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Low Incomes in New Zealand 2007 – 2020: Incidence, Intensity and Inequality[1]

By

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Abstract

This paper examines the characteristic of low-income groups in New Zealand over the period 2007 to 2020, using a series of Household Labour Force Surveys (HLFSs). The emphasis is on the incidence, intensity and inequality of low-income groups. The income measure relates to Inland Revenue administrative data, which are contained in the New Zealand Integrated Data Infrastructure (IDI) and linked to the HLFS. It is therefore the value, for each taxpayer, of annual total taxable income. Hence, the term 'low income' cannot be construed in terms of poverty. Each person is assigned the total family taxable income per adult equivalent person, where the family is regarded as consisting of an adult, or adult partners and/or dependent children who live at the same address. Adult children in the same household are treated as separate adult family units. Results are reported for a range of demographic groups.

JEL Code: D31; D63; I32

Keywords: Low income, adult equivalent scales, TIP curves.

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1 Introduction

This paper examines the characteristics of low-income groups in New Zealand over the period 2007 to 2020, using a series of Household Labour Force Surveys (HLFSs).[2] The emphasis is on the incidence, intensity and inequality of low-income groups. The income measure relates to Inland Revenue administrative data, which are contained in the New Zealand Integrated Data Infrastructure (IDI) and linked to the HLFS. It is therefore the value, for each taxpayer, of annual total taxable income. In NZ, some social welfare payments, such as New Zealand Superannuation, are taxable. The data source contains no information about non-taxable sources of income (including most capital gains as well as non-taxable benefits), and obviously does not include data on expenditure. Hence, in what follows, the term 'low income' cannot be construed in terms of any kind of poverty measure. Nevertheless, the analysis makes use of measures and diagrams which were designed to examine poverty. As in the context of poverty measurement, an arbitrary low-income threshold, expressed in terms of a proportion of median income, is used to distinguish those considered to have low incomes.[3]

In constructing the income measure, or 'welfare metric', allowance is made for the fact that many individuals, including those who are not taxpayers (such as dependent children and partners with no taxable income), benefit from the incomes of taxpayers through income sharing. However, in common with the vast majority of studies, information is not available about the precise nature of such sharing, which would also require details of expenditure. It is also not known how widely the income is shared. Hence, an artificial welfare metric, involving a strong assumption of equal sharing, is usually constructed. This typically allows for the differing size and composition of the group of those over whom sharing is assumed to take place, via the use of adult equivalent scales.

In defining the relevant group, there are no ideal or universal definitions of 'households' or 'families'. Many single adults who live alone, or with other adults in the same household, are likely to consider themselves as members of one or more families, defined in terms of genetic or social relationships. Furthermore, within-family income transfers may take place among those who live in different households. Money flows may include intergenerational transfers.

The approach taken here is to adopt the strong assumption that sharing is most important within family groups consisting of either a single adult, or partners, and dependents who are living together. Given this choice, the welfare metric is the resulting 'total taxable income per adult

[2] A companion paper examines the income dynamics of individuals in New Zealand over the same period: see Creedy and Ta (2022).

[3] The threshold is imposed by analysts, rather than being part of individuals' preferences, as in the analysis of Lewis and Ulph (1988) and Creedy (1997).

equivalent person' in that group, and this measure is assigned equally to each member.[4] The 'income unit' is thus the individual.[5]

Section 2 briefly describes the data and income concept used, including the form of adult equivalence scales adopted. Section 3 reports examples of 'Three "I"s of Poverty' (TIP) curves, devised by Jenkins and Lambert (1997). As explained above, the term 'poverty' is not used here, in view of the use of a gross income measure, but the TIP curves conveniently show at a glance three important aspects of low incomes. These are the incidence (the proportion of people below a low-income threshold), intensity (the extent to which individuals fall below the threshold), and inequality among those below the threshold. Comparison between groups or over time can also usefully be made using specific numerical measures. Section 4 reports numerical values of three members of a class of widely used poverty measures, FGT, named after their originators, Foster, Greer and Thorbecke; see Foster *et al*. (1984). These measures emphasise the same three characteristics as the TIP curves. Results for a range of demographic groups are reported. Section 5 compares low-income measures with population shares. Brief conclusions are in Section 6.

2 The Data and Income Concept

Subsection 2.1 briefly describes the datasets used. Subsection 2.2 then describes the adult equivalent scales used for the construction of the income measure for each individual. Subsection 2.3 provides some summary information. As explained above, each person is assigned the total family taxable income per adult equivalent person, where the family is regarded as consisting of an adult, or adult partners and dependent children who live at the same address.[6] Adult children in the same household are treated as separate adult family units. Information about incomes is obtained from Inland Revenue administrative data. As a result, the income measure used throughout is gross taxable income which makes use of the accurate administrative data on taxable income. Income includes wages and salaries, self-employment and investment earnings, pensions and taxable benefits like jobseeker support, sole parent support, and young parent payment.

[4] It may be thought that a sharing assumption could be based on the equivalence scales used, but these (as defined below) typically involve an assumption of economies of scale, and would not capture the public good nature of much of the family expenditure.

[5] Some studies, while using a welfare metric based on a measure of income per adult equivalent person (for a specified sharing group), nevertheless use the sharing group as the 'income unit' in distributional analyses. Hence, their reported decile groups contain equal numbers of such groups, but unequal numbers of individuals.

[6] Effectively, a weight is attached to each income measure equal to the number of individuals in the family. An alternative would be to use the number of 'equivalent persons' as weight. For discussion of the implications for welfare comparisons, see Glewwe (1991), Shorrocks (2004) and Creedy and Scutella (2004). On the range of alternative distributions which could in principle be examined, see Creedy (2017).

However, the income data do not reflect the complete tax and transfer system, as they exclude non-taxable benefits.

2.1 The Data

The data are obtained from New Zealand Household Labour Force Surveys (HLFSs) for the years 2007 to 2020. Table 1 provides information about variable definitions used when looking at separate demographic groups.

Table 1. Variable Descriptions

Variable	Description
Adult	Individuals aged 18 or above.
Children	Individuals aged under 18.
Family type	Couple only; couple with children; single female; single male; sole parent female; sole parent male.
Age group	18-24; 25-34; 35-44; 45-54; 55-64; 65 and over.
Ethnicity	One of the following ethnic groups prioritised by Māori; Pasifika; Asian; European; MELAA (Middle Eastern, American, and African); and Other.
Working status	Employed; unemployed; not in the labour force.
Highest education	No Qualification; School (NCEA levels 1 – 3); Post-School (NCEA levels 4 – 6); University+ (NCEA level 7 or higher). Data for education are available from 2014 onwards.
Occupation	Managers; professionals; technicians and trades; community and personal services; clerical and administrative; sales; machinery operators and drivers; labourers. Data for occupation are available from 2009 onwards.
Two-way decomposition: To generate two-way decomposition outputs, the following variables of interest are recategorised into fewer subgroups based on their counts and similarities.	Family types: Couple Only; Couple with Children; Single; and Sole Parent Ethnic groups: European; Māori & Pasifika; and Other (Asian, MELAA, and other ethnics). Age groups: Young (aged <35); Middle-Aged (aged 35-54); and Old (aged 55+) Working status: Working (Employed); and Not Working (Unemployed and Not in Labour Force) Highest qualification: Low Qualification (No Qualification & School); Post-School Graduates; and University Graduates (Uni Grads and Postgrads).

2.2 Adult Equivalent Scales

This paper uses a set of two-parameter adult equivalent scales, which allow for a difference between adults and children, as well as economies of scale within the family. Following Jenkins and Cowell (1994), the adult equivalence size, m, of a family is given by:

$$m = (n_a + \beta n_c)^{\delta} \quad (1)$$

where n_a is the number of adults, and n_c is the number of children. A child is classified as a dependent if that person is under 18 years of age. These parametric scales have been found to give close approximations to many alternative, and often more complex, scales; see Creedy and Sleeman (2005). Benchmark parameters values of $\beta = 0.6$ and $\delta = 0.8$ are used in all cases reported below.[7] The income measure – total family income per adult equivalent person – is thus total family income (gross taxable income) divided by the adult equivalent size, m. The income unit is the individual, so that each individual in the family is assigned the income per adult-equivalent person.

2.3 Summary Information

The data contain taxable income data for a small number of part-time youths and students, and those who are not working, but have small capital incomes. To avoid results being contaminated by these low incomes, individuals with log-income per adult equivalent person of less than 6 were omitted from the analysis.[8] The omitted people account for just over 3 per cent of the total sample. Summary information about the HLFS samples is given in Table 1.[9] Appendix Tables A1 and A2 provide detailed descriptions of the HLFS samples by ethnicity in 2007 and 2020 respectively.

Figure 1 shows the variation over time in summary measures of the distribution of real income per adult equivalent person: profiles of the top and bottom deciles, along with the arithmetic mean and median, are shown, after in each case rescaling real income to the start year 2007.[10] Hence each measure takes the value, 1, in 2007, and diverging profiles indicate changes in the shape of the distribution. Real incomes were relatively stable over the period 2007 to 2012, followed by gradual

[7] These give scales close to those by Michelini (1999), estimated using New Zealand data. Sensitivity analyses were carried out and results were found to be similar to those obtained by the baseline values.

[8] Sensitivity analyses were carried out using a higher cut-off, where individuals with log-income per adult equivalent person of less than 7 were omitted. The results were found to remain similar to those obtained using the baseline results. The results are available on request.

[9] Experiments using HLFS weight to scale up the sample to the population were found not to affect the main findings. This arises from the relatively low variation in weights among individuals. The results are available on request.

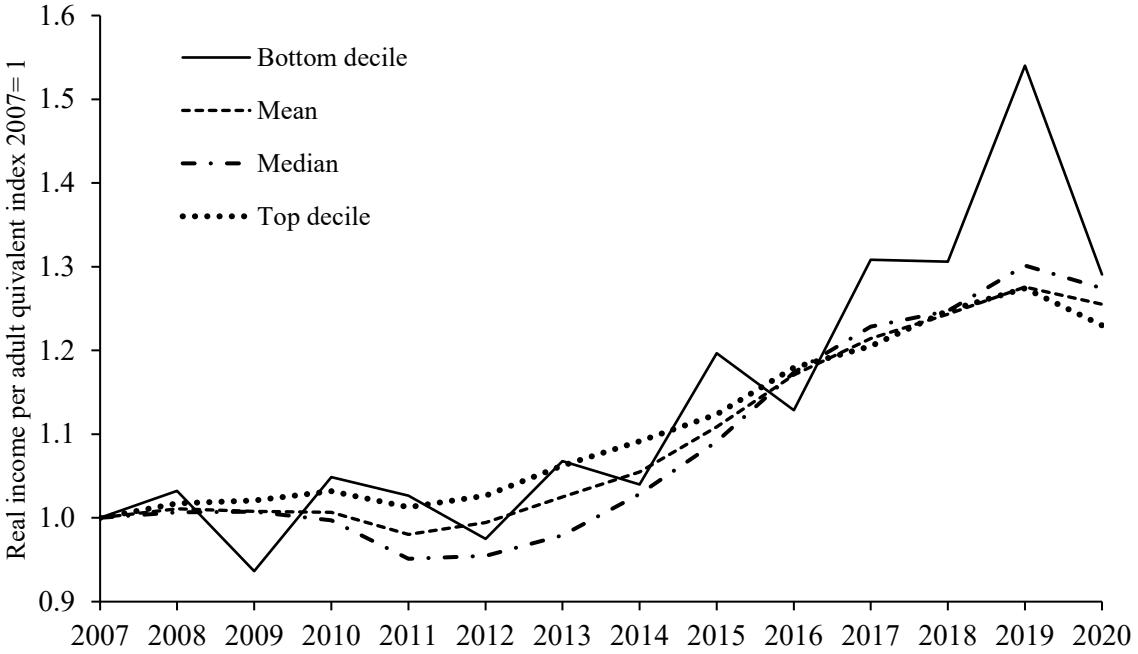
[10] Incomes were adjusted using the Consumer Price Index, where CPI in 2013Q1 equals 100.

increases until 2019, after which all measures fell in 2020. The bottom decile experienced more variability over time compared with other measures; see Appendix Figure A1 for more details.[11]

Table 2. Summary Measures of Adult Equivalent Income Per Person: 2007 to 2020

year	Entire sample			Adults			Children		
	N	mean	median	N	mean	median	N	mean	median
2007	32,052	28,803.5	22,417.5	22,959	30,658.5	24,216.0	9,096	24,120.2	19,290.8
2008	32,172	30,494.8	23,653.4	23,247	32,370.7	25,068.8	8,925	25,607.8	20,973.0
2009	34,488	31,310.2	24,238.5	24,819	33,321.5	25,919.5	9,669	26,147.3	21,124.9
2010	34,950	31,822.6	24,316.4	25,302	33,948.8	26,096.8	9,648	26,246.6	21,126.3
2011	34,206	32,436.0	24,797.0	24,846	34,463.5	26,435.1	9,357	27,051.3	22,022.4
2012	34,155	33,482.5	25,628.0	24,846	35,495.7	27,452.2	9,309	28,109.8	22,539.0
2013	34,290	35,014.0	26,897.0	25,074	37,193.5	28,787.0	9,216	29,084.3	23,306.8
2014	35,337	36,412.5	28,174.0	26,019	38,370.7	29,730.7	9,318	30,943.5	24,783.4
2015	34,179	38,043.7	29,786.3	25,278	40,039.0	31,540.0	8,901	32,379.0	26,536.1
2016	33,672	40,640.2	32,391.5	24,909	42,597.4	33,974.9	8,766	35,079.0	28,672.4
2017	34,155	42,286.9	34,072.7	25,302	43,792.8	35,380.4	8,853	37,982.4	31,611.0
2018	34,671	44,066.4	35,490.6	25,821	45,831.6	36,805.5	8,850	38,916.9	32,619.1
2019	36,141	45,661.8	37,311.6	26,700	47,584.0	38,896.1	9,441	40,225.5	33,989.9
2020	33,483	45,916.0	37,678.7	24,867	47,794.2	39,278.6	8,616	40,496.9	33,980.2

Figure 1. The Changing Distribution of Income Per Adult Equivalent Person: 2007 to 2020



[11] These are of course cross-sectional comparisons of annual incomes distributions, and cannot reflect typical income movements for individuals. On income dynamics, see Creedy and Ta (2022) and papers cited therein.

