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The Art of the Possible

data-driven insights into child poverty in New Zealand

Abstract

A central goal of income support policies is to reduce the number of families below a minimum standard of living; in other words, to reduce the number of people in poverty. But one challenge is that there is no single measure of what it means to be poor. This article outlines an experimental approach that uses the available data to provide insights into the different dimensions of poverty. It applies a statistical algorithm to three poverty indicators to identify seven different categories of children in poverty, and describes the characteristics of children in each group.

Keyword child poverty, poverty measurement, multidimensional measures

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One way that governments support people is by providing a safety net through main benefits like jobseeker support, supplementary benefits like the Working for Families tax credits, and discretionary payments such as special needs grants. A central goal of these programmes is to reduce the number of families below a minimum standard of living; in other words, to reduce the number of people in poverty. But while this may be a simple idea, in practice it is no easy task.

A challenge is that there is no single, objective measure of what it means to be poor. Indeed, it has been said that 'counting the poor is an exercise in the art of the possible' (Stephens and Waldegrave, 2001), where the 'art' lies in choosing a poverty indicator. The best approach is to use a range of poverty indicators that illustrate different parts of the puzzle and together provide a fuller picture, enabling others to make their own judgements.

This exploratory analysis investigated three poverty indicators used in New Zealand: material hardship, fixed-line after-housing-costs poverty, and moving-line before-housing-costs poverty. The data show that the

relationship between material hardship, income and housing costs is complex. For some children there is a direct relationship between low incomes, either before or after housing costs, and material deprivation. However, for other children, low incomes do not correspond to deprivation, and vice versa.

Our ability to measure poverty has evolved over time

New Zealand experts have been working on poverty measurement since the 1970s, progressively building a body of work and iteratively improving our understanding of poverty (see Box 1).[3] As Stephens and Waldegrave (2001) noted, citing Mollie Orshansky, the developer of the US poverty threshold: 'Counting the poor is an exercise in the art of the possible ... when it comes to defining poverty you can only be more subjective or less so.'

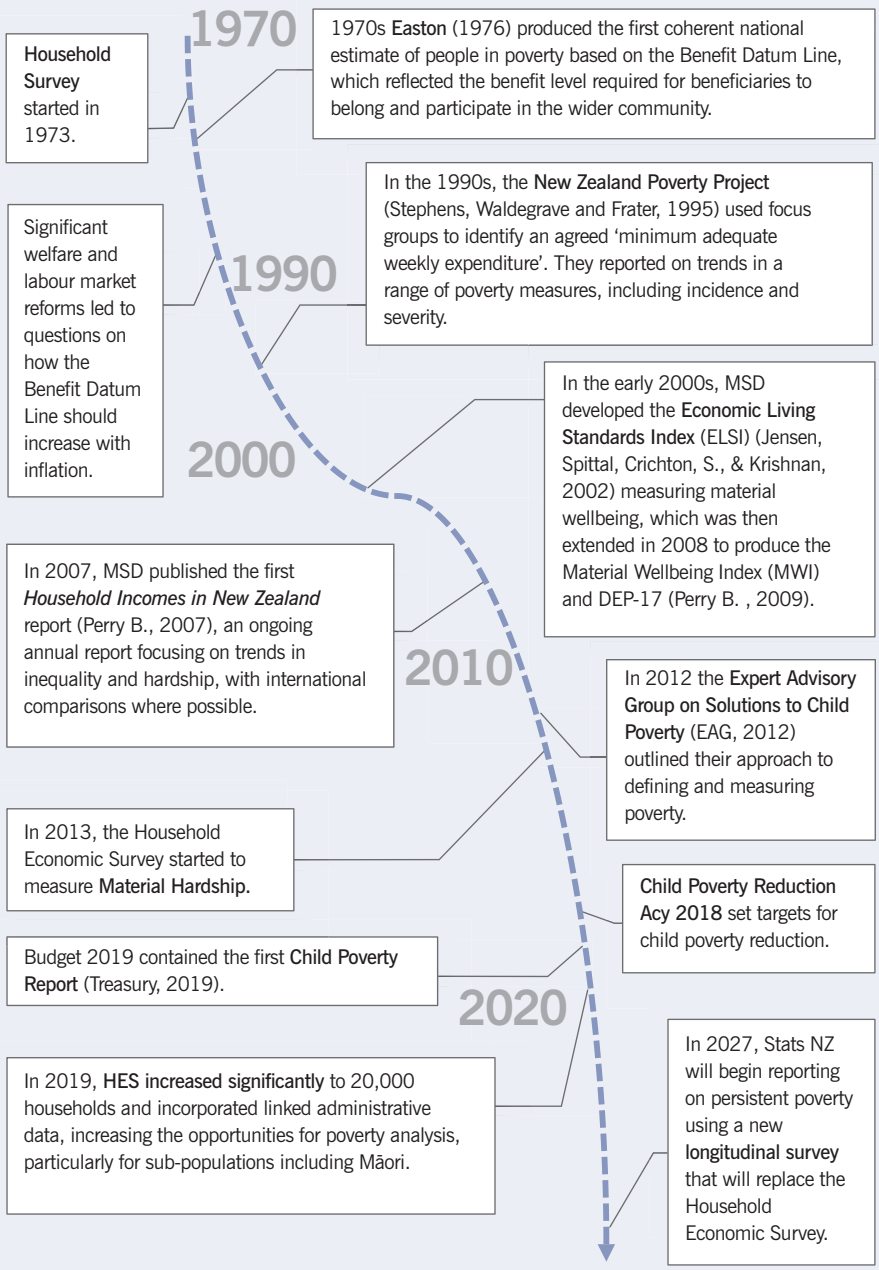
But what is possible continues to change. With the growing availability of data and improving computing power, we have an opportunity to better understand the incidence and causes of poverty and, in turn, help lift the living standards of New Zealand's poorest families.

