

# POLICY Quarterly

Volume 18 – Issue 3 – August 2022

A photograph of a person jumping into a lake with their arms and legs spread wide. The person is seen from behind, wearing black shorts. The background features a large blue lake, green hills, and snow-capped mountains under a blue sky with scattered clouds.

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ISSN: 2324-1098 (Print)

ISSN: 2324-1101 (Online)

Volume 18, Issue 3 – August 2022

**Copy Editor:** Rachel Barrowman

**Design & Layout:** Aleck Yee

**Proof Reader:** Vic Lipski

**Cover Photography:** Chris Chapman

**Production:** Alltex Design

## Wellbeing and child poverty

As Agatha Christie wrote: “One of the luckiest things that can happen to you in life is to have a happy childhood.” And for most Kiwi kids there are few better places in the world to grow up than in New Zealand. But this is not true for all. And there are concerns that when we look forward some factors important for a happy childhood – like the ability to enjoy the natural environment and access to opportunities to succeed – may be under threat.

This edition of *Policy Quarterly* highlights analytical work on wellbeing and child poverty in New Zealand. These are important topics and there is a lot underway, so the papers included here are a sample that highlight recent thinking and new analytical approaches. The work in this issue will help inform the Treasury's first wellbeing report, which will be published later this year.

Hughes begins the issue by outlining how the purpose of wellbeing research has changed over time and could evolve as we continue to learn. He argues for a hybrid approach that draws insights from both aggregate social indicators and detailed distributional evidence. Wellbeing questions are complex and so looking at problems through multiple lenses makes sense.

The challenge of generating and using appropriate evidence is also highlighted by Upton, who highlights the difficulty of evaluating environmental issues as they are often complex, long-term, or characterised by tipping points. He argues for the need for better advice on the trade-offs between investing in wellbeing now and investing in wellbeing for the future, along with flexible thinking on how environmental spending should be treated in the annual Budget process.

Income mobility patterns in New Zealand over the short to medium term are considered in the article by Creedy and Ta. They highlight how unemployment and single parenthood are closely associated with having a persistently low income. They also show that, relative to other groups, sole parents are less likely to exit low-income when they increase their qualification levels.

The article by Brown continues with the theme of social mobility and considers how a child's outcomes are associated with their parents' situation. He finds a relationship between where parents rank in the income distribution and the expected income and qualification levels of children at 30. He notes this can influence skills development, productivity growth, and the achievement of improved living standards.

Housing wealth could play a role in influencing social mobility, and the work by Symes illustrates long-term changes in the overall wealth distribution in New Zealand and the share of wealth that is held

in the form of housing. He highlights a changing pattern of wealth accumulation, with a growing share of households finding home ownership – the first rung of “wealth ladder” – out of reach. The significance of this finding is reinforced with data that show that households that rent are more likely to be living in material hardship or to have high housing costs.

In their contribution Davies, Webber and Timmins summarise three recent research projects on how disadvantage due to a lack of resources and increased “toxic stress” in the household impact on child wellbeing and development in early childhood. They find that about one in ten children experience substantial disadvantage relating to a lack of resources during early childhood and for many children this lack of resources is persistent. This disadvantage is inequitably distributed across the population and is associated with worse outcomes later in childhood.

Stephens then notes that 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 incidence of poverty. But one challenge is that there is no single measure of what it means to be poor and different measures point to different people being in poverty. She thus outlines an experimental approach that uses the available data on a range of poverty measures, which highlights the complexity of the relationships between material hardship, income, and housing costs.

This complexity of poverty measurement is also raised by Wang, who considers what the data on household expenditure tell us. Like Stephens she notes the potential mismatch between different types of poverty measures. The implication of this is, as she notes, to consider how different measures provide different insights and could potentially combine to provide a fuller picture on child poverty in New Zealand.

Fortunately, as Nolan, Wang and Stephens discuss, the growing availability of data and improved modelling techniques mean that what is possible when it comes to measuring poverty and wellbeing continues to improve. They focus on the potential of one tool, the Treasury's Tax and Welfare Analysis (TAWA) model, but there are more general grounds for optimism. Indeed, as Hughes also highlighted in the opening article, we have a real opportunity to better understand wellbeing and poverty and, in turn, help ensure that New Zealand is the best place in the world for all Kiwi kids.

Patrick Nolan and Meghan Stephens

Tim Hughes<sup>1</sup>

# Social Investment (in Wellbeing?)

## Abstract

This article outlines social investment and the wellbeing approach. It discusses how these frameworks have evolved and argues for a hybrid approach, one drawing on the insights of both a broad spectrum of indicators and detailed distributional evidence.

**Keywords** wellbeing approach, social investment

Over the past decade the Treasury has had a lead role in supporting two high-profile frameworks: social investment and the wellbeing approach. Through practical experience and principled critique (e.g., Boston and Gill, 2017), much has been learned about each. In this article I suggest that a hybrid approach between the two frameworks could hold promise, as each has strengths that can complement the other.

### Social investment and the wellbeing approach: a brief overview

The precise content of both social investment and the wellbeing approach has evolved over time. Some of the enduring

features of social investment include:

- using data and modelling to understand life-course trajectories of different cohorts and focus efforts on those most likely to face persistent and multiple disadvantage;
- dealing with the challenge of social service integration for people with multiple needs, colloquially referred to as the ‘multiple cars up the driveway’ problem;
- leveraging both local and central sources of knowledge and supporting local innovation, particularly by NGOs;
- identifying ‘what works’ and attempting to direct new investment towards options with a high return on investment.

Key aspects of the wellbeing approach include:

- emphasis on measurement and monitoring of a broad spectrum of indicators to understand progress in New Zealand;<sup>2</sup>
- using these indicators, alongside other evidence, to identify and communicate budget priorities;
- encouraging agencies to identify the impact of their policy and investment proposals on wellbeing, particularly as part of the budget process; and
- collaboration and dialogue with other ‘wellbeing governments’, such as Scotland, Canada, Iceland, Finland and Wales, and also with the OECD’s Centre on Well-being, Inclusion, Sustainability and Equity (WISE).

### A hybrid model

A hybrid of the two approaches could draw from the strengths of each in three areas – framing, analytics and budget management. Social investment’s strengths relate in particular to analytics and

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**Table 1: Use of data and analytics in the different frameworks**

	Social Investment	Wellbeing Approach
Primary data source	Linked administrative data	Surveys and environmental monitoring series
Primary data type	Person-level panel (longitudinal)	Repeated cross section
Scope of data	Social	Social, environmental and economic
Primary analytical methods	Microsimulation	Indicators monitoring
Timeframe	Forward-facing (modelled projections)	Backwards-facing (trends to date, with a lag)
Dimensionality	Dimensions integrated into a single figure (liability or similar)	Dimensions mostly dealt with one at a time <sup>3</sup>
Units of analysis	Individual person or cohort	Individual person Population group Geographical location Nation
Type of policy response	Social services	Any

budget management, and the wellbeing approach’s strengths relate in particular to the question of framing.

*Conceptual framing*

Each framework directs policy analysts to assemble certain kinds of information to help ministers decide whether government should invest funds on behalf of the general public for the benefit of private individuals.

Each framework has emphasised that there may be public benefits to investment in private individuals that may strengthen the case for investment beyond mere solidarity – i.e., our desire to see our fellow citizens do well. For example, the social investment framework has emphasised that people who are disadvantaged are often less able to contribute to the public purse, often require greater public support, and often create public expense via the benefit system, justice system, health system and so on. Investment today in disadvantaged people could produce a return for the government later in terms of reduced fiscal costs or increased revenue.

A hybrid approach would maintain a focus on opportunities to invest now for fiscal returns later, and continue to be open to the idea that because cumulative fiscal costs can be substantial over the life course, substantial public investment in the most disadvantaged children may be warranted even in narrowly fiscal terms. In the context

of an ageing population and associated fiscal pressure, every opportunity to manage that fiscal pressure should be explored.

But focusing on fiscal returns alone risks underestimating the spillover effects of disadvantage, and thus underestimating the full economic return of public investment in people (Chapple, 2013, 2017). In some cases the fiscal return may be a reasonable proxy for wider economic return, but this will not always be the case. For example, the World Bank (2021) reports that human capital constitutes the majority of wealth in most countries across the world. Investing in this ‘asset’ could provide fiscal return by, for example, reducing rates of joblessness and benefit receipt. But the wider economic returns are likely to be much greater than the fiscal returns, and so the break-even level of investment in human capital is correspondingly higher.

For related reasons, Colin James (2015) has argued that the investment approach should focus on building assets rather than reducing liabilities. A hybrid approach would consider the full return associated with investment in human capital and also in other assets, such as social cohesion and the natural environment, that have been given greater prominence in the wellbeing approach.

Acknowledging the importance of maintaining our collective wealth,

including environmental wealth, also invites consideration of the spillovers associated not with disadvantage, but with affluence. Higher-income households tend to exert greater environmental pressure than low-income households, through phenomena such as larger homes, greater energy use, greater international travel, greater consumption of meat, greater car use and so on (Allan, Kerr and Will, 2015). These private choices create public costs that may reduce collective wellbeing both now and in the future. A hybrid approach would encourage consideration not just of investment opportunities to improve the situation of the disadvantaged for the benefit of all, but also regulatory opportunities to manage the external costs imposed on current and future generations by the advantaged.

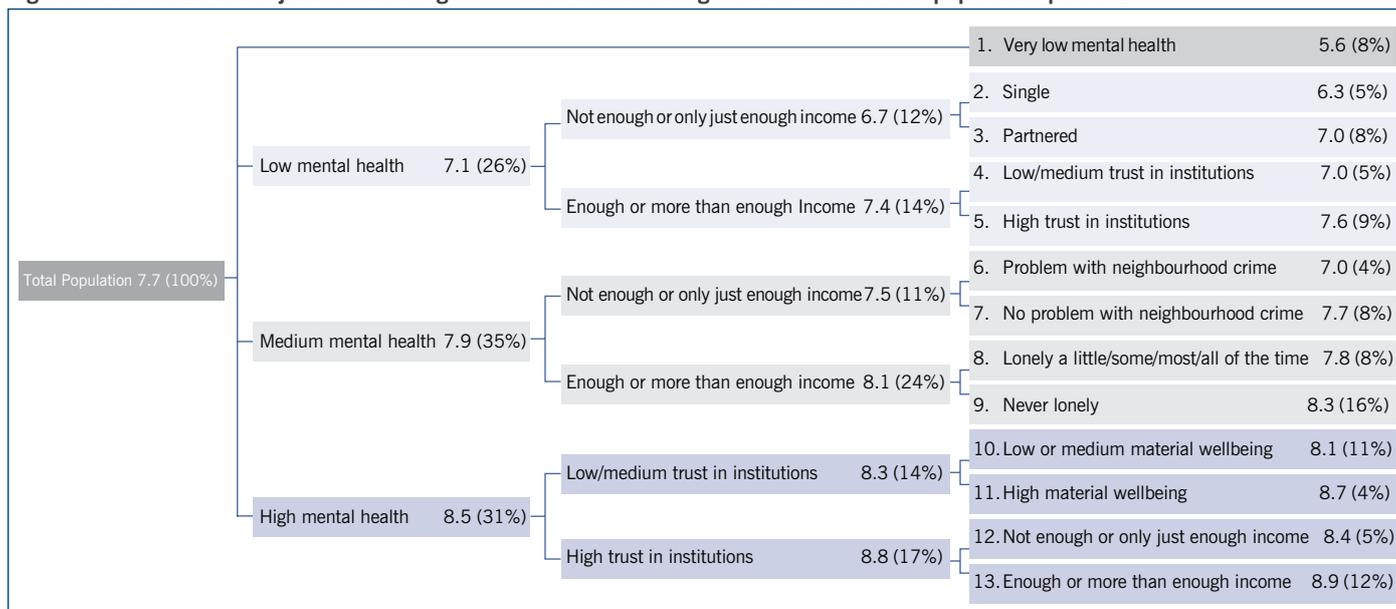
This brief discussion suggests that a hybrid framing would focus on investment in building and maintaining our individual and collective assets. But as Weijers and Morrison (2018) pointed out, the question of framing is one that Wellington analysts attempt to resolve ourselves at our peril.

With the wellbeing approach this has led to more than one framework being embraced. For example, the current government has emphasised both the Treasury’s Living Standards Framework and He Ara Waiora as important complements to each other (Robertson, 2021). Others have pointed out the need to consider the particular circumstances and perspectives of, for example, disabled people (Murray and Loveless, 2021) and Pacific peoples (Thomsen, Tavita and Levi-Teu, 2018). Good engagement is also important to avoid accusations of paternalism, accusations that have been levelled at both social investment (Berentson-Shaw, 2018) and the Living Standards Framework that subsequently supported the wellbeing approach (Wilkinson, 2016). A hybrid approach would thus continue the engagement processes initiated under the wellbeing approach.

*Data and analytics*

Both social investment and the wellbeing approach have aimed to make better use of data and empirical analysis in the process of policy development. Some of the key

**Figure 1: Correlates of subjective wellbeing – each box shows average life satisfaction and population percent**



Source: Crichton and Nguyen (forthcoming)

differences in the use of data and analysis are highlighted in Table 1.

A major distinction between the two approaches is one between breadth and depth. In one sense the wellbeing approach has been more ambitious in that it attempts to integrate social, environmental and economic concerns into a single framework. This makes it theoretically applicable across all of government. However, social investment has been more ambitious in another sense, in that it makes greater use of advanced and multidimensional empirical methods to make the most of government’s substantial data assets, particularly in making life-course patterns readily understandable and salient.

A hybrid approach would seek to achieve a balance between breadth and depth. There are at least two ways to think about how to achieve this: a top-down, uncentric approach, and a bottom-up, polycentric approach.

A top-down approach might start with a broad dashboard of simple indicators covering a range of concerns, supporting a triage process to identify concerning trends or issues that warrant more in-depth subsequent analysis. The Treasury’s upcoming wellbeing report and accompanying background papers are a good example of this type of exercise (see, for example, Treasury, 2022). Depending on the types of issue being surfaced, different types of detailed analytical methods will be more or less relevant for

understanding the drivers of the identified trends or issues to inform potential policy responses. Microsimulation based on administrative data is a powerful technique in some circumstances, but used by itself can be misleading. For example, as Jess Berentson-Shaw (2018) has noted, it can lead to overemphasis on individual-level drivers of persistent disadvantage and bracket out explanations that focus on structural features, such as the complexity of a highly targeted benefit system.

When it comes to measuring progress and identifying areas to focus on, there is much debate about the merits of a dashboard approach versus an index approach (such as that of the Human Development Index). People like Arthur Grimes (Tibshraeny, 2019) and Eric Crampton (2018) argue, in line with global figures such as Richard Layard (2020), that a multiplicity of indicators risks leaving the choice of what to focus on arbitrary or vulnerable to purely political contingencies. One strength of social investment in this light is its reliance on a single metric, the liability figure, which, for all its limitations, does at least provide a clear and consistent ordering across multiple dimensions. From a wellbeing perspective many of these economists propose using as an indexing metric the wellbeing-adjusted life-year, or WELLBY, which is founded on answers to survey questions about life satisfaction.

In these debates the options are sometimes presented as binary – either a

dashboard approach, or an indexing approach. But there is no reason why a hybrid approach cannot use both. The dashboard approach has the advantage that it allows for, as pointed out by David Hall (2019), multiple interpretative possibilities. And the WELLBY approach is one useful way to interpret the indicators in the dashboard that can provide insight even without necessarily endorsing the value judgements implicit in that particular metric.

One important use of life satisfaction data and the WELLBY is to identify groups of people whose low wellbeing is driven by multiple factors that no one agency has responsibility for attending to. In some cases, a triaging exercise will identify an issue that is clearly in the remit of one agency. For example, a recent Treasury paper identified mental health as a major area of concern (Treasury, 2022), and the policy lead for this is clearly the health sector (even if others have a supporting role). But in other cases disadvantage may be compounded across multiple domains such that no one agency has responsibility for the whole. For example, sole parents as a group have notably low wellbeing and there is no obvious policy lead on this group. New Zealand’s public sector is generally regarded as being weak at supporting people with multiple and complex needs (Productivity Commission, 2015). And because line agencies generally have an incentive to view their clients from

the perspective of the services the agency offers rather than their overall needs, person-centred analysis by central agencies can be an important complement to analysis by line agencies.

The correlates of life satisfaction have been explored in New Zealand in a series of papers by Conal Smith and others, the most recent of which is Smith, Krassoi Peach and Cording (2019). Crichton and Nguyen (forthcoming) have recently extended this analysis, which has generally focused on main effects, to explore interactions between different domains of

form the basis for subsequent cross-agency policy work if desired by government, providing a way to cut across the much-maligned 'silos' of the public service. But, unlike social investment, these cohorts are identified on the basis of their life satisfaction, not their future fiscal cost.

These are examples of how top-down analysis can help direct government's attention in a systematic way towards major problems and cohorts in need of support. But an important criticism of the top-down approach is that the best investment options are not necessarily

specialists with detailed knowledge of topics such as soil health and ocean systems are necessary, and who are likely to identify problems, risks or areas for improvement that could well be lost at the highest level of analysis.

### *Budget management*

An entire issue of *Policy Quarterly* could easily be dedicated to the topic of budget management, but I will have to limit myself to a few general remarks relating to the setting of budget strategy, the ex ante evaluation of funding proposals, and ex post monitoring of those proposals that are funded.

At the strategy stage, one perennial challenge is to ensure that long-term issues are given adequate consideration alongside the politically salient issues of the day. One strength of the future liability approach was that it provided a concrete mechanism by which to make at least one class of long-term issues salient in the minds of busy ministers. This type of modelling could help provide additional insight at the strategy-setting stage of a wellbeing budget. The parliamentary commissioner for the environment (2021) has recently argued that the wellbeing approach also needs better mechanisms to ensure that long-term environmental costs are kept salient as well, arguing that in practice the wellbeing approach has focused on the wellbeing of current over future generations.

A hybrid approach could make greater use of forecasts and projections to understand long-term costs (both economic and fiscal) in the setting of budget strategy. The dashboard triage methodology described above is one way to keep long-term trends salient, but this would ideally be supplemented by the ability to project future trends, not only in social and fiscal costs, but in economic and environmental costs as well. Mechanisms such as the long-term insights briefing and Treasury's new statutory wellbeing report provide vehicles to report on trends, and ideally in time the modelling capability will be developed to increase our sophistication in understanding the future implications of current trends.

At the initiative assessment stage, greater and more rigorous use of cost-benefit analysis would do much to support

... even the best cost-benefit analysis in the world is still an estimate of what the impact of an initiative will be, and any number of reasons could lead the real-world impact to be very different.

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wellbeing using regression tree methods. This has resulted in a segmentation of the entire New Zealand population aged 15+ grouped by different levels of life satisfaction.

This analysis provides an intuitive way to understand how different combinations of variables are associated with life satisfaction. For example, Figure 1 illustrates that the total population has an average life satisfaction of 7.7 out of 10, whereas the 26% of people with low mental health have an average life satisfaction of 7.1. But among those with low mental health, there is a big difference between those with not enough or only just enough income and who are single (segment 2 – 5% of the population with an average life satisfaction of 6.3), for example, and those with enough or more than enough income and high trust in institutions (segment 5 – 9% of the population with an average life satisfaction of 7.6).

This is an example of hybrid social investment and wellbeing analysis. As with social investment, it identifies specific cohorts of people with distinct combinations of strengths and needs. These cohorts could

those that address the most salient high-level problems. Sole reliance on the top-down approach risks taking government towards the politician's syllogism (something must be done; this is something, therefore it must be done). It also risks government focusing on a small number of large problems rather than a large number of small problems which may, in aggregate, be more important. This is one reason to complement a top-down approach with a bottom-up approach, to encourage agencies to identify any high-return investment options in their areas even if they are not aligned with priorities set at the centre.

Another reason why polycentric analysis is necessary is that there is simply too much information to process centrally, and a lot of information, especially qualitative information, can only be processed in a decentralised way. Much of the analytical depth should therefore be provided by line agencies. It is nowhere near sufficient for Treasury analysts to track aggregate indicators of natural capital, for example. Across the wider system, many

the aims of both social investment and the wellbeing approach, or a hybrid of the two.

That cost–benefit analysis is superior to a focus on reducing the Crown’s liability is a point made by several commentators (Chapple, 2013; Rosenberg, 2015; Productivity Commission, 2015). Others have also suggested that the Living Standards Framework (and by extension the wellbeing approach) add nothing that cost–benefit analysis does not already provide, because good analysts are already alert to externalities and long-term impacts (Wilkinson, 2016).

I certainly agree that greater use of cost–benefit analysis to evaluate specific initiatives is a vital complement to the Living Standards Framework.<sup>4</sup> The Treasury has continued to update its CBAX tool and guidance to that effect. One important addition has been to add WELLBY-related metrics and guidance to support direct analysis of the wellbeing impacts of policy analysis. But it remains the case that demand for high-quality cost–benefit analysis remains generally low, as does capability. One innovation in the social investment approach that could be worth incorporating into a hybrid approach is greater involvement of the chief science advisor network in the formal evaluation of budget initiatives, to help increase demand for evidence-based proposals and provide further institutional support to ministers, who often lack the time and specialist knowledge to interrogate the evidence base sitting behind initiatives.

But even the best cost–benefit analysis in the world is still an estimate of what the impact of an initiative will be, and any number of reasons could lead the real-world impact to be very different. For this reason both social investment and the

wellbeing approach have included aspirations to improve the monitoring of initiatives after they are funded, to create ‘feedback loops’ that result in initiatives improving their results, or being defunded if necessary. The need to improve ex post monitoring of impact and the ultimate connection to outcomes is a very old issue in New Zealand’s public finance system (see, for example, Ussher and Kibblewhite, 2001) and there is not space in this article to properly address the topic. But I think it is fair to say that neither social investment nor the wellbeing approach have yet made very much progress in this area, so even a hybrid model would need to do better at strengthening the incentives and capability to evaluate and continuously improve the effectiveness of expenditure across the base, not just at the margin.

### Conclusion

To summarise, I have suggested that there would be value in a hybrid approach between social investment and the wellbeing approach that:

- carefully considers both fiscal returns and wider economic returns associated with building and maintaining human and non-human assets;
- emphasises both life-course and intergenerational patterns of advantage and disadvantage;
- considers the spillover effects of both advantage and disadvantage;
- balances analytical breadth with depth, exploiting both survey and administrative data using both dashboard and indexing approaches, and both centralised and decentralised analysis; and
- encourages robust analysis at the strategic priority-setting stage and the initiative assessment stage, particularly

through greater use of cost–benefit analysis.

Critics of social investment and the wellbeing approach might argue that it would be better to start again with a new framework. I have taken the approach of working with the strengths that we have and building on them, but it is important to acknowledge that the hybrid approach I outline would still have limitations and it is certainly nothing like a comprehensive blueprint for good government. As noted, neither approach has been very strong at ex post value management. Another limitation is that neither approach is very sensitive to rights-based arguments for government action. But as long as we are sensitive to these limitations, and seek to manage them as well, then a hybrid approach should have some promise in helping government and the public service improve the allocation of public resources.