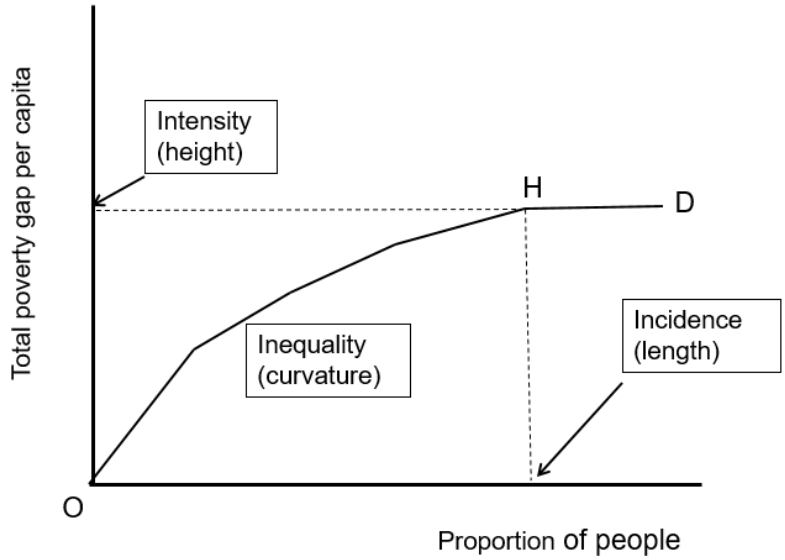
3 Three 'I's of Poverty (TIP) Curves

This section provides 'Three "I"s of Poverty' (or in the present context, low-income), or TIP curves, showing, at a glance, information about three important properties of low-income groups. These three 'I's are incidence, intensity and inequality. Subsection 3.1 provides a brief introduction to the diagram. Subsection 3.2 presents empirical results for a range of time periods and demographic groups.

3.1 The TIP Curve Defined

Jenkins and Lambert (1997) demonstrated that three important dimensions of cross-sectional poverty (here low incomes) can be summarised by the following curve. First define a low-income threshold. For each individual below the threshold, the low-income gap is the difference between the threshold and the individual's income. For incomes above the threshold, the gap is zero. With incomes arranged in ascending order, the TIP curve plots the cumulative low-income gap per capita against the corresponding proportion of people: an example is shown in Figure 2.

Figure 2. A Hypothetical TIP Curve



Incidence, the proportion of people below the threshold value of income, is given immediately by the value on the *horizontal axis* where the TIP curve becomes horizontal. Intensity, the total income gap per capita, is given as the value on the *vertical axis* at which the curve becomes horizontal. Since incomes are arranged in ascending order, the curve must in general be concave. It is linear only for the case where all individuals below the threshold have the same low-income gap. The slope at any point is equal to the average poverty gap corresponding to the particular proportion of people. A flattening of the curve therefore shows the extent to which the average poverty gap falls as income rises. Hence, inequality among low-income individuals is indicated

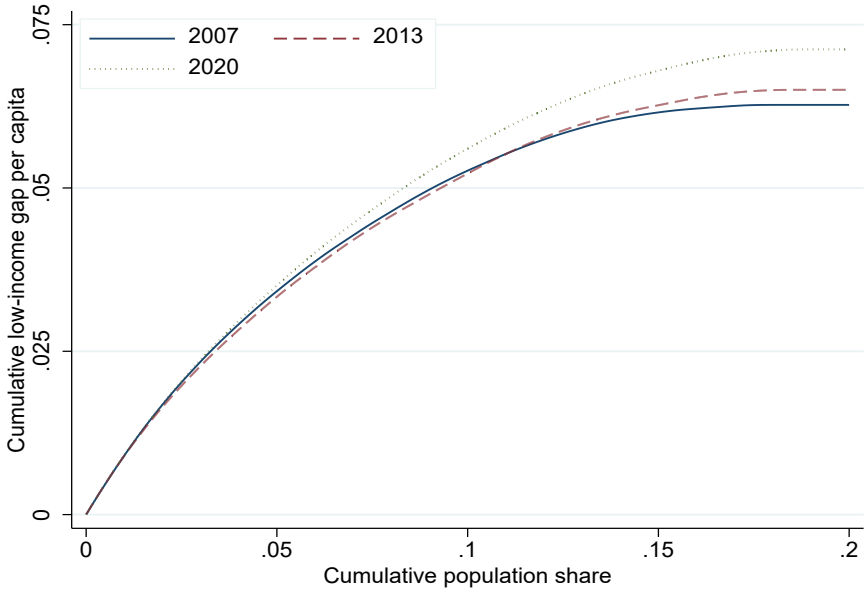
by the curvature of the TIP curve. Hence, comparisons over time and between population groups in the incidence, intensity and inequality of low-income groups can easily be made without producing explicit cardinal measures.

3.2 New Zealand TIP Curves Illustrated

This subsection reports TIP curves for a range of periods and population groups. In each case the low-income threshold is set at 50 per cent of the median income per adult equivalent person, for all individuals in the relevant year, as reported in Table 1. In all cases the unit of analysis is the individual.

These curves indicate little change in the overall incidence of, and inequality among, individuals with an income per adult equivalent person of less than half the median value (over all individuals). Figure 3 shows that about 20 per cent of individuals fall below the threshold in each year. Again, it is important to stress that, in view of the income measure used (annual taxable income), this cannot be interpreted in terms of poverty. However, there is an increase in the intensity of low-income experience, shown by the increasing height of the TIP curve, particularly between 2013 and 2020.

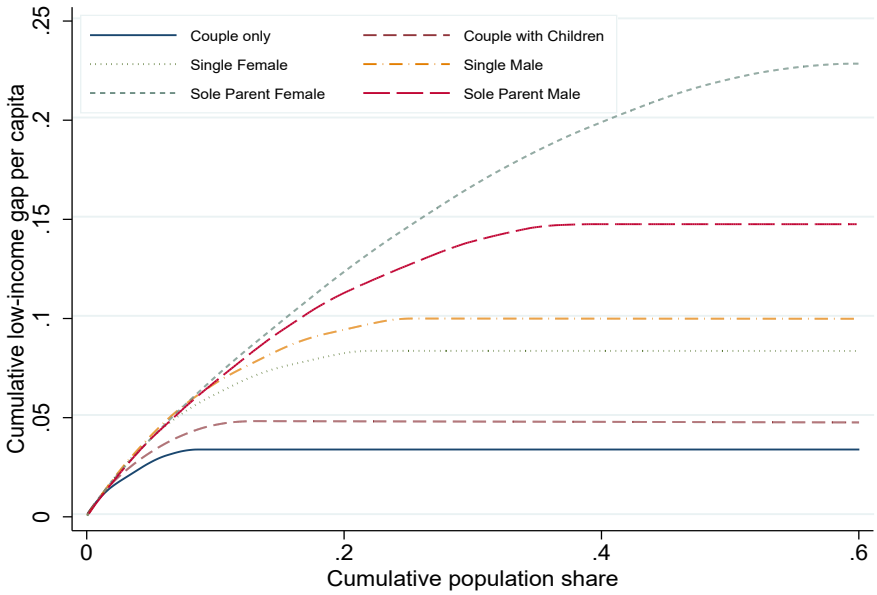
***Figure 3. New Zealand TIP Curves*: 2007, 2013, and 2020**



When individuals are grouped according to the type of family to which they belong in each year, substantial differences are revealed, as shown in Figure 4. This shows separate TIP curves for the year 2020, for individuals in a range of family types. These curves are similar only at the very bottom of the distribution, and for the major part of their length, the curves reveal substantially different patterns. In particular, the incidence (the population proportion at which the curve

becomes horizontal) may in each case be compared with the overall proportion of approximately 20 per cent shown in Figure 3. Both the intensity of low-incomes (the average low-income gap) and its incidence (the proportion of individuals below the low-income threshold) increase together: there is a clear hierarchy moving from individuals in couples, couples with children, single females, single males, sole parent families with a male adult, and those in sole parent families with a female adult.

Figure 4. TIP Curves in 2020: Individuals in Family Types



It is also of interest to consider low-income characteristics when individuals are grouped according to their declared ethnicity. The TIP curves are shown in Figures 5, 6 and 7 for 2007, 2013 and 2020 respectively. These curves reveal interesting differences over time. Between 2013 and 2020 the TIP curves for MELAA, Pacifica and Māori individuals moved much closer together, largely through a reduction in the low-income intensity among the first two ethnicities.

Figure 5. TIP Curves in 2007: Individuals in Ethnic Groups

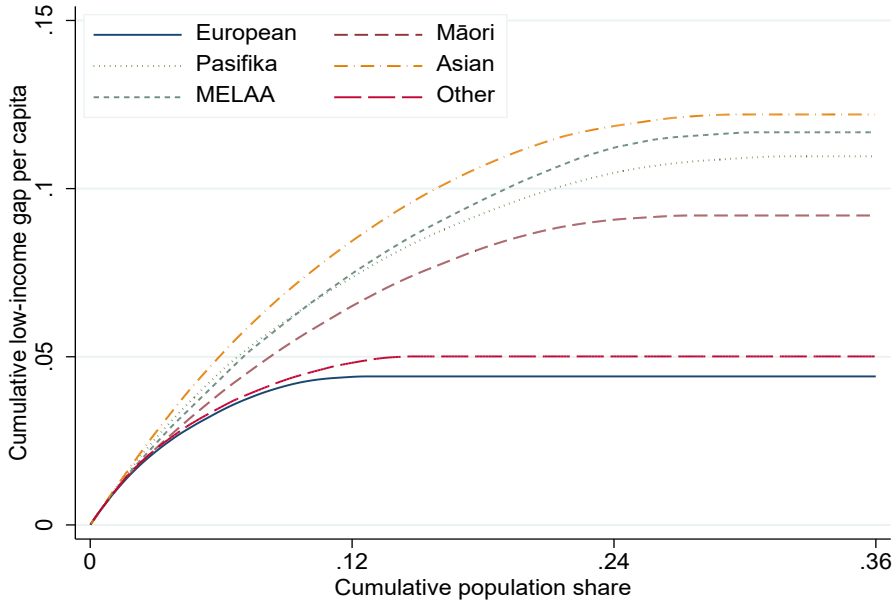


Figure 6. TIP Curves in 2013: Individuals in Ethnic Groups

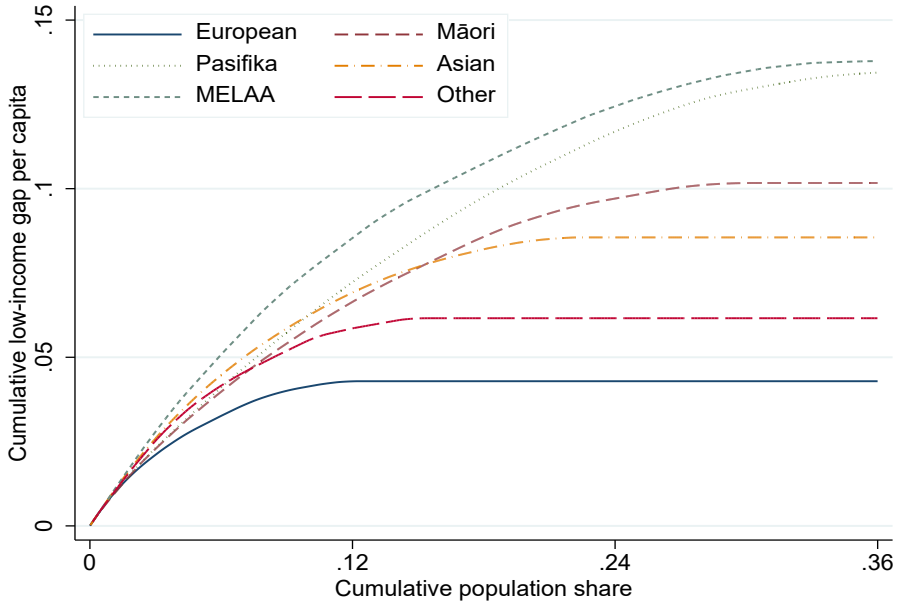
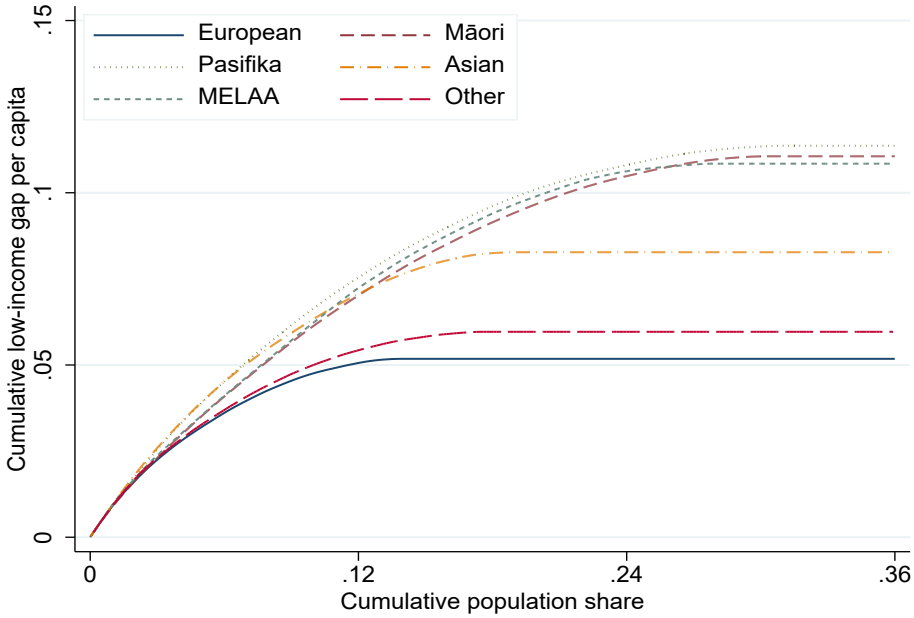
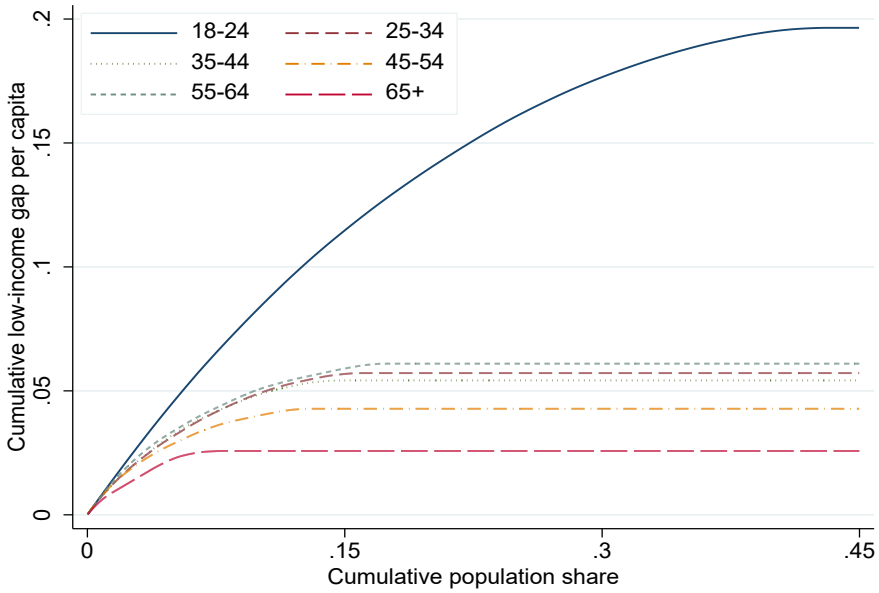


