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Dynamics of Income and Deprivation in New Zealand, 2002-2009

A descriptive analysis of the Survey of Family, Income and Employment (SoFIE)

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Summary

Study of the distribution of incomes, and how the incomes of individuals change over time, is integral to the understanding of changes in the economic situation and poverty in the New Zealand population over time. Research of temporal dynamics presents a more comprehensive understanding of poverty than point-in-time (multiple cross-sectional) studies. Longitudinal (dynamics) research shows that people can experience different types of poverty, that the majority of people who experience poverty move in and out of poverty, and that many more people experience poverty over a period of time than they do at any one moment in time.

We utilise the recent release of seven years of data from the Survey of Family, Income and Employment (SoFIE) to examine dynamics in income, low income and deprivation for individuals from 2002 to 2009. The objective of this report is to provide relevant and timely information for current policy discussions on poverty being undertaken by the Treasury, a Ministerial Committee on poverty and the Children's Commission, which is investigating evidence for interventions to reduce poverty in children.

The Survey of Family, Income and Employment

The report uses seven waves of data from SoFIE, which was an annual panel survey administered by Statistics New Zealand. SoFIE gathered detailed annual information on income such as employment and education experiences, household and family status and changes, demographic factors and health status, from over 18,000 individual sample members for seven years from 2002 to 2009. Attrition (drop out of respondents) over the seven years was around 37% which is similar to comparable panel surveys internationally.

Income

The main measure of income used in this report was total household (gross) income derived by totalling adult annual personal income (before tax) from all sources received within a household and equivalised for household size. Equivalised household income adjusting for changes in the CPI from October 2001 (the first income reference period quarter) was used as a measure of "real" income over the time period. In the SoFIE data 10% of individuals had a missing component of personal income, which may have led to an underestimation of household income. However, annual measures of personal and household income in SoFIE have been found to follow similar income trajectories as other national cross-sectional surveys.

The measure of low income used in this analysis of SoFIE was calculated as 60% (or less) of median equivalised gross household income at each wave. Duration of low income is the number of waves the respondent was in low income over the survey period. The measure of chronic low income compares a respondent's permanent income (smoothed) over the study period with the average low income line, using CPI adjusted equivalised household income data. This was used to decompose the average low income rate into those who were in chronic versus those in transitory low income, as well as decompose cross-sectional rates of low income into those who were chronically in low income and those who were not.

Deprivation

The measure of deprivation used in this report was taken from an individual-level index of socioeconomic deprivation (NZiDep), which was asked as part of the health module in waves 3, 5 and 7. The NZiDep is a tool used for measuring deprivation for individuals and is a composite score based on eight simple questions ranging from whether the respondent had to buy cheaper food so they could pay for other things to whether the respondent had to make use of food banks over the past 12 months. Respondents were classified as being in deprivation if they reported three or more measures at each wave. The duration of deprivation was calculated by adding up the number of waves the respondent was classified as being in deprivation.

Results

Income mobility

- There was much annual mobility in income, both up and down the income scale.
- From year to year, there was relative stability in income at the upper and lower income quintiles, with those in the highest quintile having a 72% probability of remaining there in the next year; this was 65% for the lowest quintile. Around 50% of the middle income quintiles experienced year on year mobility.
- From wave 1-7, overall mobility in income was higher, with around 50% of those who started out in the lowest or highest quintile ending the study period in the same quintile. Around two thirds of the middle income quintiles experienced mobility (i.e. moving either up or down from the wave one quintile).

Low income

- Between 23-25% of the SoFIE population were in 'low income' (<60% of the median household equivalised before tax household income) in each wave.
- Low income rates were higher for Māori, children and older adults (>65 years).
- About 50% of the population experienced low income for one or more years of the study, 20% were in low income for over half of the study period (four or more years) and 6% for all seven years.
- Persistence and/or recurrence of low income was also high. Of those who were in low income at wave 1; 65% remained in low income at wave 2; 50% were in low income in wave 7; a quarter were in low income for all seven waves.
- Entry rates into low income over two years were around 7% and exit rates were 7-8%.
- Chronic low income (where permanent income over the seven waves was below the average low income line) was 21% overall but higher in Māori and children. This means that about 5% of the survey population experienced transitory low income over the study period.
- Of those who were in low income at each wave, over 60% were chronically in low income.

Deprivation

- Approximately 6-7% of the population were in deprivation (defined as a score of three or more measures on the NZiDep) at the three time points at which deprivation was measured.
- About 12% of respondents were in deprivation at least once over the three waves.
- Of those who were in deprivation initially (at wave 3), over 40% were in deprivation in wave 7 also and a quarter were in deprivation in both waves 5 and 7.

Low Income and Deprivation

- Respondents who experienced a longer duration of low income also reported more deprivation (the mean deprivation increased with duration of low income and the percentage of those in longer duration of deprivation also increased).

Key Messages

- There is much mobility in income, both upwards and downwards over seven years.
- Cross-sectional rates of low income and deprivation underestimate the experience of low income and deprivation over a period of time.
- Where cross-sectional low income (<60% of median household equivalised income) rates were around 24% (low income estimate) the longitudinal estimate of low income prevalence over seven years is approximately double this (50%) – i.e. half of the sample experienced one or more years of low income.
- Where deprivation (New Zealand Individual Deprivation Index score of three or more) rates were 6-7% (cross-sectionally), the longitudinal estimate of deprivation over three time periods is approximately twice this (12%).
- Approximately two thirds of people who were in low income at any one point in time were chronically in low income over a longer period of time (higher for Māori and children).
- Approximately 5% of people who are not in low income at one point in time were in chronic low income over a longer period of time (higher for Māori and children).
- Increasing duration of low income is correlated with increasing levels of deprivation.

Table of Contents

List of Tables

List of Figures

List of Appendix Tables

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Statistics New Zealand Security Statement

Access to the data used in this study was provided by Statistics New Zealand in a secure environment designed to give effect to the confidentiality provisions of the Statistics Act, 1975. The results in this study and any errors contained therein are those of the authors, not Statistics New Zealand.

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Background

Study of the distribution of incomes, and how the incomes of individuals change over time, is integral to the understanding of changes in the economic situation and poverty in the New Zealand population over time. Research of temporal dynamics presents a more comprehensive understanding of poverty than point-in-time (multiple cross-sectional) studies (Wilkins et al., 2011). While point-in-time studies provide a static 'snap shot' of the population at a given time period, dynamics or longitudinal research traces the same individuals or households over time and so is able to record stories of change. Longitudinal (dynamics) research shows that people can experience different types of poverty, that the majority of people who experience poverty over a period of time move in and out of poverty, and that many more people experience poverty over a period of time than they do at any one moment in time (Smith and Middleton, 2007, Jenkins, 2011). Chronic and transitory poverty most likely have different causes and have different policy responses so it is important to tease them apart where possible (Rodgers and Rodgers, 2009, Jenkins, 2011).

We utilise the recent release of seven years of longitudinal data from the Survey of Families, Income and Employment as this survey has the capacity to provide more information on the dynamics of economic life in New Zealand than any other data source. One of the original objectives of the SoFIE study was to identify patterns of income experiences over time for individuals and families (Carter et al., 2010, Statistics New Zealand, 2001b). SoFIE gathered detailed annual income information from over 18,000 individual sample members for seven years from 2002 to 2009, therefore we can examine changes in income and poverty for individuals over time. This is not to argue that the SoFIE Survey provides the best evidence about *current levels* and *recent trends* in income or poverty. The regular point-in-time income reports produced by Bryan Perry from the Ministry of Social Development provide detailed analysis and monitoring of trends and depth of poverty and hardship, using a wide range of measures of poverty and economic well-being (Perry, 2011, Perry, 2009). However, these reports are based on cross-sectional survey data, which cannot provide information on income mobility (how individuals move in and out of higher and lower income groups), poverty duration (how long individuals remain in poverty over time), poverty persistence (the proportion of people who are still in poverty at one or more years after experiencing poverty), poverty recurrence (how many people exit and re-enter poverty) and chronic poverty (the proportion of people whose average income over a given time period is below the average poverty line of that same time period). Therefore, the examination of longitudinal dynamics of income and poverty will complement these cross-sectional studies (Perry, 2011, Perry, 2009) and provide more information to the understanding of poverty in New Zealand.

The objective of this report is to provide relevant and timely information on the dynamics of income, low income and deprivation over time, for current policy discussions on poverty being undertaken by the Treasury, a Ministerial Committee on poverty and the Children's Commission, which is investigating evidence for interventions to reduce poverty in children.

Methods

Data

We used seven waves of data from the Survey of Family, Income and Employment (SoFIE), an annual longitudinal survey administered by Statistics New Zealand (SoFIE data waves 1-7 version 2). SoFIE was a fixed household panel survey that began in 2002 and finished in 2010, with the first wave of data collection continuing over the period of October 2002 to September 2003 and the final (eighth) wave from October 2009 to September 2009 to October 2010. Information from the first seven waves was used in this analysis.

Population

The sample population used for the analyses in this paper was SoFIE participants who were eligible at wave 1, who responded in all seven waves, giving a sample size of 18,785. The individual was the unit of observation for this analysis, so if there were two or more individuals in a household then their household income was represented two or more times in the analysis population.

Eligible participants included the usually resident population of New Zealand living in permanent, private dwellings on the main islands in the North and South Islands (including Waiheke Island), and excluded overseas visitors resident in NZ for <12 months and who intend to stay in NZ for <12 months; non-NZ diplomats and diplomatic staff and their dependants; members of non-NZ armed forces stationed in NZ and their dependants; and people living in institutions or in other non-private dwelling establishments such as boarding houses, hotels, motels and hostels, as well as people living on offshore islands (Statistics New Zealand, 2008, Carter et al., 2010). Children (those aged less than fifteen years) were not asked specific survey questions, but demographic information (age, sex and ethnicity) on all children in the household was collected from the respondent in the household who answered the household questionnaire.

Sampling for SoFIE was by a three stage stratified cluster approach, by selecting a random sample of primary sampling units (a group of around 70 dwellings) stratified according to socioeconomic and other variables, then a random sample of dwellings within these units (Carter et al., 2010). The initial SoFIE sample comprised approximately 11,500 responding private households (response rate of 77%) with over 29,000 respondents (over 22,000 adults) included in wave 1, reducing to over 18,000 in wave 7 (63% of wave 1 responders), 13,850 adults (aged 15 years and older; 66% of Wave 1). This rate of attrition is similar to other international longitudinal surveys (HILDA 69%, 67% BHPS) (Wilkins et al., 2011, Buck et al., 2006).

Appendix Table A: 1 presents the Wave 1 characteristics of the original Wave 1 SoFIE population and the balanced panel. This table shows that respondents reporting Māori or Other ethnicity, low income and sole parents were more likely to drop out over the seven waves of the study. This may have led to an over-estimation of income in the balanced panel and an underestimation of those respondents classed as in low income.

Measures

In SoFIE, face to face interviews are used to collect information annually on income levels, sources and changes, and on the major influences on income such as employment and education experiences, household and family status and changes, demographic factors and health status. The SoFIE-Health module was comprised of 20 minutes of questionnaire time in waves 3 (2004-05), 5 (2006-07) and 7 (2008-09), in the following health-related domains: health status (SF36 & Kessler scale), perceived stress, chronic conditions (heart disease, diabetes, and injury-related disability), tobacco smoking, alcohol consumption, health care utilisation, and an individual deprivation score (Carter et al., 2010).

Income

Household income was derived by totalling adult annual personal income (before tax) from all sources received within a household for the 12 months prior to the interview date, so annual income estimates for wave 1 relate to the 2001-2002 financial period. This was equivalised for household economies of scale using the 1988 Revised Jensen Scale (Jensen, 1988) which is very close to the widely used modified OECD scale. Most analyses– unless otherwise noted – used (nominal) equivalised household income calculated before housing costs and *did not* adjust for changes in Consumer Price Index (CPI). Equivalised household income calculated after housing costs was used to compare rates of low income to other surveys. Housing costs included: rents, mortgage payments

(principal and interest), and rates (land and water). Equivalised household income adjusting for changes in the CPI from October 2001 (the first income reference period quarter) was used as a measure of "real" income over the time period. The CPI adjustment for income was mapped to the four quarters of the year, as SoFIE data is collected throughout a 12 month calendar period. This means that for data in one wave that was collected over different reference periods had slightly different CPI adjustments made (e.g. a wave 1 respondent interviewed in October 2002 compared to someone interviewed in August 2003).