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Simon Upton

# Wellbeing Budgets and the Environment

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## Abstract

Wellbeing budgets have created a need to link the environment to wellbeing. This may seem like a self-evident task, but in practice it is extremely difficult. There is often not enough information to link how a given environmental policy or initiative will impact on the environment, let alone how it will impact on wellbeing. These difficulties are compounded by the fact that many environmental issues are complex, long-term, or characterised by tipping points. So far, decision makers have not had adequate advice to make informed trade-offs between investing in wellbeing now and investing in wellbeing for the future. In order to address these limitations, the government and its advisors should consider whether it is worth treating environmental spending in a different way.

**Keywords** wellbeing budgets, environmental information, environmental spending

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Simon Upton is the parliamentary commissioner for the environment. He is a former minister for the environment as well as a former environment director at the OECD. His report *Wellbeing Budgets and the Environment: a promised land?* was published in December 2021.

**D**o we have the information we need about the state of the environment and how it is changing to make informed decisions about how best to protect it? Over the past four years, this question has spurred three investigations centred on the importance of environmental information. It started with a 2019 review of environmental reporting, followed by a 2020 review of publicly funded environmental research, and culminated last year in a review of how the environment is incorporated into the wellbeing budget process.<sup>1</sup>

Environmental information and the annual budget cycle may not seem like obvious bedfellows, but the extension of the original review to an examination of wellbeing budgets flowed from a simple premise unearthed in the 2019 review. Environmental data is not collected for the sake of it. We collect it for the same reason that we collect data about the economy, the education system or people's health: these things matter for our wellbeing.

Since wellbeing budgets are New Zealand's latest effort to erect an overarching goal for the expenditure of public money, evaluating how well the environment is treated in this process is

## BOX 1 Core conclusions about the budget process

- Existing budget processes appear to be more useful for allocating investments to short-term, social and economic outcomes than they are for allocating investments to environmental outcomes.
- For a given environmental priority or policy initiative, it is very challenging to make the link with wellbeing, particularly in a way that is measurable. The environmental information required to make this link is not often available.
- Information limitations do not permit an assessment of the level or quality of environmental investment needed to maintain existing environmental quality and existing flows of ecosystem services, let alone what level or quality of environmental investment is needed to maintain current or future wellbeing.
- Advice received by decision makers is insufficient to make informed trade-offs between investing in wellbeing now and investing in wellbeing for the future.
- Scrutiny of environmental expenditure in terms of its contribution to intergenerational wellbeing appears to be lacking.
- Placing desired environmental, social and economic outcomes alongside one another does not necessarily make them consistent or comparable and does not resolve the fact that they are realised over different time frames.<sup>5</sup>

important, as it is likely to have a direct impact on whether environmental initiatives are funded.

### What is wellbeing and how is the environment related?

Giving definitive meaning to ‘wellbeing’ is a challenge (Dodge et al., 2012). It is intangible and difficult to define. There is no one wellbeing, only wellbeings, and those wellbeings are distributed through time.

For Māori there is no compartmentalisation of human wellbeing and the environment; they are one and the same (Mika, 2021; Reid, 2021). The whakapapa of people extends to non-human kin groups, including inanimate entities such as the land and the seas. Many Western conceptions of wellbeing are fundamentally anthropocentric. They are concerned with human wellbeing, and only consider the environment relevant to wellbeing as a means to human ends.

No matter how wellbeing is understood, there is an increasing awareness among New Zealanders that the environment is fundamental to their wellbeing.<sup>2</sup> There is

also broad agreement that the environment is linked to both our economic and our non-economic wellbeing, now and in the future.

To understand the link between the environment and wellbeing in the future, the environment is sometimes described as a stock of natural capital.<sup>3</sup> This refers to land, soil, water, flora and fauna, as well as the broader ecosystems they are part of. Without a healthy environment, economic and social wellbeing cannot be sustained into the future. The Organisation for Economic Co-operation and Development notes that:

our ability to sustain economic and social progress in the long run will depend on our capacity to reduce dependence on natural capital as a source of growth, abate pollution, enhance the quality of physical and human capital and reinforce our institutions. (OECD, 2017, p.3)

Having clear and coherent definitions of what is actually encapsulated by the concept of wellbeing is essential if agencies

are to be able to elaborate its connections with the environment and, from there, develop analysis based on those connections.

Establishing a general link between the environment and wellbeing is one thing. Establishing specific links between dimensions of the environment and dimensions of wellbeing is another. Establishing the magnitude of these links and integrating them into wellbeing budgets is another again.

### Wellbeing budgets and the environment

Wellbeing budgets are supposed to ensure that expenditure focuses on those areas that offer the greatest opportunities to improve the wellbeing of New Zealanders. These opportunities are supposed to align with the wellbeing outcomes that New Zealanders value most highly. Wellbeing budgets are also supposed to take a long-term view and ensure that intergenerational outcomes are kept in sight (New Zealand Government, 2018, pp.4–5).

While the limitations of gross domestic product have been widely noted over the last two decades, there is comparatively little discussion about the potential limits of wellbeing and measures of wellbeing. Wellbeing’s value is frequently represented as being self-evident.

Being aware of the potential limits of wellbeing as the lodestar of fiscal policy is essential if it is to be meaningful. Holding up wellbeing as the goal of fiscal policy risks returning us to the same dance that characterised the ‘dominance’ of gross domestic product: everything that is not consistent with a wellbeing approach is expunged from the formal budget process. Decision making in a pluralistic society involves different values that can be linked to different conceptions of wellbeing. But in some instances these do not appear capable of being reduced to wellbeing. If a particular wellbeing approach is not the only lens decision makers actually use to rationalise spending, then tasking officials with framing all spending in terms of wellbeing may not be worthwhile.

A detailed examination of the budget process undertaken as part of the 2021 review found that wellbeing budgets are not currently capable of delivering on their promise, at least as far as environmental

considerations are concerned. This is partly due to fundamental difficulties associated with integrating environmental considerations into wellbeing budgets. These include the absence of a granular understanding of the relationship between dimensions of the environment and dimensions of wellbeing, the difficulty of reducing the values of the environment to considerations of wellbeing, and radical uncertainty about how the environment might contribute to the wellbeing of future generations (see Box 1).<sup>4</sup>

The other reasons wellbeing budgets do not deliver for the environment relate to the limitations of existing environmental information, prevailing wellbeing frameworks and available analytic tools. There is also a lack of clarity about how to implement a wellbeing approach within the annual budget process, at least in the context of the environment.

These findings are based on an intensive analysis of dozens of budget documents totalling several hundred pages, and extensive engagement with officials from both the Treasury and agencies that submit budget initiatives with environmental considerations. Unprecedented access to budget documents makes it possible to open up the 'black box' of the budget process.

These findings are likely to be of relevance beyond the environmental sector.

The wellbeing approach may be better suited to the timelines associated with a structured baseline expenditure review than the pressure-cooker process of assessing new initiatives. However, it appears that the wellbeing approach is largely implicit in the recently completed spending review of the Natural Resources Cluster.

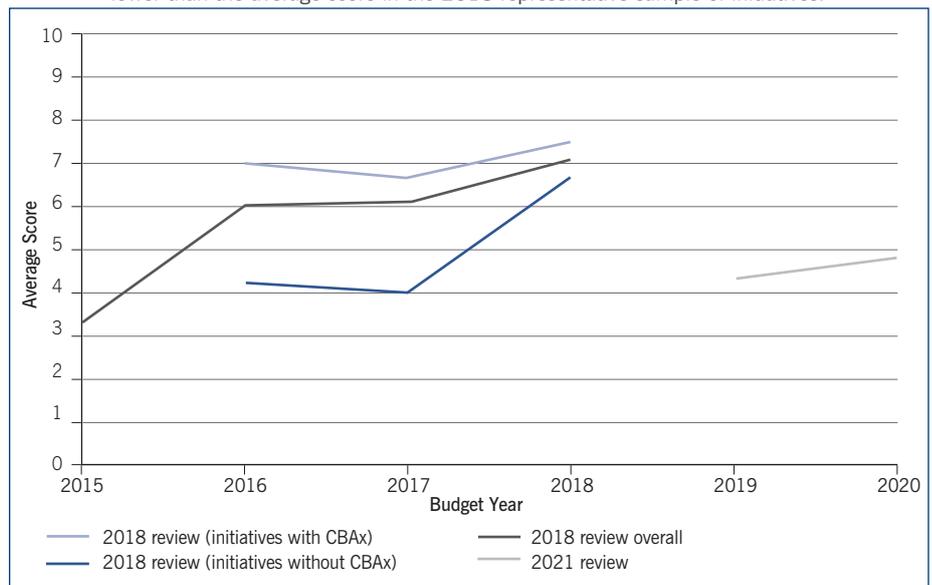
**Is the issue 'wellbeing'? Is it 'the environment'? Is it both?**

For the environment, relying solely on wellbeing as the justification for spending could end up hindering more than it helps.

In the course of conducting my 2021 review, I came to doubt whether constructing budgets around the goal of wellbeing will make much of a difference for the environment. The continuous demand to render long-term environmental considerations in terms of wellbeing may simply end up complicating the budget

**Figure 1: Trends in mean scores from NZIER's 2018 review and NZIER's 2021 review of the quality of budget initiatives**

The average score from the 2021 sample of environmental initiatives was significantly lower than the average score in the 2018 representative sample of initiatives.



Source: NZIER, 2021

prioritisation process for marginal added value.

I worry that if we become fixated on making that link in a meaningful, evidence-based way, we will only focus on those areas that can be easily linked to wellbeing. This could divert a large amount of energy from tackling environmental issues that are already long overdue for attention.

Our ability to understand the outcomes of intervening in different policy problems also varies significantly. Without much better information about the contribution of the environment to current wellbeing, environmental investments may be discriminated against in favour of investments that are better understood. It is very likely that more direct, quantifiable and monetisable contributions will be seen as superior because they are more richly described and more certain.

This is already happening, at least from a technical standpoint. A review of budget initiatives with environmental considerations conducted by the New Zealand Institute of Economic Research found that the quality was 'very low'. In general, environmental initiatives were found to be 'deficient in a number of quality criteria and needed considerable improvement' (NZIER, 2021, p.5). (See Figure 1.)

Several features of the environment make its integration into the budget process challenging. These include the long-term nature of environment impacts,

the diversity of the environment and the fact that the environment is not traded in markets. Some aspects of the environment – such as those that are critical, life-supporting or characterised by tipping points – are difficult to place alongside other investments with less severe consequences.

If it is hard enough to assess the environment's contribution to the here and now, then doing so over extended time frames is orders of magnitude more difficult. So many environmental issues involve dynamic living systems whose disruption today will lead to unknown perturbations with significant consequences for the wellbeing of younger generations, as well as generations to come. We know even less about what future societies are going to value for their wellbeing.

**How can we do a better job in the budget process?**

While we have to do a better job of ensuring that the environment receives consistent attention in wellbeing budgets, that doesn't necessarily require a perfect union between a wellbeing approach and the environment.

The budget process needs to change so that the environment is not only considered but embedded at each phase of the process. This requires better measurement and synthesis of environmental information, improved interrogation of expenditure

proposals using purpose-built tools, and better synthesis and communication of impacts throughout the budget process.

In my review, I made four clusters of recommendations that would be useful to any sort of budget process that wanted to take the environment seriously. All of them address wellbeing budgets as they are currently conceived, but could also be applied in budgets with a focal point other than wellbeing. They have been chosen on the basis that they can be progressed without delay and provide the most immediate opportunities to improve the quality of budget making. They included:

- improving the way the environment is handled in the budget's wellbeing analysis templates and other tools;
- improving the quality of information available in the budget process to reflect what is known about future risks, uncertainty and tipping points;
- reviewing the way cost–benefit analysis is applied to budget initiatives to ensure that budget proposals with enduring benefits to future generations are not effectively discounted away to nothing; and
- improving the presentation of critical environmental information in the budget process.

The recommended actions are in no way comprehensive. They should be viewed, rather, as points of leverage to improve a process that is still relatively new and evolving.

#### **Is that enough? Or should 'the environment' be even more distinct in the budget process?**

The government and its advisors should consider whether it may be worth treating environmental spending and investment priorities in a different way. This would need to acknowledge the radical uncertainties that surround potential tipping points and the lengthy time frames over which major environmental issues evolve.

Identifying key, long-run, systemic challenges and developing investment priorities to progressively address them is one way to ensure that action on key environmental issues is not neglected by the budget process. This can be done without continually framing the underlying analysis in terms of current wellbeing. Existing approaches to environmental

One way to ensure a steady focus on the issues that continue to eat away at our natural wealth is to have a short but comprehensive list of key standing environmental issues that are raised consistently, year on year.

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reporting (such as the driver–pressure–state–impact–response framework) or natural capital could be used as frameworks to implement this.<sup>6</sup> While these frameworks can be linked to wellbeing in a granular way, it is not essential to do so to act on what they are telling us.

Challenges such as trying to eliminate fossil fuel emissions to the atmosphere, stop the flow of microplastics into the environment or arrest the decline in native biodiversity all require urgent action. Failure to do so will bring about changes that irreversibly commit current and future generations to a world with greatly reduced options.

This could be expressed as a concern for intergenerational wellbeing. But does that need to be the lens we use?

We have no way to say how wellbeing will be construed in the future. Are we really aiming to rid our native ecosystems

of exotic predators by 2050 to enhance the future wellbeing of New Zealanders? In a sense we are. But that rationale does not seem to make the case for investment any more potent, or provide any better guidance on how it might be weighed up against other proposed investments affecting our natural wealth, or, indeed, other aspects of our national wealth.

One way to ensure a steady focus on the issues that continue to eat away at our natural wealth is to have a short but comprehensive list of key standing environmental issues that are raised consistently, year on year. The budget cycle could include a crisp, high-level stocktake of how these key long-term environmental issues are being managed.

Such an approach may also make it simpler for agencies that do not deal with the environment as part of their core business – but still need to take account of it – to approach these issues directly, rather than through a wellbeing lens.

No budget ignores the impact of the Crown's spending on its future liabilities. Why should it be any different with respect to environmental responsibilities? We can estimate the trajectory of public debt with a reasonable level of confidence under different scenarios. We need a similar, though not necessarily monetised, way of estimating the trajectory of accruing environmental liabilities.

One way to do this would be for the Ministry for the Environment and the Treasury to identify tipping points beyond which irreversible change to natural capital may occur. This flags not only the potential loss of ecological benefits that flow from natural capital, but also costly fiscal liabilities that may flow from a failure to grapple with the problem much sooner.

The sort of long-term environmental challenges I have alluded to remain challenges whether politicians choose to acknowledge them as priorities or not. The best we can hope for is that their existence and trajectory is brought consistently into the frame of budget conversations.

#### **Conclusions**

Since the publication of my report on wellbeing budgets, I have become even more convinced that the minister of finance should, at the presentation of

the budget, publish a report that outlines how new fiscal initiatives, as well as any changes to baseline expenditure, respond to environmental issues identified in state of the environment reports. These issues are enduring ones and not amenable to finite, short-term solutions. They are largely issues we will live with for the indefinite future.

I am in the process of formalising a recommendation on how environmental reporting and the budget system might be formally linked. That will become part of a short follow-up synthesis report I will publish later this year that will draw together the threads of my three reports on the generation and use of environmental information.

Details aside, the key message is clear: key long-term environmental issues need to be explicitly acknowledged and responded to as part of the budget process.

I take no issue with the decision to align expenditure with the pursuit of wellbeing as the pre-eminent goal of fiscal policy. But *if* wellbeing is to be the central pillar of

public expenditure, and environmental spending needs to be justified in relation to this goal, then the links between the state of the environment and wellbeing need to be understood.

These links are only tenuously developed, if at all. It is not hard to make the connection between the immediate benefits of safe drinking water or access to parks for recreation. But trying to think about the impact of an evolving biophysical environment we understand very incompletely on unborn generations becomes vertiginously challenging. These are not the sorts of questions that are easily accommodated by something as relentless and necessarily truncated as the annual budget cycle.

Trying to fix environmental problems is hard. As things currently stand, the environment is not any better off in a wellbeing budget. It is much easier for decision makers to focus on initiatives that provide short-term, relatively certain outcomes.

Until we have good environmental data and knowledge, and good connections between environmental reporting, research and budget processes, we will continue to make poorly informed spending decisions about the environment. Hopefully, the suggestions presented here provide some options to make the long road a little easier.

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- 1 See Parliamentary Commissioner for the Environment, 2019, 2020, 2021. These three reports will be supplemented by a short synthesis report that focuses on the need for better connections between environmental reporting, environmental research and budget process.
- 2 Country-level analysis confirms the strength of this link. See Vemuri and Costanza, 2006.
- 3 For further information on the genesis of the concept of natural capital, see Missemer, 2018.
- 4 There is ongoing work – for example, Ausseil et al., 2021 – that responds to some of these difficulties.
- 5 This box pulls out findings from chapter three of *Wellbeing Budgets and the Environment: a promised land?* (Parliamentary Commissioner for the Environment, 2021). On the focus on the short term, see pp.69, 73; on difficulties linking the environment and wellbeing, see pp.51, 59, 72; on uncertainty about the level of investment needed, see p.72; on the lack of informed trade-offs, see pp.55, 60, 67; on the absence of scrutiny from the standpoint of intergenerational wellbeing, see pp.60–4, 67–9, 72; on the commensurability of outcomes, see p.59.
- 6 For more information on the DPSIR framework, see European Environment Agency, 1999. For more information on natural capital accounting, see United Nations et al., 2014

# Changing Family Incomes in New Zealand 2007–20

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## Abstract

This article describes income mobility patterns in New Zealand over the short to medium term. It uses a special dataset which tracks the Household Labour Force Survey over the period from 2007 to 2020, using 2013 census data. The measure of income is total family taxable income per adult equivalent person. The income unit is the individual. Just below half of those initially in the bottom decile remained either there or in the second-lowest decile over seven years, while about two-thirds of those initially in the top decile remained either there or in the second-highest decile. Income mobility was least for those in the top and bottom deciles. People also move below or above a low-income threshold over time. Of those who initially had incomes less than half of the median income per adult equivalent person, about half remained in that category after six to seven years. Unemployment and single parenthood were closely associated with longer-term low income. Policies that promote employment and education may be effective, yet not necessarily sufficient, in reducing low income and low-income persistence.

**Keywords** income dynamics, income distribution, low income, mobility

The vast majority of studies of income inequality report measures of annual incomes, using cross-sectional data. Nevertheless, individuals experience relative income changes from year to year, some of which are associated with systematic life-cycle variations. A concern for inequality therefore needs to consider incomes over a longer accounting period, along with the precise nature of the income changes.<sup>2</sup>

The present article provides a description of some features of income mobility in New Zealand over the short to medium term (up to eight years). It uses a special dataset, made possible by the ability to link sources within the Integrated Data Infrastructure managed by Statistics New Zealand. The dataset links individuals in the Household Labour Force Survey (HLFS) with those in the 2013 census, over the period 2007–20. Importantly, a rich amount of information about the households in which individuals live is available. The results complement previous studies, which have used Inland Revenue administrative data and which necessarily relate only to individual taxpayers, and contain little information about the characteristics of those individuals.<sup>3</sup>

An advantage of the data used here is that they make it possible to include non-

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Figure 1: The datasets – HLFS data linked to census 2013



taxpayers, by allowing for the fact that income sharing inevitably takes place within families or households. However, no information is available about the precise nature of such sharing. Furthermore, difficulties arise when discussing households or families, since there are no ideal or universal definitions of these terms. The question of how a family is defined has to depend on the context. The approach taken here is based on the assumption that sharing is most important within families living together at the same address, rather than within households. The income concept is the resulting total taxable income per adult equivalent person in that family group, and this is assigned equally to each member: the basic ‘income unit’ is always the individual. Between two years, individuals may move between family units, so that the relevant income depends on both their individual income and the family unit to which they belong.<sup>4</sup>

The next section briefly describes the dataset and adult equivalent scales used. The third section examines relative income mobility in New Zealand, in terms of inter-decile and inter-quintile movements of individuals over time. The emphasis of section four is on the mobility characteristics of low-income groups, defined as those with income per adult equivalent person of less than half the median value in the relevant year. The fifth section concludes.

#### The data and income concept

The income and demographic data were obtained from the New Zealand Household Labour Force Survey for the years 2007–20. Sample calibration weights, produced by Statistics New Zealand, are used to ensure that grossed-up values match a range of population characteristics. The HLFS follows participants for eight consecutive quarters on a rotating basis and asks about income only in the June quarter, providing a maximum of two data points over two consecutive years. Therefore, people from each HLFS wave are matched with their records in the 2013 census, using unique anonymous identifiers, in order to examine income mobility beyond two consecutive years.<sup>5</sup> Income data for both the HLFS and the census are from Inland Revenue and make use of the more 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 the young parent payment. However, the income data do not reflect the complete tax and transfer system, as they exclude non-taxable benefits.

This process generates a series of pairings between the census and the HLFS, from 2007 to 2020, which are between two and seven years apart. The datasets are outlined in Figure 1. Effectively, there is a pairing for each different HLFS sample, linked to the 2013 census, so that they differ according to

the relevant time intervals. There are therefore two points in time for each panel, and in most cases the years are not consecutive. Each sample contains about 20,000 adults and 7,500 children, with an 80% match between the HLFS and the census. The possibility of sample selection bias was investigated by comparing the sample income distributions with the full HLFS data for each year: the differences in the density functions are minor.<sup>6</sup>

As mentioned above, the income concept is total family taxable income per adult equivalent person. The family is regarded as consisting of an adult, or adult partners, and dependent children who live at the same address. Adult children in the same household are treated as separate adult family units. The income measure is assigned to each person in the family. The analysis uses a two-parameter expression for the adult equivalent size of a family, which allows for a difference between children and adults, and economies of scale within the family.<sup>7</sup> This allows sensitivity analyses to be carried out easily. Furthermore, the form closely approximates many alternative, and often more complex, scales (see Creedy and Sleeman, 2005). A child is classified as a dependent if that person is under 18 years of age.