Figure 7. TIP Curves in 2020: Individuals in Ethnic Groups



There is an interesting shift in the TIP curves for individuals in Asian families between 2007 and 2013. In 2007 their TIP curve is higher, over the whole of its range, than any other group. However, in 2013 and 2020, Asian individuals comprise the 'middle' group, with both lower incidence and intensity compared with the three groups with higher TIP curves. However, they display greater low-income inequality (greater curvature) with a higher intensity at the very low ranges.

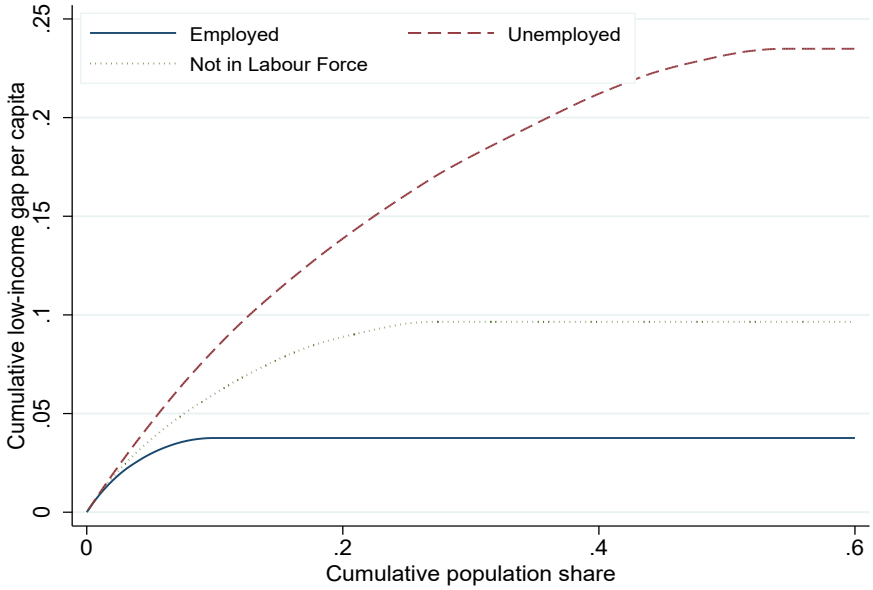
Figure 8. TIP Curves in 2020: Individuals in Age Groups



Individuals may also be grouped according to age. Figure 8 shows TIP curves for six age groups. Those between 35 and 64 have similar curves, with the older age groups showing lower incidence and intensity. The group with the highest incidence and intensity (but with little inequality at the very low end of the distribution) is clearly the youngest age group, of those aged 18 to 24.

TIP curves for individuals distinguished by their labour market status are shown in Figure 9. As expected, the curve for the unemployed dominates those for those not in the labour force and the employed. All three characteristics of the distribution of low-income individuals increase when moving from employed to unemployed individuals

Figure 9. TIP Curves in 2020: Labour Market Status



Curves for different occupation groups are displayed in Figure 10. There is a clear hierarchy, with professional workers having the lowest incidence, intensity and inequality, while labourers have the highest values of all three features. As with the other groups examined, there are very few cases where curves intersect. For machinery operators and drivers, all low-income features are lower than those of managers. Technicians and traders are almost identical to clerks and administrators.

TIP curves for different education levels are reported in Figure 11. Again, they reveal unequivocal comparisons among the different groups, with non-intersecting curves. Perhaps surprisingly, those with school qualifications only have higher intensity than those with no qualifications, although this property is in each case higher than for the population as a whole.

Figure 10. TIP curves in 2020: Individuals in Occupations

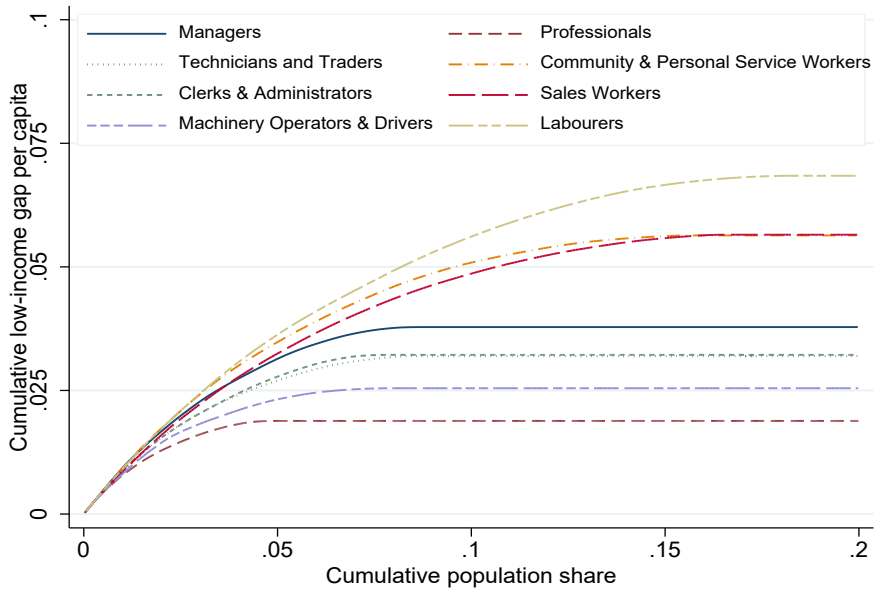
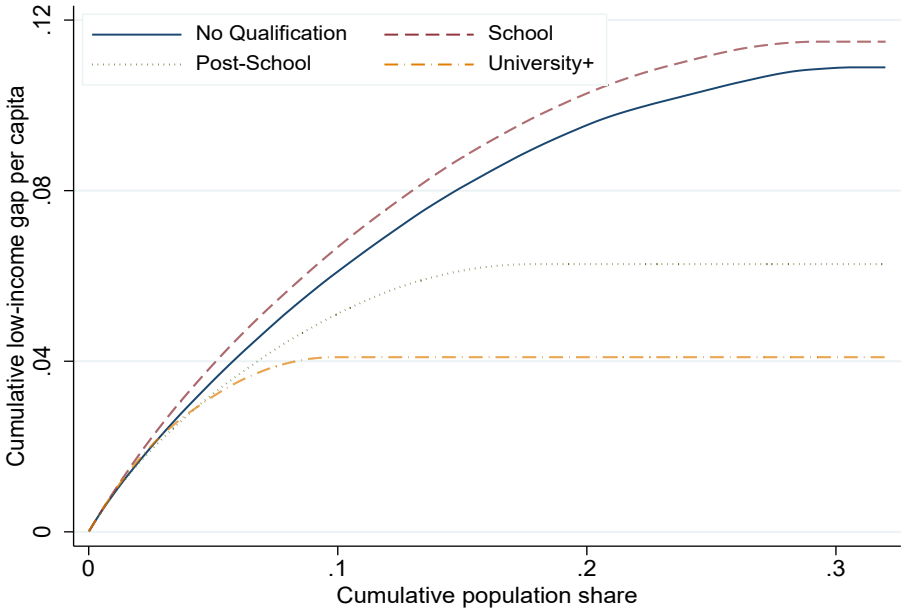


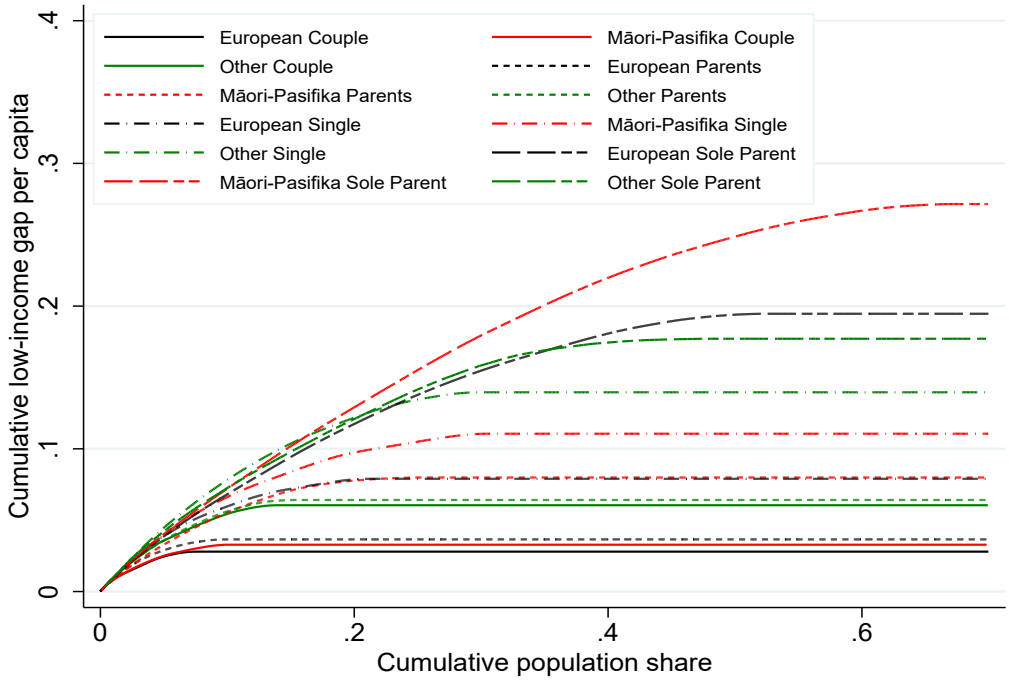
Figure 11. TIP Curves in 2020: Education Levels



3.3 TIP Curves: Two-Way Classifications

This subsection presents TIP curves using a further decomposition of the data, whereby two-way classifications are used. First, Figure 12 presents separate curves, defined by family type and ethnicity. Not surprisingly, those in sole parent families have the highest 'low-income characteristics', dominated by those in Māori-Pacifica sole-parent families. Those with the lowest levels are the closely-grouped European couples, Māori-Pasifika couples, and European couples with children. For some of the groups shown in Figure 12, the TIP curves intersect, so that unequivocal comparisons are harder to make.

Figure 12. TIP Curves in 2020: Family Type and Ethnicity



Groups containing individuals distinguished by both age and the family type to which they belong are illustrated in Figure 13. Sole parents under 35 have the highest low-income levels of intensity and incidence, but inequality among low-income individuals is greater for single individuals under 35. There appear to be two broad groups. Those with the highest incidence and intensity are all sole parents, except for single individuals under 35. Couples with parents, older and middle-aged single individuals make up the second broad group of those with low incidence and intensity.