The SoFIE survey collects both point-in-time data and time-spell data. Annual personal income was derived by adding together the following: Employee earnings were the 'usual/regular' pay received in a spell with an employer, government transfer income referred to gross as well as non-taxable income received from government transfers within the reference period, income from self-employment, interest from bank accounts, income from other investments, income from private superannuation and pension schemes, other income received as regular payments and other irregular income. In the SoFIE data 10% of respondents had a missing component of personal income, which may be only a small component over their overall income across the wave (e.g. missing the dollar amount of employee earnings or benefit for a short spell over the 12 months). Missing data was more common in respondents who reported multiple spells and components of income over the annual reference period, who were also more likely be in lower income groups. Therefore the household income may be slightly underestimated leading to a small overestimation of those in low income. However, annual personal income in SoFIE has been found to follow income trajectories from the NZ Income Survey closely [SoFIE User Network meeting February 2012]. Also a comparison of the median and mean gross equivalised household income of the SoFIE (balanced panel) with a comparable household income from the Household Economic Survey found very similar results across the study period (See Table 3 below).

Measurement error in income afflicts all household income surveys. In longitudinal data it poses a particular problem of 'regression-to the-mean', where under- or over-reporting income in one year increases the chances an individual will be located at an extremity of the income distribution. If that individual in the next year accurately reports income, it is likely they will be located closer to the middle of the income distribution in that year. Therefore, we may get a misleading picture of income mobility within the sample, where changes in income between waves for individuals at high and low initial incomes will be too large. Respondents' income will appear to have 'regressed' or moved back towards the mean. A partial remedy for regression to the mean of changes in income is to combine years in income to create a measure of more permanent income: i.e. waves 1 and 2, and Waves 6 and 7. The percentage change in income over the survey period for each individual was calculated as:

$$\left(\mu inc_{W6/7} - \mu inc_{W1/2}\right)/\mu inc_{W1/2} \times 100\%$$

Income mobility is presented as transition tables of quintiles of equivalised household income summing transitions from wave (i) to wave (i+1) across the seven waves. Transition tables of deciles of equivalised household income were also calculated for sub-population groupings (these are available upon request from the authors).

Low Income

The measure of low income used in this analysis of SoFIE was calculated as less than 60% of the median gross equivalised household income of each wave. This may not be comparable to measures of 'poverty' in other surveys, for the following reasons: these tables were not weighted to the New Zealand population; the main measure of income used was before tax; and as discussed above there was measurement error in income specific to SoFIE data. Therefore, the measure of low income in this report should not be interpreted as poverty as defined in other surveys. We also investigated

dynamics in low income using gross equivalised household income after housing costs and found similar relationships in the data. We also investigated a lower cut-point for low income (<50% median gross equivalised household income), which reduced the magnitude of the proportion of respondents in low income.

The measure of low income in this research is a measure of *relative* deprivation or socioeconomic disadvantage, which measures deprivation in terms of inadequacy of *income* in the SoFIE population. This approach sets the low income (poverty) line as 60% of the median income at each wave of the survey so the threshold changes with the incomes of those in the middle of the income distribution at each wave. Each household was classified as low income, or not, at each wave and this was applied to every respondent in that household. Therefore, this approach provides an indication of changes in income within households relative to the SoFIE population, not the general population.

Duration of low income

We calculated the duration a respondent or household was classed as being in poverty or low income over the seven waves of the survey period by adding up the number of waves the respondent was in poverty or low income (range: 0 = never to 7 = always).

Chronic low income

As discussed above chronic and transitory low income most likely have different causes and have different policy responses (Rodgers and Rodgers, 2009, Jenkins, 2011). This method compares a respondent's permanent income (smoothed) with the average low income line ($27,337), over the seven waves, using CPI adjusted equivalised household income data to give a measure of chronic low income (C). If a respondent had permanent income below the average low income line then they were classed as being in chronic low income (chronically poor). If a respondent was in low income in any one wave, but not chronically in low income, they were in 'transitory' low income (T). Therefore, the average low income rate (A) can be decomposed into those in chronic (C) versus transitory (T) low income, where the proportion in transitory low income,

$$T = \frac{1}{nW}\sum_{i=1}^{n}\sum_{w=1}^{W} a_{iw} - \frac{1}{n}\sum_{i=1}^{n} c_i = A - C$$

Where w = wave, i = respondent, a_{iw} = average of the proportion of cross sections in low income over the study period (or average annual low income rates over the seven years), c_i = proportion of people with chronic low income (permanent income less than the average low income line) over the study period.

In any given year a respondent could be chronically in low income and cross-sectionally in low income, one or the other, or neither. Therefore, we also examined the contribution of those who were chronically in low income to the proportion who were in low income at each year/wave (w) of the survey. This provides information on how much cross-sectional rates of low income are made up from those chronically in low income and those in transitory low income.

Deprivation (NZiDep)

As part of the health module asked in waves 3, 5 and 7 an individual-level index of socioeconomic deprivation (NZiDep) was included. The NZiDep is a tool used for measuring deprivation for individuals and is a composite score based on eight simple questions (Salmond et al., 2005):

- Whether the person had been forced to buy cheaper food in the 12 months before the interview date, so that they could pay for other things needed
- Whether the person has been unemployed for 4 or more weeks during the last 12 months
- Whether the person had put up with feeling cold in the 12 months before the interview date, to save on heating costs

- Whether the person has received help in the form of clothes or money from a community organisation in the 12 months before the interview date
- Whether the person had gone without fresh fruit and vegetables in the 12 months before the interview date, so that they could pay for other things needed
- Whether the person continued wearing shoes with holes in them in the 12 months before the interview date, because they could not afford to replace them
- Whether the person received an income tested benefit, in the last 12 months
- Whether the person has made use of special food grants or food banks in the 12 months before the interview date, because they did not have enough money for food.

The NZiDep is typically coded as: 1. no deprivation measures, 2. one deprivation measures, 3. two deprivation measures, 4. three or four deprivation measures, or 5. five or more deprivation measures. We created a binary measure of whether an individual had evidence of living in deprivation based on a score of three or more reported measures of deprivation (and for validation/comparison purposes, we also repeated this for a score of two or more). For children (less than 15 years), who did not report an individual score, we calculated an average NZiDep across adults within their household and applied this rounded average score to the children in the household.

In wave 3, there were 360 missing NZiDep values, in wave 5 there were 310 missing but in wave 7 there were only 20 missing. For the transition tables, missing values were removed; for tables of cross sectional prevalence, missing values were disregarded. For tables using duration of deprivation, people with a missing NZiDep score were classified as having 'no deprivation' so as not to lose useful data on changes over time.

Duration of deprivation

We calculated the duration a respondent or household was in deprivation over waves 3, 5 and 7 by adding up the number of waves the respondent was classified as being in deprivation (indicated by three or more measures at each wave, or as a sensitivity analysis 2 or more measures at each wave). The range of duration of deprivation over the three health waves of SoFIE was: 0 = never to 3 = always.

Descriptive Variables

Most of the descriptive factors were taken from the wave 1 interview. However, we used the highest level of education across all of the waves (at wave 7).

- **Age** categories (where applicable): 0-17; 18-24; 25-44; 45-64; and 65+
  1. all ages (0 years +)
  2. children (0-17 years) ; also (0-4, 5-9 and 10-17 years)
  3. working ages (18-64 years)

Age used in this report is age at wave 1, therefore in tables where age is used a descriptive characteristic by wave of low income, it is important to understand that by wave 7 the age groups will have increased by seven years (e.g. age 0 to 17 at wave 1 will increase to age 6 to 23 at wave 7).

- **Ethnicity**: NZ European, Māori and Other (Pacific and Asian populations are included in Other). Most tables are presented for NZ European and Māori ethnicity only. Ethnicity is taken as the most often reported ethnicity across the seven waves of SoFIE and prioritised into Māori, Pacific, Asian, Other, NZ European.
- **Education** (at wave 7): No qualifications, school, vocational, degree and above. – NOTE there is missing education for people aged 15 years and older at wave 7 (N=2,575).
- **Family structure**: Sole parent families, couple only, couples with children, and not in a family nucleus.
- **Location** (standard localities): Auckland, Wellington, Waikato, rest of North Island, Canterbury, and rest of South Island.
- **Main urban/other** : Main urban area: Centres with populations of 30,000 or more; other

Caveats of the results

Results were not weighted to the New Zealand population and relate only to the SoFIE survey balanced panel sample. The numbers presented in the tables are rounded due to Statistics New Zealand confidentiality protocols, therefore, the numbers between tables may not be the same.

This report is a simple descriptive analysis of dynamics in income and deprivation using the SoFIE data. No statistical tests for differences between groups or trends over time were conducted. Although there is a large sample size in SoFIE, any proportions or percentages that were based on cell numbers of 50 or less are bolded in the tables, these should be interpreted with caution. The results in this report were not standardised for age differences between population subgroups. There were different age structures in a number of the sub-groups presented in this report such as the younger age distribution of Māori compared to non-Māori and so the results need to be interpreted with this in mind.

There were changes in demographic events, such as forming partnerships, having children or marriage dissolution, that have an impact on income mobility and transitions in and out of low income (Jenkins, 2011). This is a descriptive report only and the results presented in this report do not control for changes in demographic characteristics. Therefore, associations between demographic characteristics and income mobility cannot be interpreted as causal relationships, as confounding and other biases were not controlled for.

The results may have been affected by attrition bias, as we know that attrition was greater amongst young people, Māori and those with low income. This means that the 'true' low income rates in these groups in the general population may actually be higher than what was found in the analysis of this sample. Although longitudinal weights (weighting the SoFIE population back to the original sample) were provided as part of the SoFIE data, they did not (currently) take into attrition by key sub-groups of the population such as income, so we have not used these weights. An investigation of income using the longitudinal weights, showed that the mean and median income was grossly overestimated compared to National level data. New longitudinal and cross-sectional weights that may be used in future work are in development. As discussed previously, there may be some measurement error in the income data due to missing components of personal income and regression to the mean in longitudinal changes in income. However the gross income compares reasonably well to the Household Economic and NZ Income Surveys over similar time periods.

Results

Baseline Demographics

Table 1 and Table 2 present descriptive tables of the demographic characteristics of the balanced panel sample included in the analysis. There was a similar proportion of Māori to the NZ population in the NZ Census 2001 (Statistics New Zealand, 2001a). In this analysis sample the Māori population is younger than the NZ European respondents and have a higher proportion of sole parent families.

Table 1. Baseline sample characteristics by age

			Age at Wave 1				
			0-17	18-24	25-44	45-64	65+
	Total N	Col %	Row %				
All	18,785		26.2	5.9	29.9	27.2	10.8
Ethnicity							
NZ European	14,250	75.9	22.7	5.3	29.3	29.6	13.2
Māori	2,450	13.0	42.7	7.1	30.4	16.5	3.3
Other	2,085	11.1	31.4	8.6	33.3	23.0	3.8
Highest education at wave 7							
Degree or Higher	2,560	13.6	4.5	11.5	49.0	29.7	5.3
Post school qualification	5,685	30.3	6.3	7.5	39.8	34.9	11.4
School qualification	4,305	22.9	30.0	6.6	30.7	23.5	9.4
No qualification	3,660	19.5	16.3	2.9	21.2	36.9	23.1
Std family type at Wave 1							
Couple only	4,555	24.2	**0.1**	4.3	20.2	49.2	26.2
Couple with children	9,645	51.3	41.1	4.8	35.0	18.2	0.9
Sole parent family	2,100	11.2	43.8	7.4	30.7	15.5	2.6
Not in a family nucleus	2,485	13.2	**1.6**	11.9	27.0	31.6	28.0
Geographic region at Wave 1							
Auckland	4,595	24.5	26.7	6.1	32.1	26.9	8.3
Waikato	1,695	9.0	27.1	8.3	28.0	25.1	11.5
Wellington	2,470	13.1	26.5	5.7	31.8	25.7	10.3
Rest of North Island	4,315	23.0	28.0	4.3	27.1	27.5	13.1
Canterbury	3,000	16.0	23.8	6.3	31.7	27.3	10.8
Rest of South Island	2,710	14.4	24.7	6.3	27.9	29.7	11.4
Urban Area at Wave 1							
Main Urban	13,655	72.7	26.3	6.4	31.0	26.2	10.1
Other	5,130	27.3	26.1	4.4	26.9	29.7	12.8