#### Relative income changes

The transition matrix summarises movements between specified segments of the distribution between two years.<sup>8</sup>

Table 1: Inter-decile transition matrices

A. Period 2007-2013											
	Decile in 2013										± 1 decile
	Bottom	2	3	4	5	6	7	8	9	Top	
Bottom	32.6	19.8	9.0	6.6	9.9	6.3	4.4	4.5	3.6	3.2	52.4
2	15.9	26.0	14.7	11.4	10.0	7.3	5.3	4.3	2.7	2.2	56.6
3	6.5	11.5	37.5	17.2	9.2	6.1	4.4	3.1	1.9	1.1	66.2
4	7.4	10.7	10.8	31.1	14.4	11.3	6.8	4.5	3.3	1.6	56.3
5	7.9	9.3	8.6	9.3	17.3	17.4	15.1	7.7	5.8	1.8	44.0
6	6.6	7.1	6.4	6.9	12.8	15.9	17.5	14.6	8.6	3.6	46.2
7	6.6	4.9	4.0	5.4	9.8	12.7	19.8	18.4	12.7	5.9	50.9
8	5.3	4.5	4.2	5.3	7.3	10.1	13.1	20.0	19.9	10.5	53.0
9	4.0	3.9	2.4	4.8	5.7	8.0	8.6	15.1	25.9	21.9	62.9
Top	7.3	2.3	2.6	2.1	3.8	4.9	5.2	7.8	15.7	48.3	64.0

B. Period 2013-2019											
	Decile in 2019										± 1 decile
	Bottom	2	3	4	5	6	7	8	9	Top	
Bottom	31.9	14.4	8.1	8.3	8.4	8.2	6.7	5.9	4.8	3.6	46.3
2	19.8	26.1	11.2	11.6	10.0	6.3	5.5	4.9	2.7	1.9	57.1
3	7.7	18.2	32.0	14.4	9.3	6.5	4.6	3.0	3.2	1.2	64.6
4	8.1	10.1	15.7	28.1	12.7	10.3	6.0	4.1	3.4	1.6	56.5
5	7.7	7.8	9.3	13.1	18.1	18.4	11.4	7.8	4.1	2.3	49.6
6	4.9	7.2	6.4	7.9	15.4	17.2	17.1	13.0	8.2	2.8	49.7
7	5.4	5.7	4.4	6.5	10.6	14.7	19.1	15.9	13.0	4.9	49.7
8	4.8	4.4	4.9	4.3	7.7	8.9	16.1	20.9	18.5	9.5	55.5
9	5.2	3.2	2.8	4.5	4.7	6.5	8.4	17.3	26.3	21.2	64.8
Top	4.5	2.2	3.6	2.9	3.5	3.7	5.2	7.35	15.8	51.3	67.1

Note: The final column is the percentage of individuals who in 2019 remained in the same decile or the decile immediately above or below their decile in 2013.

Figure 2: People moving at least two deciles from their initial decile

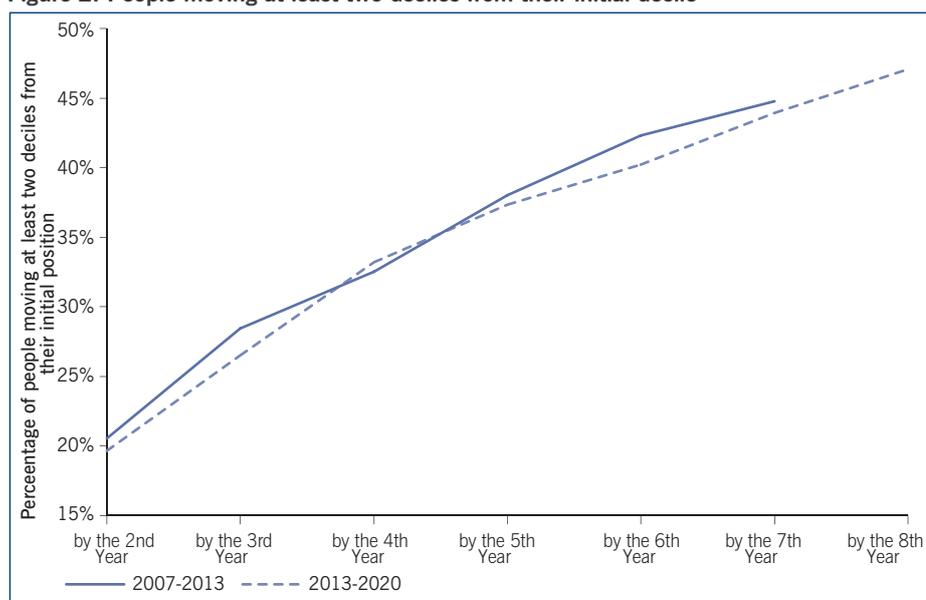


Table 3 shows transition matrices for movements between deciles from 2007 to 2013 and from 2013 to 2019, for all individuals combined: movement is from rows to columns of the matrix.<sup>9</sup> For each

matrix, the final column is the percentage of individuals who in the second year remained in the same decile, or the decile immediately above or below their decile in the first year. The matrices necessarily

ignore income changes that do not move the individual into a different decile.

This demonstrates substantial mobility in terms of differential income growth. However, just over half the people in the bottom decile in 2007 were in the lowest two deciles in 2013. Of those initially in the top decile, 64% were in the highest two deciles in 2013. Over the period 2013–19, 46.3% of those initially in the bottom decile remained either there or in the second-lowest decile in 2019. Furthermore, 67.1% of those in the top decile in 2013 remained either there or in the second-highest decile in 2019.

Figure 2 shows the proportion of individuals (starting in any of the deciles) who moved by two or more deciles over the relevant periods. Separate results are shown for the years 2007–13 (where data are linked ‘moving forward’ to the census) and 2013–20 (where the individuals are linked by ‘moving backward’ to the census from a later HLFS). Not surprisingly, the

number moving by two or more deciles increases as the time interval increases. Around 20% changed by at least two deciles after a year. Over eight years, 47% changed by two deciles or more. The results are similar for the periods 2007–13 and 2013–20.

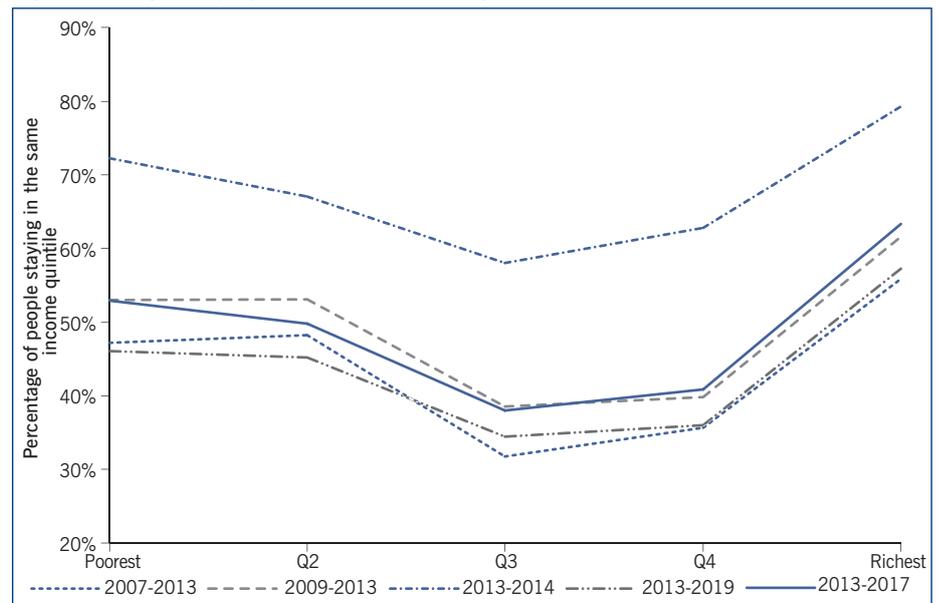
Figure 3 reports the proportion of individuals who stayed in the same quintile, for each quintile group and for a number of time intervals. There is more stability for people in the two bottom quintiles and even more for those in the top quintile. After 2013 medium-term mobility was slightly greater for those in the second-bottom quintile compared with the pre-2013 periods.

Results relating to quintile movements for all individuals and separately for those of ‘working age’ are shown in Figure 4. There are almost no differences between groups for the top and bottom quintiles. However, there is somewhat greater mobility for the working-age people in the second-bottom quintile when compared to the entire population. This reflects the importance of retired people, who typically are in the second-bottom quintile: that is, about 60% of those in that quintile in 2020 are aged 65 or over, and 70% were not in the labour force. For the entire population, almost 43% of those in the bottom income quintile in 2013 remained there in 2020, while 55% of those in the top quintile stayed there after seven years. Income mobility is higher for those in the middle group: 30% of those who stayed in the middle quintile in 2013 remained there and 38% moved up at least one quintile in 2020.

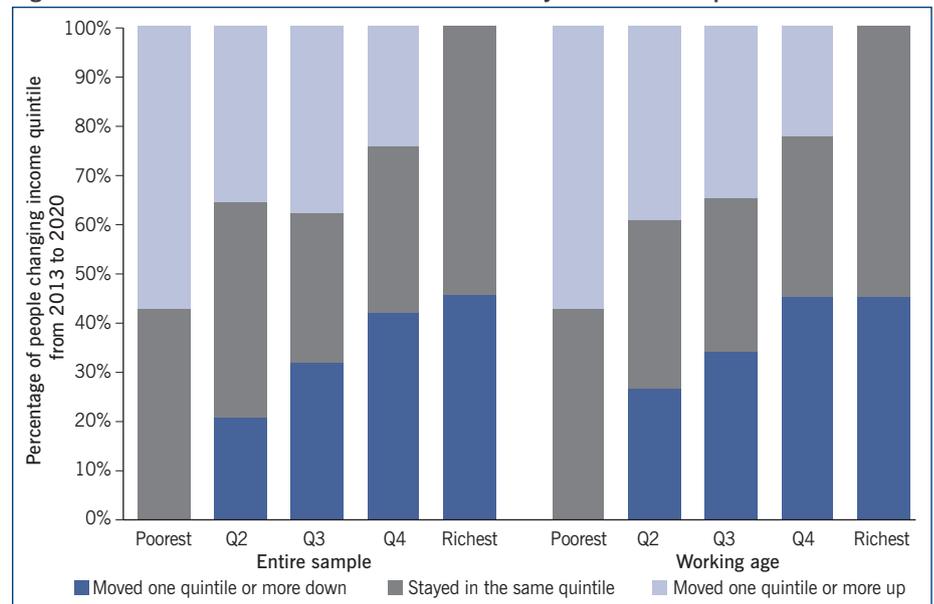
Figure 5 shows that people who stayed in lower income quintiles were more likely to experience real income increases over time compared to those in higher quintiles. This may partly be due to income transitions over the life cycle.<sup>10</sup> Of those in the bottom quintile in 2013, 83% experienced an increase or no changes in real income in 2020, while about 44% of the richest quintile increased their real income or remained in the previous real income levels.

Direct international comparisons are difficult to make. However, based on information about movements from the top and bottom quintiles over four years, data suggest that New Zealand is in the

**Figure 3: People staying in the same income quintile over different time intervals**



**Figure 4: Quintile movements from 2013 to 2020 by initial income quintile**



**Figure 5: Trends in income mobility by initial quintile over eight years**

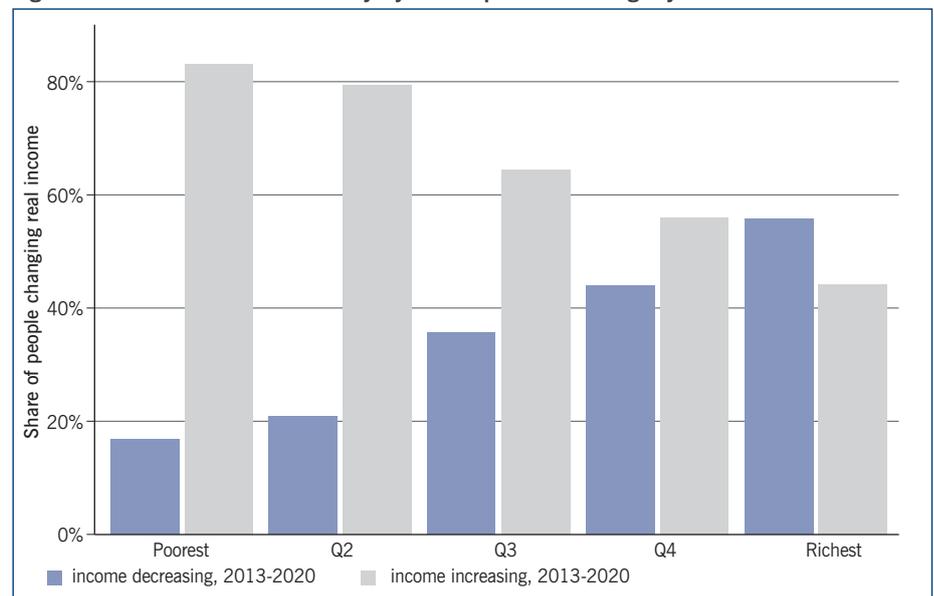


Figure 6: New Zealand low-income FGT measures decomposed – incidence measure ( $\alpha = 0$ )

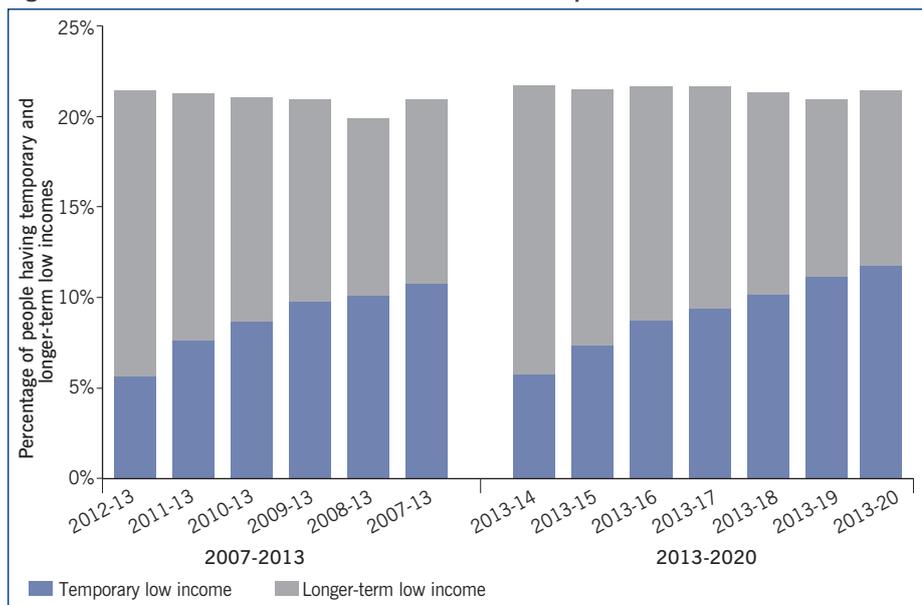
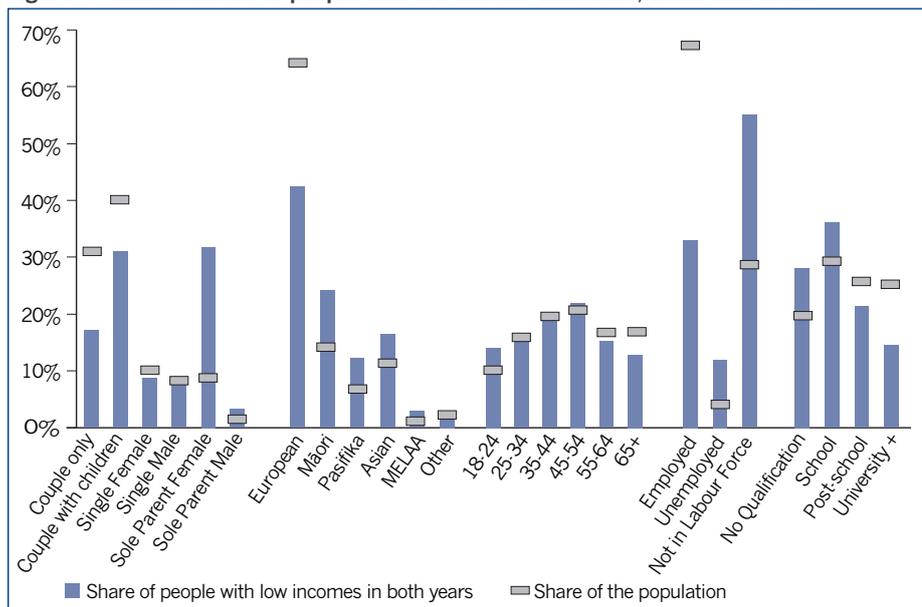


Figure 7: Characteristics of people with low-income incidence, 2013 and 2020



‘middle’ of OECD countries (see Creedy and Ta, 2022).

**Low incomes and mobility**

This section concentrates on the income changes of low-income individuals, defined as those below a threshold value set in relation to the median income per adult equivalent person. The analysis uses a class of poverty measures introduced by Foster, Greer and Thorbecke (1984). While these measures are applied in the present context, care must be taken to avoid referring to them as ‘poverty’ measures, given the use of gross taxable income. The Foster–Greer–Thorbecke, or FGT, measures are denoted  $LT_\alpha$ , and are based on the sum of powers,  $\alpha$ , of the individual

low-income gaps, defined (for those below a specified low-income threshold) as the relative difference between income  $y_i$  and the threshold  $y_p$ . Hence:

$$LT_\alpha = \frac{1}{n} \sum_{y < y_p} \left( \frac{y_p - y_i}{y_p} \right)^\alpha \quad (1)$$

For  $\alpha = 0$ , this is the proportion of people below the low-income threshold, and hence measures the *incidence* (conventionally referred to as the ‘headcount’ measure). For  $\alpha = 1$ , it depends on  $LT_0$  and the average low-income gap per capita, and reflects *intensity*. For  $\alpha = 2$ ,  $LT_2$  depends on the average squared low-income gap per capita, which is related to the standard deviation of low incomes, and

reflects *inequality* among the low-income group.

Given incomes in two years, and dropping the  $\alpha$  subscript, define  $LT$  as the arithmetic mean of the measures for each year. Borooah and Creedy (1998) show that it is possible to decompose  $LT$  into two components. A temporary or short-term component,  $LT^T$ , relates to those with low income in one period only, and a longer-term component,  $LT^L$ , relates to those with low income in both periods. The low-income threshold was set at 50% of median income. This is of course an arbitrary setting, but it also allows comparisons to be made with other countries.

Figure 6 presents the low-income prevalence of different HLFS samples, in terms of the proportion of people having low incomes over two years. Average low-income measures,  $LT$ , are reflected by the height of the bars. The blue bars reflect the proportion of people with low income in one of the years. The grey bars show the proportion of people with low income in both years. Given the dataset used here, consecutive years are not used in most cases.

The average low-income measures,  $LT$ , are similar for different time intervals. On average, just over a fifth of the New Zealand population had income per adult equivalent person below 50% of the median value. For decompositions between two consecutive years, around 6% of the population had low income in either 2012 or 2013, and 16% had low income in both years. As the interval of time expands, the temporary component increases, while the longer-term component decreases. For decompositions between two non-consecutive years, one in ten New Zealanders had low income in either 2007 or 2013, and the same rate for those who had low income in both years. The two sets of results for two periods before and after 2013 are similar.

Figure 7 displays the characteristics of people who experienced longer-term low income. In particular, the height of the vertical bar represents the proportion of people with the characteristic who have a longer-term low income. The horizontal bars show the value that would be reached if people with that characteristic were to match the average for the whole population.

That is, the horizontal bars represent the share of each demographic group in the entire population. Where the vertical bar is significantly higher than the horizontal bar, a person with that characteristic is more likely to have a longer-term low income than the population as a whole; these include sole parents, people not working, and those without qualifications. The analysis was replicated for different cohort groups over different time intervals: there were similar patterns across samples, with the exception of some differences for young people as they transitioned from study to work.

Figure 8 provides an alternative way to identify people who are more likely to have a longer-term low income, applied for the low-income measures: it shows low-income people in 2020 who were also below the relevant low-income threshold in 2013. For instance, regarding the incidence measure, each number represents the proportion of people with a certain characteristic having a longer-term low income compared with the corresponding population. The average measures (derived for the entire population) are used as the benchmark to identify those with significantly higher longer-term low-income measures than the average values.

The following characteristics were found to be associated with a higher likelihood of having a longer-term low income than the average population: for the incidence measure, sole parent female, unemployed people, MELAA (Middle Eastern, Latin American and African), sole parent male, Pasifika, Māori, Asian, people not in the labour force, and those without qualifications. For example, among all sole-parent-female families in 2013, 32% had low income in both 2013 and 2020.

For the intensity measure they are: sole parent female, sole parent male, unemployed people, Asian, MELAA, Pasifika, people not in the labour force, Māori, and those without qualifications. Asians were found to have slightly higher longer-term low-income rates than Māori or Pasifika people, according to this intensity measure. The latter populations were younger, had a higher proportion of sole-parent families and had lower qualifications than the average population, while the Asian respondents had a higher share of couple-parent families.<sup>11</sup>

Figure 8: Longer-term measures of low income, 2013 and 2020

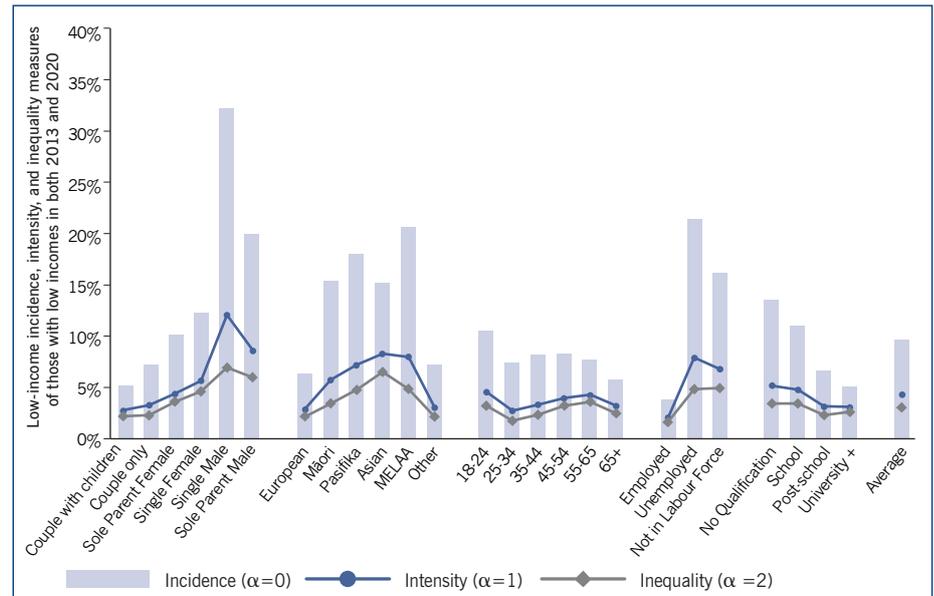


Figure 9: Temporary and longer-term low-income incidence, 2013 and 2020

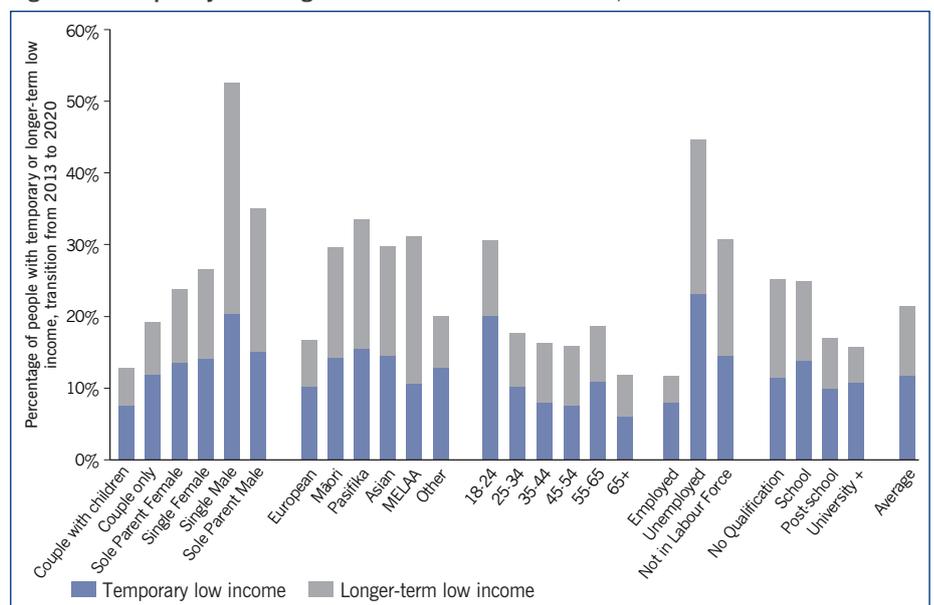


Figure 9 depicts decompositions of temporary versus longer-term low-income incidence across demographic groups, for the HLFS sample in 2020 who were traced back to the 2013 census. For those with low incomes at one point in time, the probability of having a longer-term low income increases. An exception is those aged 18–24 as they transfer from study to work. Again, not all people who were below the low-income threshold in one period also had low income in both periods, as there were substantial differences between the longer-term components and average low-income measures.