Figure 13. TIP curves in 2020: family type and age group

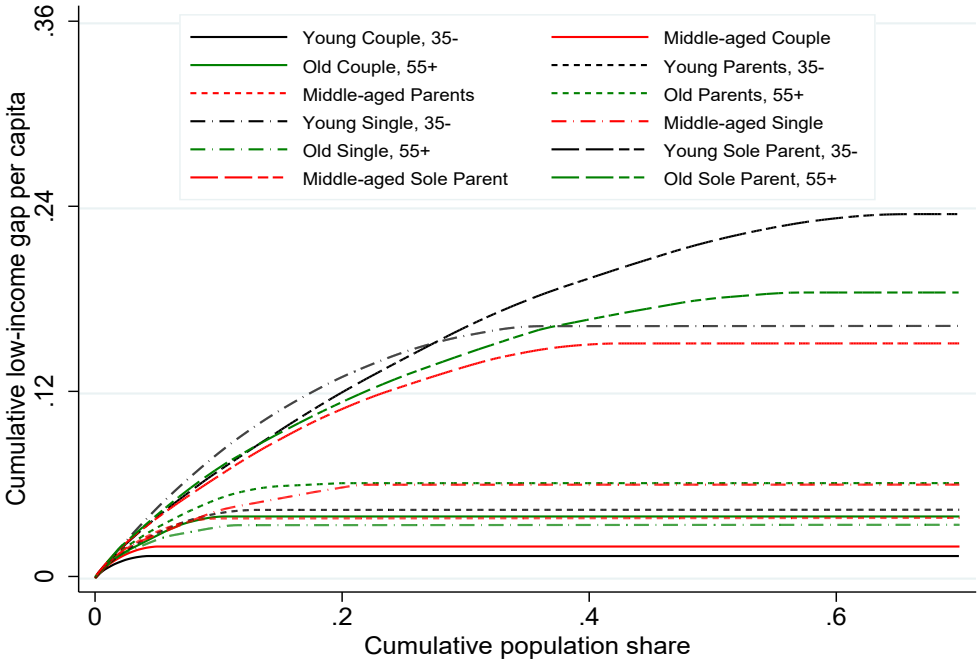


Figure 14. TIP Curves in 2020: Family Type and Labour Force Status

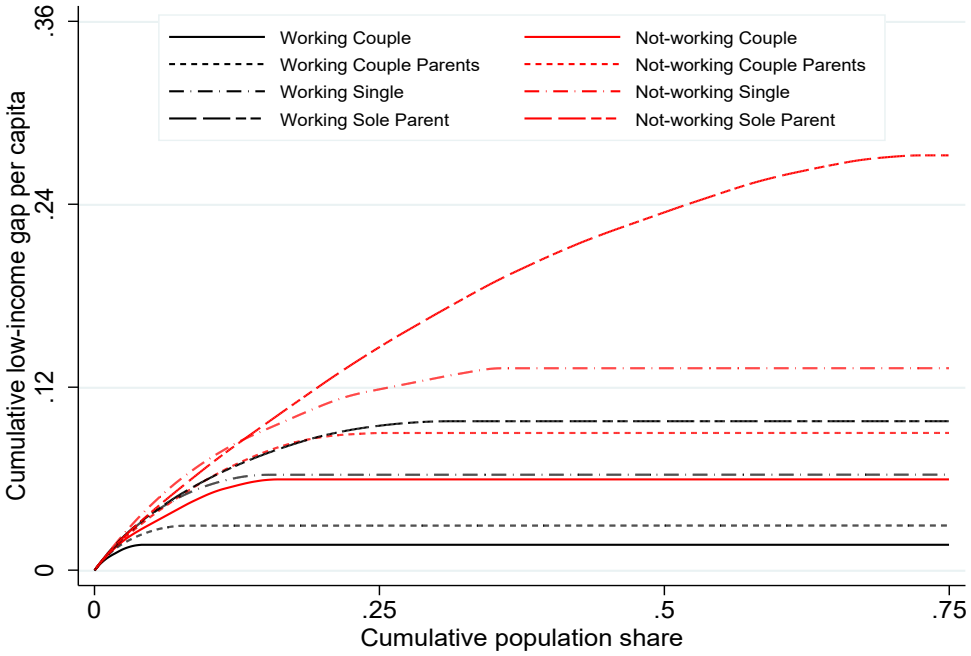
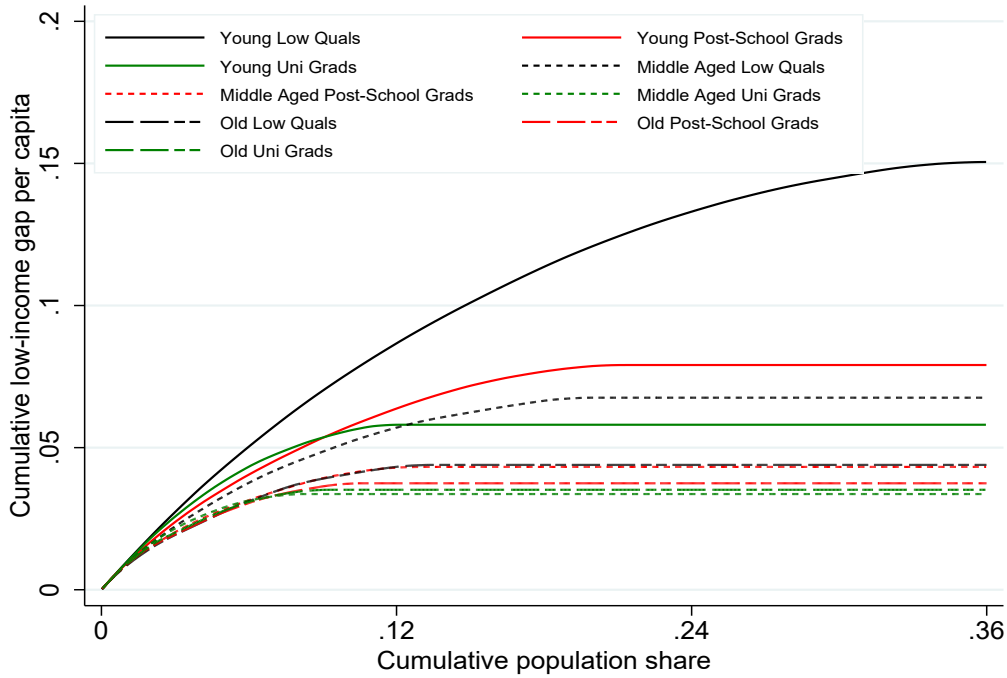


Figure 15. TIP Curves in 2020: Age Group and Education



Those individuals distinguished by both their labour force status and the family type are shown in Figure 14, while Figure 15 shows TIP curves for individuals distinguished by age and education. In the latter case, life-cycle income variations clearly play an important role, with younger individuals displaying higher low-income features.

4 Further Empirical Results: Foster-Greer-Thorbecke Measures

The previous section reported TIP curves for individuals in a range of demographic groups, distinguished by one and two characteristics. They provide a convenient visual indication of the incidence, intensity and inequality of low incomes, for a given threshold defined in terms of the median value for all individuals combined. In many cases, comparisons are clear, as the TIP curves lie unequivocally above or below other comparison groups. However, it is often useful to supplement the visual information with quantitative measures of these three low-income features, of incidence, intensity and inequality. This section reports such summary measures, based on the family of poverty measures named after their originators, Foster, Greer and Thorbecke; see Foster *et al*. (1984). However, as explained above, the income measure - based on gross taxable income – again precludes the use of the term 'poverty' here. As with the TIP curves, the results use a low-income threshold, in each year, of 50 per cent of median income per adult equivalent person. Subsection 4.1 briefly describes the measures used, and the following subsections report results for different time periods and demographic groups.

4.1 Three Low-Income Summary Measures

Following Foster *et al.* (1984), let y_i denote the income of person i (i= 1, 2, …, n) and y_p is a low-income threshold. The subset of low-income people is denoted, A. The family of low-income measures, for a specified value of the parameter, α, are given by:

$$LT_\alpha = \frac{1}{n}\sum_{i \text{ in } A}\left(\frac{y_p - y_i}{y_p}\right)^\alpha \qquad (2)$$

The most interesting cases are for values of α of 0, 1 and 2. For α=0, expression (2) is simply the proportion of low-income people, and hence measures the *incidence* (conventionally referred to as the 'headcount' measure). For α = 1, (2) depends on LT_0 and the average normalised low-income gap, which depends on average income among the low-income people, μ_p, and reflects *intensity.* Hence, letting $G = \frac{y_p - \mu_p}{y_p}$, $LT_1 = LT_0$*G. For α = 2, LT_2 depends on the average squared normalised low-income gap, which is related to the standard deviation of low incomes, σ_p^2, reflecting *inequality* among the low-income group. It can be shown that:

$$LT_2 = LT_0[G^2 + (1 - G)^2)\ {\sigma_p}^2] \qquad (3)$$

4.2 Low-income Measures 2007 to 2020

Figure 16 shows the variation in all three members of the FGT family of low-income measures (in percentage terms) over the period. The left-hand axis measures the percentage of individuals below the relevant low-income threshold for each year, while the right-hand axis measures the values of LT_1 and LT_2. These values show no systematic tendency to increase or decrease.

Figures 17 and 18 display the same measures, for adults and children separately.[12] The adult measures have a slight upward shift between 2016 and 2017 but are otherwise relatively stable. However, the LT_0 and LT_1 values are below those for all individuals. For children, all measures are higher than those of 'all individuals', and there is more variability over time in the low-income incidence measure, LT_0. This measure declined from 2012 to 2019, and then increased between 2019 and 2020. Even when the incidence of low-incomes among children is at its lowest, in 2019, it is nevertheless larger than the corresponding measure for all adults.

[12] As with earlier analyses, the low-income threshold is the same for all groups, equal to 50 per cent of the overall median income per adult equivalent person, with individuals as the income unit.

Figure 16. Trends in FGT Low-Income Measures: All Individuals

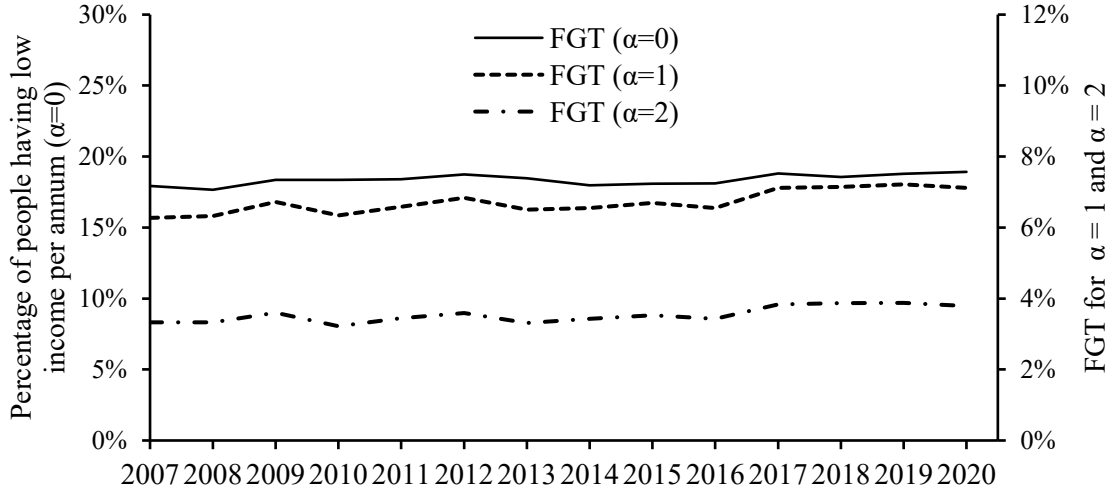


Figure 17. Trends in FGT Low-Income Measures: All Adults

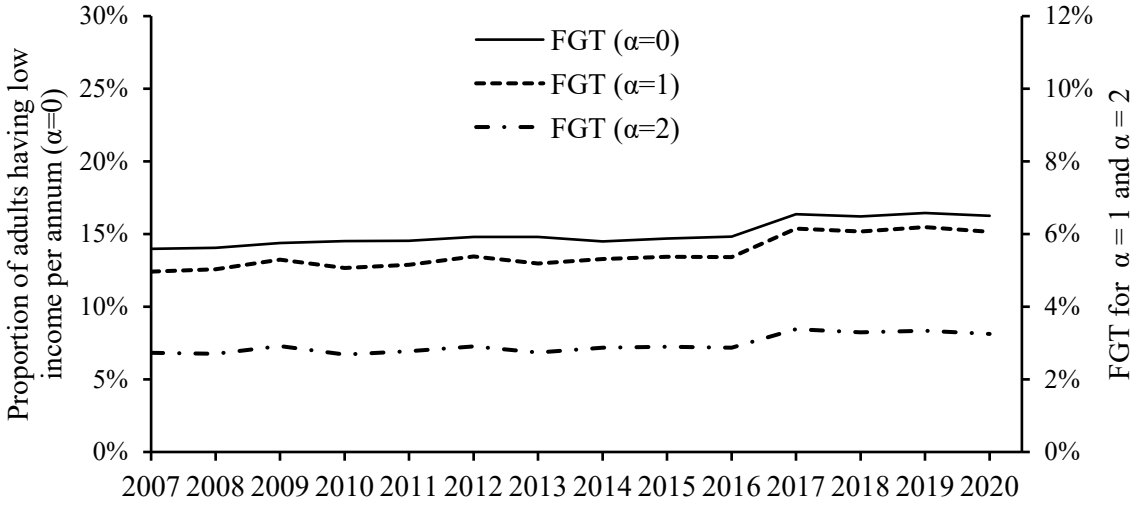
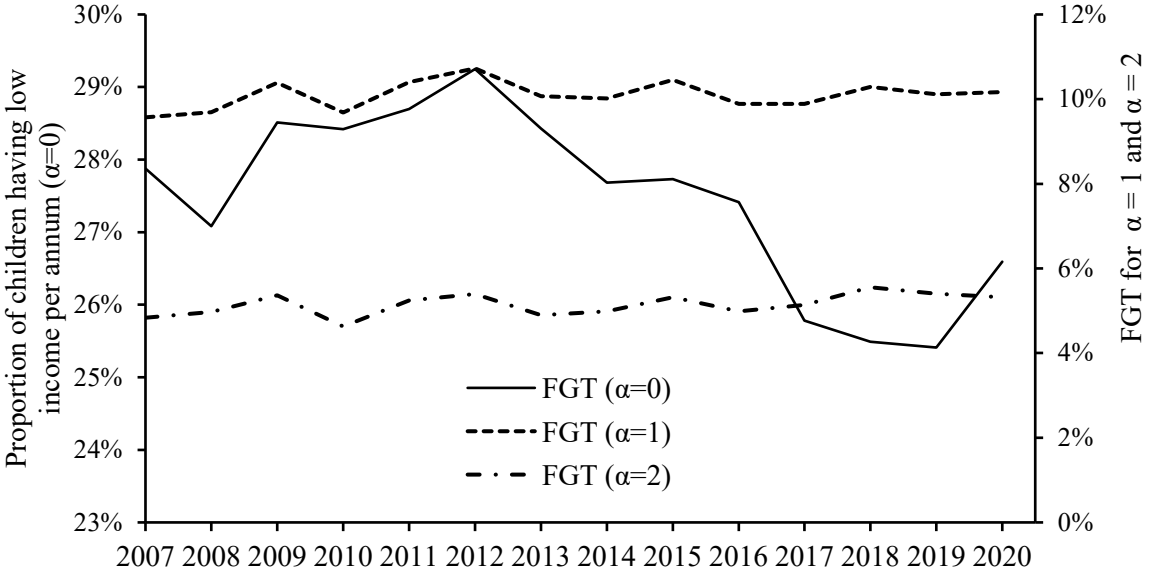


Figure 18. Trends in FGT Low-Income Measures: All Children



4.3 Low-Income Incidence (LT_0) for Demographic Groups

This subsection reports low-income incidence, LT_0, for individuals in different demographic groups, defined by family type, ethnicity, age and labour force status. In each case, as above, the low-income threshold for each year is obtained as 50 per cent of the median income per adult equivalent person, for all individuals. As indicated earlier by the TIP curves, Figure 19 shows that there is little variation over the period. The incidence of low incomes is higher among those in single-parent families, particularly where the parent is female. Figure 20 reveals a steady decline over the period for Asians, with more variability for MELAA individuals.