Bold values are row percentages based on cell numbers of 50 or less

Table 2. Baseline characteristics of sample by ethnicity

		Ethnicity		
		NZ European	Māori	Other
	Total N	Row %		
All	18,785	75.9	13.0	11.1
Age at Wave 1				
0-17	3,230	65.5	21.2	13.3
18-24	750	67.9	15.8	16.3
25-44	4,170	74.3	13.3	12.4
45-64	4,220	82.7	7.9	9.4
65+	1,875	92.4	3.9	3.9
Highest education at Wave 7				
Degree or Higher	2,560	76.0	7.2	16.6
Post school qualification	5,685	81.2	10.8	8.0
School Qualification	4,305	76.8	10.3	12.8
No Qualification	3,660	75.1	16.4	8.6
Std family type at Wave 1				
Couple only	4,555	87.5	6.7	5.8
Couple with children	9,645	71.9	13.6	14.5
Sole parent family	2,100	58.3	29.5	12.1
Not in a family nucleus	2,485	84.7	8.5	6.8
Geographic region at Wave 1				
Auckland	4,595	63.7	10.4	25.9
Waikato	1,695	75.8	18.0	6.2
Wellington	2,470	74.1	12.6	13.6
Rest of North Island	4,315	75.4	20.9	3.7
Canterbury	3,000	85.7	7.5	6.8
Rest of South Island	2,710	88.0	8.5	3.5
Urban Area at Wave 1				
Main Urban	13,655	73.5	12.4	14.0
Other	5,130	82.1	14.6	3.3

Bold values are row percentages based on cell numbers of 50 or less

Dynamics of Income

Income Mobility

Table 3 presents the median and mean equivalised household income across the seven waves of SoFIE using different measures of household income. As discussed in the Methods section, the main income measure used in this report was the equivalised gross household income (before tax). The trends in Table 3 show that the median and average household income increased over the seven waves, even after adjusting for effects of inflation (consumer price index). As expected the median and mean income was lower after taking into account housing costs in the equivalised household income. The difference between the before and after housing costs incomes increased over the seven waves from around $7,000 to $10,000, reflecting increases in housing costs over the time period. Comparing the results (columns 1 and 2) to gross income before housing costs in the Household Economic Survey (columns 5 and 6) the median and means were similar over time. This provides confidence in the measure of equivalised gross household income from the SoFIE data. The equivalised household (real) income adjusted for changes in the CPI still show increases in the median and mean income across the seven waves.

Table 3. Median and mean equivalised gross household income by wave

	Median	Mean	Median AHC	Mean AHC	Median HES *	Mean HES *	Median CPI adj	Mean CPI adj
W1	$43,060	$55,484	$36,115	$48,318			$41,485	$53,377
W2	$44,898	$58,564	$37,314	$50,528	$44,248	$53,894	$42,014	$54,890
W3	$46,926	$62,216	$38,868	$53,318			$42,690	$56,515
W4	$49,612	$65,400	$41,254	$56,702			$43,740	$57,603
W5	$52,728	$68,505	$43,535	$58,233	$50,523	$62,174	$45,240	$58,810
W6	$55,356	$72,430	$45,408	$61,891	$54,758	$68,343	$45,819	$59,878
W7	$56,590	$72,369	$46,977	$62,357	$58,977	$72,535	$45,869	$58,722
W1-2							$42,476	$54,133
W6-7							$46,566	$59,300

***** Equivalised Gross Household Income from the Household Economic Survey [personal communication Bryan Perry]

While many people were experiencing increases in income, it may also be that some people experienced declines in income, or at least only small increases. The longitudinal structure of the SoFIE data allows us to examine respondents' experiences of income changes over the study period. Table 4 presents income mobility in the SoFIE population through transition probability tables which maps the income quintile a respondent is in at wave i (1) to their income quintile in wave i+1 (2) and sums the transition probabilities over the six wave combinations. These transition tables used household equivalised (not CPI adjusted and before housing costs) income. The transition tables reveals the amount of movement that is hidden in the cross sectional descriptions of income.

Table 4 shows that there is some stability in income between waves i.e. 65% of respondent in income quintile 1 in wave 1 were also in income quintile 1 in wave 2, indicating that respondents are much more likely to remain in the same quintile in the next wave. However, Table 4 also shows that there was also much off diagonal mobility in income, with higher probability of moving to an adjacent quintile (up or down) than moving two or more quintiles between waves i.e. 23% of respondent in income quintile 1 in wave 1 were in income quintile 2 in wave 2. The probability of moving (up or down) greater than one quintile is much less. This is also evident in Table 12 (persistence of low income) below. Transition tables by age and ethnicity are presented in Appendix Table A: 3 and Table A: 4 and there doesn't appear to be a strong age or ethnicity effect in wave by wave transitions. Table A: 5 presents transition probabilities using deciles of income and shows that when using finer cut-points of income (i.e. 10 compared to 5) there is much more mobility in income (both up and down the scale).

Table 5 presents the probability of changing income quintile over the study period by crossing income quintile at wave 1 (origin) with income quintile at wave 7 (destination). This shows that about 45% of respondents who start out in income quintile 1 at wave 1 were also in income quintile 1 at wave 7. There is much more off-diagonal movement in Table 5 compared to Table 4, indicating that over a seven year period people are more likely to move (both up and down) income quintiles.

Income mobility and stability per se are not 'good' or 'bad' – it depends on the origin and destination, and upward mobility is usually considered desirable. For example, of those who started in quintile 3 in wave 1, 37% moved up into a higher income quintile, but 32% moved into a lower quintile (and 31% stayed in quintile 3). However, a limitation of such transition tables is that they only examined one metric (income) without reference to other dimensions that income and income mobility may affect (e.g. health, wellbeing, quality of life). For example, a decline in income may be expected and be associated with positive life events such as having a baby.

Table 4. Income transition probability table w(i) to w(i+1)

Income quintile transition probabilities wave 1-7 All ages							
		W(i+1)					
		Q1 (low)	Q2	Q3	Q4	Q5 (high)	Totals
	Q1 (low)	0.653	0.226	0.066	0.034	0.021	21,330
W(i)	Q2	0.198	0.524	0.202	0.053	0.024	21,800
	Q3	0.069	0.165	0.504	0.207	0.053	21,905
	Q4	0.040	0.058	0.176	0.538	0.187	21,855
	Q5 (high)	0.031	0.030	0.055	0.169	0.715	21,830
	Totals	21,325	21,785	21,920	21,855	21,840	108,720

Income based on equivalised household income (not CPI adjusted and before housing costs)

Table 5. Income transition probability table Wave 1 to Wave 7

Income quintile transition probabilities wave 1-7 All ages							
		Wave 7					
		Q1 (low)	Q2	Q3	Q4	Q5 (high)	Totals
Wave 1	Q1 (low)	0.450	0.289	0.137	0.087	0.039	3,755
	Q2	0.250	0.349	0.228	0.119	0.055	3,755
	Q3	0.134	0.185	0.313	0.256	0.112	3,765
	Q4	0.096	0.108	0.208	0.337	0.253	3,750
	Q5 (high)	0.069	0.070	0.114	0.202	0.543	3,760
	Totals	3,755	3,755	3,755	3,760	3,755	18,785

Income based on equivalised household income (not CPI adjusted and before housing costs)

Changes in Income

As discussed in the methods regression to the mean is an issue in longitudinal analyses of changes in income, so we created a measure of permanent income taking the average of real income (CPI adjusted equivalised household income) at waves 1 and 2 and waves 6 and 7. To examine changes in income within respondents we calculated the percentage change in income from waves 1 and 2 to waves 6 and 7 and is presented in Table 6. This table shows that households which started in low income were more likely to experience an increase in their (percentage change) income, which may be due to the general increases seen in income over the study period. Whereas, households which started in high income quintiles were more likely to experience a decrease in their income, which may be due to ceiling effects of high levels of income. However, these tables are not adjusted for age. These effects may be explained (in part) by age effects where high income older populations are entering retirement and low income earners (e.g. young people and students) are entering employment and career trajectories. Additional tables stratified by ethnicity and age are presented in Appendix Table A: 6.

Table 6: Percentage change in real income (CPI adjusted) by baseline income quintiles

		Percentage change in income from w1/2 to w6/7									
N / Row %		**> 40% decrease**	**40-20% decrease**	**10-20% decrease**	**0-10% decrease**	**0-10% increase**	**10-20% increase**	**20-40% increase**	**40-60% increase**	**60-100% increase**	**100%+ increase**
Overall	18,785	12.0	10.8	6.7	8.7	10.0	9.1	13.2	8.5	9.8	11.0
Household Income Wave 1											
Q1	3,760	6.0	4.7	3.6	5.1	8.0	7.6	12.0	9.8	12.5	30.2
Q2	3,755	5.7	7.1	6.8	9.1	11.9	10.8	13.3	10.4	14.6	10.5
Q3	3,755	10.0	10.7	6.8	9.2	10.8	10.1	15.6	9.3	10.1	7.7
Q4	3,755	14.5	13.0	7.6	10.5	10.8	9.6	14.1	7.7	8.0	4.0
Q5	3,760	24.1	18.4	8.6	9.4	8.4	7.7	11.2	5.5	4.1	2.7

Income based on equivalised household income (CPI adjusted and before housing costs)

Dynamics of Low Income

Table 7 presents cross-sectional rates of low income for each wave. As discussed in the Methods section above, the low-income measure used in this report (below 60% of equivalised median gross household income, before housing costs are deducted) was not directly comparable with the common income poverty measure which uses a threshold of 60% of median equivalised disposable (i.e. after tax) household income. Between 23 and 25% of the SoFIE population were in low income across the seven waves, so the 'low income' population can be characterised as the lower quartile. This is a higher low income rate than what is found using disposable income and a 60% threshold (18%) (Perry, 2011). Using a threshold of 50% of gross income produces a low income rate (~15%) slightly lower than this. We also present low income rates, 60% of equivalised median real household income, adjusted for changes in the CPI over the time period. These were slightly higher than the low income rates based on gross income, but follow a similar pattern.

The low income rates were higher in Māori respondents and in the youngest and oldest age groups. The higher rates for children and Māori are consistent with higher rates of poverty for these groups, as found in other research (Perry, 2011). Due to the ageing of the sample over time, the '0-17' age group (which was age at wave 1) by the end of the study will include 8-23 year olds. Therefore the rates of low income for children aged 0-17 at wave one are broken down by age group in Appendix A: 8), and show higher rates in the younger age groups (ages 0 to 4 and ages 5 to 9) compared to the older children aged 10 to 17, possibly reflecting the ageing of the sample. The high rate of low income in the older population (Table 7) reflects the fact that around 40 to 49% of those aged 65+ were highly dependent on New Zealand Superannuation (NZS) with very little income from other sources (see Perry, 2011, Section I). The gross dollar value of NZS from 2002 to 2009 was below the 60% threshold used in this report. The low income rates for the 65+ (40 to 49%) were consistent with this. This table shows that although using different cut-points to define low income impacts the magnitude of the population classified as being in low income, the patterns over time were similar.

Cross-sectional rates of low income for each wave after removing housing costs (AHC) from the gross equivalised household income are presented in Appendix Table A: 7. Compared with the rates in Table 7 (before deducting housing costs), the AHC low income rates are lower for older New Zealanders and higher for children and Māori, reflecting differences in the amount of income that is spent on housing in these groups.