A range of indicators can provide a fuller picture

When considering poverty, we are generally concerned about people who do not have enough resources to meet a minimum standard of living. The World Bank (2001) defines poverty as 'pronounced deprivation in wellbeing', but it is important to distinguish between absolute poverty in a global sense and what it means to be poor in New Zealand. To measure current and estimate future levels of poverty, we need to define what is enough, what types of resources we are considering, and what is a minimum standard of living.

We can provide a useful picture of living standards by measuring the number of children in households experiencing material hardship using survey questions. This tells us how many households have needed to forgo expenditure on essential items. Material hardship is a relatively direct measure of what we think of as poverty. But material hardship[4] can only be measured using a survey and is hard to forecast and model.

Box 1 Short history of poverty measurement in New Zealand

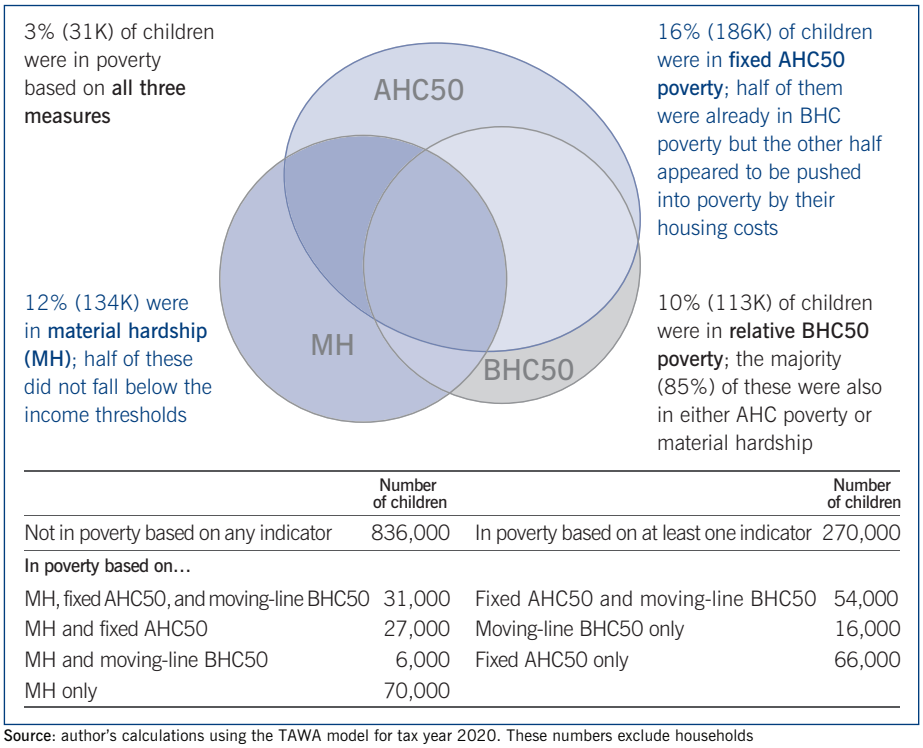


Instead, we can look at income-based measures of poverty, which vary depending on the definition of income and whether they account for key expenditures such as housing costs. The poverty threshold is also important. It can be based on a level of income that is assumed to provide a minimum standard of living, or it can be a relative threshold that is defined in terms of a typical income. This can be either a typical income from a year in the past (fixed-line) or a current typical income (moving-line).