Figure 19. Trends in LT_0: Family Types

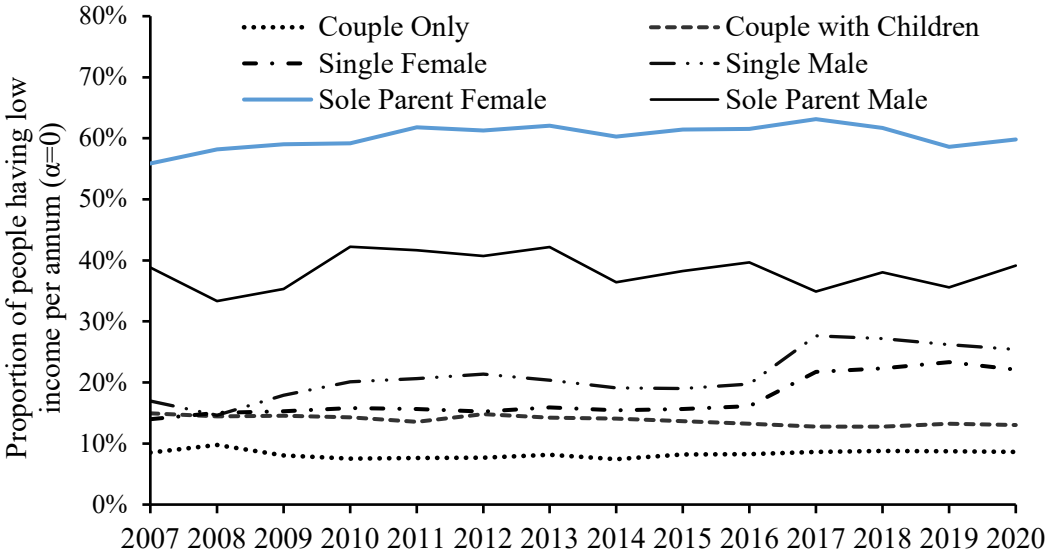


Figure 20. Trends in LT_0: Ethnic Groups

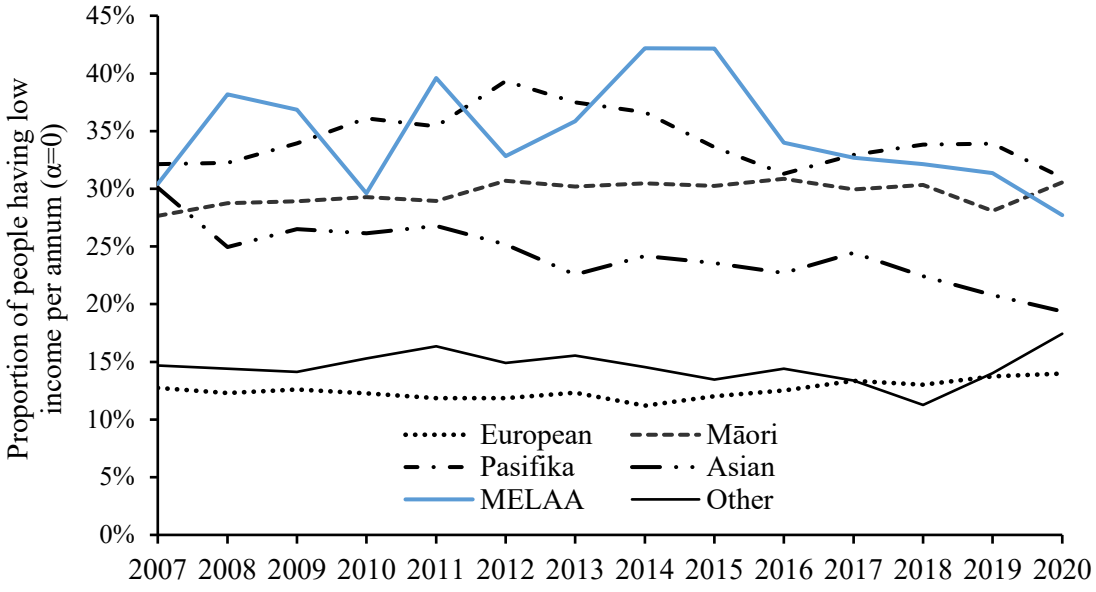


Figure 21 reveals, as did the TIP curves above, that the proportion of individuals aged 18 to 24 with taxable incomes below 50 per cent of the median, is substantially higher than for other groups. This result, of course, largely arises because of the definition of the 'family' and the use of an assumption of equal sharing among only individuals in such families. It is likely that many individuals in this age group would be allocated larger incomes if an assumption of equal sharing within households were adopted. Figure 22 shows the expected pattern for those in different labour market states, although clearly the incidence of relatively low-incomes among the unemployed has increased over the period.

Figure 21. Trends in LT_0: Age Groups

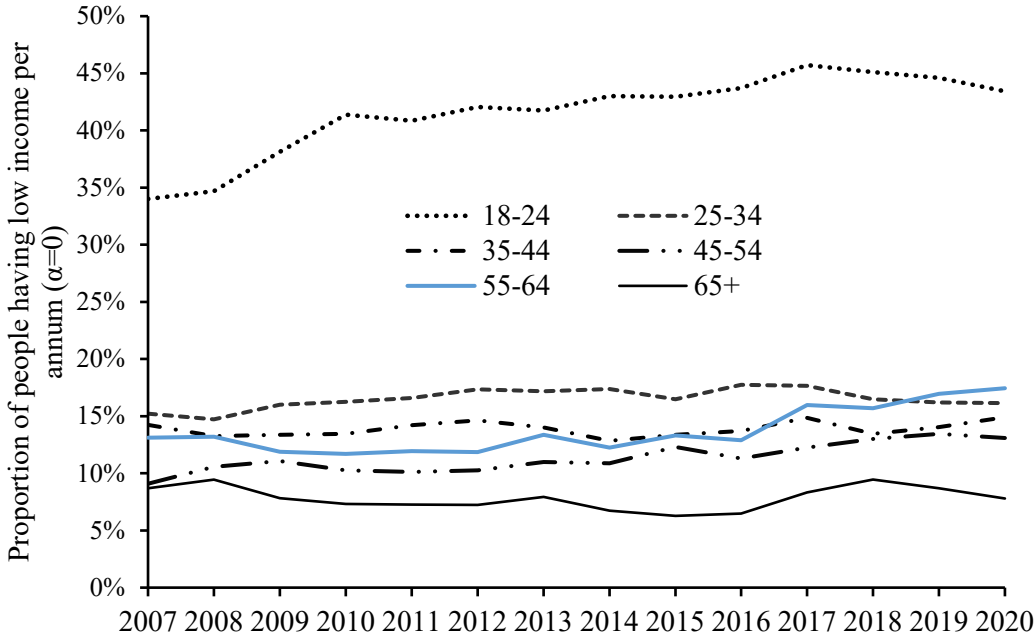


Figure 22. Trends in LT_0: Labour Force Status

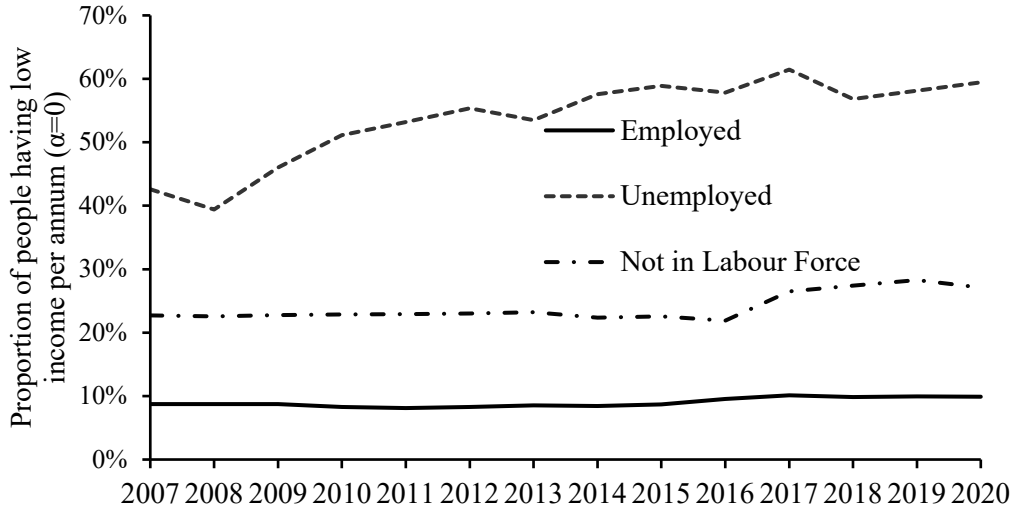
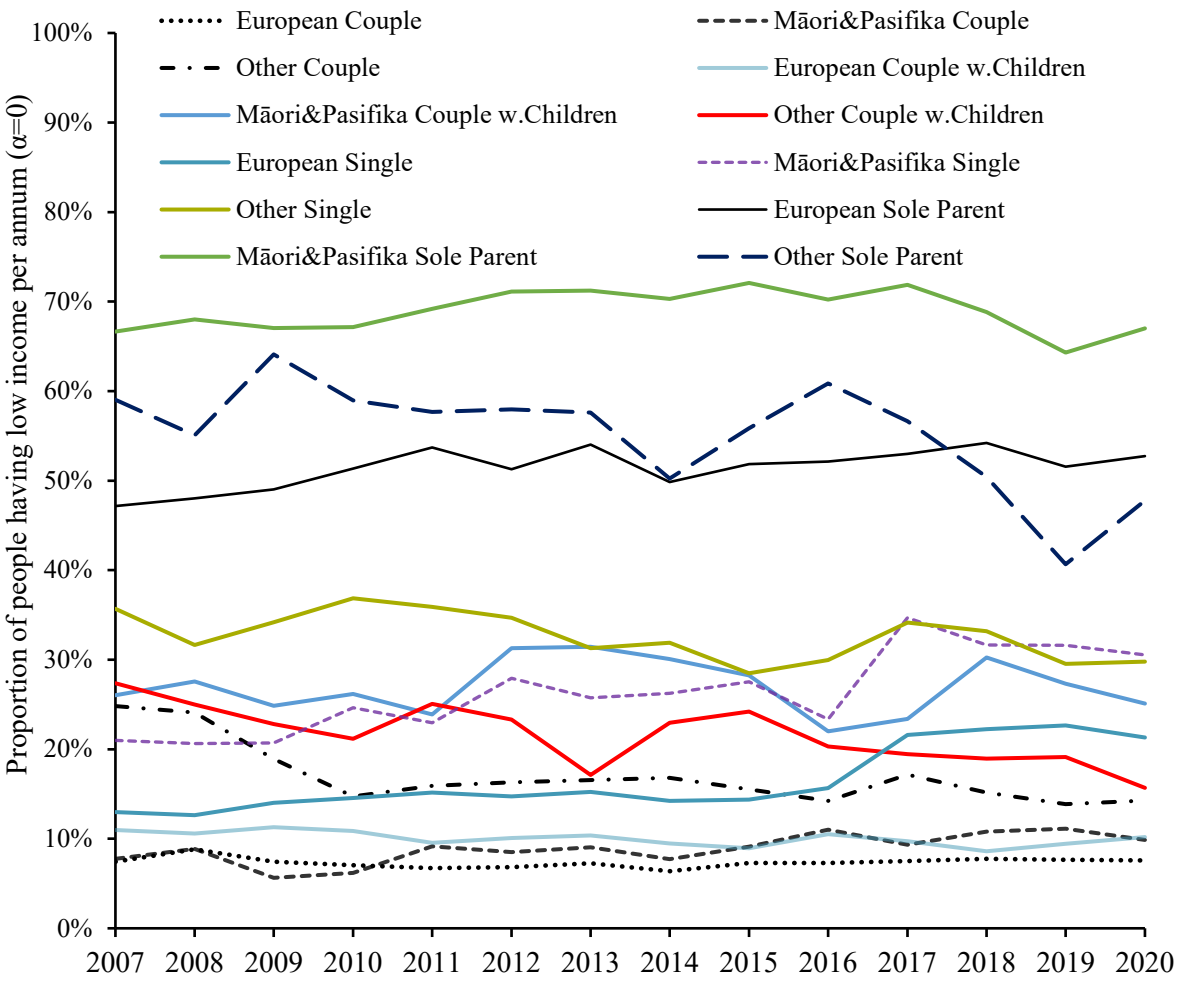


Figure 23 groups individuals by family type and ethnicity. The groups with similar and lowest measures of incidence are Māori and Pacifica couples, European couples, and European couples with children. Individuals in sole parent families, as expected, have the highest incidence. Again, no clear trends over time are evident.

Figure 23. Trends in LT_0: Family Type and Ethnicity



5. Comparisons with Population Shares

5.1 Low-Income Incidence, LT_0

This subsection compares, for different demographic groups, the low-income incidence measure (showing the proportion of individuals in the group below the low-income threshold) with the corresponding population share of that demographic group. If the population share exceeds the value of LT_0, low-income individuals in the particular group are 'under-represented' in the

population. In the following diagrams the (red) horizontal dash shows the population share of the group, while the (blue) vertical bar shows the low-income incidence.

Figure 24 compares shares for a range of demographic groups in 2020. Appendix C reports corresponding diagrams for 2007 and 2013, which have similar properties. The population share exceeds the low-income share for couples (with and without children), Europeans, those aged 35 and over, the employed, professionals, clerks and administrators, machinists, and drivers. The groups that are most over-represented are female sole parents, those aged 18 to 24, and individuals who are not in the labour force. There is clearly some overlap within these groups. Hence, Figure 25 shows population and low-income proportions for demographic groups defined by two characteristics. Here it can be seen that the young (in age group 18 to 24), irrespective of ethnicity, are over-represented in the low-income category, having a proportion below the threshold that exceeds their population proportion. The same is true of those with low qualifications. Similarly, couples without children are all under-represented in the low-income category, for all ethnic groups. Only Māori and Pasifika couples with children are over-represented below the low-income threshold. Of those with post-school qualifications, only Māori and Pasifica have a population share that (slightly) exceeds their low-income proportion.