Table 7. Percentage of the population in low income at each wave

Percentage of the population in low income at each wave								
	Total	**W1**	**W2**	**W3**	**W4**	**W5**	**W6**	**W7**
	N	**% in low income (<60% of median income)**						
All	18,785	25.2	24.1	24.0	23.2	24.5	23.8	23.8
Age at wave 7								
0-17	4,930	29.6	29.0	27.4	25.7	26.1	25.5	26.0
18-24	1,105	22.6	22.6	22.6	21.3	19.9	17.6	18.1
25-44	5,610	19.8	19.3	18.2	17.2	18.0	16.8	16.8
45-64	5,105	20.1	18.7	19.7	19.7	21.5	21.5	21.0
65+	2,030	43.3	40.1	43.8	44.1	48.8	48.3	48.3
Ethnicity								
NZ European	14,250	21.3	20.7	20.8	20.7	22.2	21.8	21.9
Māori	2,450	37.6	35.7	33.9	32.4	33.1	31.0	32.7
	% in low income (<50% of median income)							
All		16.0	14.7	14.9	14.7	15.7	15.3	15.0
	% in low income (<60% of median income) using CPI adjusted income							
All		27.7	26.7	26.4	25.1	25.8	25.0	25.3

Duration of Low Income

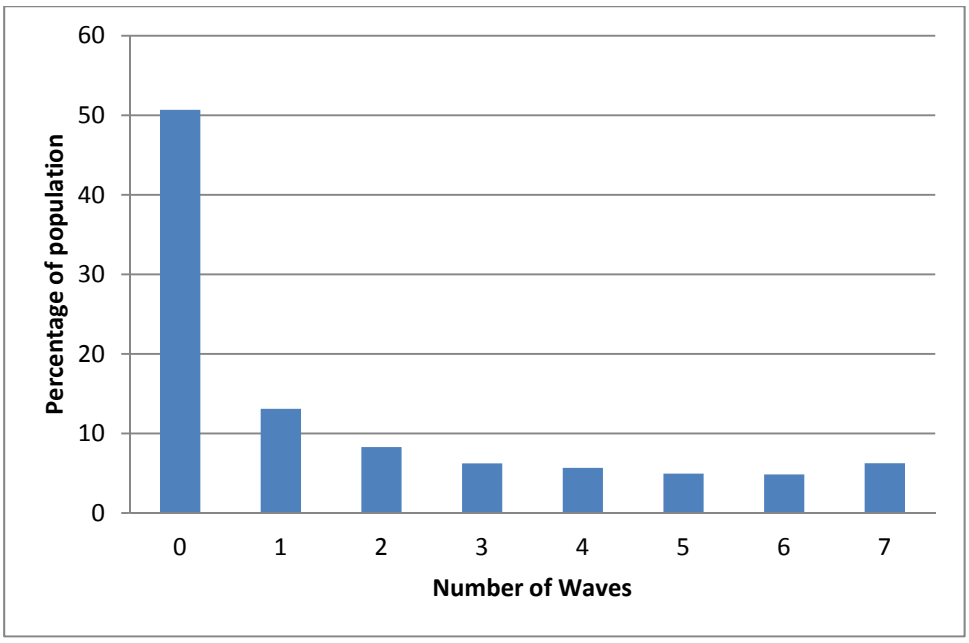

Figure 1. The number of waves respondents' were in low income over 7 years of SoFIE

Figure 1 and Table 8 presents the number of waves the respondents were in low income across the study period. This shows that about 50% of the study population experienced low income at some stage over the study period, with 13% experiencing low income once in the study period, another 14% were 2 to 3 times in low income and over 20% were in low income for over half of the study period. Around 6% of the study population were in low income at all-time points in the study period. Almost three quarters of respondents living in sole parent families experienced one or more periods of low income over the study period. A third of respondents who did not start the study in low income (at wave 1) experienced one or more periods of low income over the next six years.

Table 8 shows the characteristics of the population by the number of waves they were in low income over the study period. More people of older age and Māori were in low income for all seven waves of the study, but note this table is not age standardised. Also respondents living in sole parent families spent more time (longer duration) in low income over the study period. Table 8 also presents the number of waves experienced in low income by whether the respondent started in low income (wave 1) or not. This shows that 25% of those households in low income at wave 1 were in low income at all waves.

Table 9 shows the characteristics of respondents by duration of low income using the less than 50% of median income as the definition of low income (instead of less than 60% of median income, as in the previous table), giving an indication of the depth of low income or poverty. Approximately 40% (compared to 50%) of respondents experienced one or more years of low income, using this lower cut-off of low income. About 11% were in low income for over half the study period (four or more waves). As the threshold for low income is lower, less of the sample is classified as being in low income so the proportion of the sample overall who experienced 6-7 waves in low income is also lower (around 2%, compared to 5-6%). Using the higher relative income cut-point (<60% median incomes) those who started out in low income (in Wave 1) were more likely to spend more time in low income (40% spend 6-7 waves in-low income) compared to using a cut-point of <50% of the median income (20% spend 6-7 waves in low income).

Table 8. Characteristics of respondents by number of waves the population experiences low income (<60% of median income)

		Number of waves in low income							
		0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Total N / row %	18,785	50.7	13.1	8.3	6.2	5.7	5.0	4.8	6.3
Age of the person at wave 1									
0-17	4,930	44.0	14.1	10.0	7.5	6.7	6.2	5.7	5.9
18-24	1,105	46.6	18.6	10.9	8.1	6.3	**4.1**	**2.7**	**2.3**
25-44	5,610	59.2	12.5	7.5	5.4	4.9	3.8	3.3	3.4
45-64	5,105	57.8	12.3	6.8	4.9	4.8	3.7	3.8	5.8
65+	2,030	27.6	11.6	8.4	7.4	7.1	8.9	10.8	18.5
Ethnicity									
NZ European	14,250	54.4	13.2	8.2	5.7	4.8	4.0	4.4	5.3
Māori	2,450	39.0	11.8	8.2	8.4	8.4	6.9	6.5	10.8
Other	2,085	39.3	13.9	8.4	7.2	8.2	8.9	6.2	7.7
Highest education at wave 7									
Degree or higher	2,560	66.4	12.3	7.2	4.7	3.7	2.5	2.1	**1.2**
Post school vocation	5,685	54.1	13.3	8.0	6.4	5.0	4.7	3.8	4.7
School qualification	4,305	51.5	14.9	9.1	5.6	5.3	5.1	3.7	5.0
No qualification	3,660	36.6	12.6	8.2	7.2	7.7	6.0	8.5	13.3
Family type at wave 1									
Couple only	4,555	54.4	12.8	7.0	5.5	4.8	3.6	5.0	6.6
Couple with children	9,645	56.6	13.8	8.7	5.7	5.3	3.9	3.2	2.8
Sole parent family	2,100	26.7	11.2	9.0	10.2	8.6	11.0	10.2	13.1
Not in a family nucleus	2,485	41.0	12.5	8.2	6.2	6.0	6.6	6.4	13.1
Geographic region at wave 1									
Auckland	4,595	55.0	13.1	7.4	5.8	5.0	5.4	3.7	4.7
Waikato	1,695	48.4	14.2	8.0	6.5	6.5	5.3	**2.9**	8.0
Wellington	2,470	60.5	11.3	7.1	3.4	4.7	3.6	5.1	4.5
Rest of North Island	4,315	42.6	13.4	9.2	7.1	6.8	5.6	6.6	8.7
Canterbury	3,000	53.0	12.8	8.5	6.2	5.2	4.5	4.8	5.2
Rest of South Island	2,710	46.3	14.0	9.2	8.1	5.9	4.8	5.0	6.6
Urban area at wave 1									
Main urban	13,655	53.4	12.9	7.8	5.5	5.3	4.7	4.7	5.7
Other	5,130	43.5	13.7	9.5	8.2	6.5	5.6	5.2	7.8
Low income status in wave 1									
Not in low income	14,060	67.7	13.1	7.2	4.6	3.3	2.6	1.4	-
In low income	4,725	-	13.0	11.4	10.9	12.6	12.1	15.0	24.9

Income based on equivalised household income (not CPI adjusted and before housing costs)
Bold values are row percentages based on cell numbers of 50 or less

Table 9. Characteristics of respondents by number of waves the population experiences low income (<50% of median income)

		Number of waves in low income							
		0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Total N	**Row %**							
	18,785	60.9	13.9	8.0	5.9	4.1	3.2	2.1	1.9
Age of the person at wave 1									
0-17	4,930	53.2	14.8	9.2	7.3	5.6	4.3	2.8	2.7
18-24	1,105	56.6	17.2	10.9	6.3	**3.6**	**2.7**	**1.4**	**1.4**
25-44	5,610	67.5	12.4	6.2	4.6	3.3	2.7	1.9	1.5
45-64	5,105	65.1	11.9	6.8	5.4	3.6	2.9	2.2	2.2
65+	2,030	52.7	19.2	11.1	7.1	4.4	3.2	**1.5**	**1.0**
Ethnicity									
NZ European	14,250	65.1	13.9	7.5	5.0	3.4	2.4	1.5	1.2
Māori	2,450	47.6	12.9	10.0	9.2	6.1	5.3	4.5	4.7
Low income status at wave 1									
Not in low income	15,785	72.4	12.6	6.5	4.0	2.3	1.6	0.6	-
In low income	3,000	-	20.8	15.5	16.0	13.5	11.8	10.2	12.0

Income based on equivalised household income (not CPI adjusted and before housing costs)
Bold values are values based on cell numbers of 50 or less

Table 10 presents the characteristics and number of years in low income (using 60% the median income) in the study population who experienced low income at least once during the study period. This shows that 18 to 44 years olds were more likely to experience transient low income (1 to 3 times) during the study period. Of those respondents in low income at wave 1, 65% were in low income for four or more waves over the study period. Older populations (aged 65+), Māori, respondents with no education, and in sole parent families or not in a family nucleus were more likely to be in low income for over half the study period (four or more waves). However, these numbers were not adjusted for age and other confounding factors. Only 13% of respondents who were in low income at wave 1 experienced only one wave of low income over the study period, highlighting the importance of longitudinal measures of low income which measure the duration and persistence of low income.

Table 10. Characteristics of respondents having at least one experience of low income (<60% of median income)

		Number of waves in low income						
		1	**2**	**3**	**4**	**5**	**6**	**7**
Total N / Row %	9,265	26.6	16.8	12.6	11.5	10.0	9.8	12.7
Age of the person at wave 1								
0-17	2,765	25.1	17.9	13.4	11.9	11.0	10.1	10.5
18-24	585	35.0	20.5	15.4	12.0	**7.7**	5.1	**4.3**
25-44	2,290	30.6	18.3	13.3	12.0	9.4	8.1	8.3
45-64	2,150	29.3	16.0	11.6	11.4	8.8	9.1	13.7
65+	1,475	15.9	11.5	10.2	9.8	12.2	14.9	25.4
Ethnicity								
NZ European	6,505	28.9	18.1	12.5	10.6	8.8	9.5	11.5
Māori	1,495	19.4	13.4	13.7	13.7	11.4	10.7	17.7
Highest education at wave 7								
Degree or Higher	865	36.4	21.4	13.9	11.0	7.5	6.4	**3.5**
Post school Qualification	2,610	28.9	17.4	14.0	10.9	10.3	8.2	10.2
School Qualification	2,095	30.5	18.6	11.5	11.0	10.5	7.6	10.3
No Qualification	2,320	19.8	12.9	11.4	12.1	9.5	13.4	20.9
Family type at wave 1								
Couple only	2,070	28.3	15.5	12.1	10.6	8.0	11.1	14.5
Couple with children	4,185	31.8	20.1	13.1	12.3	9.0	7.3	6.5
Sole parent family	1,540	15.3	12.3	14.0	11.7	14.9	14.0	17.9
Not in a family nucleus	1,470	21.1	13.9	10.5	10.2	11.2	10.9	22.1
Geographic region at wave 1								
Auckland	2,070	29.0	16.4	12.8	11.1	12.1	8.2	10.4
Waikato	870	27.6	15.5	12.6	12.6	10.3	**5.7**	15.5
Wellington	980	28.6	17.9	8.7	11.7	9.2	12.8	11.2
Rest of North Island	2,475	23.4	16.0	12.3	11.9	9.7	11.5	15.2
Canterbury	1,415	27.2	18.0	13.1	11.0	9.5	10.2	11.0
Rest of South Island	1,455	26.1	17.2	15.1	11.0	8.9	9.3	12.4
Urban Area at wave 1								
Main Urban	6,365	27.6	16.8	11.7	11.5	10.1	10.1	12.2
Other	2,895	24.4	16.8	14.5	11.6	9.8	9.2	13.8
Low income status in wave 1								
Not in low income	4,540	40.6	22.2	14.3	10.4	8.0	4.4	-
In low income	4,725	13.0	11.4	10.9	12.6	12.1	15.0	24.9

Income based on equivalised household income (not CPI adjusted and before housing costs)
Bold values are values based on cell numbers of 50 or less

Persistence and recurrence of low income

From the results above we wanted to examine entry rates into- and exit rates out of- low income and the persistence of low income beyond one year in the SoFIE population further. Table 11 examined changes in income status over two year periods during the study and highlights the significant proportion of respondents who remained in low income in two consecutive years (17%). Table 11 also shows that around 7% of people not in low income in one year entered into low income in the next year and about 7-8% of people in low income in one year exited in the next year.

Table 12 presents the persistence of low income from one year to the successive years. There is a high degree of persistence and or recurrence of low income in the SoFIE population. So of those in low income in wave 1, 67% remained in low income in wave 2 and 50% were in low income in wave 7. However this table does not show how people enter and exit low income states over the study period. Similar analyses based on HILDA data show high re-entry rates into poverty (low income) even six years after the initial measurement of poverty (Wilkins et al., 2011).