Figure 10 illustrates the longer-term measures of low income, decomposed by two characteristics for the HLFS sample in

2020. These decompositions help to identify the characteristics of people who were more likely to experience a longer-term low income compared with the population as a whole. They include non-European sole parents and non-working sole-parent families (whose low-income measures are far higher than the averages of the entire population).

Figure 11 shows low-income exits (movement from below to above the low-income threshold) over the medium term for the entire population and by demographic groups, observed in the initial years (computed as the proportion of people who exited low income in the second period, conditional on having a low income in the first period, divided by the

Figure 10: Longer-term components of low-income measures, 2013 and 2020

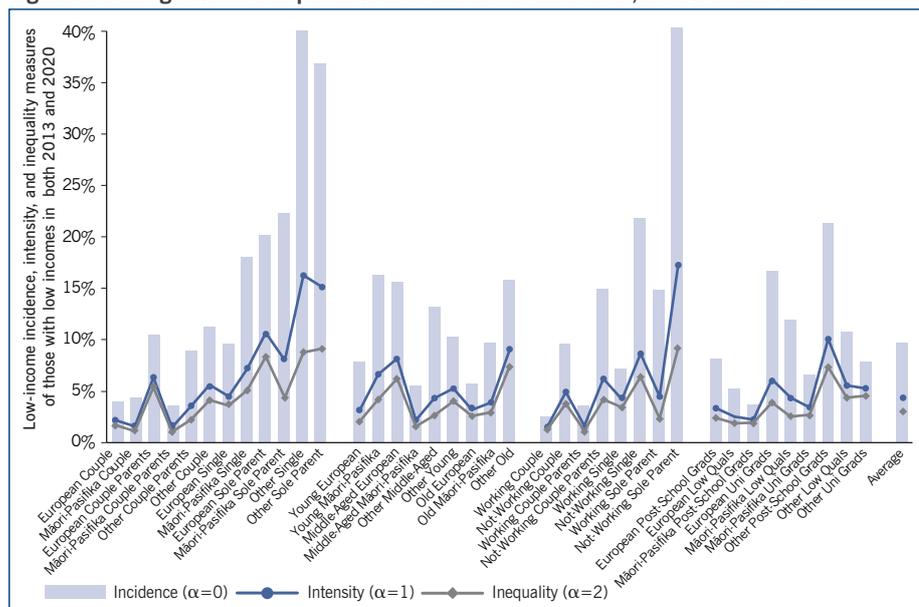
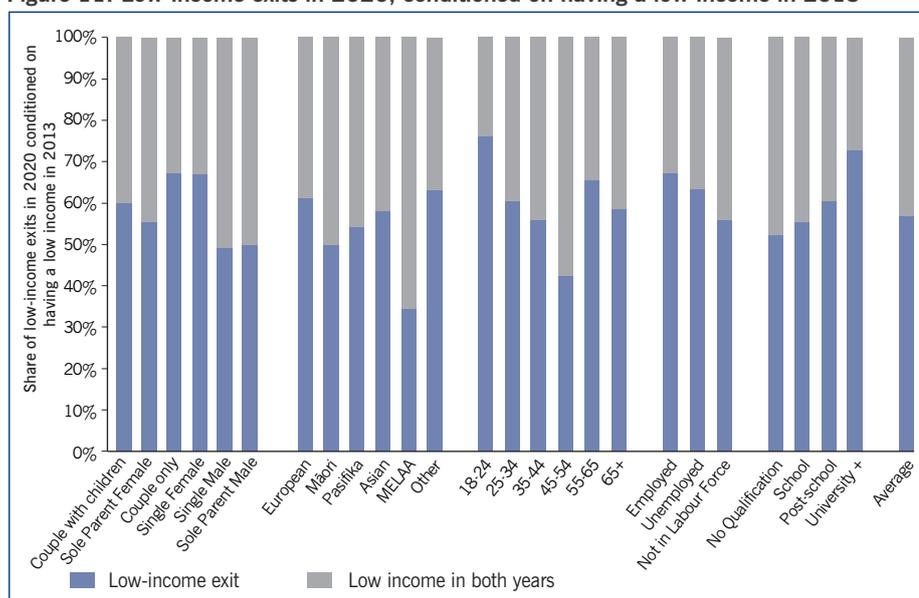


Figure 11: Low-income exits in 2020, conditioned on having a low income in 2013



total number of people with low income initially). For New Zealanders as a whole, of those who were below the threshold initially, just under half were below or had returned to being below the relevant threshold after six to seven years.<sup>12</sup>

Those aged 18–24 and single people were more likely to move above the low-income threshold over the medium term, compared to the entire population. Three-quarters of young people who initially had low incomes exited after six to seven years; the rate was two-thirds for single people. These groups were more likely to transition from study to work and thus more likely to move above the threshold over the medium term compared with the overall sample. For instance, for the transition

from 2013 to 2020, 26% of those aged 18–24 studied in 2013 compared with 6% of those aged 25 or above. Similarly, workers and people with university education were more able to rise above the low-income threshold over the medium term, as these groups were more likely to achieve labour market success. Interestingly, people aged 55–64 were also more likely to exit low income than the average, due to their significant increase in non-labour income during their transition to retirement.<sup>13</sup>

Table 2, following the approach of Jenkins and Schluter (2003), presents the relative importance of different events, the probability of the event happening, and the proportion of those subsequently

exiting the low-income group. As with other results, the individual is the unit of analysis. The exit rate is the number of individuals whose income is at least half of median equivalised income as a percentage of the total number of those initially being below the threshold. Percentages do not add to 100 because transitions out of low income can happen when none of the identified triggered events occurs, and they are not mutually exclusive. Most events are based on family changes.

For example, consider the exit event ‘fall in number of children, same family type’. Among all individuals having a low income in 2013, 4.3% experienced a fall in family size without changing family type in 2014. Among those who experienced that event, 31.3% exited low income, accounting for 4.5% of low-income exits. Overall, these events are more likely to occur, and people are more able to exit low incomes, over a longer term.

The following features of Table 2 are noteworthy.

- Labour market events were more likely to occur than family changes over the short to medium term. Likewise, low-income exits were more frequently associated with the former (share of exits). Among the low-income people in 2013, less than a quarter gained one or more workers in 2014, while half of them exited low income after the event, making up more than a third of the total exits.
- Among low-income individuals from sole-parent families in 2013, a quarter of them were no longer in a sole-parent family in 2014 and half of them in 2020, given the over-representation of these people in the initial low-income population.<sup>14</sup> Following this event, two-thirds of them moved above the low-income threshold.
- Low-income people from a working family were more likely to exit the low-income category over the short to medium term compared with those from a non-working family. For example, 32.3% of those from a working family had at least 20% income gain in 2014 given no changes in the number of workers in the family, compared with 19.5% of those in the entire population.

**Table 2: Low-income exits over the short to medium term**

Event	2013 to 2014			2013 to 2020		
	Pr(event)	Pr(exit event)	Share of exits	Pr(event)	Pr(exit event)	Share of exits
Among all individuals in 2013 at risk of low-income exit: Pr(exit in 2014 or 2020)		30.0			57.0	
Fall in family size, same family type	4.3	31.3	4.5	9.2	54.8	9.2
Fall in No. of children, same No. of adults	6.8	35.8	8.1	21.0	56.5	21.0
Fall in No. of children, same No. of workers	5.4	39.2	7.1	13.9	50.2	13.9
No longer in a sole parent family (for sole parent)	25.1	66.7	62.1	51.8	66.3	69.5
Rise in No. of workers	23.6	49.2	38.9	37.5	75.1	37.5
Rise in real labour income by 20% or more, same No. of workers	19.5	45.7	29.9	19.1	69.0	19.1
Rise in real labour income by 20% or more, same No. of workers (for working family)	32.3	55.0	46.8	31.6	77.7	39.8
Gain higher individual qualification (adults only)	15.4	31.9	16.4	21.1	65.6	21.1
Gain higher family qualification	26.4	33.3	29.4	35.0	60.0	35.0

Note: Pr(event) represents the chance (probability) of the event happening. Pr(exit|event) represents the probability of a move out of low income if the individual experiences the particular event.

**Table 3: Low-income exits from 2013 to 2020 for selected demographics**

Group	Rise in labour income by 20% or more, same number of workers		Increase in family qualification	
	Pr(event)	Pr(exit event)	Pr(event)	Pr(exit event)
1. All	19.1	69	35	60
2. Sole parent	9.3	46.3	23.5	30.4
3. Couple family	31	74.9	86.5	68.9
4. Young 18-24	81.7	89.7	46.9	78.1
5. Low-qualification family	18.4	64.7	79	57

Notes: For young people, events are: (1) rise in real labour income by 20% or more, and (2) increase in qualification. Couple families include those with and without children.

- An improvement in the family education level was associated with a transition of about a third of those low-income families above the low-income threshold.

In addition, a positive and statistically significant correlation was found between the age of the youngest child and the likelihood of the jobless parent(s) in 2013 entering the work force in the second year: the correlation coefficient is 0.32 for the transition from 2013 to 2020. Parents with younger children were therefore less likely to enter the labour force over the period. Comparing those jobless parents who entered the labour force in 2020 with those who did not enter, the former group had older children on average (8.5 versus 5 years of age).

People from different demographic groups respond to a specific event in various ways, as indicated in Table 3, which considers two typical events, a rise in real labour income and an increase in the

highest family qualification. These estimates indicate that the five selected demographic groups differ both in their likelihood of experiencing the event and in their likelihood of exiting low income after the event.

Table 4 presents the relative importance of different events, the probability of the event happening, and the proportion of those entering low income following the particular event. Again, percentages do not add up to 100. The population includes all individuals with equivalised income at least half of the median income in 2013. Key messages from the table include:

- Labour market events were more likely to occur than family changes over the short to medium term. Low-income entries were more frequently associated with the former (share of entries). However, people were less likely to enter low income after experiencing a labour

market event rather than family changes.

- A small proportion of 2013 partners separated by 2014 or 2020. However, following this event, a substantial proportion entered low income (almost half in 2014 and 40% in 2020).
- Low-income people from a working family were less likely to enter low income over the short to medium term, compared to those from non-working family. For example, 4.8% of those from a working family entered low income in 2014 after losing 20% or more of family income, given no changes in the number of workers in the family. This compares with the equivalent rate of 6.5% for the entire population.

### Conclusions

This article has used a special dataset to examine income mobility in New Zealand. The data were obtained by

**Table 4: Low-Income Entries Over the Short to Medium Term**

Event	2013 to 2014			2013 to 2020		
	Pr(event)	Pr(enter event)	Share of entries	Pr(event)	Pr(enter event)	Share of entries
Among all individuals in 2013 at risk of low-income entry: Pr(exit in 2014 or 2020)		6.0			12.7	
Rise in family size, same family type	3.8	13.8	12.5	6.5	15.0	7.7
Rise in No. of children, same No. of adults	6.0	13.9	13.8	11.6	14.5	13.2
Rise in No. of children, same No. of workers	4.4	12.6	9.2	8.7	14.8	10.1
Be part of a sole parent family (for non-sole parent)	3.0	48.1	26.6	4.8	39.3	15.1
Fall in No. of workers	14.0	19.8	46.0	26.2	25.4	52.1
Fall in real labour income by 20% or more, same No. of workers	25.2	6.5	27.1	16.0	16.7	21.1
Fall in real labour income by 20% or more, same No. of workers (for working family)	28.0	4.8	23.4	16.6	16.0	21
Fall in real labour income by 20% or more, same No. of workers, same family type	22.4	5.2	19.4	10.5	12.7	10.5

Note: Pr(event) represents the chance (probability) of the event happening. Pr(enter|event) represents the probability of a move to low income if the individual experiences the particular event.

linking a number of Household Labour Force Survey with the census for 2013, in order to obtain information about families and individuals in two different years. The income concept used was total family taxable income per adult equivalent person. Hence, in comparing incomes in two different years, the income measure depends on the family to which the person belongs, and this may differ between years.

In examining relative income mobility, transition matrices were used to measure inter-decile and inter-quintile movements. Typically, over all quintiles and population groups, about half of the individuals moved into another quintile over a four-year period, with about 40% remaining in the same decile over a period of seven years. However, more stability was found for those initially observed in lower and upper quintiles.

The article also examined the characteristics of individuals observed to be below a relative low-income threshold, set at 50% of the median income per adult equivalent person in each relevant year. Adopting a class of three poverty measures, which reflect the incidence and intensity of low income and inequality among those with low incomes, differences among demographic groups were examined. The

evidence suggests that many people enter and exit low income over time, while some demographic groups are more likely to remain in or have returned to low income over the medium term, most notably sole-parent families. Several factors were found to be related to low-income entry and exit: changes in family structure over the life cycle, labour market events and educational attainment. Though it is hard to separate or account for all possible trigger events, labour market events seemed to be more relevant in explaining low-income entry and exit. The findings are, to some extent, suggestive that policies aiming at promoting employment and education might be effective in reducing low income and low-income persistence: those unlikely to be attached to the labour market or pursue educational achievement are more likely to end up with low-income persistence. The question arises of what kinds of employment and educational initiatives are most cost-effective in reducing low-income persistence.

However, such policies necessarily exclude those who, often through no fault of their own, are unable to enter the labour market (for example, because of significant physical or intellectual disabilities) or can only participate to a modest and perhaps

episodic degree (for example, because of significant health problems). In addition, policies need to account for the fact that people at different stages of their lives appear to experience different trigger events, and respond in different ways.

The present article has provided an initial exploratory analysis of a new dataset, using descriptive measures, to explore differences between demographic groups in their mobility and low-income characteristics. It is hoped that this can contribute to informed debate and policy design.

<sup>1</sup> This article results from a partnership between the Chair in Public Finance at Victoria University of Wellington (as part of its project on measuring income inequality, poverty and mobility in New Zealand, funded by an Endeavour Research Grant from the Ministry of Business, Innovation and Employment) and the New Zealand Productivity Commission (as part of its *A Fair Chance for All?* inquiry). 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 authors, not Statistics New Zealand or individual data suppliers. The datasets used here were initially constructed by Chris Ball.
- 2 Mobility may reduce longer-period inequality relative to annual incomes, but not all changes are necessarily desired. Mobility may reflect positive opportunities (for example, via education) as well as risks (for example, of job loss or illness).
  - 3 Recent studies of individual mobility include Creedy, Gemmell and Laws, 2021, and Alinaghi, Creedy and Gemmell, 2022b, 2022c, 2022d, 2022e.
  - 4 For detailed discussions of this feature, see Shorrocks, 2004, and for New Zealand comparisons using different units, see Creedy and Sleeman, 2005 and Creedy and Eedrah, 2016.
  - 5 The absence of a match can arise because of international migration, births and deaths, or data problems such as measurement errors.
  - 6 Here, and in subsequent analyses, negative incomes (accounting for about a quarter of 1% in each sample) were converted to zeros. In addition, 0.25% of incomes at the top end of the income distributions were set to a maximum at 99.75%. Further sensitivity checks were carried out by truncating just over 3% of the families in the bottom of the income distribution (retaining those with log-equivalised income of 6 and above), and by not using the sample weights. The results were found to be consistent with the baseline.
  - 7 For all results reported here, the weight attached to a child is 0.6, and the effective number of adults is raised to the power 0.8, to reflect economies of scale.
  - 8 As the datasets consist of constant population groups of individuals, and as decile income groups are used rather than absolute incomes, all row and column sums add to 100%. In the matrices reported here, the use of rounding to one decimal place means that the values do not sum to exactly 100.
  - 9 For all tables and figures reported here, the results are based on the authors' calculations using the dataset described.
  - 10 On the changing distribution of individual incomes with age in New Zealand, see Alinaghi, Creedy and Gemmell, 2022a.
  - 11 Some groups need to be treated with care, as discussed further in Creedy and Ta, 2022. A small proportion of very low-income Māori and Pasifika people and MELAA were omitted, whereas the excluded Asians seemed to have incomes above the low-income threshold. In addition, in linking census respondents to the IDI, the linkage rates for Asians might be slightly lower than for other ethnic groups, possibly due to changing their names or using unofficial names (see Statistics New Zealand, 2019).
  - 12 There was a similar pattern in Australia over the period from 2000/01 to 2015/16, where nearly half of those with income less than half of disposable household equivalised income in one year were also in, or had returned to, below the threshold five years later (see Australian Productivity Commission, 2018, p.127).
  - 13 Those people were mainly either old couples without children or old singles (9/10), those not in the labour force (6/10), and those with low qualifications (7/10) in 2013. Their average non-labour income rose from \$4,500 in 2013 (mostly unemployment benefits) to \$15,900 in 2020 (mostly superannuation or veterans' pensions), in terms of the 2013 dollar (adjusted for CPI in 2013Q1).
  - 14 Being no longer in a sole-parent family includes the case of re-partnering, or the case where a sole parent becomes a single adult without dependent children (for example, all children become adults).

## Acknowledgements

We are grateful to Geoff Lewis, Carolyn O'Fallon, Jo Smith and Philip Stevens from the New Zealand Productivity Commission for their helpful comments. We are also indebted to Jonathan Boston, Patrick Nolan and Meghan Stephens for their suggestions.

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Simon Brown<sup>1</sup>

# Intergenerational Income Mobility in New Zealand

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## Abstract

Intergenerational mobility considers how a child's outcomes are associated with their parents' situation. If intergenerational mobility is low, then a child has less of a chance of moving up the income distribution relative to their parents. This can influence skills development, productivity growth and the achievement of improved living standards.

The findings presented in this article highlight the importance of policies that focus resources on improving educational outcomes for students from low socio-economic backgrounds, which would help lift intergenerational economic mobility and support higher living standards for all.

**Keywords** income mobility, educational outcomes, child wellbeing

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Intergenerational income mobility refers to 'a child's chance of moving up in the income distribution relative to her parents' (Chetty et al., 2014a). The Treasury has previously explored this topic in a 2010 working paper (Gibbons, 2010), which made use of the Dunedin Study of people born in Dunedin in 1972–73. That paper described why intergenerational mobility matters:

Researchers are interested in intergenerational economic mobility because of its implications for equality of opportunity and because barriers to people developing and making full use of their abilities could potentially hinder skills development, productivity growth and the achievement of improved living standards. (p.1)

Intergenerational mobility is relevant to the Treasury's Living Standards Framework and making the best use of New Zealand's human capital. It also affects the distribution of wellbeing if children from low-income households face significant obstacles to making the most of their potential.

The analysis in the Treasury's 2010 working paper was constrained by the sample of people in the Dunedin Study. This limited the number of cases and raised some questions about how well this sample represented New Zealand more broadly. The paper speculated:

In the future, it might be possible to develop large national datasets containing the incomes of New Zealanders from government statistical records ... However, researchers using administrative data to study intergenerational mobility would need to match individual-level historical data on parents with subsequent data on their grown-up children. (p.38)

A decade later it is possible to use the Integrated Data Infrastructure (IDI) to explore intergenerational income mobility.<sup>2</sup> The IDI links various administrative and

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<sup>1</sup>Simon Brown is a principal analyst at the Ministry of Health.

survey datasets to a central ‘spine’, which aims to include all people living in New Zealand. Using the IDI, it is possible to identify cohorts of children born in New Zealand and analyse how their income at age 30 is associated with their parents’ income when they were growing up (aged 15–19).

It is also possible to look at qualification completion rates (for level 4+ and level 7+) at age 30, and level 7+ qualification enrolment rates by age 20. Qualifications are strongly related to lifetime earnings potential, so this gives us a secondary measure of intergenerational mobility.

## Methodology

### Measuring income mobility

This analysis used two indicators of the income mobility of children:

- income rank at age 30 compared to other cohort members born in the same tax year; and
- the probability of being in the top income quintile at age 26 (time series by year of birth).

This article uses a cohort of people born in the three tax years from 1985/6 to 1987/8 for the indicators relating to age 30, and a cohort born between 1985/6 and 1991/2 for the indicators at age 26.

Children were linked to parents using the Department of Internal Affairs’ (DIA) births data. Then, data from Inland Revenue and the Ministry of Education were used to track outcomes for the children and their parents. This analysis only used records where children and both parents can be linked to the IDI spine, where the child has recorded income in the relevant tax year, and where parents have recorded income when the children were aged 15–19. This means that each record was matched to data on income and qualifications.

Table 1 shows the sample sizes at each stage of the cohort selection process. For the main analysis at age 30, the final cohort was 57% of the recorded births between 1985/6 and 1987/8. Almost all of the recorded births were found on the IDI spine. There were significant drops in the cohort size due to some parents not being found on the IDI spine (14% of the cohort) and the child not having any recorded income in their 30th year (27% of the cohort). A further 2% of the cohort was removed due to no parental

**Table 1: Sample sizes at each stage of selection for intergenerational income mobility analysis, at ages 30 and 26**

Cohort selection stage	Born 1985/6 to 1987/8 (income at age 30)	Born 1985/6 to 1991/2 (income at age 26)
Births	163,800	403,600
Child on IDI spine	163,000	401,800
Parents on IDI spine	141,400	351,000
Child has recorded income in relevant tax year	96,500	255,800
Parents have recorded income when child aged 15 to 19	93,900	249,000

Source: author’s calculations

**Table 2: Sample sizes at each stage of cohort selection for intergenerational analysis of education outcomes**

	People with level 4+ and level 7+ qualifications by age 30	Enrolment for a level 7+ qualification at age 20
	Born 1985/6 to 1987/8	Born 1985/6 to 1996/7
Births where child and parents were on IDI spine	141,400	611,100
Child had not permanently departed NZ	130,400	590,900
Parents had recorded income when child aged 15 to 19	123,300	551,900

Source: author’s calculations

income being found in the years when the child was aged 15–19.