Moving-line measures are not only sensitive to changes in incomes among the poorest families, but also to the incomes of middle-income families. When the median income rises, the relative poverty threshold will increase, which means that even if absolute poverty is falling, relative poverty can increase.

Income data give us only a partial picture of the choices and opportunities faced by families. Children can appear to have reasonable levels of household income but experience material deprivation, and vice versa. There are a number of reasons for this mismatch, including access to extended family resources or wealth,

Figure 1: Coverage of different poverty measures



	Number of children		Number of children
Not in poverty based on any indicator	836,000	In poverty based on at least one indicator	270,000
In poverty based on…			
MH, fixed AHC50, and moving-line BHC50	31,000	Fixed AHC50 and moving-line BHC50	54,000
MH and fixed AHC50	27,000	Moving-line BHC50 only	16,000
MH and moving-line BHC50	6,000	Fixed AHC50 only	66,000
MH only	70,000		

Source: author's calculations using the TAWA model for tax year 2020. These numbers exclude households with missing material hardship data

additional costs related to disability and childcare, and the length of time families have been on low incomes. Income, even if perfectly measured, is an imperfect measure of economic wellbeing, although it has the practical advantage that it can be directly influenced by policy instruments such as taxes and benefits (Nolan, 2018).

Given these issues, the best approach is to use a range of poverty indicators. Indeed, this is what the government does in its reporting on child poverty. Different measures illustrate different parts of the puzzle and together provide a fuller picture.

The TAWA model

This analysis used the Treasury's TAWA (Tax and Welfare Analysis) model to estimate two income-based measures of child poverty and investigate how they relate to a non-income measure, material hardship. TAWA is a static arithmetic[5] microsimulation model, which applies different tax and welfare scenarios to households in a sample of the New Zealand population. In the context of child poverty, TAWA is used in two ways: as part of the policy design process and to estimate future levels of child poverty.

TAWA's input data is created using Statistics New Zealand's Household Economic Survey and Integrated Data Infrastructure. Over the last five years, the TAWA model has been progressively improved to take advantage of linked administrative data. Where it previously relied solely on survey data, which can be subject to recall errors, the surveyed households are now linked to administrative data on tax and welfare payments. This has improved the accuracy, but also provides extra information on, for example, the number of eligible families who receive different benefit payments.

This analysis is based on modelled results for April 2019–March 2020, which means it does not take into account recent policy announcements or line up with the poverty statistics published by Statistics New Zealand (which combine data from multiple financial years). However, the patterns we see in the relationships between the three different measures of child poverty are consistent with Statistics New Zealand data, so we can infer useful insights on the type of children who are experiencing poverty.

Child poverty trends in New Zealand

New Zealand sets targets on the following poverty indicators:[6]

- material hardship: defined as a lack of six or more of the 17 items on the material deprivation index, DEP-17 (Statistics New Zealand, 2019);
- fixed-line after-housing-costs poverty, fixed-AHC50: compares after-housing-costs income[7] with that of a typical 2018 household. Defined as having an income below 50% of the median equivalised[8] household income in 2017/18, after accounting for housing costs; and
- moving-line before-housing-costs poverty, BHC50: compares before-housing-costs income with that of a typical household. Defined as having an income below 50% of the median equivalised household income in the year measured.

The three measures track different high-level indicators of poverty. The fixed-line AHC50 measure shows if inequalities are increasing over time and the impact of housing costs; the moving-line BHC50 measure shows if low incomes are increasing at the same rate as median incomes; and the material hardship measure shows if children have access to essential items. They should be considered together because they can often follow different trends. For example, Statistics New Zealand's latest release shows that fixed-line AHC50 rates have been reducing over the last three years as real incomes at the bottom increase compared to incomes in 2017/18. However, over the same time, moving-line BHC50 rates have been stable as median incomes increased at around the same rate as low incomes. For moving-line BHC50 rates to decrease, low incomes would need to increase at a faster rate than median incomes.

Trends in these aggregate poverty indicators are important, but children in poverty can have very different experiences and may require different policy interventions. Not all children experiencing poverty have the same characteristics. To provide more detailed insights, we can use the TAWA model and data in the Integrated Data Infrastructure to look at each child's household income, housing costs, income sources (i.e., are they supported by benefits), family size, etc.