Table 11. Entry and exit to and from low income over two years

	Wave 1-2	Wave 3-4	Wave 5-6
Two-year low income status		**Col%**	
Not in low income either year	67.6	69.2	68.9
Low income both years	16.8	16.5	17.2
Out of low income the first year and in the second	7.3	6.7	6.6
Low income first year and out the second	8.3	7.6	7.3

Income based on equivalised household income (not CPI adjusted and before housing costs)

Table 12. Persistence of low income beyond one year

	Low income w1	Low income w2	Low income w3	Low income w4	Low income w5	Low income w6
Low income w2	67.1					
Low income w3	61.2	69.6				
Low income w4	56.4	60.9	68.5			
Low income w5	56.8	60.1	65.1	72.7		
Low income w6	52.2	55.6	59.2	65.0	70.0	
Low income w7	50.5	54.4	57.5	60.3	63.8	70.0

Income based on equivalised household income (not CPI adjusted and before housing costs)

Chronic low income

We can examine the difference between cross sectional and longitudinal estimates of the percentage of the sample experiencing low income by assessing those who were chronically in low income over the study period. This method compares a respondent's permanent (smoothed) income (using the mean CPI adjusted equivalised household income data over waves 1 to 7) with the average low income line ($27,337), over the study period. If a respondent had permanent income below the average low income line then they were classed as being chronically in low income. Therefore, the overall rate of low income in the data can be decomposed into those in chronic versus transitory low income, where the percentage in transitory low income is (T = A – C).

The results are shown in Table 13. Over the study period, 21% were chronically in low income, but this was higher in Māori and children. We estimate that the transitory low income rate is about 5%, by subtracting the chronic low income rate from the average low income rate over the study period

(Rodgers and Rodgers, 2009). This indicates that the majority of people that were low income were chronically in low income over the study period. However, there was a much lower contribution of transitory low income in Māori, reflecting the rate of chronic low income in this population.

Table 14 and Figure 2 present how much chronic low income was captured by the cross-sectional rates of low income over the study period. It can be seen that of those respondents in low income in any given wave, between 60 and 68% were classified as chronically in low income. Therefore, more than 30% were transitorily poor at any given wave. This table also highlights the percentage of respondents who were not classified as low income in any given wave but were chronically in low income, between 4% and 6% over the waves. This shows the importance of using longitudinal data to decompose the cross-sectional rates of low income. Similar trends were observed by age group and ethnicity (Table 14). However there were interesting results for Māori, with much higher rates of chronic low income than other groups, which was seen in the percentage of respondents who were in chronic low income and classed as in low income at each wave. This percentage grew over the seven years of SoFIE, indicating that Māori are more likely to be chronically in low income than transitory.

Table 13. Percentage of respondents in chronic and transitory low income (permanent CPI adjusted income)

	Average low income	Chronic low income	Transitory low income
Overall	26.0	20.8	5.2
NZ European	23.1	17.5	5.6
Māori	35.9	32.0	3.9
Age 0-17	29.2	23.9	5.2
Age 18-64	20.7	15.5	5.2

Income based on equivalised household income (CPI adjusted and before housing costs)

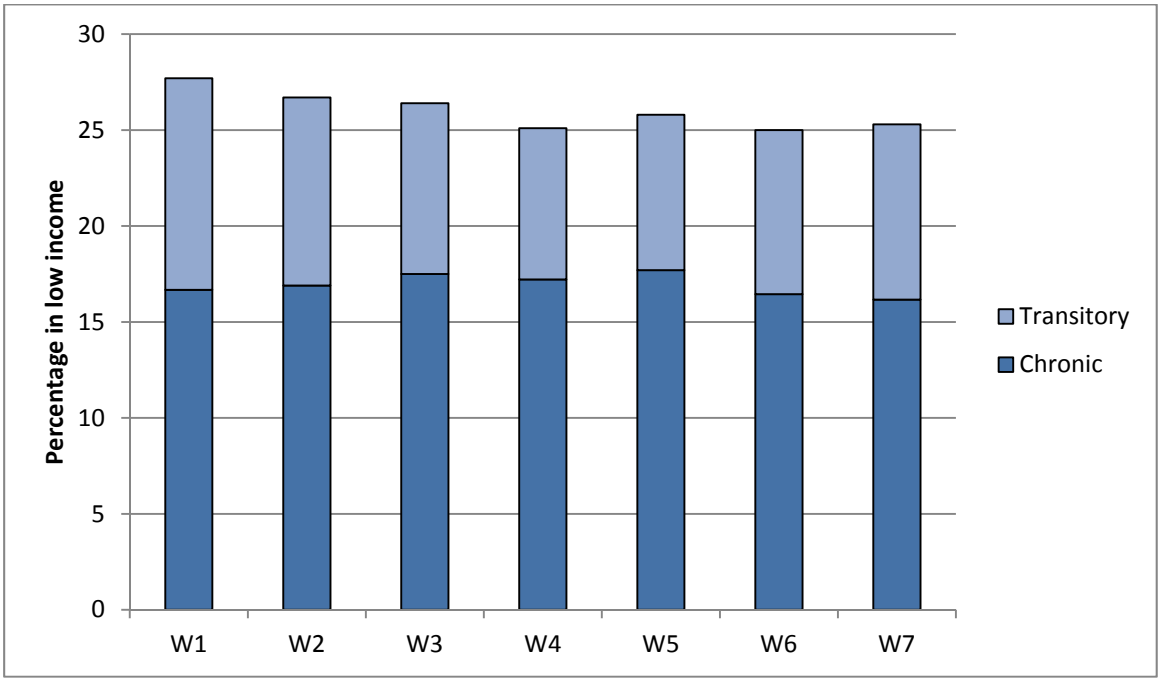

Figure 2. Breakdown of cross-sectional low-income rates by chronic and transitory low income

Table 14. Percentage of respondents in cross-sectional low income (CPI adjusted) by chronic low income at each wave.

Wave	% Low Income	Pr(Chronic Low Income |Low Income $_t$)	Pr(Chronic Low Income |NOT Low Income $_t$)
Overall			
W1	27.7	60.2	5.7
W2	26.7	63.3	5.3
W3	26.4	66.3	4.5
W4	25.1	68.6	4.7
W5	25.8	68.6	4.2
W6	25.0	65.8	5.8
W7	25.3	63.9	6.2
Age 0-17			
Wave	% Low Income	Pr(Chronic Low Income |Low Income $_t$)	Pr(Chronic Low Income |NOT Low Income $_t$)
W1	32.8	59.1	6.8
W2	31.9	61.6	6.3
W3	30.2	66.1	5.7
W4	27.6	69.5	6.6
W5	27.5	70.5	6.3
W6	26.7	64.6	9.1
W7	27.4	64.1	8.8
Age 18-64			
Wave	% Low Income	Pr(Chronic Low Income |Low Income $_t$)	Pr(Chronic Low Income |NOT Low Income $_t$)
W1	22.0	55.1	4.4
W2	21.2	58.0	4.1
W3	20.9	60.8	3.5
W4	20.2	63.3	3.4
W5	20.7	63.4	3.0
W6	19.8	61.3	4.2
W7	20.0	59.1	4.7
NZ European			
Wave	% Low Income	Pr(Chronic Low Income |Low Income $_t$)	Pr(Chronic Low Income |NOT Low Income $_t$)
W1	23.6	58.8	4.8
W2	23.1	60.8	4.5
W3	23.1	63.9	3.6
W4	22.7	64.7	3.7
W5	23.2	64.4	3.3
W6	22.9	61.9	4.3
W7	23.2	60.1	4.6
Māori			
Wave	% Low Income	Pr(Chronic Low Income |Low Income $_t$)	Pr(Chronic Low Income |NOT Low Income $_t$)
W1	41.2	65.3	9.0
W2	38.8	67.9	9.3
W3	36.3	71.3	9.6
W4	33.9	76.5	9.3
W5	34.9	77.8	7.5
W6	32.4	76.1	10.9
W7	33.9	74.7	10.2

Income based on equivalised household income (CPI adjusted and before housing costs)

Dynamics of Deprivation

The first examination of deprivation is cross-sectional rather than dynamic, to give a snapshot of deprivation at several points in time. Table 15 presents the percentage of the SoFIE population who reported three or more measures of deprivation (from the New Zealand Individual Deprivation Index, NZiDep) at the three waves that information about deprivation was collected (waves 3, 5 and 7) at each wave.

A smaller proportion of the whole population were in deprivation (6-7%) than in low income (around 24%). Around three times more Māori than NZ European were in deprivation at any of the three waves. Older age groups (from 45 years on) were less likely to report deprivation, particularly those aged over 65 years. This age difference may be part of the explanation for the higher prevalence of deprivation in Māori. Appendix Table A: 13 presents the same table using a lower cut-point of two or more measures of deprivation, with 11-14% of respondents in deprivation at each wave.

Table 15. Percentage of the population in deprivation (based on NZiDep 3 or more)

Percentage of population in deprivation (NZiDep score 3 or more)							
		W3		W5		W7	
	Total	N	%	N	%	N	%
Whole pop	18,785	1,325	7.1	1,025	5.5	1,335	7.1
Ethnicity							
NZ European	14,250	735	5.2	580	4.1	765	5.4
Māori	2,450	400	16.3	305	12.4	350	14.3
Age at wave 1							
0-17	4,930	470	9.5	330	6.7	430	8.7
18-24	1,105	110	10.0	80	7.2	110	10.0
25-44	5,610	470	8.4	375	6.7	515	9.2
45-64	5,105	260	5.1	225	4.4	250	4.9
65+	2,030	**20**	**1.0**	**15**	**0.7**	**25**	**1.2**

Bold values are based on cell numbers of 50 or less

Deprivation Mobility

Table 16 shows the probabilities of individuals moving between different deprivation states, starting from an initial wave and moving to the next time they were asked about deprivation. Not surprisingly, those who started out reporting no deprivation (0) had a higher probability of reporting no deprivation at the next wave (86.2%). However, the transition table reveals a lot of movement that was hidden in the cross sectional rates. Of those who report 3-4 measures of deprivation at the initial wave, only 35.4% still remained in this category at the next time point. 9.4% report more deprivation but the remainder report less. Similarly, for those reporting 5 or more measures – only 30% were consistently in this category – but over a third move to the next category down (reporting 3-4 measures of deprivation). There was a higher level of mobility amongst the deprivation categories than amongst the income quintiles, but more stability at the less deprived end of the deprivation scale.

Table 16. NZiDep transition table – w(i) to w(i+1) Whole population – All Ages

NZiDep transition probabilities wave 3-7							
Overall (w 3-7)		**W(i+2)**					
		0	**1**	**2**	**3 to 4**	**5+**	**Totals**
W(i)	**0**	0.862	0.101	0.026	0.010	0.001	26,635
	1	0.451	0.344	0.133	0.063	0.010	5,185
	2	0.255	0.284	0.243	0.184	0.031	2,115
	3 to 4	0.146	0.186	0.226	0.354	0.094	1,750
	5+	0.064	0.136	0.145	0.364	0.300	550
	Totals	26,125	5,485	2,375	1,790	465	36,240

Deprivation Duration

Table 17 shows the characteristics of the sample by the number of waves in deprivation which ranges from zero to three (all of waves 3, 5 and 7). Most of the SoFIE population report not experiencing any deprivation (87.8%) over the study period and only 5.5% report deprivation in 2 to 3 waves. However, some differences by characteristics were notable. Māori respondents report more deprivation measures, although again this could be at least partly due to higher rates in younger people. Respondents in sole parent families were much more likely to be in deprivation at any wave and also for multiple waves over the study period.