The majority of the people with no recorded income in their 30th year were out of the country for at least some of that year. Migration data showed that 70% of these people were out of the country for a period of at least 90 days on their 30th birthday. Of the people who had no recorded income in their 30th tax year but were not overseas for an extended period of time, 55% were female. This group was distributed evenly across the different levels of parent income.

The large majority (94%) of the cohort had two recorded parents in the births data, with the remainder having just one. The results for intergenerational mobility were very similar when the cohort was limited to only those people with two recorded parents, so the 6% of the cohort who had only one recorded parent was included.

### Measuring education outcomes

This analysis used two indicators of educational performance:

- having a level 7+ or level 4+ qualification by age 30; and
- being enrolled for a level 7+ qualification by age 20.

The Ministry of Education’s tertiary completions and industry training datasets were used for qualification rates for level 7+ and level 4+ at age 30. Accurate data on

school qualifications (levels 1–3), including alternative qualification frameworks, was not available for the relevant time period.

The Ministry of Education’s tertiary enrolments dataset was used to calculate the percentage of people who had enrolled on a course associated with a level 7+ qualification by age 20 (before turning 21). In this case, we used a cohort of people born between 1985/6 and 1996/7. This gave us a significantly longer period of time over which we could observe this cohort compared with the cohort for completed qualifications by age 30.

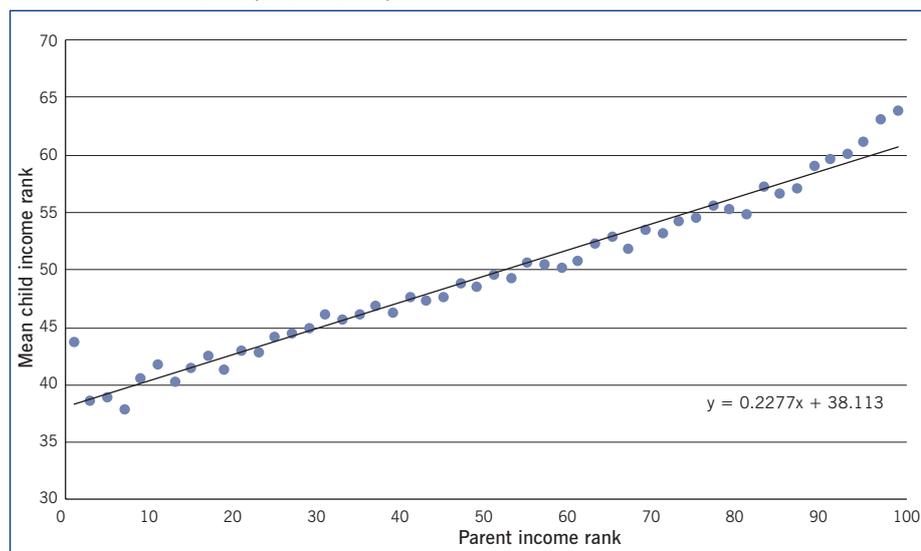
Table 2 shows the sample size at each stage of the cohort selection process. To set up the cohorts, we again started with recorded births between 1985/6 and 1987/8 where the child and parents were all found on the IDI spine. Then we used the IDI migration data to remove anyone who had left New Zealand at the age we were interested in (30 or 20) and not returned. This step wasn’t necessary for the income analysis because anyone who didn’t have a recorded income in the relevant year was excluded. Finally, we removed any of the cohort where the parents had no recorded income during the years when their child was aged 15–19.

### Results for intergenerational income mobility

#### Income rank at age 30

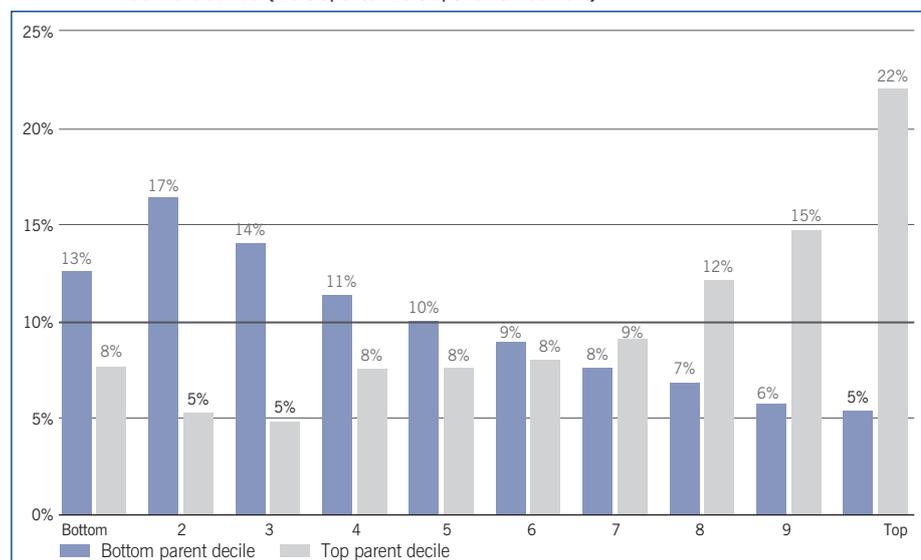
This analysis measured intergenerational mobility using a rank–rank specification:

**Figure 1: Child income rank at age 30 versus parent income rank, for children born between 1985/6 and 1987/8**



Source: author's calculations

**Figure 2: Income rank by decile at age 30, for children of parents in the top and bottom income deciles (1985/6 to 1987/8 birth cohort)**



Source: author's calculations

that is, it compared a parent's rank in the earnings distribution and their children's rank in earnings distribution as adults. We adopted Raj Chetty's approach (Chetty et al., 2014a, 2014b) and aimed to replicate his results in the New Zealand context. He found that 'rank-rank specifications provide a more robust summary of intergenerational mobility than traditional log-log specifications'.

For each person in the cohort (born between 1985/6 and 1987/8), their income at age 30 was compared with that of other members of the cohort who were born in the same year. Their parents' income was also ranked and compared with the parents of other cohort members born in the same year. Parental income was defined as their

combined average annual income during the tax years that included their child's 15th–19th birthdays. Then, the analysis compared the relationship between the child and parent income ranks.

Figure 1 plots the average income rank of children in their 30th year versus parent income rank. The top percentile rank (100) represents the highest parent incomes, while the bottom percentile rank (1) represents the lowest parent incomes. To reduce noise, we divided parent income ranks into 50 (rather than 100) percentile bins.

This analysis suggests a clear relationship: the rank-rank slope is almost perfectly linear. We can interpret the slope of this line (0.23) as the difference in the expected income rank between children of the highest

income and lowest income parents: that is, a 10 percentile increase in parent income rank is associated with a 2.3 percentile increase in their child's expected income rank. This result is lower than Chetty's result for the United States of around 0.3 (Chetty et al., 2014a) and appears to indicate that New Zealand has more intergenerational mobility than the United States.<sup>3</sup> This finding is consistent with other cross-country research (Corak, 2013).

However, the results contain information beyond this trend. There is a small peak, above the linear line of best fit, for the children of parents above the 95th income percentile. This indicates that these children have particularly good prospects for their income at age 30. There is also a slightly higher child income rank associated with parents at the very bottom of the distribution. This may indicate that some of these parents are not genuinely very low income (e.g., they had income that does not appear in the Inland Revenue dataset) or were wealthy despite having low recorded income.

The children of the lowest income parents were, on average, slightly below the 40th percentile for income at age 30. The children of the highest income parents were, on average, slightly above the 60th percentile for income at age 30.

To provide some context for this result, the children of bottom-decile parents had an average income of \$36,900 at age 30, while the children of top-decile parents had an average income of \$61,700.<sup>4</sup> This means that, on average, the child of a parent in the top income decile earns \$24,800 more at age 30 than the child of a parent in the bottom income decile.

Figure 2 summarises the income distribution for the cohort at age 30, comparing the children of parents in the lowest income decile with the children of parents in the highest income decile. If the incomes between generations were entirely independent of one another, then we would expect all of these values to be around 10% (highlighted in the figure), with the children of top- and bottom-decile parents being evenly spread across the income distribution at age 30.

In fact, the children of top-decile parents were over-represented in the top three income deciles and under-represented

in the bottom three income deciles. The opposite was true for children of bottom-decile parents, who were over-represented in the bottom three deciles and under-represented in the top three deciles. Nearly half (49%) of the children of top-decile parents were in the top three income deciles at age 30, compared with only 18% of the children of bottom-decile parents. The children of top-decile parents were over four times more likely to be in the top income decile at age 30, compared with children of bottom-decile parents (22% vs 5%). Fewer than one in five children (18%) of top-decile parents were in the bottom three income deciles at age 30, compared with 43% of the children of bottom-decile parents.

These distributions for the children of top and bottom-decile parents are more similar to Canada than the US (Corak, 2013, figures 2 and 3). The US has 'more stickiness', with a higher proportion (about half) of children of bottom-decile parents rising no further than the bottom three deciles and a lower proportion (about 12%) rising to the top three deciles. However, differences in methodologies mean these comparisons are only provisional.

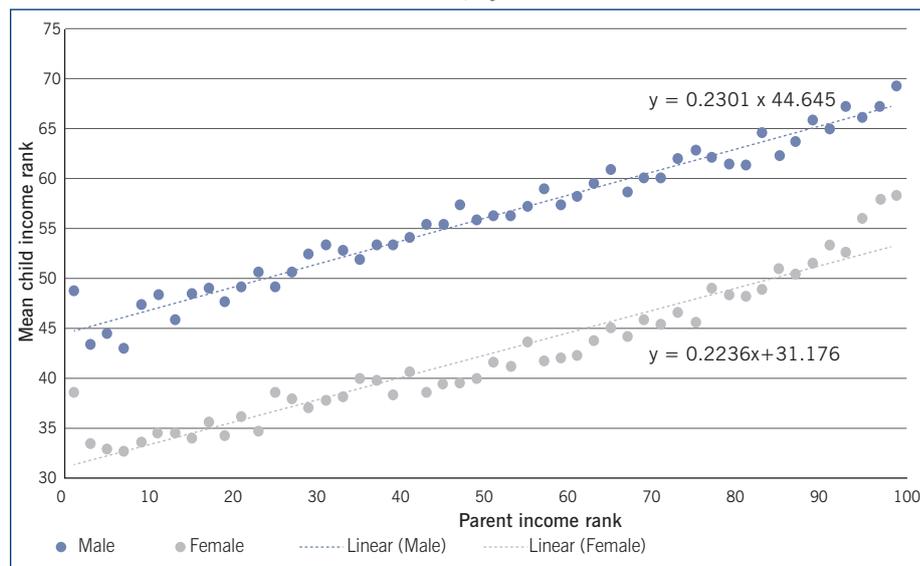
Figure 2 provides a reminder that, despite the clear relationship between parental income and average children's income at age 30, there is a lot of variation in individual outcomes. Parental income is not, by itself, a strong predictor of an individual child's income. A regression model of child income rank, with parent income rank as the only explanatory variable, explained 5.2% of the variation.

#### Income rank by gender

This section provides breakdowns by gender for intergenerational mobility. This analysis used the same cohort (children born between 1985/6 and 1987/8) and income ranks from the previous section. We did not produce a new set of income ranks within each demographic group, to allow for comparisons of outcomes across groups.

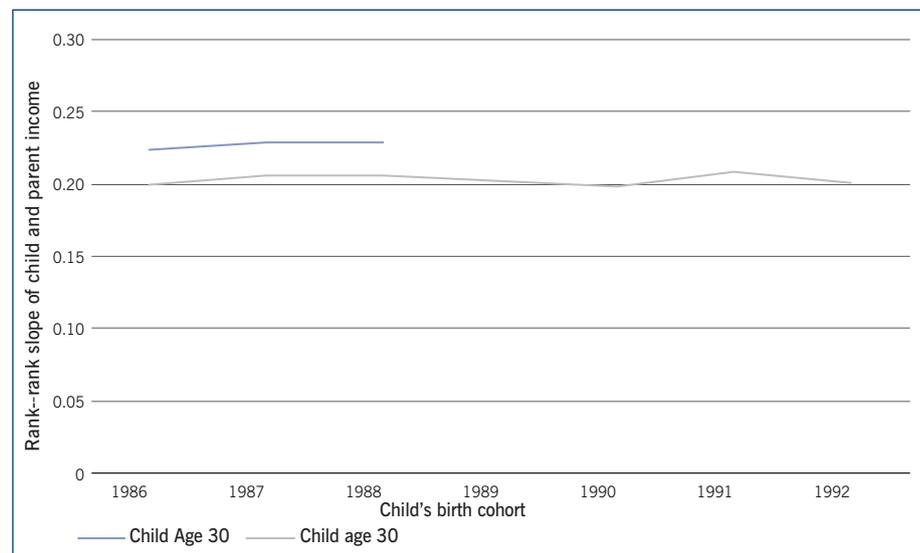
Figure 3 shows income rank at age 30 by sex, which indicates that intergenerational mobility is very similar for males and females. For both males and females, there is a linear rank–rank slope for income at age 30 and parent income.

**Figure 3: Child income rank at age 30 versus parent income rank, for children born between 1985/6 and 1987/8, by sex**



Source: author's calculations

**Figure 4: Intergenerational mobility estimates for the birth cohorts from 1985/6 to 1991/2**



Source: author's calculations

The gradients of the two slopes are very similar, and the difference is not statistically significant.

However, male children consistently have a higher average income rank at age 30 than female children. This difference was about 13.5 percentile points across the distribution of parental incomes. This meant, for example, that females with parents at the 90th income percentile had a similar average income rank to males with parents at the 30th income percentile. This may be partially explained by a higher proportion of males working full-time at age 30.

Female children of the highest income parents were particularly likely to earn a higher income at age 30 than other female children, as they were slightly above the

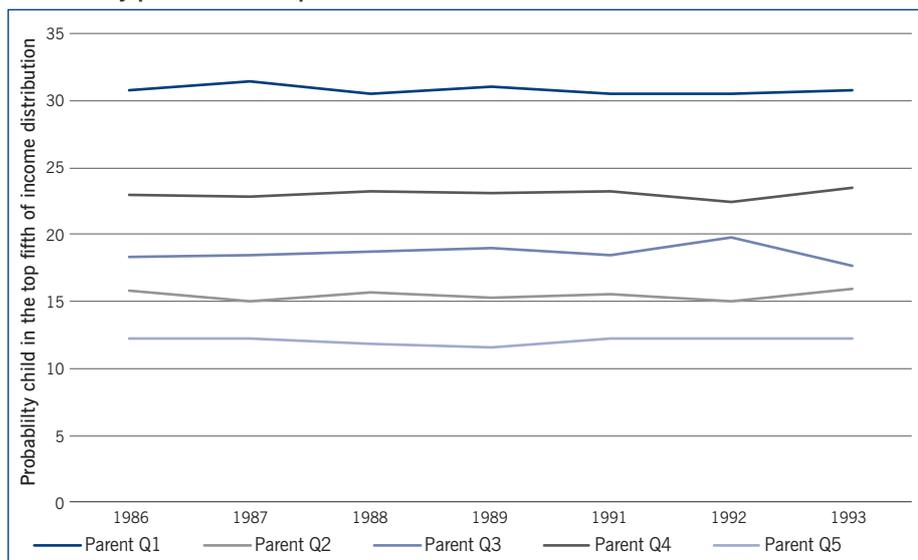
linear slope for income rank. However, they still only had a similar average income rank to males with parents around the 60th income percentile.

#### Trends in income mobility

This section looks at trends in intergenerational mobility. Unfortunately, we can only produce a short time series for income mobility at age 30. A slightly longer time series is available for income at age 26, but this is a less reliable indicator than income at age 30.

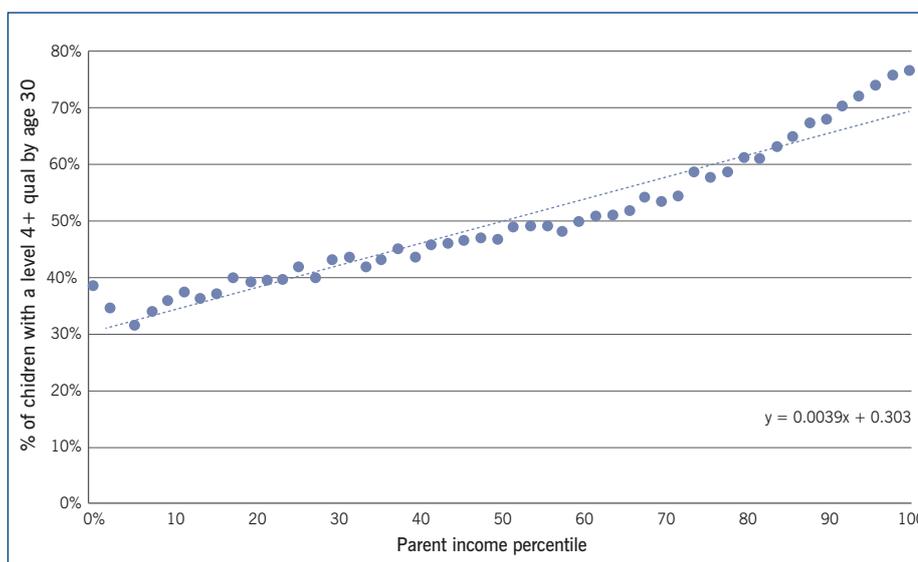
Figure 4 shows the estimates of intergenerational mobility by individual year of birth. Each estimate is based on a linear regression of child rank against parent rank for the relevant year of birth.

Figure 5: Probability of reaching top income quintile at age 26, by parent income quintile



Source: author's calculations

Figure 6: Rates of having a level 4+ qualification by age 30 versus parent income rank, for children born between 1985/6 and 1987/8



Source: author's calculations

These results indicate that parents' income is more strongly associated with children's income at age 30 than at age 26. The blue line shows the regression estimates for intergenerational mobility at age 30, which are consistently around 0.23. The orange line shows the estimates at age 26, which are consistently around 0.20. This difference is not surprising, because income at age 30 is generally a better early indicator of a person's longer-term income trajectory than income at age 26 (when they may still be doing casual part-time work).<sup>5</sup>

Levels of intergenerational mobility were quite stable for the cohorts born between 1985/6 and 1991/2, as indicated by the flat trends in Figure 4. In the future we will be able to look at a longer time

period, as more tax data becomes available and perhaps the Department of Internal Affairs births data for recorded parents can be linked to the IDI spine for earlier years (prior to 1985).

Figure 5 shows, for each parent income quintile, the probability of their children being in the top income quintile at age 26. For 1985/6, 12% of the children of bottom-quintile parents were in the top income quintile at age 26. By comparison, 31% of the children of top-quintile parents were in the top income quintile at age 26. These results were quite stable for births between 1985/6 and 1991/2.

Compared with Chetty's results for the US (Chetty et al., 2014a), the children of bottom-quintile parents do slightly better

in New Zealand. We found that 12% of these children made it to the top quintile at age 26, while Chetty's result was 9%.

### Results for qualification levels

#### Qualification levels by age 30

As a second measure of intergenerational mobility, we have analysed qualification levels at age 30. Higher qualifications are associated with more skilled jobs and higher earnings.

The results show that parent income rank is clearly associated with their children's level 4+ and level 7+ qualification rates by age 30, but the strongest relationship is with level 7+ qualification rates.

Figure 6 shows the percentage of people with a level 4+ qualification at age 30 by the income rank of their parents. The figure shows the linear line of best fit, but the relationship between level 4+ qualification rates and parent income rank is not as linear as the relationships we saw between child and parent income ranks. The relationship is quite linear up till around the 70th percentile of parent income, and then level 4+ qualification rates for the children begin to increase more rapidly. The level 4+ qualification rates are under 35% for the lowest parent income percentiles, and rise to around 75% for the highest parent income percentiles.

Figure 7 shows the level 7+ qualification rates at age 30 by parent income rank. This relationship is clearly not linear. The level 7+ qualification rates increase at an exponential rate above the 70th percentile of parent income. Nearly two in three children (64%) with the highest income parents had a level 7+ qualification by age 30. This is well above the level 7+ qualification rate associated with parents at the 90th income percentile (50%). The level 7+ qualification rate falls to just over 10% for the children of parents with the lowest incomes. Children of top-decile parents were more than three times as likely to have a level 7+ qualification compared with children of bottom-decile parents (56% vs 18%).

#### Rates of having a level 7+ qualification by gender

In this section, we look at the rates for having a level 7+ qualification at age 30

by parent income and child gender. Figure 8 shows that females consistently have higher level 7+ qualification rates than males at age 30. The gap between males and females is relatively narrow till around the 40th percentile of parent income, and then broadens for higher parental incomes. The gap is around 8 percentage points for children of the lowest income parents, but is up to around 20 percentage points for children of parents in the top income quartile.

*Trends in enrolment for level 7+ qualifications by age 20*

To get a time series for qualification levels, we have looked at the enrolment rates for level 7+ qualifications by age 20 (before turning 21). Not everyone who enrolls for a qualification will complete it, but this indicator gives us some insight into changes in qualification rates over time.

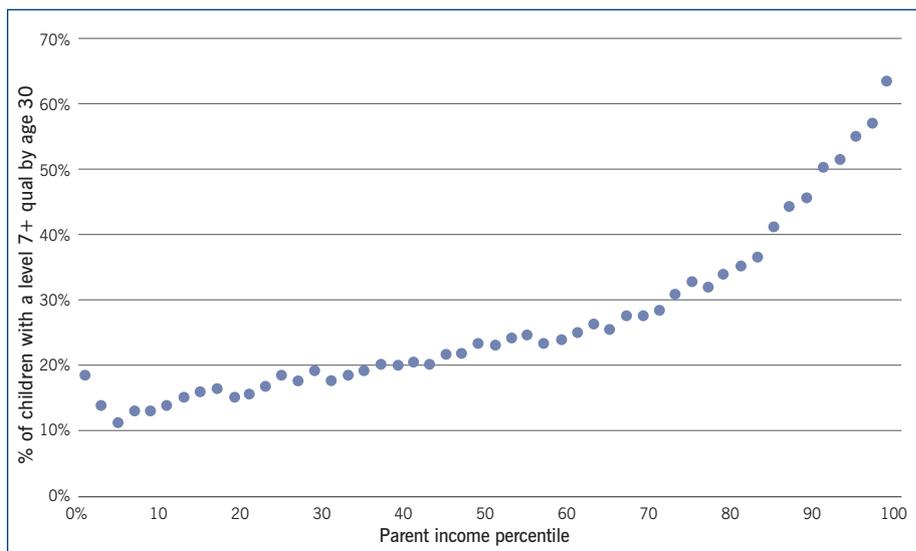
Figure 9 shows, by parent income quintile, the percentage of children who had enrolled for a level 7+ qualification by age 20. The results are shown by year of birth from 1985/6 to 1996/7.

There has been growth over time in the level 7+ qualification enrolment rates for children of each parent income quintile. In absolute terms, the highest growth in enrolment rates has been for the top two parent income quintiles (13 percentage points for the top quintile; 10 percentage points for the second top quintile), while the lowest growth has been for the bottom two parent income quintiles (4 percentage points for the bottom quintile; 5 percentage points for second-bottom quintile).