We can consider each indicator in isolation …

TAWA data can be used to investigate the characteristics of children in poverty based on each of the three different measures.

Table 1

This table shows how the groups identified by the algorithm correspond to some key characteristics used in the clustering method. Note that although some characteristics are over-represented within groups there are still variations. For more detailed results see Stephens (forthcoming)

Characteristics used in clustering	Interpretation	Other characteristics
Benefits are the family's main source of income *Over-represented: families with disabilities, single parents*		
Around 30,000 children were in poverty based on all three measures.	Multi-dimensional poverty.	Over-represented: families with no earned income, Housing New Zealand residents, parents who didn't finish school, crowded houses
Around 50,000 children were around material hardship and AHC50 thresholds but were above the BHC50 threshold.	High-housing costs boost BHC incomes via the Accommodation Supplement, making these families look better off than they are. All the additional BHC income (and more) is spent on housing.	Over-represented: private renters, families receiving Accommodation Supplement.
Around 50,000 children had low BHC and AHC incomes but were not in material hardship.	Most are not far below the material hardship threshold.	Over-represented: Dep17 values between 2 and 4, lower housing costs, Housing New Zealand residents, smaller families.
Market income is the family's main source of income *Over-represented: one earner families*		
Around 40,000 children had reasonable AHC and BHC incomes but experienced extreme hardship.	This group would not be targeted via income poverty indicators but appear to be in a worse situation than the other working family groups.	Over-represented: more single parents than other working groups, parents with disabilities, families in crowded houses, larger families.
Around 80,000 children were around the material hardship and AHC50 thresholds, but they mainly did not have low BHC incomes.	The data suggest that even though they are not in BHC50 poverty, they don't have very high BHC incomes and may have extra costs.	Over-represented: working couples (potentially with high childcare costs).
Around 75,000 children were in working families with extremely high housing costs compared to their income but did not experience hardship.	Modelling suggests that some could be eligible for (but not receiving) Accommodation Supplement. They may also have access to other resources.	Over-represented: parents with higher education levels, households paying mortgages. Under-represented: families with disabilities, crowded households.
Around 50,000 children were in working families with very low incomes but who were not experiencing hardship.	Many have incomes below benefit levels. Saving or other resources?	On many characteristics they look like families who aren't near poverty thresholds. Over-represented: larger families, and households with no recorded housing costs (29%).

Source: Author's calculations using the TAWA model for Tax Year 2020

But it is reasonable to assume that there are overlaps between the different poverty indicators. For example, it is likely that there is some correlation between low income and material hardship. To investigate further, this analysis also looked at the overlaps between the different poverty measures.

… or a combination of indicators …

Figure 1 shows how these three measures overlap with each other. Some of the overlaps in the different measures of poverty are intuitive. For example, most children experiencing before-housing-costs poverty also experience after-housing-costs poverty or material hardship.

But the limited overlap between the two income poverty measures and material hardship can be surprising. This has been discussed previously, most recently in the Ministry of Social Development's material wellbeing report (Perry, 2021). From a data analysis or measurement perspective, the limited overlaps demonstrate the value of a multi-measure approach. If the measures overlapped exactly, we would only need to track one poverty indicator.

These measures tell us about the number of children in households below a threshold, but they do not tell us how far they are below or about children who are near the threshold.[9] The children in material hardship but not in income poverty could have incomes that only just push them over the income poverty thresholds, or they could have relatively high incomes.

… or more detailed information

To understand these overlaps, the next stage of this analysis added more detailed continuous data. For example, instead of just considering whether a household's income is below a particular threshold, the more detailed dataset included household income itself. The goal is to investigate the relationships between the different poverty indicators while recognising that each indicator exists on a continuum; that is, to see if the data can provide information on

different levels and dimensions of poverty.

Similarly to the *Poverty in Perspective* reports in the UK, 'We are not redefining poverty or measuring it in a new way … Instead, we are applying a new model of analysis ... to generate new insights into how to tackle it' (Wood et al., 2012; Barnes et al., 2017).[10]

Clustering is one method that can be used to reduce a multidimensional dataset into easily interpreted groups, with the aim of accounting for characteristics that typically appear together. This analysis used clustering to identify groups of children who are near or under poverty thresholds in such a way that they are similar with respect to:[11]

- before-housing-costs equivalised household income;
- the proportion of household income spent on housing costs;
- the number of 17 basic needs that the household is going without (the DEP-17 indicator); and
- the proportion of family income that comes from core benefits.