Figure 24. Low-Income Incidence (LT_0) 2020: Demographic Groups and Population Shares

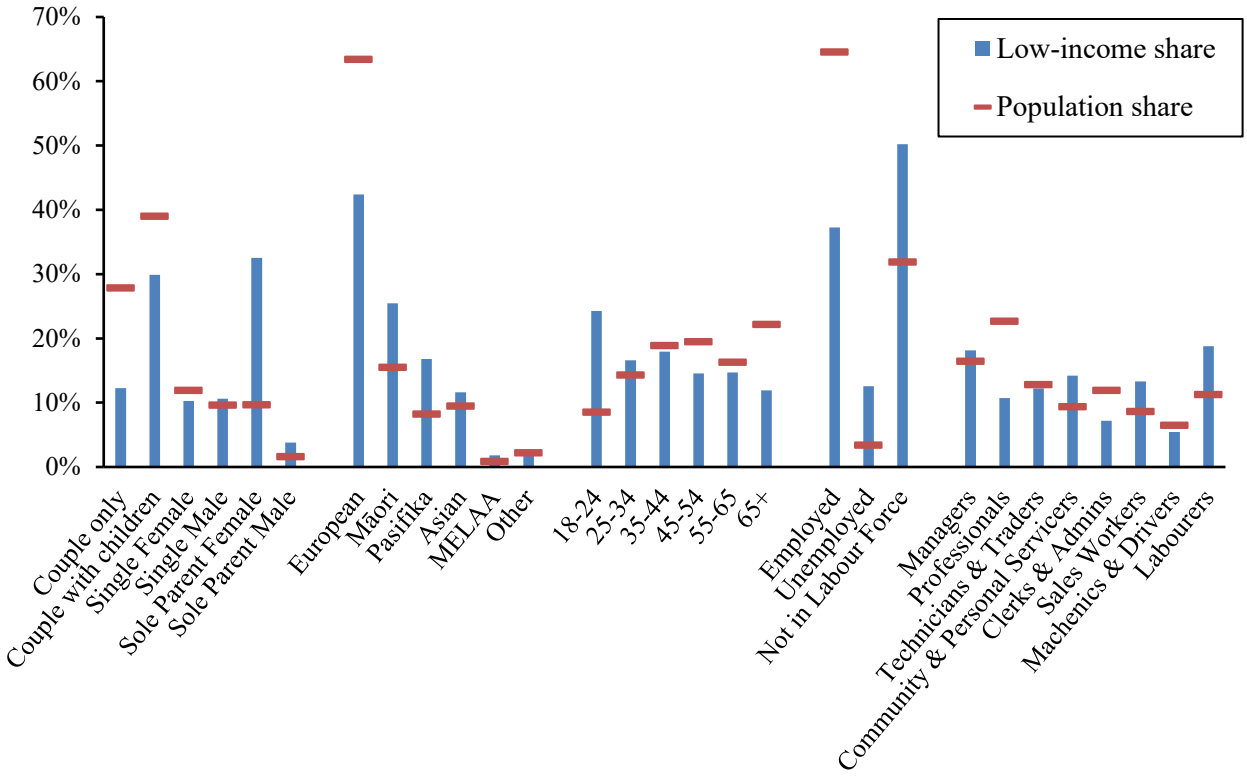
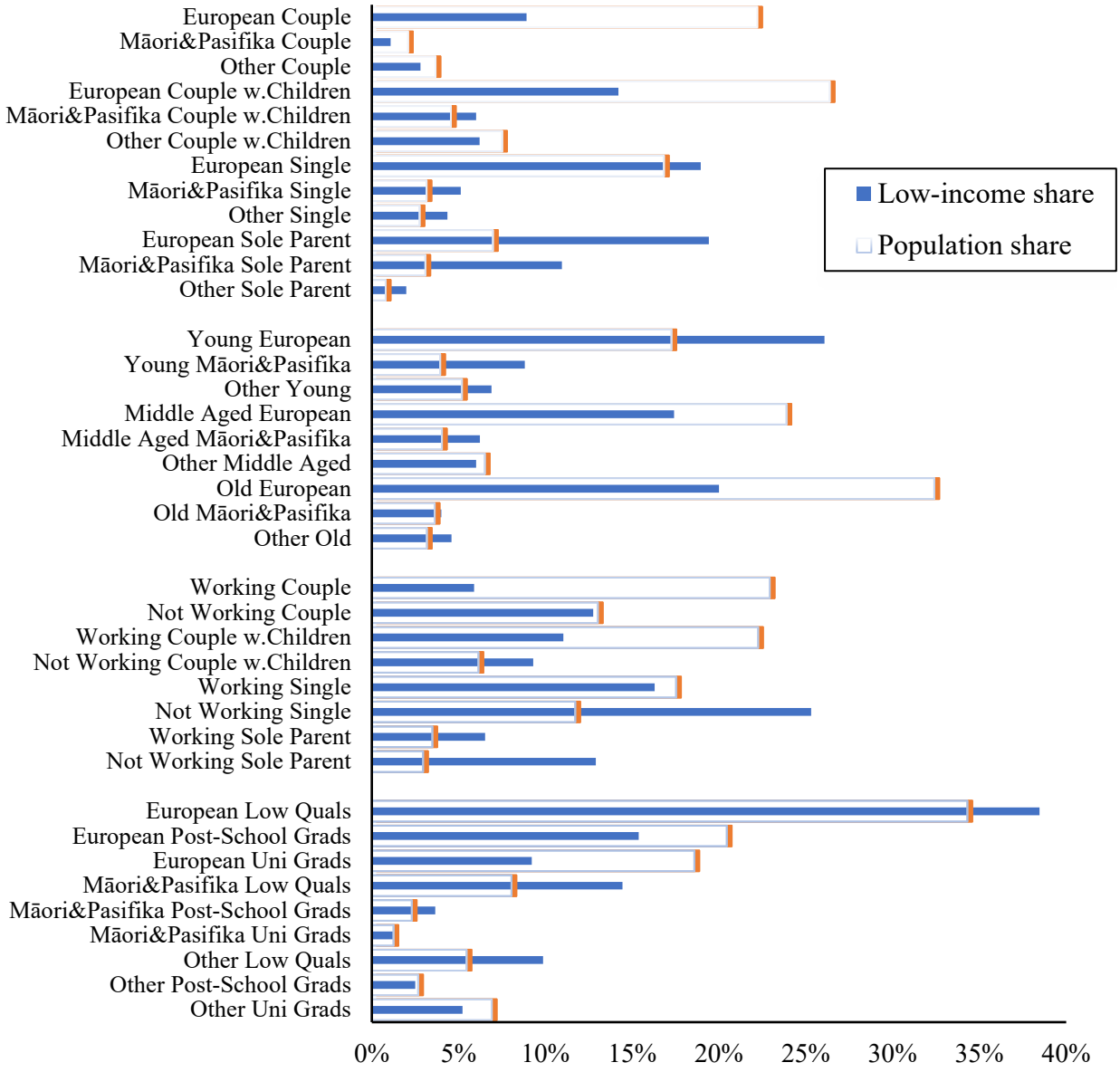


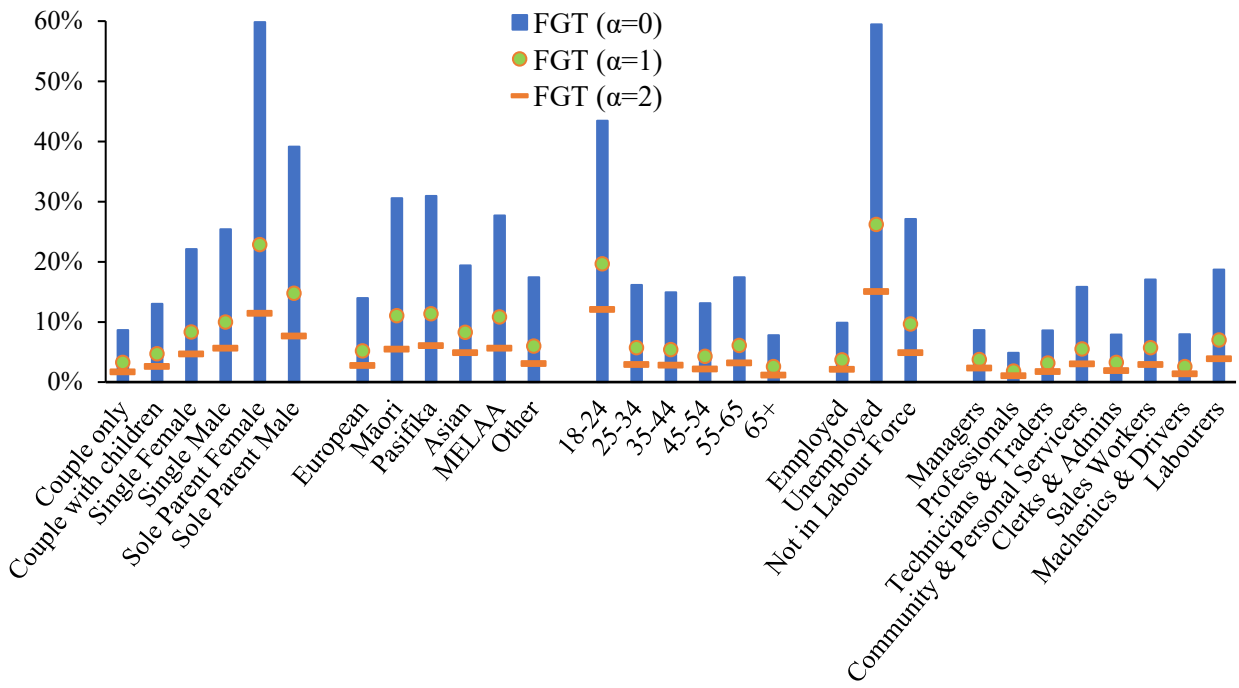
Figure 25 Low-Income Incidence (LT_0) 2020: Groups Defined by Two Characteristics



5.2 The Three Low-Income FGT Measures for Demographic Groups

Figure 26 collects information about all three FGT summary measures in 2020, for various demographic groups, in one diagram. Similar properties hold for 2007 and 2013, as shown in corresponding diagrams in Appendix D. This shows that those with the highest low-income incidence, such as the unemployed, those aged 18 to 24, and sole parents, also have the highest intensity and inequality. This general property was also revealed by the corresponding TIP curves presented earlier. Couples, the employed, individuals aged between 45 and 54, and those over 65, and professionals are among those with lowest values for all three FGT measures.

Figure 26. Three FGT Measures 2020: Individual Characteristic



5. Conclusions

This paper has presented descriptive information about the levels and trends of low-income prevalence in New Zealand since 2007. Income was measured, for each individual, as income per adult equivalent person, reflecting an assumption of equal sharing within families. While almost all data used were from the Household Labour Force Surveys over the period 2007 to 2020, income data were from the Inland Revenue, providing anonymous information about the gross taxable income of each taxpayer. It was possible to link the data sources within the New Zealand Integrated Data Infrastructure (IDI). The unit of analysis throughout was the individual. In classifying individuals as having a low income, an arbitrary threshold of one half of median income per adult equivalent person was chosen.

Low income characteristics of the income distribution were presented graphically, using the 'Three "I"s of Poverty', or TIP, curve. This form of presentation is convenient because it displays, at a glance, the three important characteristics of low-income, incidence, intensity and inequality. Graphs for a number of demographic groups were obtained, showing that specific groups are observed with higher levels of low-income, for all three characteristics, than the population as a whole. Most notably, these groups are sole parent families, Māori and Pasifika, young adults,

people not in the labour force, and those with low qualifications. The lower incomes of young adults are clearly associated with life-cycle variations.

An important finding is that, when the population is divided into groups distinguished by two characteristics, rather than ethnicity only, differences between ethnic groups are considerably reduced, and in some cases reversed. The main factors associated with low-incomes are (other than life-cycle income variations) largely related to family type, and labour market characteristics such as qualifications, occupation and attachment to the labour market.

Quantitative measures of the three characteristics of low incomes – incidence, intensity and inequality – were also reported using the first three indices from the Foster-Greer-Thorbecke (FGT) class of measures. These indices depend on powers of the proportional income gap of each individual, that is, the proportional difference between income (per adult equivalent) and the low-income threshold.

Considering variations in the various measures over the period 2007 to 2020, no clear trend in all three FGT low-income measures were observed for the entire sample, and for all adults (individuals over 18 years of age). However, the low-income incidence for children seems to have declined. The downward trend was also observed for the Asian group, regarding the incidence and intensity of low incomes. However, the young and those not working experienced an upward trends in these two measures. Low-income measures of those in the bottom decile of the distribution seem to be the most volatile over time. Higher deciles reveal no trend in the form of the distribution.

It would be of interest, in further research, to compare these results with measures obtained using alternative metrics, such as net income, allowing for taxation and non-taxable welfare benefits, and expenditure, or some combination of the two.