The relative percentage increases in the enrolment rates for each parent income quintile are quite similar. The biggest relative increase in enrolment rates was for the second and third parent income quintiles (up by 32%), while the other quintiles were all up by around 25%.

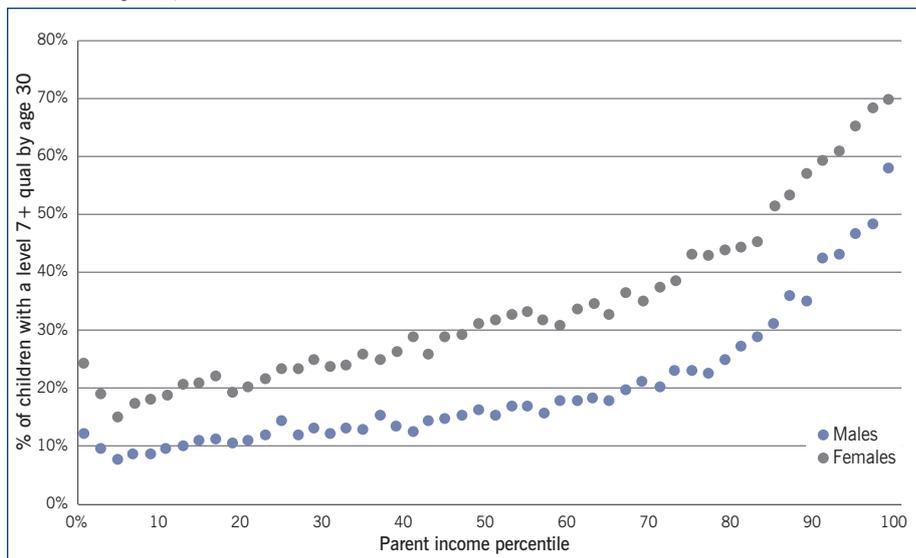
The level 7+ qualification enrolment rates, by age 20, have consistently been over three times higher for children of parents in the top income quintile compared with children of parents in the bottom income quintile. For children born in 1996/7, the level 7+ qualification enrolment rate by age 20 was 64% for children of top-quintile parents and 20% for children of bottom-quintile parents.

**Figure 7: Rates of having a level 7+ qualification by age 30 versus parent income rank, for children born between 1985/6 and 1987/8**



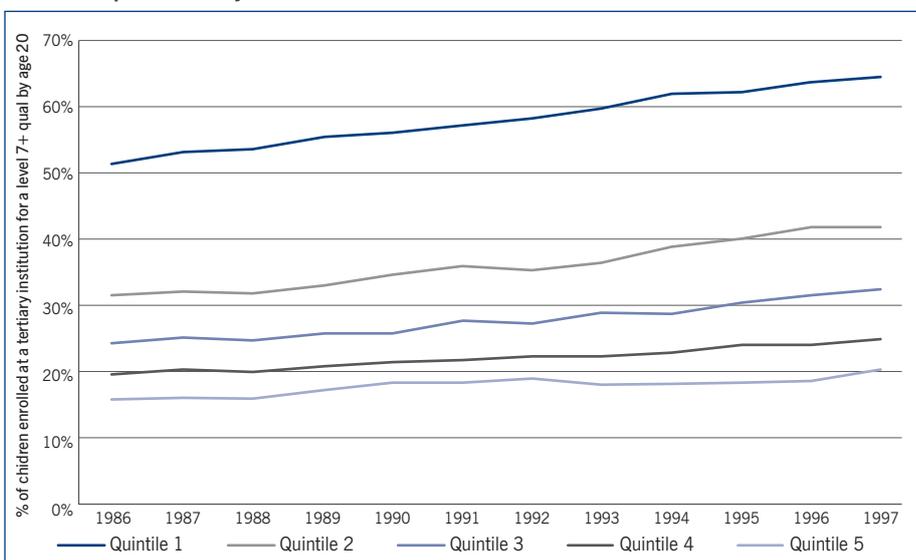
Source: author's calculations

**Figure 8: Rates of having a level 7+ qualification by age 30 versus parent income rank by sex, for children born between 1985/6 and 1987/8**



Source: author's calculations

**Figure 9: Rates of enrolment for a level 7+ qualification by age 20, by parent income quintile and year of birth**



Source: author's calculations

### Conclusion

This article has used the linked population data in the IDI to provide new insights on intergenerational income mobility in New Zealand.

### Income mobility

We replicated Chetty's finding from the US that there is a linear relationship between parent income ranks and the expected income rank of their children at age 30. Roughly, a 10 percentile increase in parent income rank is associated with a 2.3 percentile increase in their child's expected income rank. Nearly half (49%) of the children of top-decile parents were themselves in the top three income deciles at age 30, compared with only 18% of the children of bottom-decile parents.

Males and females had similar levels of income mobility. However, at each level of parent income the expected rank for males was about 13 points higher than for females.

We have relatively little data on trends over time for income mobility, but the patterns looked very stable for children born between 1985/6 and 1991/2.

### Qualification rates and parent incomes

As a second measure of intergenerational mobility, we looked at qualification levels at age 30. Higher qualifications are associated with more skilled jobs and higher earnings.

A report by the New South Wales government found that

the Australian education system plays a substantial (though not the only) part

in the transmission of economic advantage ... Education can not only contribute to the nation's economic growth and productivity, but it also has a role to play in how fair Australia will be.

It comments that resources need to be focused on improving outcomes for students from low socio-economic status backgrounds to increase opportunities regardless of background (Centre for Education Statistics and Evaluation, 2016).

Rates of having a level 4+ and level 7+ qualification by age 30 were positively associated with parent income. Qualification rates increased exponentially for higher parent income ranks, above the 70th percentile, particularly for level 7+ qualifications. Children of top-decile parents were more than three times as likely to have a level 7+ qualification compared with children of bottom-decile parents (56% vs 18%).

Females consistently had higher level 7+ qualification rates than males. The gap was around 8 percentage points for children of the lowest income parents and increased to around 20 percentage points for children of the highest income parents.

To analyse the trend over time, we looked at enrolment rates by age 20 for a level 7+ qualification. Then we looked at children born between 1985/6 and 1996/7. For children of parents in each income quintile, there had been growth in the enrolment rates over this period, but the largest increases (in absolute terms) were

for the higher parent income quintiles. The enrolment rates have consistently been over three times higher for children of top-quintile parents compared with children of bottom-quintile parents.

These results highlight the importance of policies that focus resources on improving educational outcomes for students from low socio-economic backgrounds. This would, in turn, increase intergenerational economic mobility, which is key to making the best use of New Zealand's human capital and increasing living standards for all.

- 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 Ministry of Health or the New Zealand government. The Ministry of Health 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 These results 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. 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.
- 3 We cannot replicate Chetty's method exactly, and cross-country comparisons are rarely precise, but the difference in the results is quite significant.
- 4 These income figures have been adjusted using the CPI to March 2018.
- 5 For each series, the small changes from year to year were not statistically significant.

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# House Prices and Wealth Inequality in New Zealand

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## Abstract

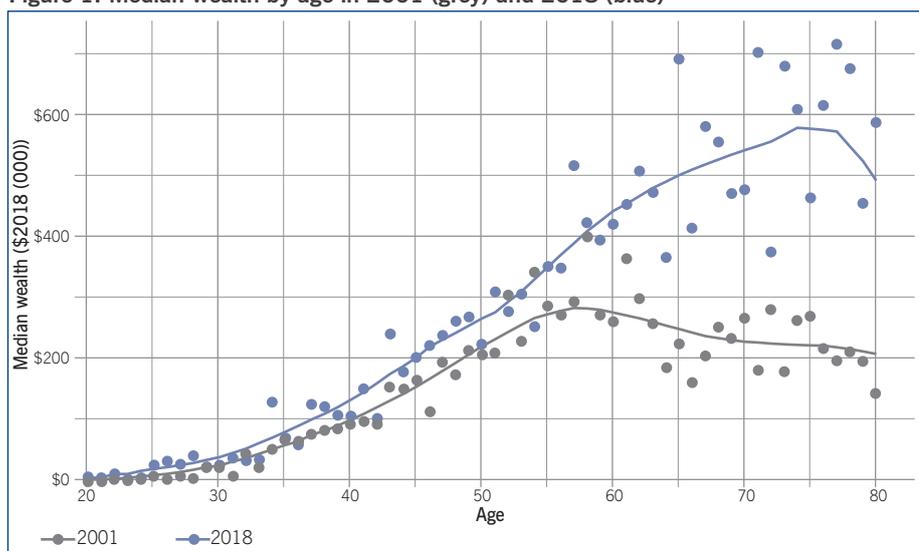
This article discusses the relationship between house prices, the wealth distribution and wealth inequality. It considers long-term changes in overall wealth distribution in New Zealand and the share of wealth that is held in the form of housing. It also explores the potential impact of large increases in house prices using a ‘scenario’ approach – modelling the effect of house price growth scenarios on the 2018 wealth distribution and, in turn, wealth inequality, while holding all else constant. The article shows how looking at headline measures can obscure changes in wealth inequality between groups. It also reinforces the value of complementing such analysis with measures that illustrate other dimensions of wellbeing.

**Keywords** wealth inequality, house price growth, home ownership rates

For many New Zealanders, buying a house has traditionally been the first rung on the wealth ladder. But there have been questions about how this wealth ladder has changed over time, such as the degree to which home ownership is moving out of reach of first home buyers and people reaching retirement age with little or no housing wealth.

To help investigate these questions, this article considers the relationship between house prices, the wealth distribution and wealth inequality. This involves looking at both the headline Gini coefficient of the whole population and decompositions of this measure for different population groups. It also considers other measures, such as the incidence of material hardship, and data that illustrate the life-cycle pattern of wealth accumulation over the last 15 years.

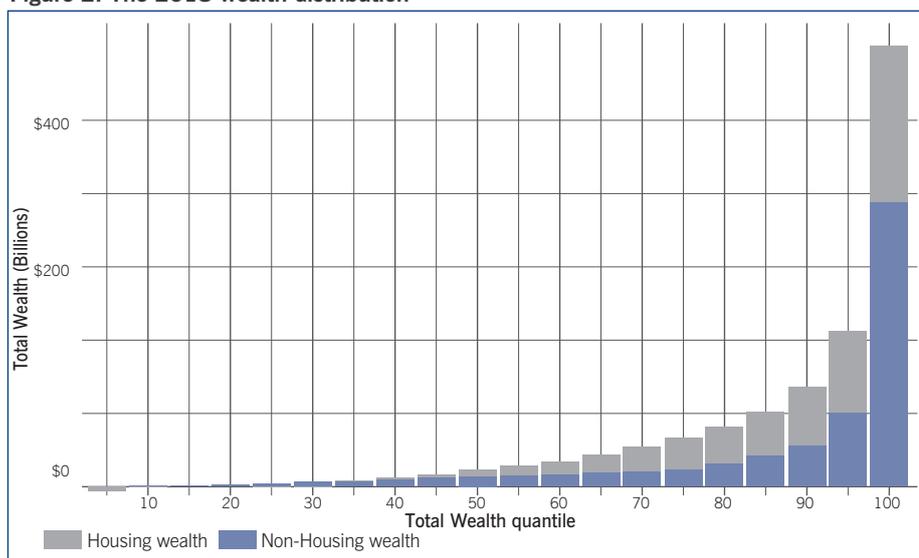
Figure 1: Median wealth by age in 2001 (grey) and 2018 (blue)



Note: Solid lines are smooth fits through the individual data points.

Sources: Treasury, 2021, which used data from the Household Savings Survey 2001 and the Household Economic Survey 2014/15 and 2017/18. Differences in survey sampling methodology were accounted for, but differences in survey questions and definitions may explain some of the remaining differences.

Figure 2: The 2018 wealth distribution



Source: Household Economic Survey 2017/18.

**Method and data**

**Method**

This article considers changes in wealth inequality as measured by the Gini coefficient (a more detailed explanation of the method can be found in Symes, 2021). The Gini coefficient is commonly used to measure relative wealth inequality and is unchanged if everyone’s wealth increases by the same percentage amount.

The most recent available data on the wealth distribution are from the Household Economic Survey (HES) in 2017/18, so it is not yet possible to directly measure the impact of recent changes in house prices. (The HES 2021 wealth data were not available at the time of writing.) The article thus instead models a housing price shock

that inflates all housing assets by the same percentage increase, while keeping all other components of wealth unchanged. Comparing the Gini coefficient of the baseline distribution with the inflated distribution can then give an estimate of the effect of house price increases on wealth inequality.

This is a highly stylised exercise, and changes in the return on other assets (such as financial assets) will also have an important effect on inequality. It is thus useful to consider the findings of this work alongside other relevant research, such as Reserve Bank of New Zealand work on the household cash flow effects of low interest rates (Nolan, 2021).

Using a single number to measure wealth inequality across a whole population hides the complexity of who gains and who loses from changes in wealth. To better understand how a change in house prices affects different groups, the population can be split into homeowners and non-owners. This article thus decomposes the total Gini coefficient into within-group inequality and between-group inequality to better understand the implications of one group increasing their wealth more than another group. The article also compares these groups by share of population, share of wealth, housing costs and material hardship status, to provide context for why wealth inequality might be concerning.

**Data**

The wealth data used, from the 2017/18 HES, include detailed breakdowns into various components of wealth (e.g., property, financial, and physical assets and liabilities), including wealth from household-related trusts and businesses. The HES has unit-record data at the individual, family and household level for approximately 3,000 representative households. This wealth data can be linked to Treasury’s TAWA (Tax and Welfare Analysis) model to include various components of income and linked with material wellbeing data from HES 2017/18.

**Changes in the wealth distribution over the last two decades**

The Treasury’s recent long-term fiscal statement (Treasury, 2021) showed how the wealth distribution has been changing over the last two decades. Important aspects of wealth include how it is distributed by age, as people generally accumulate wealth over their working life, and homeownership, as housing is a major component of wealth in New Zealand.

Total wealth increased between 2001 and 2018, and older people gained relatively more than younger people (Figure 1). Indeed, the number of people aged 65 and older in the top wealth quintile increased from around 30% to about 50%. This will have had multiple causes, including changes to the housing market (e.g., house prices and interest rates), capital gains accruing to certain cohorts more than others, and changes in the labour market.

### The role of housing

The wealth distribution in New Zealand is unequal (Rashbrooke, Rashbrooke and Molano, 2017). Part of this is due to life-stage effects, which have a big impact on what assets and liabilities people own. A certain level of wealth inequality might be expected between young people and old people, as – as already noted – people generally accumulate wealth over their working life, and particularly by becoming homeowners. Younger people are more likely to be renters and in the bottom half of the household wealth distribution, whereas older people are more likely to be homeowners and in the top half.

### The 2018 wealth distribution

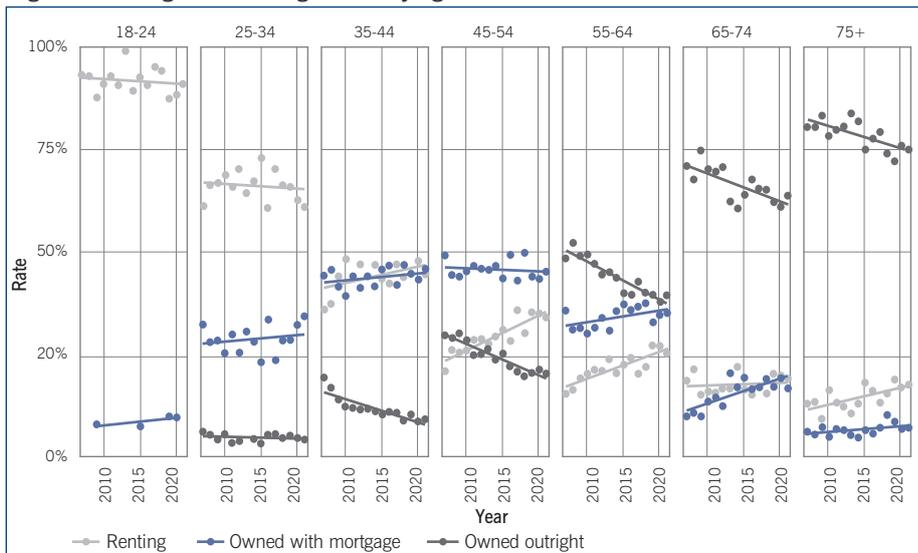
Housing wealth is the largest and most widely held type of wealth in New Zealand, as shown in Figure 2. Housing wealth is valued using house prices, and these have been rising quickly for several years. REINZ figures show that, although house prices have fallen recently, between June 2018 and June 2021 the median house price in New Zealand had annual growth of 4.5%, 8.9% and 27.9%, leading to a total increase of 46%. Over the last two decades, the house price index (which incorporates market activity) had average growth of 7.2% each year.

The wealth of the richest New Zealanders is a special case, as, along with housing and property, they own much of New Zealand's business and financial wealth. Non-housing assets are the main component of their wealth, including shares in the stock market. Between June 2018 and June 2021, the S&P/NZX 50 index increased annually by 15.2%, 9.1% and 12.9%, leading to a total increase of 45%. While total growth in shares is similar to total growth in median house prices over the last three years, the stock market has been more stable year to year.

### Wealth and the life cycle

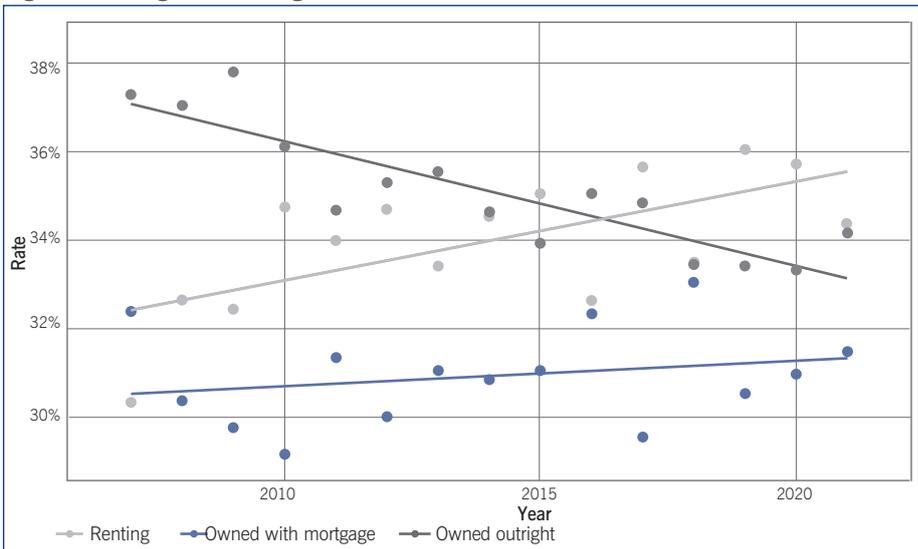
At the aggregate level, there is often a pattern where people start as renters, take their first step onto the wealth ladder to become homeowners paying mortgages, then eventually pay off their mortgages and own their homes outright. Figure 3 illustrates this life-cycle pattern by showing tenure rates for different age bands.

Figure 3: Changes in housing tenure by age over time



Source: Author's calculations based on HES 06/07 through to 20/21, i.e. 15 years. Straight lines are indicative linear fits. Rates of each type of tenure are for households grouped into age bands based on the oldest person in the household.

Figure 4: Changes in housing tenure rates over time



Source: Author's calculations based on HES 2006/07–2020/21, i.e. 15 years. Straight lines are indicative linear fits. Rates of each type of tenure are the average for all households.

However, this pattern appears to have been slowly shifting over the last 15 years. In total, the proportion of households who rent appears to have been growing, while outright homeownership rates have been falling (Figure 4). Figure 3 shows that this trend is strongest in the 45–54 and 55–64 age bands.

These results suggest a potential shift in the housing life cycle between cohorts, with older generations achieving higher outright homeownership rates than younger ones who are renting for longer. This is reinforced by Figure 5, which shows that average housing costs for renters and mortgage-payers have been growing, while outright owners' housing costs have remained relatively stable.

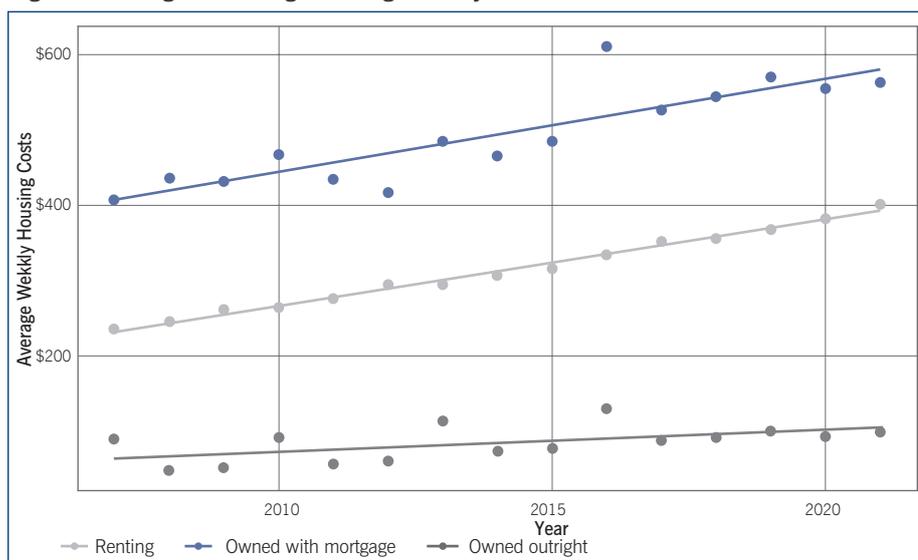
### Implications for wealth inequality

#### How evenly is current wealth distributed?

One way to measure how evenly wealth is distributed is to calculate the Gini coefficient. The Gini is just one potential measure of inequality, but has the advantage that it is widely used and understood. It is a measure of relative inequality, which is high when a small number of households hold a large percentage of total wealth. An increase in the Gini suggests an increase in inequality.

Symes (2021) estimates a baseline Gini coefficient for the wealth of all households in 2018 of 70.8% ± 1.8%. Housing wealth, with a Gini coefficient of 73.7% ± 1.7%, is slightly more evenly distributed across all households than non-housing wealth,

Figure 5: Changes in average housing costs by tenure over time



Source: author's calculations based on HES 2006/07–2020/21, i.e. 15 years. Straight lines are indicative linear fits. Rates of each type of tenure are the average for all households.