Clustering is purely driven by how alike different children are based on the characteristics we provide to the algorithm; it does not imply cause and effect. Details of the method used in this exploratory analysis are provided in Stephens (forthcoming).

To focus on children near or under at least one poverty threshold, the population of interest was defined as households with either equivalised before-housing-costs incomes in the bottom 20%, equivalised after-housing-costs incomes in the bottom 20%, or DEP-17 scores of 5 or more. This includes the 270,000 children who are in poverty according to at least one of the main indicators, but is a larger group including a total of 360,000 children (approximately 30% of children in New Zealand).

The clustering algorithm identified seven categories within this population. The clearest split was on a family's main income source (benefits or market income). Children in families that were mainly supported by core benefits represent three groups, and children in families that were mainly supported by market income represent the remaining four.[12] This distinction based on income from core benefits was an output of the clustering algorithm rather than being predefined. In addition to benefit receipt, the algorithm distinguished the different groups via various combinations of levels of hardship, income and housing costs.

> For some … there is a direct relationship between low incomes, either before or after housing costs, and material deprivation. However, low incomes [do not always] correspond to deprivation, and vice versa.

Within the beneficiary families, the groups were split based on deprivation level and the proportion of income spent on housing. Within the working families, the three poverty indicators appear to be less correlated. Two groups were (mostly) not in income poverty but were showing signs of hardship: one group had very high deprivation scores, and the other group is mainly around the material hardship threshold. The other two working groups were not experiencing material hardship but had either very high housing costs or were below one of the income poverty thresholds. These characteristics are summarised in Table 1.

Descriptions of typical characteristics of children in each category provide useful insights into the different poverty indicators, but the total numbers of children in each group should be considered indicative.

The different levels of analysis provide different insights into children in poverty

Families mainly supported by benefits

All three levels of analysis show that beneficiary families were overrepresented in child poverty statistics under all three measures, but not all beneficiaries were in poverty. In this data, around 200,000 children were in families that received some income from core benefits over the year. Around 140,000 children were in families that were mainly supported by benefits: 60,000 of these were in material hardship, 60,000 were in moving-line BHC50 poverty, and 90,000 were in fixed-line AHC50 poverty.

Considering the overlaps between the different measures, 110,000 children in families that were mainly supported by benefits were beneath at least one of the poverty thresholds.[13] Of these around 20,000 were in poverty based on all three measures.

However, the clustering approach provided more information:

- most of these families were showing some signs of deprivation and/or after-housing-costs poverty even if they were not below the poverty thresholds;
- beneficiary families were experiencing different levels of hardship and families in deeper hardship were more likely to have disabled parents and/or be more reliant on benefits; and
- some children in these beneficiary families were not in BHC50 poverty because the families' incomes were boosted by the accommodation supplement, but this supplementary payment did not completely offset their high housing costs, so they still experienced material hardship and mostly fell under the AHC50 poverty threshold.

Families mainly supported by paid work

The top level of analysis shows that many children in poverty were in families that were mainly supported by paid work. In this data, around 70,000 of these children were experiencing material hardship, around 95,000 were in fixed-line AHC50 poverty, and around 50,000 were in moving-line BHC50 poverty.

Data on the overlaps show that around 185,000 children in poverty under at least one of the indicators were in families mainly supported by paid work,[10] but they were less likely to be in multidimensional poverty. They were most likely to be in material hardship only or fixed-AHC50 poverty only.

The breakdowns provided by the clustering approach also show the following:

- Around 40,000 children were in working families who mostly appeared to have reasonable levels of income but experienced extreme hardship. Single parents, parents with disabilities, families in crowded houses and families with high housing costs were overrepresented in this group (compared to other working families).
- Around 80,000 children were in working families who were around the material hardship threshold; most do not have low before-housing-costs incomes, but many were under or near the AHC50 threshold. They may have extra costs: some had high housing costs, and they were also more likely to have two earners (so childcare costs could be an issue).
- Some working families had extremely high housing costs compared to their income but did not experience hardship. These families could have access to other resources.
- Some working families had very low incomes but did not experience hardship, so they could have drawn on savings or other resources. We expect that there is some measurement error for this group, as a number had income levels well below what they would receive from benefits.
- Combined, these groups contain many coupled parents with one earner. Families in these working family groups were twice as likely to have only one earner than families with children who were not near poverty thresholds.