Table 17. Number of waves in deprivation (3 or more measures of NZiDep)

	Number of waves in deprivation				
		0	1	2	3
	Total N	Row %			
	18,785	87.8	6.8	3.5	2.0
Age of the person at wave 1					
0-17	4,930	84.1	9.2	4.5	2.2
18-24	1,105	82.4	9.5	5.9	**1.8**
25-44	5,610	85.4	7.8	4.2	2.7
45-64	5,105	91.2	4.9	2.4	1.6
65+	2,030	97.8	**1.7**	**0.2**	**0.2**
Ethnicity					
NZ European	14,250	90.7	5.4	2.5	1.4
Māori	2,450	75.3	11.8	7.3	5.5
Highest education at wave 7					
Degree or Higher	2,560	93.0	4.5	**1.8**	**0.6**
Post School Qualification	5,685	88.6	5.9	3.5	2.1
School Qualification	4,305	89.8	6.7	2.4	**1.0**
No Qualification	3,660	85.7	8.1	4.0	2.3
Family type at wave 1					
Couple only	4,555	95.8	3.0	**0.9**	**0.4**
Couple with children	9,645	90.0	6.2	2.7	1.1
Sole parent family	2,100	61.7	17.9	12.1	8.3
Not in a family nucleus	2,485	86.5	7.2	3.8	2.4
Geographic region at wave 1					
Auckland	4,595	88.4	7.0	3.4	1.2
Waikato	1,695	90.0	5.0	4.1	**0.9**
Wellington	2,470	86.8	7.3	3.4	2.4
Rest of North Island	4,315	85.5	7.9	3.6	3.0
Canterbury	3,000	88.0	6.2	3.7	2.3
Rest of South Island	2,710	89.5	6.3	2.8	**1.5**
Urban Area at wave 1					
Main Urban	13,655	87.3	7.1	3.7	1.9
Other	5,130	89.0	6.0	2.9	2.0
Deprivation status in wave 3 (3 or more on NZiDep score)					
Not in deprivation	17,100	94.6	4.2	1.2	0
In deprivation	1,325	0	40.4	32.1	27.9
Missing value	360	84.7	9.7	5.6	0

Bold values are row percentages based on cell numbers of 50 or less

Deprivation Persistence

Another way to examine deprivation over time is to see how many people who initially report deprivation persist in deprivation at subsequent time points (see Table 18). Here we can see a high persistence of deprivation. It would be interesting to know, if there were more data points after wave 7, whether the persistence continued to be high or dropped off, as it did for income.

Table 18. Percentage of respondents persisting in deprivation (NZiDep score 3 or more) beyond two years

	In deprivation w3		In deprivation w5	
	N	%	N	%
In deprivation w3	1,325			
In deprivation w5	580	43.8	1025	
In deprivation w7	580	43.8	595	58.0

Dynamics of Poverty and Deprivation

Deprivation and duration of low income

As a measure of socioeconomic disadvantage, NZiDep differs from low income in that it directly reflects material deprivation. In this section, we compare the measures of NZiDep and low income.

Table 19 presents the duration that respondents spent in low income by the NZiDep score at each wave. This shows that respondents who spent longer in low income (6-7 waves), reported higher levels of deprivation (three or more measures) at each wave, and patterns were similar across the waves.

Table 19. NZiDep score at waves 3, 5 and 7 by low income duration

		NZiDep score					
		Wave 3					
Low income		**0 dep vars**		**1-2 dep vars**		**3+ dep vars**	
duration	**N**	**N**	**Row %**	**N**	**Row %**	**N**	**Row %**
Total	17,730	12,790	72.1	3,640	20.5	1,300	7.3
0-1 waves	11,425	9,460	82.8	1,725	15.1	240	2.1
2-5 waves	4,365	2,510	57.5	1,240	28.4	615	14.1
6-7 waves	1,935	820	42.4	675	34.9	440	22.7
		Wave 5					
		0 dep vars		**1-2 dep vars**		**3+ dep vars**	
Total	17,935	13,480	75.2	3,455	19.3	1,000	5.6
0-1 waves	11,560	9,910	85.7	1,485	12.8	165	1.4
2-5 waves	4,390	2,640	60.1	1,300	29.6	450	10.3
6-7 waves	1,980	925	46.7	665	33.6	390	19.7
		Wave 7					
		0 dep vars		**1-2 dep vars**		**3+ dep vars**	
Total	18,190	12,585	69.2	4,305	23.7	1,300	7.1
0-1 waves	11,655	9,160	78.6	2,190	18.8	305	2.6
2-5 waves	4,535	2,505	55.2	1,425	31.4	605	13.3
6-7 waves	2,000	920	46.0	690	34.5	390	19.5

Income based on equivalised household income (not CPI adjusted and before housing costs)

Duration of Low Income and Duration of Deprivation

To compare measures of deprivation and low income over time, Table 20 shows the percentage of people in different durations of deprivation (0-3 waves) and low income (0-7 waves). People who experienced a longer duration of low income also reported more deprivation over the study period. Interestingly there is a large proportion of the population who did not experience three or more measures of deprivation at any point but were classified as being in low income for over half the study. This may partly be due to age confounding in the results where the elderly (aged 65 and over) had low incomes but report no deprivation. The Appendix contains this table using the definition of deprivation as two or more measures on the NZiDep (see Appendix Table A: 15).

Table 20. Duration of deprivation (3 or more measures of deprivation) by duration of low income

	Waves in deprivation (NZiDep, 3 or more)								
	N	Row %				Column %			
		0	1	2	3	0	1	2	3
	18,785	87.8	6.8	3.5	2.0				
Waves in low income									
0	9,520	96.7	2.5	0.6	**0.2**	55.8	18.8	9.2	**4.1**
1	2,460	91.3	5.5	2.6	**0.6**	13.6	10.5	10.0	**4.1**
2	1,555	85.9	9.3	**3.2**	**1.3**	8.1	11.3	**7.7**	**5.4**
3	1,170	78.6	11.5	6.8	**2.6**	5.6	10.5	12.3	**8.1**
4	1,065	73.2	14.1	7.0	5.6	4.7	11.7	11.5	16.2
5	930	67.2	16.1	9.7	7.0	3.8	11.7	13.8	17.6
6	910	64.8	17.0	11.5	6.6	3.6	12.1	16.2	16.2
7	1,175	66.8	14.0	11.1	8.1	4.8	12.9	20.0	25.7

Bold values are row percentages based on cell numbers of 50 or less

We averaged the NZiDep score over the three waves, to examine whether there is a trend of increasing NZiDep (worsening deprivation) with increasing number of waves in low income (Table 21). This trend was more marked in Māori and younger people compared to the whole sample and reduced in older adults (Table 22). The absolute means were greater in Māori and younger people compared to the whole sample and reduced in older adults but the overall trends were the same. Other noteworthy differences include those by family structure (Appendix Table A: 17), where sole parents have higher mean deprivation scores with low income duration and couples (without children) had lower mean deprivation scores. We tested the effect of changing the 'low income' threshold and looked at mean deprivation scores for those who were <50% of the median income over the time of the study, for the whole sample (Appendix Table A: 18). This showed even a stronger trend of increasing deprivation with more waves in low(er) income, with those with a <50% of median income in all seven waves having a mean NZiDep of 1.79. This table was also repeated using only NZiDep score at wave 7 (Appendix Table A: 19) to see how duration of low income (cut off <60% median) affected the mean NZiDep score at the end of the study period, for the whole sample. The same trend was observed (mean of 0.29 for those with 0 waves to 1.25 for those with all waves in low income).

Table 21. Mean deprivation score (over waves 3, 5 and 7) by duration of low income and ethnicity

Mean deprivation (NZiDep score) over waves 3,5 and 7									
	Whole population			Māori			NZ European		
	N	Mean	StdErr	N	Mean	StdErr	N	Mean	StdErr
	18,785	0.55	0.01	2450	1.02	0.03	14250	0.44	0.01
Waves in low income									
0	9,520	0.24	0.00	955	0.38	0.02	7745	0.21	0.01
1	2,460	0.43	0.01	290	0.60	0.05	1880	0.38	0.01
2	1,555	0.61	0.02	200	1.07	0.08	1175	0.51	0.02
3	1,170	0.86	0.03	205	1.14	0.08	815	0.79	0.04
4	1,065	1.05	0.04	205	1.58	0.1	690	0.91	0.05
5	930	1.23	0.04	170	1.97	0.11	575	1.11	0.05
6	910	1.33	0.04	160	2.09	0.11	620	1.10	0.05
7	1,175	1.31	0.04	265	2.00	0.09	750	1.03	0.05

Low income based on equivalised household income (not CPI adjusted and before housing costs)

Table 22. Mean deprivation score (over waves 3, 5 and 7) by duration of low income and age

	Age 0-17 years			Age 18-24 years			Age 25-44 years			Age 45-64 years			Age 65+ years		
	N	**Mean**	**StdErr**	**N**	**Mean**	**StdErr**	**N**	**Mean**	**StdErr**	**N**	**Mean**	**StdErr**	**N**	**Mean**	**StdErr**
Total	4,930	0.7	0.01	1,105	0.76	0.03	5,610	0.63	0.01	5,105	0.41	0.01	2,030	0.2	0.01
Waves in low income															
0	2,170	0.27	0.01	515	0.42	0.03	3,320	0.29	0.01	2,950	0.16	0.01	560	0.08	0.01
1	695	0.47	0.03	205	0.62	0.06	700	0.55	0.03	630	0.3	0.03	235	0.11	0.02
2	495	0.7	0.04	120	0.86	0.09	420	0.77	0.05	345	0.43	0.04	170	0.17	0.03
3	370	1.02	0.06	90	1.06	0.11	305	1.09	0.07	250	0.66	0.06	150	0.23	0.04
4	330	1.2	0.07	70	1.55	0.17	275	1.34	0.08	245	0.84	0.07	145	0.28	0.05
5	305	1.44	0.07	**45**	**1.59**	**0.18**	215	1.72	0.1	190	1.1	0.09	180	0.33	0.04
6	280	1.59	0.07	**30**	**2.07**	**0.24**	185	2.16	0.11	195	1.28	0.09	220	0.25	0.04
7	289	1.81	0.08	**25**	**2.07**	**0.25**	190	2.12	0.11	295	1.48	0.08	375	0.31	0.03

Bold values are values based on cell numbers of 50 or less

Conclusions

This report is an exploratory and descriptive analysis of the dynamics of low income and deprivation in New Zealand using SoFIE data. The results were based on unweighted survey estimates and thus are not directly generalisable to the New Zealand population.

The value of longitudinal compared to cross sectional data is that longitudinal data provides information on changes and trajectories occurring in low income and deprivation states that cross-sectional data cannot give. For example, over a period of seven years many more people experienced low income than at one point-in-time, where cross sectional low income (<60% of median household equivalised income) rates are around 24%. However, the longitudinal estimate of low income over seven years was approximately double this (50%) – i.e. half of the sample experienced one or more years of low income. The proportion experiencing low income for one or more years over the study period was much higher in Māori respondents and those in sole parent families. The rate of deprivation (New Zealand Individual Deprivation Index score of three or more) at any one time point was 6-7%, but the longitudinal estimate of deprivation over three time periods was almost twice this (12%). Longitudinal data can identify how much time people spend in low income and deprivation, which are important factors of poverty that cannot be measured by cross-sectional surveys.

Using longitudinal data, we can also examine measures of chronic low income. In this report, chronic low income was defined as where a respondent's permanent income (smoothed average household income over the seven years) fell below the average low income line (over the seven years). Approximately two thirds of people who were in low income at any one point in time were chronically in low income, but this proportion was higher for Māori and children. Conversely, this meant that around 30-40% of people in low income at any one point in time were in transitory low income, meaning that their low income state was not persistent. However, we also found that approximately 5% of people who were not in low income at one point in time were chronically in low income over the study period (and this was also higher for Māori and children), indicating that cross-sectional measures of low income or poverty may underestimate the number of people in the population who are poor.

Persistence, recurrence, exit and entry rates into low income states can only be examined using longitudinal survey data. We found high persistence of those in low income with about a quarter of respondents who were in low income at wave one being in low income for all seven waves. There was also a lot of churn in entry and exit rates in and out of low income over the study period. The two-year entry rates into low income were around 7% and exit rates were 7-8%.

We have shown that there is much mobility in incomes on an annual basis, which is similar to other recent studies (Wilkins et al., 2011, Jarvis and Jenkins, 1998, Jenkins, 2011). The mobility that we observed was both upward and downward, although the most common transition was to the adjacent income quintile. However, the results do not take into account changes in demographic events, such as forming partnerships, having children, marital dissolution, retirement or becoming employed, which have been shown to have an impact on income mobility and transitions in and out of low income over time (Jenkins, 2011). Changes in income from these different causes were also associated with different effects on important outcomes such as health, wellbeing and quality of life. Future longitudinal modelling of income dynamics using the SoFIE data will take into account changes in family structure and employment over time. Looking at income mobility in isolation from causes and effects gives only a small piece of the picture.