Table 1: Effect of a 10% increase in house prices on the Gini coefficient

	Total Population	Within Owners	Within Non-owners	Between Owners and Non-owners
Baseline Gini	70.8% ± 1.8%	59.5% ± 2.2%	82.5% ± 4.2%	86.4% ± 1.3%
Inflated Gini	70.1% ± 1.8%	58.3% ± 2.3%	82.5% ± 4.2%	86.7% ± 1.3%
Change	-0.7% ± 0.1%	-1.3% ± 0.1%	0.0% ± 0.0%	0.3% ± 0.1%

Source: author's calculations based on HES 2017/18

Table 2: Population shares of house owners and non-owners

Populations	Population Share	Wealth Share
Owners	64% ± 1%	92% ± 2%
Non-owners	36% ± 1%	8% ± 2%

Source: author's calculations based on HES 2017/18

which has a Gini coefficient of 76.0% ± 1.6%. Housing and non-housing wealth are both more unequal than total wealth, due to households not all holding similar proportions of each type of wealth.<sup>3</sup>

Over the last couple of decades, total housing wealth has increased much more than non-housing wealth. Between 2000 and 2013, housing's share of total wealth increased from 38% to 57%, while the proportion of households owning houses fell slightly from around 67% to around 65% (Irwin and Irwin, 2018).

Measuring wealth inequality poses challenges (Crampton, 2019), but previous studies have found broadly similar values for the Gini coefficient of adult wealth, with most studies measuring between 65% and 75%. Initially, the adult wealth Gini coefficient appears to have increased slightly (becoming more unequal) from

2004 to 2006 (Le, Gibson and Stillman, 2012). However, in the last decade it appears to have been slowly decreasing (becoming more equal), trending down by an average 0.5 percentage points per year since 2010 (author's calculations based on Credit Suisse global wealth reports).

**House price growth and the Gini coefficient**

Given that so many households have housing wealth, it may not seem immediately obvious how increasing house prices might affect total wealth inequality. One way to estimate the effect of house prices on wealth inequality is to think about what would happen if the value of all housing assets went up by the same percentage overnight with no changes in ownership, while all other assets and liabilities stayed the same.<sup>4</sup> This article presents a simulation of this thought

experiment using wealth data from HES 2017/18.

Table 1 shows the changes in the Gini (and confidence intervals) for the population as a whole and for key population subgroups. Across the whole population, the results show that a 10% increase in house prices causes an estimated 0.6–0.8 percentage point drop in the Gini coefficient (from 70.8% to 70.1%).

This may seem surprising. How can it be that there is a fall in wealth inequality for the total population when house prices grow? Partly, this is because the people at the top of the wealth distribution have so much of their wealth in businesses and investments. A general increase in housing wealth lets the less-wealthy middle class catch up with them, lowering the relative inequality within homeowners. The Gini for homeowners falls from 59.5% to 58.3%, and this effect dominates because a large share of the population own homes. In 2018, homeowners made up 64% of the total population and owned 92% of total wealth (Table 2).

**Inequality between homeowners and renters**

But the relative gap between homeowners and renters increases when housing wealth increases, from 86.4% to 86.7% (Table 1). Renters, who are predominantly younger and poorer, become relatively less wealthy. Homeowners, who are predominantly older and richer, become relatively wealthier. This increase in wealth inequality is hidden when looking at the combined total population, because there are more homeowners than non-homeowners.

The results look similar in direction when simulating larger house price increases, but the inequalities begin to approach limiting values as housing assets become the dominant component of wealth. The wealth inequality among homeowners trends towards a minimum of 46.5% ± 2.5%, equal to the Gini coefficient of homeowner housing assets. The wealth Gini coefficient of the total population moves towards a lower bound of 66.4% ± 1.9%, set by the distribution of housing assets and the relative population of owners and non-owners. Meanwhile, inequality between homeowners and nonowners moves slowly towards 100%, as

housing assets start to overshadow non-owner wealth.

Our results are similar if housing and shares are increased at the same time, or if commercial property is included with housing. In each case, the results show that the relative gap between asset owners and non-owners widens.

**Comparison with data on material hardship and housing costs**

The measures of wealth inequality above do not tell us about the potential flow-on impacts of house price increases. For example, this article does not consider how an increase in the relative wealth of homeowners compared with non-owners might affect household spending or saving. However, understanding how ownership or non-ownership of housing is already associated with being in difficult life circumstances provides background on why one might be concerned about a widening gap.

This article focuses on households who were in material hardship (DEP-17) or who had high housing costs (greater than 40% of disposable income) as two key indicators of wellbeing. Comparing homeowners and non-owners shows that the existing wealth disparity between these two groups correlates with households being in these unfavourable circumstances.

The results show that around 6% of households were non-owners who were experiencing material hardship. These households had approximately zero wealth, and they were clustered near the bottom of the wealth distribution (see Table 3). Only 1% of households were owners and in material hardship, and they were clustered around the middle of the wealth distribution. This shows that there is a strong correlation between non-ownership of housing and being in material hardship.

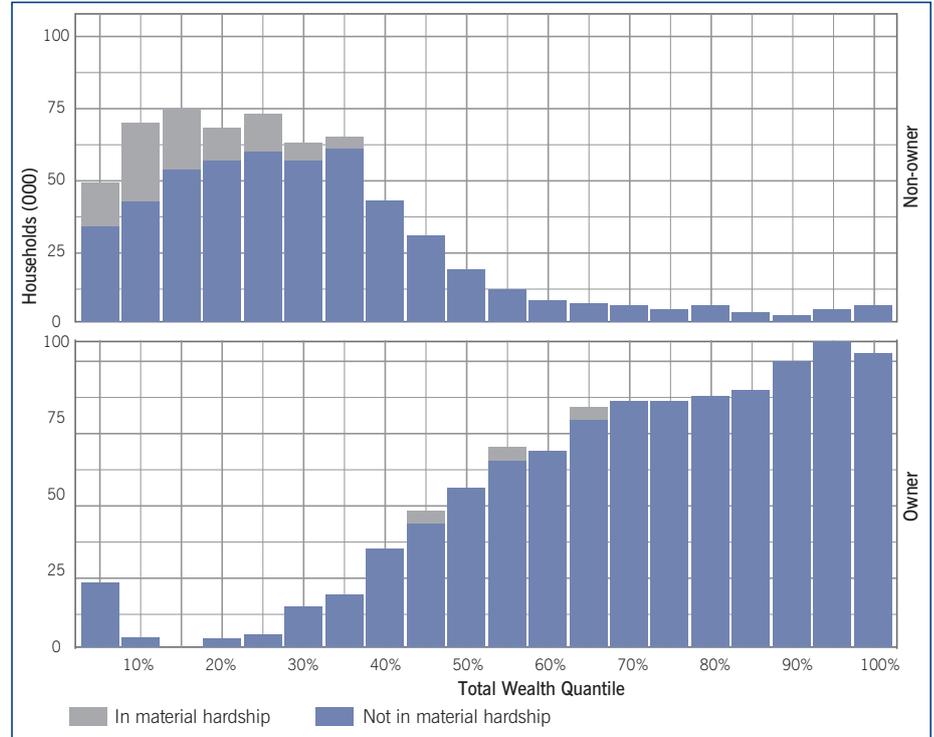
Material hardship is a multidimensional and qualitative indicator, which makes it hard to say how it might be affected by an increase in house prices. There are outstanding questions regarding the drivers of material hardship, including the potential links with high housing costs and low incomes, which would help to understand how people might move into or out of material hardship.

**Table 3: Incidence of hardship**

Populations in Hardship	Population Share	Wealth Share
Owners	1% ± 0%	1% ± 0%
Non-owners	6% ± 1%	0% ± 0%

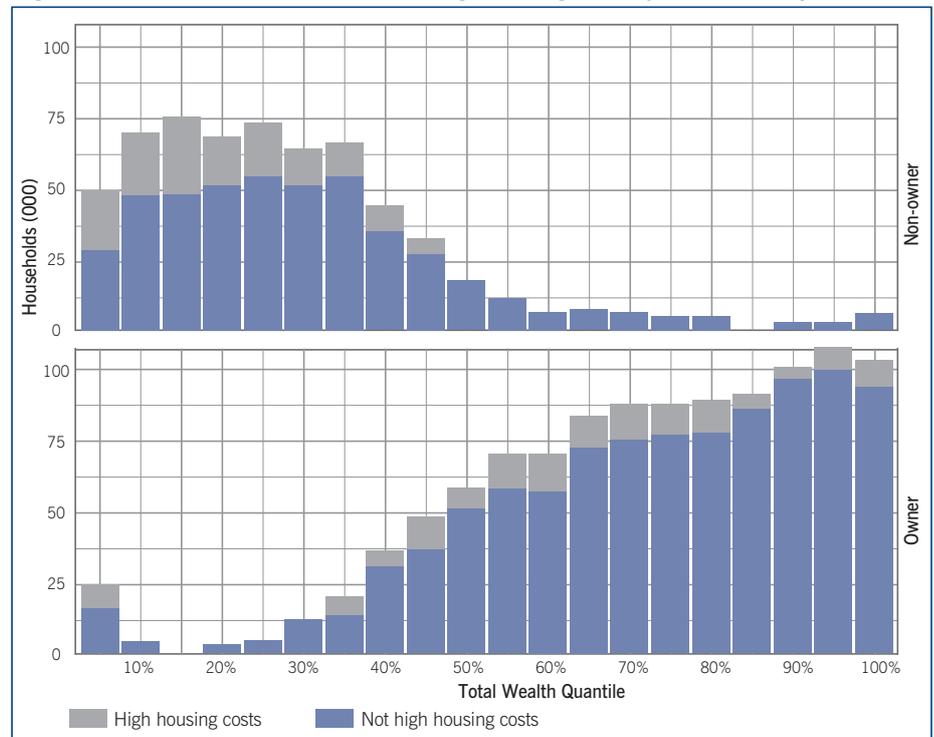
Source: Author's calculations based on HES 17/18

**Figure 6: Distributions of households in material hardship by total wealth quantile**



Source: Author's calculations based on HES 17/18.

**Figure 7: Distribution of households with high housing costs by total wealth quantile**



Source: Author's calculations based on HES 17/18

Focusing on household housing costs shows that non-owners were almost twice as likely as owners to have high housing costs; that is, housing costs that were greater than 40% of disposable income. Non-owner households with high housing

**Table 4: Incidence of high housing costs**

Housing Costs	Populations	Population Share	Wealth Share
Low	Owners	57% ± 1%	82% ± 3%
	Non-owners	28% ± 1%	7% ± 2%
High	Owners	8% ± 1%	10% ± 3%
	Non-owners	8% ± 1%	1% ± 0%

Source: Author’s calculations based on HES 17/18

costs also had very low wealth, as shown in Table 4 and Figure 7. While the drivers of owners’ and renters’ high housing costs may differ (for example, in some cases owners may choose to have high housing costs to pay down their mortgage faster), this suggests that there is a relationship between non-ownership of housing, high rental costs and living in material hardship, which is relevant to any discussion on how increasing house prices may be making it harder for non-owners to get onto the first rung of the wealth ladder in New Zealand.

**Conclusion**

This article finds that housing wealth is the largest and most widely held type of wealth in New Zealand, and that, partly reflecting house price growth, wealth has been increasing over time. Although a certain level of wealth inequality is expected, as people accumulate wealth over their working life, particularly by becoming homeowners, these results suggest that older generations are achieving higher outright homeownership rates than younger generations.

Overall, a scenario approach suggests that wealth inequality slightly decreases when housing wealth increases, all else equal. But this does not tell the complete story. This article also finds that house price growth leads to increases in wealth inequality between those already on the wealth ladder and those not on it. Households who have not made it onto the wealth ladder are also more likely to be living in material hardship or to have high housing costs.

The importance of these findings is reinforced by data on the life-cycle pattern of wealth accumulation, which appears to have been slowly shifting over the last 15 years. An increasing proportion of households, including in the 45–54 and 55–64 age bands, rent. In this context there

is real value in not only using headline measures of inequality, but also considering changes in wealth inequality between those who are on the housing ladder and those who are not.

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 For example, two households may have equal total wealth ranking, but one household might have all their wealth in housing (increasing the housing Gini coefficient) while the other has more non-housing wealth (increasing the non-housing Gini coefficient).

4 This is an important assumption, as there are many possible flow-on effects from an increase in gross housing wealth: e.g., rents, mortgages, other asset prices, and behaviours may all change over time as a result. But as a first approximation we consider wealth inequality at a single point in time before any flow-on impacts have occurred.

## Summary of results

An increase in house prices causes a slight decrease in total wealth inequality, as measured by the Gini coefficient. A 10% increase in house prices causes a 0.7 percentage point drop in the household wealth Gini coefficient of the whole population.

It seems strange that increasing the wealth of housing owners, but not the wealth of non-owners, leads to a decrease in relative wealth inequality. To help understand this the total population is split into owners and non-owners of housing. This gives us three wealth Gini coefficients, which measure inequality of owners, inequality of non-owners, and inequality between owners and non-owners.

For owners, inequality drops. A 10% increase in house prices causes a 1.3 percentage point drop in the wealth Gini coefficient of owners. About 64% of all households are homeowners. The wealth of the wealthiest owners is mostly in non-housing assets, which we hold constant, but most owners have their wealth

in housing assets, which we inflate. This reduces the relative gap between the wealthiest owners and all other owners.

Inequality increases between owners and non-owners. A 10% increase in house prices causes a 0.3 percentage point increase in the wealth Gini coefficient between owners and non-owners. The wealth of owners is increased, while the wealth of non-owners is kept constant. This widens the relative wealth gap between owners and non-owners. About 36% of all households are non-owners. Compared with owners, they are generally much poorer, have higher housing costs and are more likely to be in material hardship.

The life-cycle pattern of wealth accumulation appears to have been slowly shifting over the last 15 years. In total, the proportion of households who rent appears to have been growing, while outright homeownership rates have been falling. This trend is strongest in the 45–54 and 55–64 age bands.

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Lisa Davies, Andrew Webber  
and Jason Timmins

# The Nature of Disadvantage

## Faced by Children in New Zealand: implications for policy and service provision

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### Abstract

This article summarises key findings from three recent New Zealand research projects looking at how disadvantage due to a lack of resources and increased ‘toxic stress’ in the household impacts on child wellbeing and development in early childhood. About one in ten children experience substantial disadvantage relating to a lack of resources during early childhood, and for many children this lack of resources is persistent. This disadvantage is inequitably distributed across the population and is associated with worse outcomes later in childhood. The challenge for policy is to find a way to provide support that is flexible and values the choices family and whānau make to look after their children in the early years of life.

**Keywords** child wellbeing, child development, multidimensional wellbeing

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Conception, through birth, to early childhood is a critical stage of development for children (Haas, 2008; Hayward and Gorman, 2004). A child’s development and wellbeing are shaped by the environment and the people around them. However, in New Zealand, approximately one in ten young people and their families face ongoing stress and a lack of resources, which can reduce wellbeing and hamper development and make it harder to reach full potential later in life.

This article summarises key findings from three recent New Zealand research projects looking at how disadvantage due to a lack of resources and increased ‘toxic stress’ in the household impacts on child wellbeing and development in early childhood:

- Prickett et al. (forthcoming),<sup>1</sup> statistically analysing trajectories of disadvantage from before birth to age 8, using the Growing Up in New Zealand (GUiNZ) study;
- Morton, Knowles and Morar (forthcoming),<sup>2</sup> drawing on the GUiNZ

study and other sources to examine resources available during the first 1,000 days of a child's life, and how they are related to developmental outcomes; and an examination by the Southern Initiative and the Social Wellbeing Agency of the quantitative data and the experiences of families having a baby in South Auckland;<sup>3</sup> this provided more nuanced understanding of disadvantage in early childhood and the ways in which perceived aspects of disadvantage can include resilience, as well as risk factors. The evidence from these studies is broadly similar to the international research on child development, but also contributes details of how these issues manifest in a New Zealand context. The resulting insights imply that policies and services are likely to be more effective at reducing disadvantage if they are designed flexibly and understand the choices and aspirations of parents.

#### How stressors cluster in early childhood

Indicators based on employment or income at the time of birth and early childhood are not always the best way to assess the level of resources available to families and their children. Morton, Knowles and Morar identify four different types of resources as being important for supporting children's wellbeing and development (Table 1). There is likely to be a high level of association between the four types of resources. For example, household overcrowding could be caused by a lack of financial resources, which might also lead to a greater reliance on renting and mean having to move more often. Overcrowding can create additional hazards for a family's physical and mental health, which can exacerbate stress and conflict in the home. However, overcrowding can also be caused by whānau living in the same house, who can contribute positively to relationships, the home education environment, and the identity, language and culture of all household members.

These recent New Zealand studies tell us that:

- between 10% and 20% of children in New Zealand experience disadvantage;
- disadvantage has impacts on child development;
- disadvantage during childhood is often persistent; and

- the strongest predictor is maternal education.

*Between 10% and 20% of children in the GUiNZ study experience disadvantage in a cluster of factors known to have an impact on child development*

Morton, Knowles and Morar and Prickett et al. used different approaches to identify children in the GUiNZ study who were experiencing disadvantage in early childhood. Prickett et al. used access to seven resources to identify disadvantage in early childhood. Morton, Knowles and Morar used a model, sometimes described as 'toxic stress' (Center of the Developing Child, 2010), that includes a range of factors measuring the resources available to the family (e.g., income, owning your own home), as well as a number of factors that could create additional stress in the family, such as maternal depression, smoking during pregnancy and being a single parent.

Both studies found that children who were disadvantaged in one area were more likely to experience disadvantage in other areas. Prickett et al. found that between 13% and 22% of children in the GUiNZ study experienced disadvantage in a cluster of factors between antenatal and age 8 years. This study grouped children based on the level of resources (including income, financial hardship and overcrowding) relative to other children. Children were identified as having above average levels of resources (advantaged), average, and below average (disadvantaged). Low levels in one resource (e.g., income) was found to be strongly correlated with disadvantage in other resources (e.g., frequent moves of address). Disadvantaged children were typically below average in six out of the seven resources included in the study.

Morton, Knowles and Morar found a similar pattern of exposure to disadvantage using the slightly different 'toxic stress' approach to identifying children as disadvantaged. Children were classified as being in families facing high levels of adversity, or disadvantage, if they had four or more (out of 12) risk factors known to be associated with child development. These factors included family variables that have a direct impact on child development, such as maternal depression, less direct family factors, such as relationship stress, and home environment factors, such as

**Table 1: Four types of resources supporting child wellbeing and development**

Domain	Indicator of resource
Economic resources	<ul style="list-style-type: none"> <li>• Employment (labour force status)</li> <li>• Household income</li> <li>• Sources of income</li> <li>• Paid parental leave</li> <li>• Economic hardship</li> </ul>
Physical resources	<ul style="list-style-type: none"> <li>• Home ownership</li> <li>• Residential mobility</li> <li>• Household safety</li> <li>• Health status</li> <li>• Health service access</li> </ul>
Social resources	<ul style="list-style-type: none"> <li>• Parent-parent relationships</li> <li>• Parent-child relationships</li> <li>• Relationship status</li> <li>• Household structure</li> </ul>
Human resources	<ul style="list-style-type: none"> <li>• Early childhood education</li> <li>• Home educational environment</li> <li>• Cultural identity and belonging</li> <li>• Equity</li> </ul>

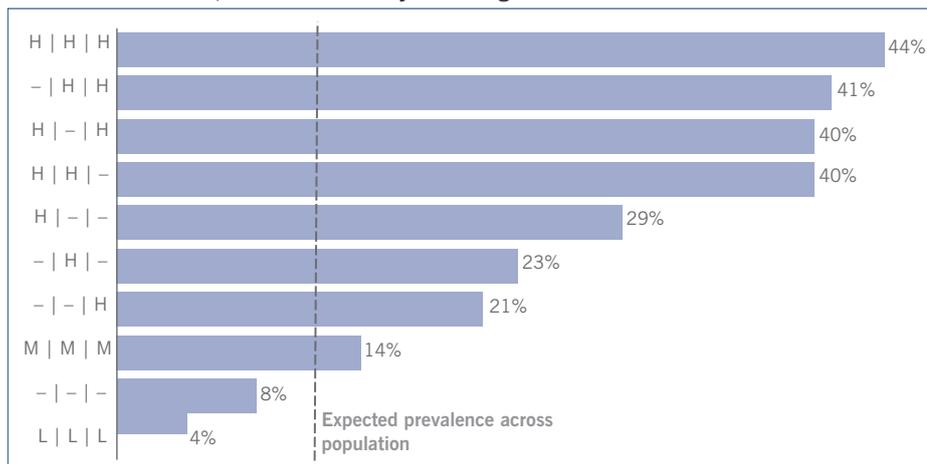
Source: Adapted from Morton, Knowles and Morar, forthcoming, Figure 6

overcrowding. Between 12.5% and 13.2% of children in the GUiNZ study had four or more of these risk factors at antenatal, 9 months and 2 years of age.

#### Disadvantage has impacts on child development

A large volume of research indicates that a lack of resources at home can create toxic stress, which can have negative impacts on a child's development (Center on the Developing Child, 2010). To get a sense of what this can look like for child outcomes in New Zealand, Morton, Knowles and Morar examined behavioural outcomes at age 4.5 years using the strengths and difficulties questionnaire.<sup>4</sup> In this work, the outcomes at 4.5 years are compared between groups of children constructed on the basis of how often (from antenatal to 2 years of age) the child was classified as having low, medium or high levels of disadvantage. Morton, Knowles and Morar found that children who were highly disadvantaged in at least two of the three time periods went on to display more behavioural issues at age 4.5 years. Between 40% and 45% of these children living in disadvantage were flagged as having potential behavioural issues, compared to

**Figure 1: Prevalence of behavioural issues at 4.5 years, by prior disadvantage at antenatal, 9 months and 2 years of age**



Note: The vertical axis categories indicate whether the child was highly disadvantaged ('H', had four or more indications of disadvantage, of the 12 examined by the authors); moderately disadvantaged ('M', had one–three indications of disadvantage); not disadvantaged ('L', had no indications of disadvantage); or were not high ('-', had fewer than four indications of disadvantage, i.e. 'L' and 'M' combined), at each stage of antenatal, 9 months and 2 years of age.

Source: Morton, Knowles and Morar, Figure 8.

only 10% across all children in the GUiNZ study, and only 4% of children who spent their early childhood in homes with no aspects of disadvantage (Figure 1).

Prickett et al. found a similar association between a child’s exposure to disadvantage and wellbeing and developmental outcomes. Children who were mostly disadvantaged during their early childhood had:

- worse internalising (e.g., depression and anxiety) and externalising (e.g., aggression) behaviours at 9 months, 2 years, 4.5 years and 8 years of age (again, measured using the strengths and difficulties questionnaire);
- lower cognitive skills at 9 months, 2 years and 4.5 years of age (unable-to-model impact at 8 years of age);
- worse parent-reported health at 9 months and 8 years of age; and
- more exposure to acute illnesses (self-reported) at 9 months and 2 years of age.

**Disadvantage during childhood is often persistent**

The longitudinal nature of the GUiNZ study means it is possible to examine a child’s exposure to disadvantage during early childhood to see if these are one-off events or are more persistent. Like all significant life events, the birth of a child can potentially increase a family’s vulnerability to multiple disadvantages as they adjust to caring for their new baby. However, if these disadvantages persist, the impacts on the child’s development are likely to be more severe.

Prickett et al. identified children who experienced mostly advantaged levels of resources, mostly average resources, or mostly disadvantaged levels of resources. The analysis found that 10% of children were exposed to disadvantage for most of their early childhood, from antenatal to 8 years of age. A smaller group of children (2.7%) were persistently exposed to disadvantage at every GUiNZ interview (antenatal, 9 months, 2 years, 4.5 years and 8 years of age) during early childhood.

