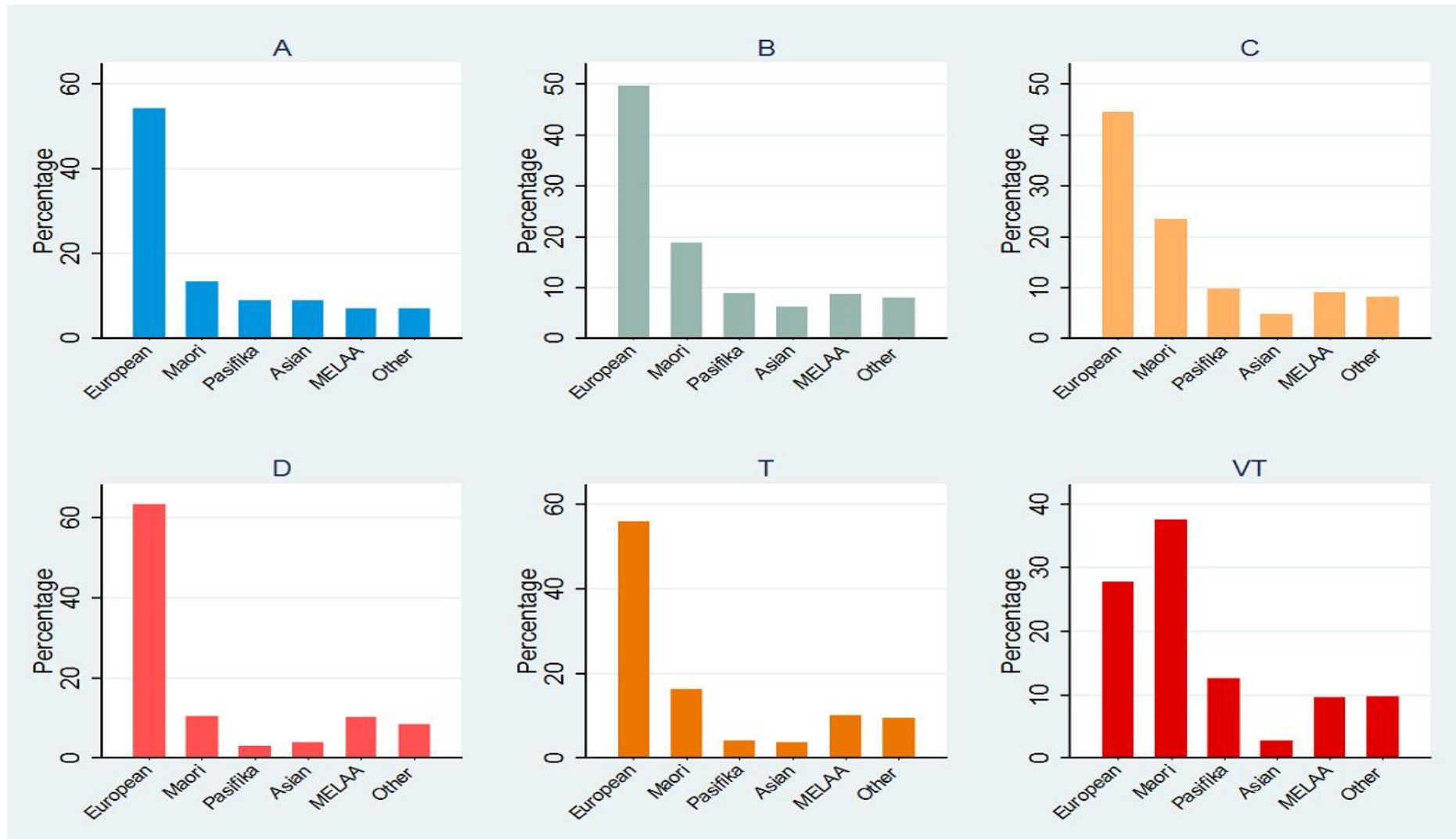
As for the ethnicity distribution for each of our mobility groups, this is presented in Figure 12, where it is clear that Māori are three times as likely to be in the VT group, compared to the A group (non-movers). Pasifika are also more likely to be in VT compared to A, but the relative odds are not as stark as those for Māori – in particular, they are 1.4 times more likely. In comparison, Europeans are half as likely to be in VT compared to A, and the likelihood of Asians being VT relative to being A is a third.