Appendix A: Further Details of HLFS Data

Appendix Table A1. Characteristics of the 2007 HLFS Sample: Ethnic groups

	% by column	European	Māori	Pasifika	Asian	MELAA	Other
Couple Only	28.25	33.95	15.49	9.96	22.64	16.73	30.13
Couple with Children	40.37	36.72	44.37	52.99	51.42	44.55	42.96
Single Female	10.44	11.75	7.05	7.33	8.7	13.23	7.81
Single Male	8.36	8.78	6.57	7.53	8.36	10.89	8.65
Sole Parent Female	10.54	7.35	22.88	17.97	6.99	13.04	8.23
Sole Parent Male	2.04	1.46	3.66	4.22	1.89	1.56	2.23
Total	100	100	100	100	100	100	100
0-17	28.31	22.62	43.4	47.37	30.15	37.16	21.62
18-24	6.95	5.74	7.69	10.48	11.92	11.67	7.67
25-34	11.25	10.13	12.45	12.15	17.84	11.87	12.69
35-44	14.31	14.32	13.38	12.35	16.34	14.79	20.36
45-54	14.15	15.42	11.87	8.53	12.39	11.09	17.99
55-64	10.89	13.08	6.55	5.18	6.52	3.89	11.99
65+	14.14	18.69	4.66	3.94	4.85	9.53	7.67
Total	100	100	100	100	100	100	100
Employed	63.43	63.85	62.84	57.12	62.75	55.87	75.97
Unemployed	2.7	1.92	5.27	5.31	3.54	5.59	2.18
Not in Labour Force	33.88	34.23	31.89	37.57	33.7	38.55	21.85
Total	100	100	100	100	100	100	100
No Qualification	23.72	22.95	33.12	31.38	12.99	15.09	14.75
School	39.06	37.66	41.15	48.07	43.12	40.88	37.34
Post-School	20.3	22.3	16.15	12.21	11.66	15.09	25.87
University+	16.92	17.09	9.58	8.34	32.23	28.93	22.04
Total	100	100	100	100	100	100	100

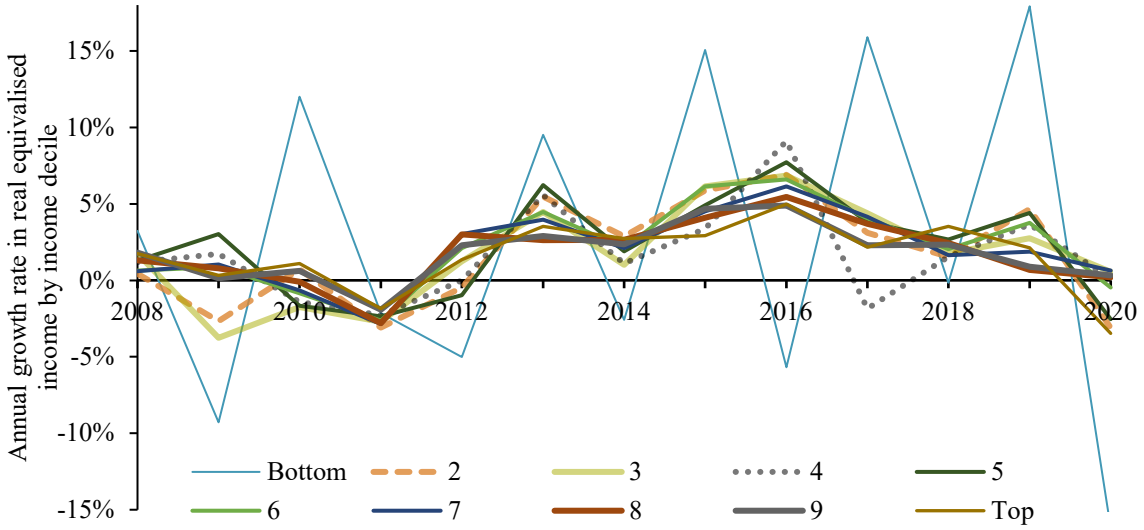
Note: All numbers are in percentages. Counts in blue are smaller than 50 individuals. Data on educational attainment are in the year 2013 using Census data.

Appendix Table A2. Characteristics of the 2020 HLFS Sample: Ethnic Groups

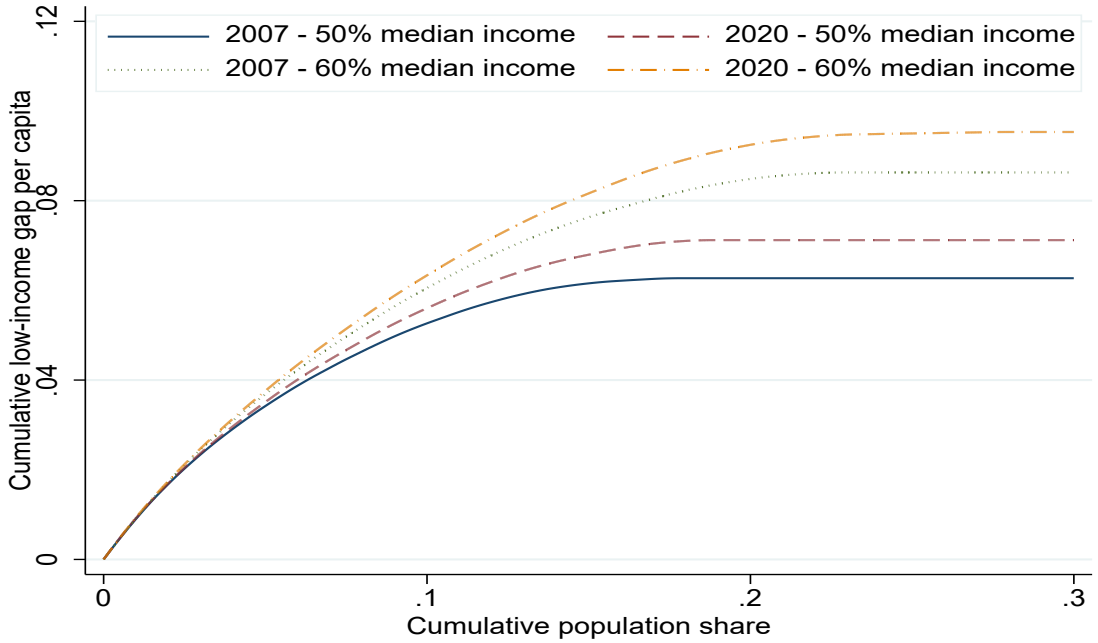
	% by column	European	Māori	Pasifika	Asian	MELAA	Other
Couple Only	27.63	33.54	16.12	13.83	23.35	17.57	36.6
Couple with Children	38.05	34.17	37.02	42.62	50.4	54.39	33.38
Single Female	12.65	13.87	12.15	11.71	9.52	9.86	10.54
Single Male	10.79	10.96	10.75	10.84	10.51	7.86	10.83
Sole Parent Female	9.01	6.03	20.39	18.12	4.88	8.63	6.73
Sole Parent Male	1.86	1.43	3.57	2.88	1.35	1.69	1.9
Total	100	100	100	100	100	100	100
0-17	25.57	20.14	36.88	39.66	27.51	34.05	21.67
18-24	7.21	6.11	8.91	12	7.42	7.4	6.3
25-34	12.47	10.49	13.14	13.11	18.99	15.25	11.57
35-44	12.37	11.21	10.77	10.52	18.72	20.18	10.83
45-54	13.15	14.34	11.54	9.8	11.68	12.63	15.08
55-64	12.5	14.9	9.62	7.56	8.37	6.63	19.62
65+	16.74	22.82	9.14	7.35	7.31	3.85	14.93
Total	100	100	100	100	100	100	100
Employed	65.43	65.31	63.17	59.47	69.22	67.77	74.07
Unemployed	3.13	2.13	5.91	5.66	3.7	5.08	2.31
Not in Labour Force	31.43	32.56	30.91	34.87	27.07	27.15	23.62
Total	100	100	100	100	100	100	100
No Qualification	19.28	18.43	29.02	31.36	10.26	11.26	17.15
School	28.69	27.16	31.91	40.28	27.41	27.03	27.74
Post-School	25.24	28.3	23.78	18.02	17.25	21.17	25.55
University+	26.8	26.11	15.29	10.34	45.08	40.54	29.56
Total	100	100	100	100	100	100	100

Note: All numbers are in percentages. Counts in blue are smaller than 50 individuals.

Appendix Figure A1. Annual Growth of Deciles of Real Income Per Adult Equivalent Person



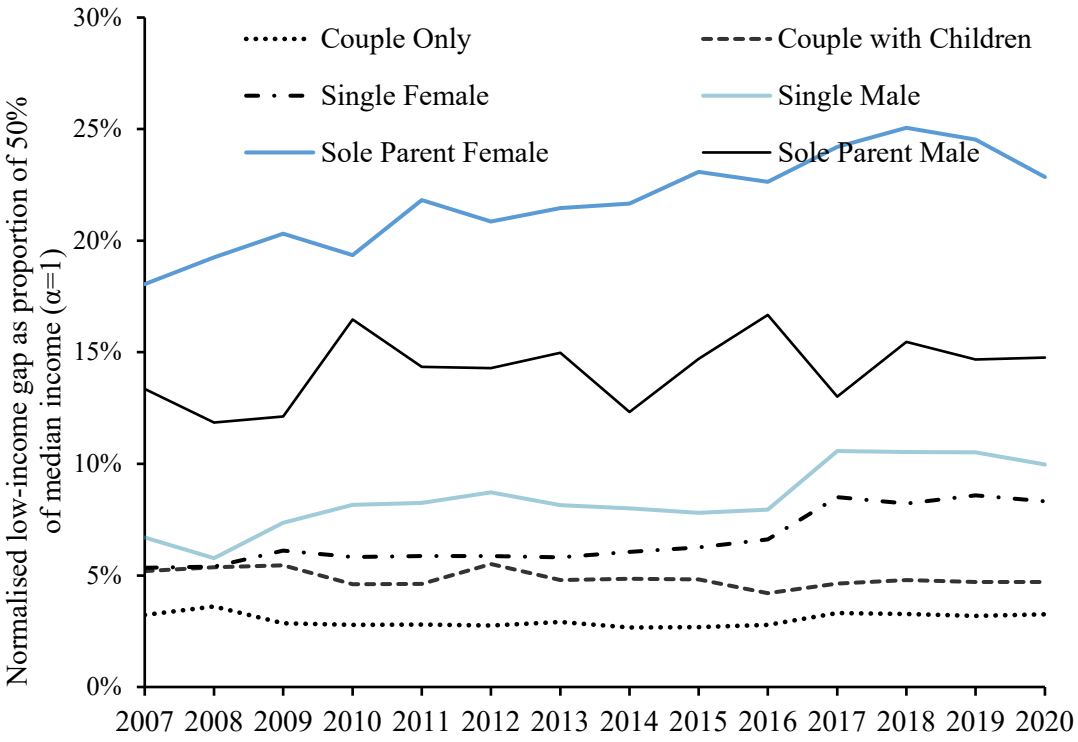
Appendix Figure A2. TIP Curves in 2007 and 2020: Alternative Low-Income Thresholds



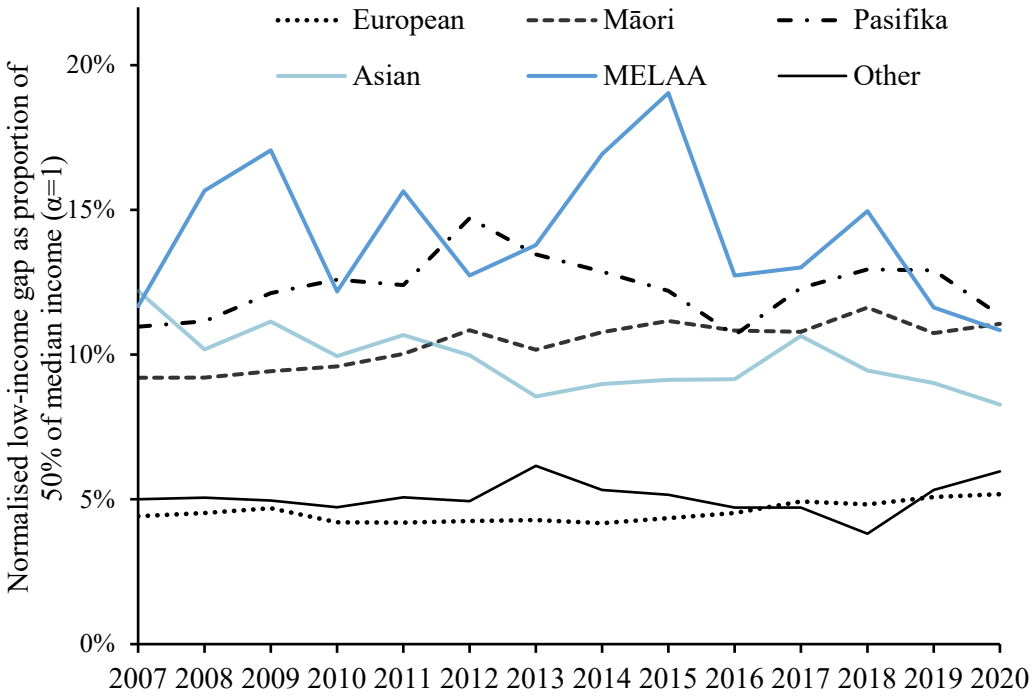
Appendix B: Low-Income Gap Measures, LT_1

This Appendix shows measures of LT_1 for the same demographic groups as in Subsection 3. This measure reflects the intensity of low-incomes, being the product of the 'headcount' measure and the average low-income gap in the group.