Low income and deprivation do not necessarily measure the same things (Perry, 2009, Perry, 2002). In our comparisons of low income and deprivation, we found that those who experienced a longer

duration of low income also reported more deprivation (the mean deprivation increased with duration of low income and the percentage of those in longer duration of deprivation also increased). However, not all of those who report deprivation were in low income and vice versa (although these correlations differ depending on the cut-points used to define low income and deprivation). Therefore, we recommend using a number of different measures of disadvantage, over time, to gain insight into poverty in the population.

Future analyses

This report used <60% of median gross household income as a measure of 'low income', as a tax model had not been applied to the SoFIE data to provide an estimate of disposable income, which is the usual income variable used in definitions of 'poverty'. Therefore, future research, using disposable income, would enable us to make more direct comparisons with the international literature on poverty dynamics and chronic poverty.

We envisage that future research would look further at entry, re-entry (recurrence) and exits from low income and the predictors of these and investigate different measures of the depth of poverty. As discussed earlier, changes in demographic events, such as forming partnerships, having children or marriage dissolution, that have an impact on income mobility and transitions in and out of low income need to be taken into account (Jenkins, 2011). This could be done using multivariate hazard regression models of poverty exit rates and re-entry rates using data on spells controlling for individual characteristics (Jenkins, 2011). Markov models can also examine poverty persistence and poverty transition probabilities, and how these probabilities differ for different types of individuals (Richardson et al., 2010). These types of models are important to control for the biases present in crude descriptive analyses (such as confounding by age). Analyses by age group to separate out children and older adults may be needed. We also aim to compare how income and deprivation measures predict health outcomes, such as self-rated health, psychological distress and quality of life. All of this work will help identify those individuals who are at risk of persisting in disadvantage over time, the reasons for the persistence and adverse outcomes associated with such persistence.

Data limitations

The dynamics in income, low income and deprivation seen in this report are crude and the results were not standardised for age differences between population subgroups. No statistical tests for differences between groups or trends over time were conducted. Descriptive characteristics (such as family structure) were presented at baseline (wave 1) and the results do not take into account changes in important characteristics that are likely to have an impact on changes in income such as changes in marital status, family structure and employment.

The results in this report may have been affected by a number of biases. Firstly, the measure of income used, was gross (before tax) household income equivalised for household composition. Therefore, the results are not directly comparable with other longitudinal analyses that used disposable household income (after tax). Secondly, attrition bias may be present, as we know that attrition (sample drop out) was greater amongst young people, Māori and those with low income. This means that the 'true' low income rates in these groups may actually be higher in the general population than what is seen in this analysis sample. The third bias, as discussed in the methods section, is measurement error in the income data due to missing components of personal income and regression to the mean in longitudinal changes in income. Therefore, the analyses in this report cannot be interpreted as causal relationships.

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Appendix

Table A: 1 Baseline characteristics of the full and the balanced panel samples.

	Full Panel		Balanced Panel			Attrition Panel		
	N	col%	N	col%	row%	N	col%	row%
All	29,795		18,785			10,990		
Age at Wave 1								
0-17	8,865	29.8	4,930	26.3	55.6	3,930	35.7	44.3
18-24	2,550	8.6	1,105	5.9	43.3	1,445	13.1	56.7
25-44	8,270	27.8	5,610	29.9	67.8	2,655	24.1	32.1
45-64	6,660	22.4	5,105	27.2	76.7	1,550	14.1	23.3
65+	3,450	11.6	2,030	10.8	58.8	1,415	12.9	41.0
Ethnicity								
NZ European	19,970	67.0	14,250	75.9	71.4	5,725	52.1	28.7
Māori	5,205	17.5	2,450	13.0	47.1	2,755	25.1	52.9
Other	4,595	15.4	2,085	11.1	45.4	2,510	22.8	54.6
Highest education at Wave 1								
Degree or Higher	2,875	9.6	2,010	10.7	69.9	865	7.9	30.1
Post school qualification	7,125	23.9	4,980	26.5	69.9	2,150	19.6	30.2
School Qualification	6,190	20.8	3,920	20.9	63.3	2,270	20.6	36.7
No Qualification	6,055	20.3	3,610	19.2	59.6	2,445	22.2	40.4
Std family type at Wave 1								
Couple only	6,430	21.6	4,555	24.3	70.8	1,870	17.0	29.1
Couple with children	14,540	48.8	9,645	51.4	66.3	4,895	44.5	33.7
Sole parent family	4,335	14.5	2,100	11.2	48.4	2,235	20.3	51.6
Not in a family	4,480	15.0	2,485	13.2	55.5	1,995	18.1	44.5
Geographic region at Wave 1								
Auckland	8,540	28.7	4,595	24.5	53.8	3,950	35.9	46.3
Waikato	2,750	9.2	1,695	9.0	61.6	1,055	9.6	38.4
Wellington	3,665	12.3	2,470	13.2	67.4	1,195	10.9	32.6
Rest of North Island	6,795	22.8	4,315	23.0	63.5	2,480	22.6	36.5
Canterbury	4,250	14.3	3,000	16.0	70.6	1,250	11.4	29.4
Rest of South Island	3,790	12.7	2,710	14.4	71.5	1,080	9.8	28.5
Urban Area at Wave 1								
Main Urban	22,170	74.4	13,655	72.7	61.6	8,510	77.4	38.4
Other	7,620	25.6	5,130	27.3	67.3	2,490	22.6	32.7
Household income at Wave 1 (full panel)								
Q1 (low)	5,960	20.0	2,790	14.9	46.8	3,170	28.8	53.2
Q2	5,955	20.0	3,415	18.2	57.3	2,535	23.1	42.6
Q3	5,955	20.0	3,885	20.7	65.2	2,070	18.8	34.8
Q4	5,960	20.0	4,240	22.6	71.1	1,720	15.6	28.9
Q5 (high)	5,960	20.0	4,450	23.7	74.7	1,505	13.7	25.3

Table A: 2 Household equivalised income quintile boundaries used for transition tables

Wave	Quintile	Boundaries
W1	Q1	low - 23432
	Q2	23432 -< 35913
	Q3	35913 -< 50781
	Q4	50781 -< 75351
	Q5	75351 - high
W2	Q1	low - 24927
	Q2	24927 -< 37643
	Q3	37642-< 53863
	Q4	53863-<78475
	Q5	78474 -high
W3	Q1	low -< 25891
	Q2	25891-< 39026
	Q3	39026-< 55700
	Q4	55700-< 81191
	Q5	81191 - high
W4	Q1	low 0 -< 27854
	Q2	27854-< 41193
	Q3	41193-< 58538
	Q4	58538-<86612
	Q5	86612- high
W5	Q1	low -< 28761
	Q2	28761-< 43702
	Q3	43702-< 61804
	Q4	61804-<90519
	Q5	90519- high
W6	Q1	low -< 30711
	Q2	30711 -< 46503
	Q3	46503 -< 65578
	Q4	65578 -< 95941
	Q5	95941 to high
W7	Q1	low -< 31283
	Q2	31283 -< 47667
	Q3	47667 -< 67768
	Q4	67768 -< 97585
	Q5	97585 to high

Income based on equivalised household income (not CPI adjusted and before housing costs)

Additional Results Tables

Table A: 3 Income transition tables – w(i) to w(i+1) population –Ages 0 to 17

Income quintile transition probabilities wave 1-7 for age 0-17							
		W(i+1)					
		Q1	Q2	Q3	Q4	Q5	Totals
W(i)	Q1	0.651	0.233	0.065	0.031	0.018	6675
	Q2	0.190	0.519	0.225	0.048	0.018	6500
	Q3	0.073	0.155	0.533	0.197	0.044	6665
	Q4	0.059	0.058	0.181	0.534	0.168	5155
	Q5	0.053	0.038	0.063	0.162	0.679	4040
	Totals	6595	6420	6635	5240	4145	29040

Income based on equivalised household income (not CPI adjusted and before housing costs)

Table A: 4 Income transition tables – w(i) to w(i+1) population –Ages 18 to 64

Income quintile transition probabilities wave 1-7 for age 18-64							
		W(i+1)					
		Q1	Q2	Q3	Q4	Q5	Totals
W(i)	Q1	0.633	0.218	0.078	0.042	0.027	10780
	Q2	0.186	0.492	0.225	0.067	0.031	11180
	Q3	0.066	0.159	0.493	0.223	0.059	13480
	Q4	0.032	0.055	0.171	0.545	0.197	15540
	Q5	0.024	0.026	0.051	0.168	0.731	16870
	Totals	10705	11285	13520	15515	16830	67830

Income based on equivalised household income (not CPI adjusted and before housing costs)

Table A: 5 Income decile transition tables – w(i) to w(i+1) population – All Ages

Income decile transition probabilities												
		W(i+1)										
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total**
W(i)	**1**	0.506	0.188	0.103	0.061	0.043	0.028	0.022	0.018	0.015	0.017	11250
	2	0.174	0.440	0.198	0.087	0.036	0.026	0.016	0.012	0.006	0.006	11285
	3	0.087	0.188	0.368	0.179	0.083	0.036	0.023	0.018	0.009	0.010	11260
	4	0.060	0.068	0.155	0.338	0.196	0.088	0.040	0.025	0.020	0.011	11260
	5	0.043	0.046	0.071	0.153	0.323	0.190	0.089	0.041	0.025	0.018	11295
	6	0.031	0.024	0.038	0.071	0.162	0.324	0.200	0.085	0.038	0.025	11270
	7	0.028	0.017	0.025	0.047	0.071	0.163	0.340	0.208	0.071	0.028	11255
	8	0.025	0.014	0.018	0.027	0.040	0.079	0.165	0.358	0.209	0.066	11260
	9	0.024	0.008	0.012	0.017	0.029	0.040	0.066	0.171	0.449	0.184	11265
	10	0.024	0.007	0.014	0.016	0.018	0.024	0.039	0.065	0.158	0.635	11270
	Total	11280	11280	11285	11240	11285	11260	11245	11275	11265	11255	112670

Income based on equivalised household income (not CPI adjusted and before housing costs)

Table A: 6 Changes in income from wave 1 to 7 by baseline income quintiles for demographic groups

		Percentage change in income from w12 to w67				
	N	decrease	0-20% increase	20-40% increase	40-90% increase	90%+ increase
NZ European	14270	39.1	19.6	13.3	16.2	11.5
Household Income Wave 1						
Q1	2300	19.3	16.7	13.3	19.1	29.8
Q2	2825	29.2	23.2	12.6	21.8	13.3
Q3	2835	35.1	20.8	16.0	17.3	10.8
Q4	3055	44.4	20.6	14.1	15.2	5.6
Q5	3250	60.0	16.2	11.2	9.4	3.2
Māori	2460	34.3	18.9	13.4	17.1	15.4
Household Income Wave 1						
Q1	800	20.6	15.0	11.3	19.4	31.9
Q2	530	23.6	24.5	15.1	23.6	12.3
Q3	500	40.0	20.0	16.0	15.0	9.0
Q4	370	51.4	18.9	13.5	12.2	2.7
Q5	265	64.2	17.0	11.3	5.7	1.9
Age 0 - 17	4940	33.4	17.4	13.6	19.5	15.7
Household Income Wave 1						
Q1	1210	17.4	12.4	11.2	20.7	36.4
Q2	1115	23.3	18.8	13.9	28.7	14.8
Q3	1135	33.0	21.6	17.2	18.1	10.6
Q4	845	47.9	19.5	13.6	14.8	4.1
Q5	635	63.0	14.2	11.0	10.2	2.4
Age 18-64	11840	39.5	17.4	13.3	16.6	12.9
Household Income Wave 1						
Q1	1990	19.8	10.8	10.8	20.1	36.7
Q2	1875	27.5	16.5	14.7	25.3	16.3
Q3	2330	36.1	20.4	15.2	18.0	10.5
Q4	2705	44.0	20.9	14.8	15.0	5.5
Q5	2940	59.0	17.0	11.4	9.2	3.4

Income based on equivalised household income (CPI adjusted and before housing costs)

Table A: 7. Percentage of the population in low income at each wave after housing costs

Percentage of the population in low income (<60% median) after housing costs							
	W1	**W2**	**W3**	**W4**	**W5**	**W6**	**W7**
All	26.9	25.9	25.6	25.8	26.0	25.7	25.7
0 to 17	36.6	35.9	34.5	33.9	32.9	32.9	33.7
18 -24	29.5	28.5	29.1	28.6	25.5	25.0	24.7
25-44	25.0	24.2	23.1	23.0	23.0	23.4	2.8
45-64	19.6	18.9	18.9	19.2	20.0	19.5	20.5
65+	24.9	22.1	25.4	29.1	32.7	30.1	28.3
Ethnicity							
NZ European	21.4	20.9	21.2	22.0	22.1	21.9	22.0
Māori	43.6	40.9	37.7	37.2	38.1	37.9	38.3