Figure 11: Age distribution for each mobility group



Note: A = non-movers; B = low mobility; C = medium mobility; D = high mobility (upward); T = transient; and VT = vulnerable transient; as defined in step (iii) of Section 4.

Figure 12: Ethnicity distribution for each mobility group



Note: A = non-movers; B = low mobility; C = medium mobility; D = high mobility (upward); T = transient; and VT = vulnerable transient; as defined in step (iii) of Section 4.

Our final set of descriptive analysis (shown in Table 3 below) represents the distance and duration patterns for the VT and T groups. Intra-regional moves indicate that an individual moved within a region but across different territorial local authorities (TLA) (e.g. Auckland city to Rodney), whereas inter-regional movements denote moving across geographic regions, such as moving from Auckland to Wellington. As Table 3 shows the majority of VT (and T) movements in the reference period were neither inter or intra-regional; meaning that these individuals tended to move within the same TLAs.

Table 3: Movement and duration patterns for T and VT

| | Percentage of mobility group | |
|---|------------------------------|-------|
| | T | VT |
| Number of intra-regional moves | | |
| None | 80.97 | 78.06 |
| One | 9.43 | 10.58 |
| Two | 5.84 | 7.10 |
| Three | 3.02 | 2.91 |
| Four to six | 0.72 | 1.31 |
| Seven or more | 0.00 | 0.03 |
| Number of inter-regional moves | | |
| None | 63.76 | 55.28 |
| One | 17.21 | 17.64 |
| Two | 11.75 | 15.45 |
| Three | 5.91 | 7.61 |
| Four to six | 1.35 | 3.81 |
| Seven or more | 0.02 | 0.20 |
| Number of times lived in an address for less than 180 days | | |
| None | 22.04 | 14.99 |
| One | 43.88 | 34.56 |
| Two | 24.11 | 25.19 |
| Three | 6.72 | 11.84 |
| Four to six | 3.05 | 10.87 |
| Seven or more | 0.18 | 2.54 |

Note: T and VT denote transient and vulnerable transient groups, as defined in step (iii) of Section 4.

Table 3 also illustrates how many within the T and VT populations experience short spells at an address (i.e. less than 180 days). We find that close to half of the VT population (and 34% of the T population) have experienced at least two under 180 day address spells during the reference period. This provides an unstable environment for these individuals, and their families, and likely negative outcomes on their health and wellbeing.

References

Australian Bureau of Statistics (2012) "Australians still on the move". Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/CO-68>.

Clark, W. and P. Morrison (2012) "Socio-spatial mobility and residential sorting: Evidence from a large-scale survey", *Urban Studies*, 49(15), pp. 3253-3270.

Machin, S., Salvanes, K. G., and P. Pelkonen (2012) "Education and Mobility", *Journal of the European Economic Association*, 10(2), pp. 417-450.

Morton, S., Carr, P., Berry, S., et al (2014) *Growing Up in New Zealand: A longitudinal study of New Zealand children and their families. Residential Mobility Report 1: Moving house in the first 1000 days*. Auckland: Growing Up in New Zealand.

Reeves, Richard V., and K. Howard (2013) "The Glass Floor: Education, Downward Mobility, and Opportunity Hoarding." Center on Children and Families at Brookings.

Statistics New Zealand (2007). "Moving to New Zealand: Reasons and Patterns of Settlement."

Statistics New Zealand (2007). Wellington, "QuickStats about Population Mobility."

Statistics New Zealand (2017) Information on Integrated Data Infrastructure. Retrieved from http://www.stats.govt.nz/browse_for_stats/snapshots-of-nz/integrated-data-infrastructure.asp