Insights for poverty measurement

- This discussion leads to a number of insights. Depth of poverty is important: some policies can improve the standard of living of children in poverty or near poverty thresholds without necessarily reducing the number of children in poverty.
- Many families in material hardship wouldn't necessarily be targeted in income-based modelling outputs.
- Expenditure data could provide useful insights on additional expenses such as childcare.
- An alternative before-housing-costs income definition that excludes the accommodation supplement could be more appropriate.

Conclusions

This exploratory analysis confirmed that the relationship between material hardship, income and housing costs is complex. For some of the identified categories there is a direct relationship between low incomes, either before or after housing costs, and material deprivation. However, for several categories low incomes did not correspond to deprivation, and vice versa.

Household income over a year can be hard to estimate, so some unexpected results could be due to measurement error.[14]

Housing costs can also have unexpected impacts on poverty indicators. Beneficiaries with high housing costs have their before-housing-costs incomes boosted via the accommodation supplement, which makes them appear to have adequate incomes even though they are in poverty on other measures.

However, income is not a perfect measure of the resources available to households. So this work makes the case for including material hardship outputs in our standard suite of modelling to inform child poverty-related policies. Although it is not possible to estimate how material hardship rates might change in the same way that we can for income poverty measures, the TAWA model can be used to estimate which families in material hardship would benefit from different policies.

1 The views, opinions, findings and conclusions or recommendations expressed in this article are strictly those of the author. They do not necessarily reflect the views of the Treasury or the New Zealand government. The Treasury and the New Zealand government take no responsibility for any errors or omissions in, or for the correctness of, the information contained in this article. The article is presented not as policy, but with a view to inform and stimulate wider debate.

2 The results in this article are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI), which is carefully managed by Statistics New Zealand. The IDI is a large research database which contains administrative data about people and households. These data come from government agencies and non-government organisations: for example, income and tax records from Inland Revenue and social benefit records from the Ministry of Social Development. For more information about the IDI please visit https://www.stats.govt.nz/integrated-data/. The results are based in part on tax data supplied by Inland Revenue to Statistics New Zealand under the Tax Administration Act 1994 for statistical purposes. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes and is not related to the data's ability to support Inland Revenue's core operational requirements. Access to the survey data used in this study was provided by Statistics New Zealand under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. The results presented in this study are the work of the author, not Statistics New Zealand or individual data suppliers.

3 See, for example, Easton, 1976, 2018; Expert Advisory Group on Solutions to Child Poverty, 2012; Perry, 2021; Stephens, Waldegrave and Frater, 1995; Boston and Chapple, 2015, and references therein.

4 Material hardship measures are currently based on survey data, but it may be possible to measure access to certain essential items or services using administrative data – e.g., primary healthcare. Currently, material hardship information is based on the response of one adult in the household, so it may not completely reflect the living standards of children within the household. The longitudinal survey currently being developed by Statistics New Zealand aims to provide more comprehensive information.

5 Arithmetic models only model first-order impacts of policy changes, in contrast to behavioural models, which attempt to estimate changes in work patterns due to a policy.

6 There are ten indicators, but only three have targets (Department of the Prime Minister and Cabinet, 2020).

7 Income here refers to disposable income, which includes taxes and transfers such as core benefits, the accommodation supplement, Working for Families, etc.

8 The two income poverty measures use equivalisation to allow for comparisons across households with different compositions. Two households with different compositions need different levels of income to meet the same standard of living. Equivalisation attempts to account for the additional income needed to support more people and also economies of scale due to shared housing costs, utilities, etc. This analysis used the modified OECD equivalence scale to be consistent with the indicators specified by the government statistician.

9 Other measures in the Child Poverty Reduction Act cover different depths of poverty, but do not directly measure distances from poverty thresholds.

10 *Poverty in Perspective* used an alternative statistical method called latent class analysis, which could be used in future work.

11 The clustering method was applied to many different combinations of characteristics. The main groups were mainly consistent, although this article presents these particular results because they illustrate the complex relationship between the three main poverty indicators (that is, relative BHC50, fixed AHC50 and material hardship) in a comparatively straightforward way.

12 In this analysis, we define beneficiary families as families whose main source of income over the reference year was benefits and working families as families whose main source of income was employment.

13 This total includes households with missing material hardship data that were in poverty based on either moving-line BHC50 or fixed-line AHC50.

14 https://www.stats.govt.nz/methods/child-poverty-statistics-year-ended-june-2021-technical-appendix.

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