Income based on equivalised household income (not CPI adjusted and after housing costs)

Table A: 8 Percentage of the child population in low income at each wave, broken down by age

		W1	**W2**	**W3**	**W4**	**W5**	**W6**	**W7**
Age at wave 1	**N**	**% low income (<60% median)**						
0-17	*4930*	*29.6*	*29.0*	*27.4*	*25.7*	*26.1*	*25.5*	*26.0*
0-4	1355	31.4	30.6	31.0	27.7	28.4	26.2	27.3
5-9	1535	31.3	32.6	28.7	26.4	24.4	24.1	25.1
10-17	2040	27.2	25.2	24.3	23.8	25.7	26.0	25.7

Income based on equivalised household income (not CPI adjusted and before housing costs)

Table A: 9 Percentage of the child population by the number of waves in low income, broken down by age

		Waves in low income (<60% median)							
		0	1	2	3	4	5	6	7
	N	**Row%**							
Age of the person at wave 1									
0-17	*4930*	*44.0*	*14.1*	*10.0*	*7.5*	*6.7*	*6.2*	*5.7*	*5.9*
0-4	1355	44.3	12.2	8.5	7.0	7.7	6.6	6.3	7.4
5-9	1535	47.9	11.1	8.5	6.5	6.2	5.5	6.8	7.2
10-17	2040	40.9	17.6	12.3	8.6	6.4	6.4	4.2	3.9

Income based on equivalised household income (not CPI adjusted and before housing costs)

Table A: 10.Duration of low income by wave one income status

		Low income at wave 1			Not in low income at wave 1		
		Duration of low income (waves)					
	N	1	2 to 4	5 to 7	0	1 to 3	4 to 6
	18785	3.3	8.8	13.1	50.7	18.7	5.5
Age of the person at wave 1							
0-17	4930	3.5	11.6	14.5	44.0	20.8	5.6
18-24	1105	**4.5**	10.9	7.2	46.6	25.8	5.0
25-44	5610	3.4	8.0	8.4	59.2	16.8	4.3
45-64	5105	2.7	6.7	10.8	57.8	17.1	5.0
65+	2030	3.0	8.9	31.5	27.6	19.0	10.3
Ethnicity							
NZ European	14250	3.0	7.4	10.9	54.4	19.2	5.1
Māori	2450	3.5	12.7	21.4	39.0	17.8	5.9
Other	2085	5.3	13.9	17.7	39.3	16.3	7.7
Highest education at wave 7							
Degree or Higher	2560	3.7	7.2	4.7	66.4	15.0	3.1
Post school Qualification	5685	3.1	8.0	10.4	54.1	19.3	5.2
School Qualification	4305	3.6	7.9	10.9	51.5	21.0	5.2
No Qualification	3660	2.9	10.4	23.4	36.6	19.0	7.8
Family type at Wave 1							
Couple only	4555	2.4	5.6	12.6	54.4	19.2	5.7
Couple with children	9645	3.6	8.6	7.5	56.6	19.1	4.6
Sole parent	2100	4.0	17.1	29.8	26.7	15.7	6.9
Not in a family nucleus	2485	3.0	8.5	21.5	41.0	18.5	7.4
Geographic region at Wave 1							
Auckland	4595	3.4	9.1	11.2	55.0	16.6	4.6
Waikato	1695	2.9	8.3	13.3	48.4	20.6	6.5
Wellington	2470	2.4	6.1	10.5	60.5	15.8	4.5
Rest of North Island	4315	3.1	10.5	17.3	42.6	20.2	6.4
Canterbury	3000	3.7	9.0	11.7	53.0	17.3	5.5
Rest of South Island	2710	3.9	7.9	13.3	46.3	22.7	5.9
Indicator of Urban Area							
Main Urban	13655	3.4	8.6	12.3	53.4	17.2	5.1
Other	5130	2.9	9.3	15.2	43.5	22.7	6.4

Income based on equivalised household income (not CPI adjusted and before housing costs)
Bold values are values based on cell numbers of 50 or less

Table A: 11. NZiDep transition table - w(i) to w(i+2) - 0 to 17

NZiDep - mean household for children							
Overall (w 3-7) for 0-18 ages				**W(i+2)**			
		0	**1**	**2**	**3 to 4**	**5+**	**Totals**
	0	0.821	0.126	0.037	0.014	0.002	6725
	1	0.473	0.307	0.147	0.060	0.013	1500
	2	0.276	0.284	0.209	0.187	0.030	670
W(i)	**3 to 4**	0.188	0.162	0.231	0.333	0.094	585
	5+	0.098	0.122	0.171	0.341	0.268	205
	Totals	6545	1620	780	580	160	9680

Table A: 12. NZiDep transition table - w(i) to w(i+2) - Age 18 to 64

NZiDep -individual adults							
Overall (w 3-7) for 18-64 years				**W(i+2)**			
		0	**1**	**2**	**3 to 4**	**5+**	**Totals**
	0	0.866	0.100	0.024	0.009	0.001	16490
	1	0.441	0.352	0.131	0.068	0.009	3285
W(i)	**2**	0.239	0.279	0.261	0.188	0.029	1360
	3 to 4	0.123	0.194	0.225	0.366	0.097	1135
	5+	0.029	0.130	0.116	0.377	0.319	345
	Totals	16205	3445	1480	1175	305	22610

Table A: 13. Proportion of the population in deprivation (based on NZiDep 2 or more)

Proportion of population in deprivation (NZiDep score 2 or more)							
		W3		**W5**		**W7**	
	Total	**N**	**%**	**N**	**%**	**N**	**%**
Whole pop	18785	2420	12.9	2100	11.2	2730	14.5
Ethnicity							
NZ European	14250	1440	10.1	1275	8.9	1655	11.6
Māori	2450	625	25.5	520	21.2	655	26.7
Age							
0-17	4930	790	16.0	685	13.9	870	17.6
18-24	1105	210	19.0	170	15.4	240	21.7
25-44	5610	860	15.3	750	13.4	990	17.6
45-64	5105	485	9.5	435	8.5	525	10.3
65+	2030	70	3.4	55	2.7	110	5.4

Table A: 14 Number of waves in deprivation (2 or more measures of NZiDep)

	Number of waves in deprivation				
		0	1	2	3
	Total N		Row %		
Age of the person at wave 1					
0-17	4930	71.9	14.6	7.7	5.9
18-24	1105	67.0	16.3	10.0	6.8
25-44	5610	73.5	13.1	7.0	6.4
45-64	5105	83.8	7.8	4.5	3.8
65+	2030	91.9	5.4	2.0	**0.7**
Ethnicity					
NZ European	11650	81.8	9.5	4.9	3.8
Māori	1465	59.8	18.2	11.0	11.0
Other	1440	69.1	16.5	8.9	6.0
Highest education at w7					
Degree or Higher	2560	84.4	9.4	4.3	**2.0**
Post school Qualification	5685	78.6	10.5	5.6	5.2
School Qualification	4305	79.3	12.1	5.5	3.3
No Qualification	3660	74.6	12.7	7.2	5.6
Std family type					
Couple only	4555	89.8	6.6	2.4	1.3
Couple with children	9645	79.7	11.2	5.7	3.5
Sole parent family	2100	44.0	21.4	15.7	18.8
Not in a family nucleus	2485	74.6	12.7	6.6	6.0
Geographic region					
Auckland	4595	78.9	11.4	5.5	4.0
Waikato	1695	80.2	10.0	6.2	3.5
Wellington	2470	75.1	12.8	7.1	5.1
Rest of North Island	4315	74.6	11.6	7.2	6.6
Canterbury	3000	78.3	11.3	5.0	5.5
Rest of South Island	2710	79.2	10.9	5.7	4.1
Urban area					
Main Urban	13655	76.8	11.9	6.2	5.1
Other	5130	79.2	10.1	5.8	4.8

Bold values are values based on cell numbers of 50 or less

Table A: 15 Duration of low income by duration of deprivation (2 or more measures of deprivation)

	Waves in deprivation (NZiDep, 2 or more)				
Waves in low income*		**0**	**1**	**2**	**3**
Total N/Row %	18785	77.5	11.4	6.1	5.0
0	9520	90.0	7.0	2.2	0.9
1	2460	80.5	12.6	4.9	**2.0**
2	1555	70.7	16.7	8.4	3.9
3	1170	62.4	18.4	9.4	9.4
4	1065	58.2	17.8	11.3	12.7
5	930	53.8	17.2	14.5	14.5
6	910	51.1	15.4	16.5	17.0
7	1175	50.6	16.6	15.7	17.0

***** Low income is <60% of median equivalised household income (not CPI adjusted and before housing costs)
Bold values are row percentages based on cell numbers of 50 or less

Table A: 16 Mean deprivation score (over waves 3,5 and 7) by highest school qualification at wave 7 and duration of low income

	School qual			Post school qual			Degree or higher			No qualification		
	N	**Mean**	**StdErr**	**N**	**Mean**	**StdErr**	**N**	**Mean**	**StdErr**	**N**	**Mean**	**StdErr**
Total	4305	0.46	0.01	5685	0.51	0.01	2560	0.36	0.01	3660	0.62	0.02
Waves in low income												
0	2215	0.23	0.01	3075	0.24	0.01	1700	0.19	0.01	1340	0.25	0.01
1	640	0.42	0.03	755	0.42	0.03	315	0.40	0.04	460	0.38	0.03
2	390	0.55	0.04	455	0.58	0.04	185	0.59	0.06	300	0.55	0.05
3	240	0.71	0.06	365	0.87	0.06	120	0.76	0.08	265	0.76	0.06
4	230	0.83	0.07	285	1.11	0.08	95	0.75	0.11	280	0.96	0.07
5	220	0.95	0.07	270	1.23	0.08	65	1.19	0.14	220	1.09	0.08
6	160	1.03	0.09	215	1.41	0.10	55	1.44	0.17	310	1.09	0.07
7	215	1.08	0.09	265	1.21	0.09	**30**	**1.15**	**0.26**	485	1.14	0.06

Bold values are row percentages based on cell numbers of 50 or less

Table A: 17 Mean deprivation score (over waves 3,5 and 7) by family structure and duration of low income

	Couple only			Couple with children			Sole parent			Not in family nucleus		
	N	Mean	StdErr	N	Mean	StdErr	N	Mean	StdErr	N	Mean	StdErr
	4555	0.24	0.01	9645	0.49	0.01	2100	1.43	0.03	2485	0.6	0.02
Waves in poverty												
0	2480	0.16	0.01	5460	0.24	0.01	560	0.53	0.03	1020	0.29	0.02
1	585	0.22	0.02	1330	0.42	0.02	235	0.93	0.07	310	0.46	0.04
2	320	0.25	0.03	840	0.63	0.03	190	1.13	0.09	205	0.65	0.06
3	250	0.28	0.03	550	0.85	0.04	215	1.58	0.09	155	0.86	0.08
4	220	0.43	0.06	515	1.14	0.06	180	1.75	0.11	150	0.83	0.08
5	165	0.54	0.07	375	1.07	0.05	230	2.18	0.1	165	0.97	0.1
6	230	0.43	0.05	305	1.47	0.07	215	2.25	0.1	160	1.12	0.11
7	300	0.51	0.05	270	1.52	0.09	275	2.31	0.08	325	1.01	0.07

Table A: 18. Mean NZiDep by waves in low income (<50% of median income)

		Mean NZiDep	
	N	**Mean**	**StdErr**
Total	18785	0.55	0.01
Waves in low income (<50% median income)			
0	11435	0.29	0.01
1	2610	0.56	0.02
2	1495	0.84	0.03
3	1110	1.04	0.04
4	775	1.28	0.05
5	605	1.48	0.06
6	395	1.46	0.07
7	360	1.79	0.08

***** Income is median equivalised household income (not CPI adjusted and before housing costs)

Table A: 19. Mean NZiDep at wave 7 by waves in low income (<60% of median income)

		Mean NZiDepw7	
	N	**Mean**	**StdErr**
Total	18765	0.59	0.01
Waves in low income (<60% of median income)			
0	9510	0.29	0.01
1	2460	0.50	0.02
2	1550	0.71	0.03
3	1165	0.95	0.04
4	1060	1.11	0.05
5	930	1.16	0.05
6	910	1.30	0.05
7	1175	1.25	0.05

***** Income is equivalised household income (not CPI adjusted and before housing costs)