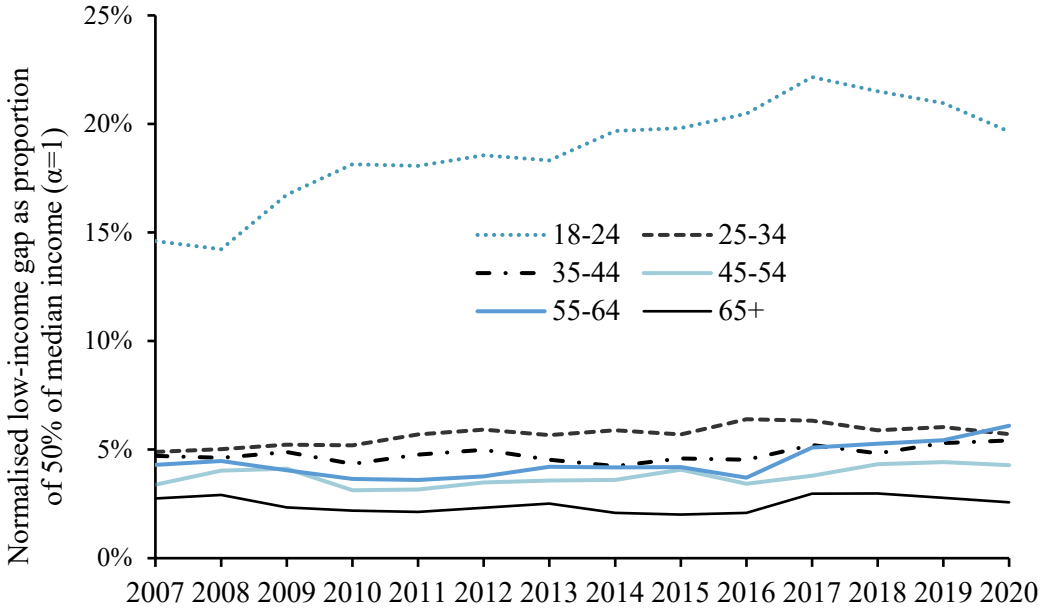
Appendix Figure B1. Trends in LT_1: Family Types



Appendix Figure B2. Trends in LT_1: Ethnic Groups



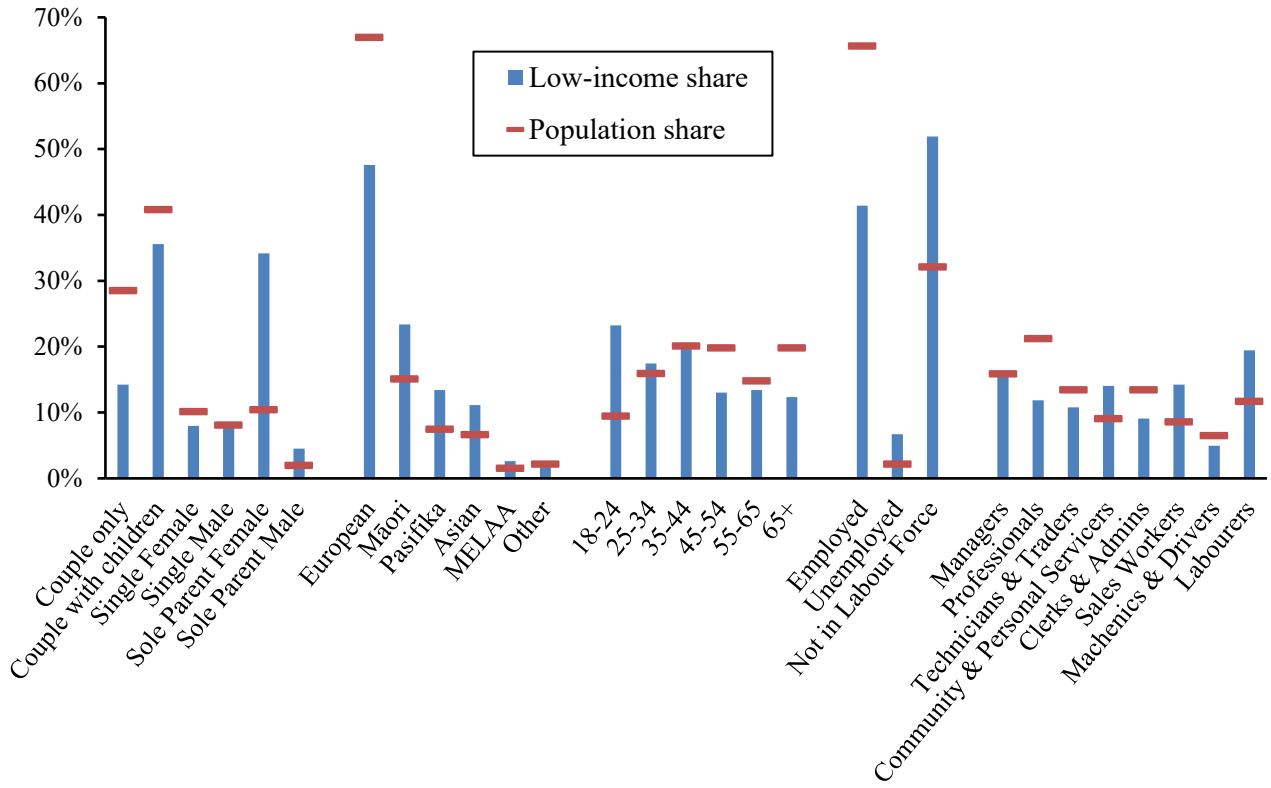
Appendix Figure B3. Trends in LT_1: Age Groups



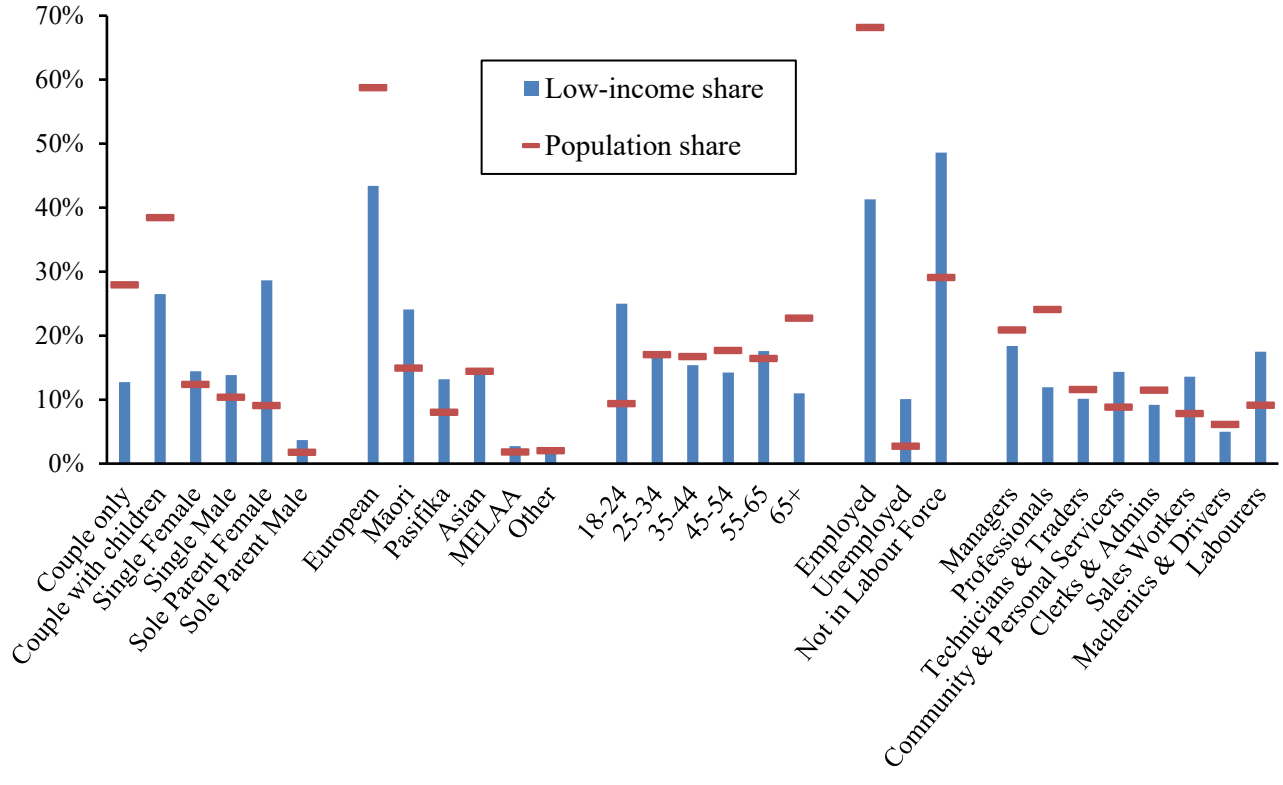
Appendix Figure B4. Trends in LT_1: Labour Force Status

Appendix C. Further Results: Low-Income and Population Shares

Appendix Figure C1. Low-Income Incidence (LT_0) 2007: Demographic Groups and Population Shares

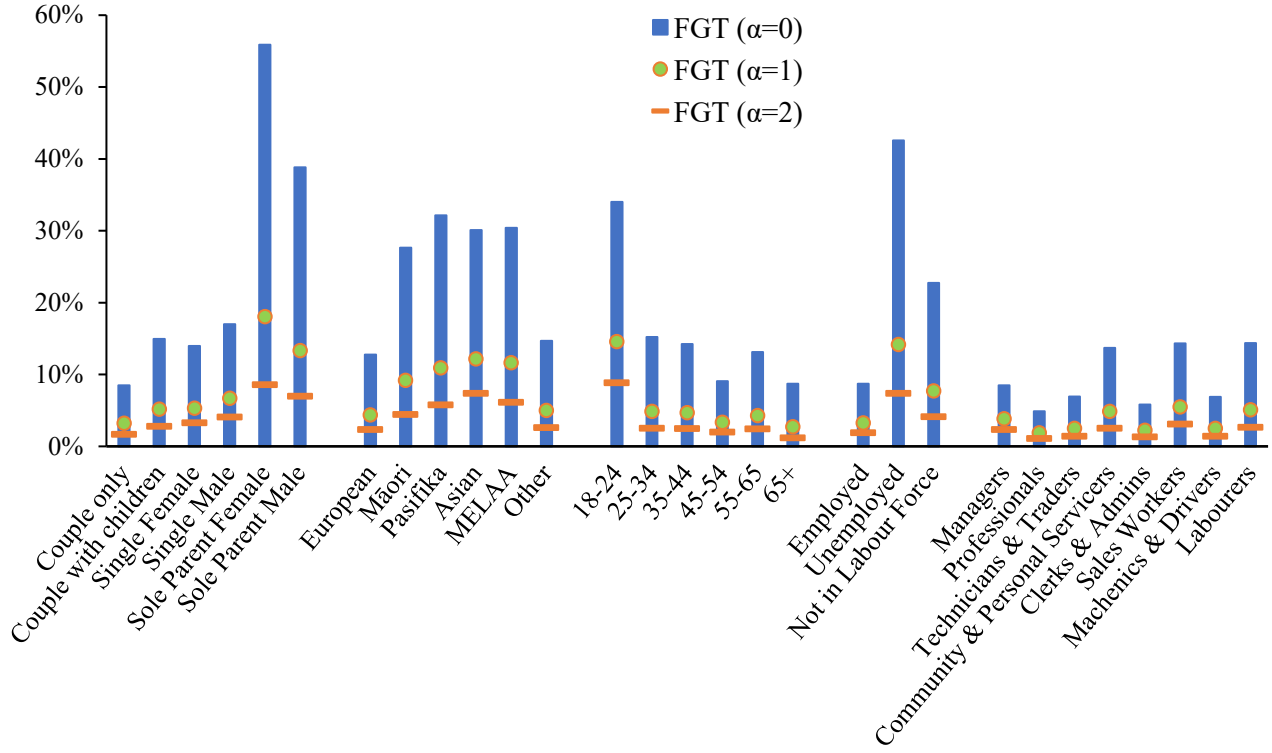


Appendix Figure C2. Low-Income Incidence (LT_0) 2013: Demographic Groups and Population Shares

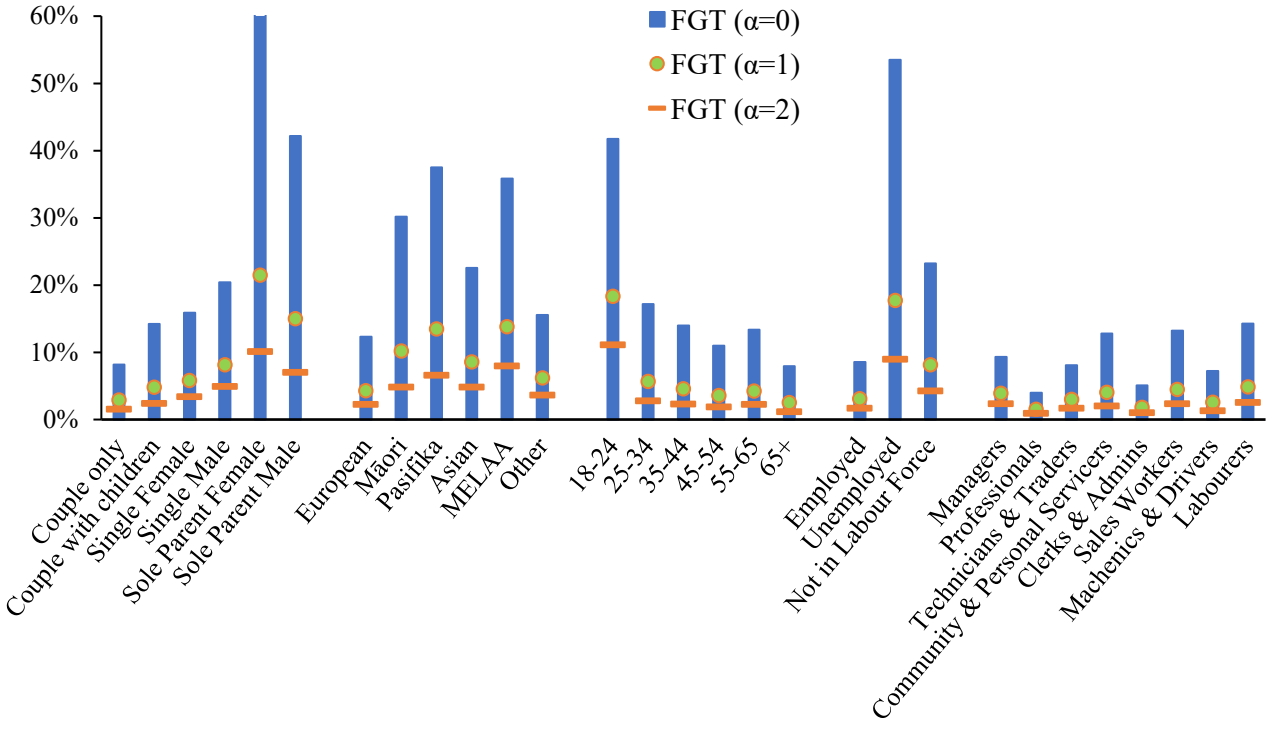


Appendix D. Further Results: Three FGT Measures for Demographic Groups

Appendix Figure D1. Three FGT Measures in 2007: Individual Characteristics



Appendix Figure D2. Three FGT Measures in 2013: Individual Characteristics



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