That research also found that moving into disadvantage was more common than moving out of disadvantage. Eight per cent of children moved to a more disadvantaged level of resources between birth and 8 years of age, and most of this transition occurred between 9 months and 2 years. A smaller group of children (4.5%) experienced an improvement in their level of resources over the first eight years of life, with most of this transition occurring before 9 months. During pregnancy, the group of children who subsequently moved out of disadvantage had access to a similar level of resources across most domains compared with children who remain in disadvantage later in childhood. The exception to this is material hardship, which, in the group moving out of disadvantage, was much lower and closer to the level of hardship experienced by children with average resources in their home environments. It is possible that these children had access to additional resources at antenatal and after birth periods, such as support from their

family and whānau. This may help explain why resources for these children quickly increased shortly after birth.

**The strongest predictor of disadvantage is maternal education levels**

After identifying children in households with less resources, Prickett et al. looked at the characteristics of these children, to examine the extent to which disadvantage occurs inequitably across society. This research found that children mostly exposed to disadvantaged levels of resources are more likely to:

- have a mother with lower educational attainment;
- belong to a minority ethnic group;
- be the child of a recent migrant (moved to New Zealand after 18 years of age); and
- have a mother with a disability.

The strongest predictor of a child being disadvantaged during their early childhood is their mother’s education. Children of mothers with no school qualifications are nearly 100 times more likely to be mostly disadvantaged during early childhood (all else being equal), compared to experiencing advantaged levels of resources. In comparison, a child born to a mother who moved to New Zealand after turning 18 years of age is four times more likely to be mostly disadvantaged during early childhood, compared to being advantaged.

This means that the mother’s education, more than any other measure, tends to cluster with indicators of disadvantage. While there are some migrant parents who were financially constrained, had insecure housing or lived in more disadvantaged communities, there are also many migrant parents for whom this is not true. In contrast, relatively few children whose mothers have no formal qualification have good access to financial, housing, labour market or neighbourhood resources. In the GUiNZ study, less than 0.5% of children with advantaged resources also had a mother with no formal qualifications.

**Having a baby can create further stress in the family, particularly for more disadvantaged families**

Having a baby can place additional stress on a family (e.g., on maternal mental health, having to move home, and lower income

from taking a break from employment) and can mean that some families are at risk of becoming further disadvantaged, which can make things worse for the family and the child's outcomes and increase the risk of intergenerational transmission of disadvantage.

Prickett et al. found a strong correlation between the home resource factors and maternal depression. Mothers of children with the most disadvantaged levels of resources were 80% more likely than mothers with the most advantaged home environment to report symptoms that indicate clinical depression.

While residential mobility increased for all families in the GUiNZ study following the birth of their child, it was much higher for children in disadvantaged households compared to more advantaged households.

- Between the antenatal period and birth, children in the 'always advantaged' households experienced 0.19 moves, compared to 0.5 moves for children in 'mostly disadvantaged' households.
- Between 2 years and 4.5 years of age residential moves averaged 0.5 for the 'always advantaged' children and 1.2 for 'mostly disadvantaged' children.
- Residential moves declined between 4.5 years and 8 years of age for 'always advantaged' children, but not for 'mostly disadvantaged' children.

Household employment patterns also changed during early childhood. For most children in the GUiNZ study, the probability of having at least one person employed in the household declined between the antenatal period and 9 months and then increased again. For children living in advantaged households, the drop in household employment was small, with employment declining from 96% in the antenatal period to 89% at 9 months, and then increasing to 99% at 8 years of age. The pattern for mostly disadvantaged children was slightly different. Average employment rates at antenatal, 9 months and 2 years of age were around 30%, but then increased to around 70% at 4.5 and 8 years of age. Interestingly, the strong increase in employment between 2 years and 4.5 years of age was not accompanied by a similar increase in income for mostly disadvantaged children.

## Having a baby can place additional stress on a family ... and can mean that some families are at risk of becoming further disadvantaged ...

### How data on disadvantage translates into real world experiences

Quantitative data from research studies such as GUiNZ are important in identifying where there are opportunities to make a policy impact. However, they often produce findings that are ambiguous in how they might be interpreted, or lack the necessary detail in people's lives to pinpoint the exact solutions that are likely to make a difference. One recent research project – 'Having a Baby in South Auckland' – aimed to enhance the evidence base through combining quantitative and qualitative data.

This research project was a partnership between the Social Wellbeing Agency, the Southern Initiative and the South Auckland community, and examined circumstances surrounding birth for parents living in South Auckland from 2005 to 2017. The project involved statistical analysis of government data about people's lives, and then conversations with local whānau and community providers about what the statistical findings might mean. This provided important context about what life really looks like in the spaces between the quantitative results, giving us clues as to potential causes and solutions. The project uncovered and contextualised four key results that are important in understanding disadvantage in early childhood.

#### *Many fathers stop earning around the birth*

Income data revealed a gap in earnings for most fathers in the weeks surrounding the birth of a child. This income gap was mainly unrelated to what was happening

with the mother; it occurred regardless of whether the father was living with the mother, whether the mother was having her first or subsequent baby, or the presence or absence of other resources for the whānau.

The economic resources and cultural norms of whānau had an influence on fathers' income. Follow-up research by the Social Wellbeing Agency examining fathers' incomes found that nationally, the biggest breaks in earnings occurred mainly for higher-income fathers (Kulkarni and Mok, 2021). But in South Auckland it was the opposite: lower-income fathers lost income for six to eight weeks around the birth of a child, compared to four weeks for other fathers. Both community insight and quantitative data point to this difference in trends being strongly driven by cultural norms in Pacific and Māori families. In South Auckland, community members confirmed that there is a strong belief that a father's need to be physically present to support mother and baby outweighs any loss of income.

For some fathers, this loss in income is made worse because of the lack of available leave, or because navigating systems relating to leave is too difficult at an already stressful time. Fathers are entitled to up to two weeks of unpaid parental leave, depending on their length of employment and hours worked. Kulkarni and Mok (2021) estimated that a quarter of Māori and Pacific working fathers would not have been eligible for any unpaid parental leave, given their patterns of working. Casual and temporary workers are also less likely to be eligible for forms of paid leave to take over this period. Those interviewed in the South Auckland study indicated that sometimes fathers just quit employment altogether, as it is perceived to be easier.

This loss in income contributes stress at an already stressful time. The presence of fathers in the home, rather than at work, is a valuable protective factor in many whānau. However, community members in South Auckland also reported that sometimes the presence of fathers (for a variety of reasons, including their own stress, struggle with competing expectations and perceived lack of choice) can add to whānau stress, the risk of violence, or relationship breakdown.

### *Mothers moving address is common*

About one in five mothers (19%) in South Auckland register a change of address while pregnant or soon after birth (compared to 16% of mothers in the rest of Auckland). Mothers were more likely to move over this time if they were younger, receiving the sole parent benefit, had a corrections sentence, or had a low birthweight baby.

These moves can occur for many reasons. Moving to a new space is often intended as a resilience practice. This can involve moves between different family members who can support the mother, or finding a new space that is safer or makes life better for their baby. In many cases, however, moves are not voluntary. Frequent moves and couch-surfing are seen as common for new mothers in South Auckland, and may not be fully captured by administrative or survey data.

Regardless of the reason for the move, moves can lead to additional stress, particularly when they create disruption and require organisation, they involve newly blended families, or they make mothers feel judged. Stepchildren and half siblings often change living arrangements during this time too, as care arrangements and relationships change. This can involve older children moving away to live with others while their mother looks after the baby. Moving with many children is much more difficult, and can mean that families wear out their welcome more quickly.

### *Mothers in South Auckland have less contact with the health system after giving birth*

The 'Having a Baby in South Auckland' project found that mothers in South Auckland are less likely to be prescribed anti-depressants (3.9% of mothers in South Auckland, compared to 8.1% nationally), and have less contact with midwives after birth (but not before). There are strong differences by ethnic group here: Pākehā mothers were 3.6 times more likely to be prescribed anti-depressants than Pacific mothers, and had five times more visits from midwives after the birth.

These statistics were interpreted in nuanced ways by whānau in South Auckland. Higher service use by Pākehā was seen as a risk factor for their wellbeing: Pākehā mothers aren't receiving the support they need from their own whānau

For South Auckland parents, there is high participation in tertiary education during pregnancy: 25% of mothers and 22% of fathers are enrolled in education or training over this time.

and community, and so are forced to rely on medication and services that, in the experience of Pacific and Māori mothers, are more about examination and judgement than care and nurturing.

Many in the South Auckland community also said it was important to improve support for the mental health and wellbeing of mothers, in a form that felt welcoming. Many Pacific families reported shame and judgement relating to depression, anger, grief and loss, for both mothers and fathers. This can be harder when, as many whānau reported, mothers have less opportunity to talk to people outside the family without judgement.

### *Parents often participate in education before the baby, but not after*

For South Auckland parents, there is high participation in tertiary education during pregnancy: 25% of mothers and 22% of fathers are enrolled in education or training over this time. This is more common when mothers are teenagers; are getting the sole parent benefit; have two or more other children; are going to drug, alcohol or mental health programmes; or have a corrections sentence. This participation in education is to build resilience and create a better life in the long term for the family. In some instances, it is also because meeting Work and Income requirements by enrolling in

training is considered easier than looking for work at an already stressful time.

However, education can also contribute to this stress. Education can be logistically difficult (with a lot of forms, travel, and juggling of other responsibilities), and parents can feel judged when entering education, especially if they previously had negative experiences of school. While parents are expecting the arrival of a baby there is a lot of thinking and planning they are having to do (working out new budgets, making health decisions, sorting new housing, negotiating relationships, new childcare and parenting issues, filling out a lot of forms, acquiring goods for the baby). Participation in education or training can add to this cognitive burden.

Both the administrative data and reports from community members indicate that education is commonly not completed after the baby is born. Whānau reported that participating in education was almost impossible with a baby or a toddler, with obstacles such as travel and the lack of facilities: 'there wasn't even a changing table'. Parents wanted to take a break from study and return at a later point, but perceived there would be little opportunity to do this. This often caused them to give up on half-finished qualifications they felt would have been in the long-term best interest of their whānau to complete.

### **What does this evidence imply for policy?**

This article has summarised a range of evidence relating to disadvantage in early childhood, including quantitative data from the Growing Up in New Zealand study and from administrative sources. This evidence indicates that about one in ten children experience substantial disadvantage relating to a lack of resources – economic, physical, social and human capital – during early childhood. For many children, this lack of resources is persistent; few children move out of disadvantage between 9 months and 8 years of age. This disadvantage is inequitably distributed across the population, and is associated with worse outcomes later in childhood.

Whānau and service providers in South Auckland have also provided insights about how these statistics on disadvantage translate into experiences during pregnancy, birth and early childhood.

These insights provide important nuance around the ways in which many indicators of ‘disadvantage’ can be resilience, as well as risk, factors. A lack of income can be an indication of financial stress, but also an indicator that parents have chosen to take time to be with and support their new baby. Changes in address can indicate insecure housing for children, and can be caused by mothers moving to sources of support and safety. Less attachment to the health system might indicate less access to caring, culturally responsive health services for some mothers. It also shows that many mothers can and do rely on their whānau, community and culture – not doctors – to provide support.

These are not mutually exclusive possibilities: each of these aspects creates the possibility for both damaging and nurturing experiences for children. An overly narrow focus on resources – particularly as determined by proxy measures in administrative data – is simplistic and can lead to stigmatising views of parents and their experiences. However, a ‘strengths-based’ approach might also unintentionally de-emphasise that some families and whānau are denied access to effective support to help their children thrive; that access is not equal on many dimensions (such as ethnicity and socio-economic background); and that controlling access to resources is an important way that society transmits inequity between generations.

The challenge for policy is to grapple with these tensions. This means finding a way to provide support that is flexible and

values the choices family and whānau make to look after their children in the early years of life; understanding why they have made these choices; and acknowledging (and reducing) the situations in which these choices can lead to negative, as well as positive, effects. While the nature of much disadvantage is a lack of tangible resources, families and whānau also pointed to the many ways the social services system has made it harder for them, and where there are practical, small-scale ways in which the government can improve their lives. These include clarity on:

- How do I know what I am entitled to and how to get it?
- How can my partner get the financial support they need to provide support for me and my child at home?
- How can I engage with the labour market and education system in a way that works for me and my young family?
- Who can I talk to outside my whānau who will offer support and not judgement?

These questions have been thoughtfully considered by many working in communities affected by disadvantage, leading to evidence-based local interventions. For example, Morton, Knowles and Morar report on a situation where research and community evidence identified three conditions that promoted wellbeing: having good informal networks and support systems; having safe spaces to gather to support each other outside the home; and services being able to come to these safe spaces. This insight led to a project using libraries as a venue for parents

and children to gather, and for support agencies to be available. The evidence points to education providers (both tertiary and early childhood education) being a similar promising safe space for many parents, so long as they are perceived as accessible and welcoming.

However, reducing disadvantage for families also requires a substantial increase in tangible resources. This might involve increases in financial support (and reducing barriers to access financial support), such as the recent introduction of the Families Package (Ministry of Social Development, 2017); working through bottlenecks in the social sector specialist workforce; and simplifying the range of support across the social system to make it easier to navigate. We know how critical the first few years of childhood are to a child’s wellbeing for the rest of their life. With all the evidence from research with communities, we can make progress so that all children in New Zealand reach their potential.

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- 1 This research was commissioned by the New Zealand Productivity Commission to inform their current inquiry ‘A fair chance for all?’ (Prickett et al., forthcoming).
  - 2 This research was commissioned by the Social Wellbeing Agency to support the government’s Child and Youth Wellbeing Strategy.
  - 3 Some of the findings from this project are published in Southern Initiative and Social Wellbeing Agency, 2020, and some follow-up quantitative analysis in Kulkarni and Mok, 2021. However, discussion in this article also draws upon more detailed findings from this project that have not yet been published.
  - 4 This is a screening questionnaire that asks parents about a range of aspects of their child’s behaviour. The assessment is scored, with higher scores indicating more potential support needs. In their work, Morton, Knowles and Morar have applied a score threshold that is calibrated so that 10% of children in the population could be expected to have scores higher than the threshold (termed ‘abnormal behaviour’ in that report).

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Meghan Stephens<sup>1,2</sup>

# The Art of the Possible

## data-driven insights into child poverty in New Zealand

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### 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

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

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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

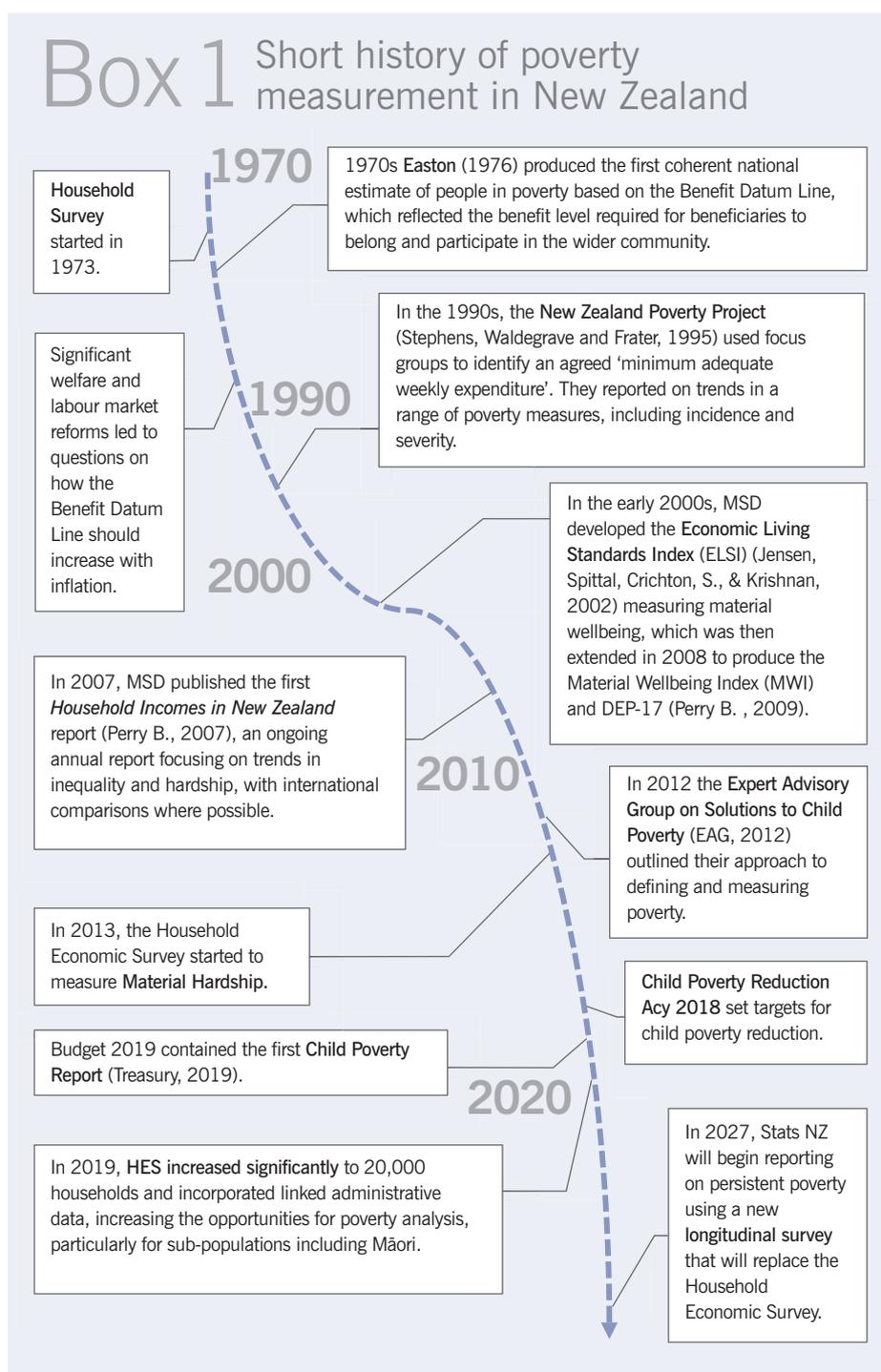
New Zealand experts have been working on poverty measurement since the 1970s, progressively building a body of work and iteratively improving our understanding of poverty (see Box 1).<sup>3</sup> As Stephens and Waldegrave (2001) noted, citing Mollie Orshansky, the developer of the US poverty threshold: ‘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<sup>4</sup> can only be measured using a survey and is hard to forecast and model.



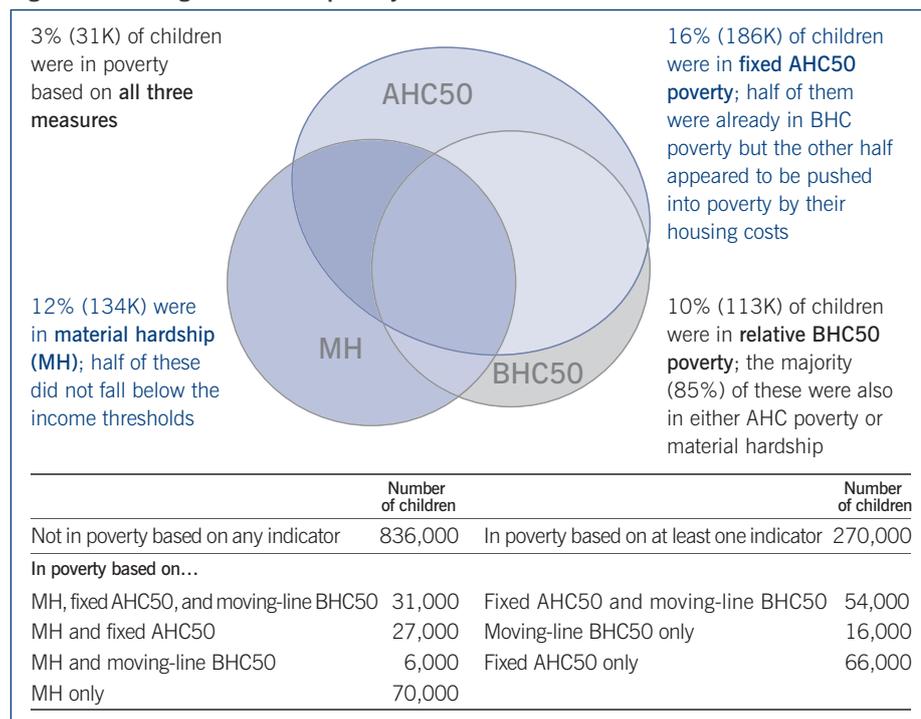
Instead, we can look at income-based measures of poverty, which vary depending on the definition of income and whether they account for key expenditures such as housing costs. The poverty threshold is also important. It can be based on a level of income that is assumed to provide a minimum standard of 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



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<sup>5</sup> 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:<sup>6</sup>

- 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<sup>7</sup> with that of a typical 2018 household. Defined as having an income below 50% of the median equivalised<sup>8</sup> 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
<i>Benefits are the family's main source of income</i> <i>Over-represented: families with disabilities, single parents</i>		
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.
<i>Market income is the family's main source of income</i> <i>Over-represented: one earner families</i>		
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.<sup>9</sup> 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).<sup>10</sup>

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:<sup>11</sup>

- 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.<sup>12</sup> This distinction based on income from core benefits was an output of the clustering

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.

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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.

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.<sup>13</sup> 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,<sup>10</sup> 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.<sup>14</sup>

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.

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>.

#### **Acknowledgements**

Many thanks to Brian Easton and Bryan Perry for their comments on earlier versions and for our continuing conversations.

<sup>1</sup> 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,

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# An Expenditure-based Approach to Measuring Child Poverty in New Zealand

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## Abstract

Poverty is complex, has many dimensions and is difficult to define and measure. When considering child poverty reduction policies, we must thus consider as many different dimensions as possible. In this way, researchers can provide data to build a comprehensive understanding of the issues, allowing decision makers to apply their own judgements. This study aims to provide such data by exploring how household expenditure data can add to our understanding of child poverty.

**Keywords** child poverty, poverty measurement, household expenditure

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## Poverty indicators

Different countries have approached measuring poverty in different ways. Some countries, like the United States, focus on a poverty indicator that depends on the basic needs of the general population. They measure pre-tax family income and compare it against a threshold that is set at

three times the cost of a minimum food diet in 1963, adjusted for family size and location (Institute for Research on Poverty, n.d.). Other countries, such as some of those in the European Union, focus more on relative income measures and consider poverty indicators that measure ability 'actively to participate in society and benefit from the

activities and experiences that most people take for granted' (International Labour Organization, 2021, p.1).

In New Zealand, the government focuses on children in poverty and monitors ten official child poverty indicators; these are based on poverty thresholds that are 40%, 50% and 60% of the median equivalised disposable household income before or after deducting housing costs, material hardship, and poverty persistence (Statistics New Zealand, 2021b). This suite of measures therefore includes relative, income-based indicators and a measure of access to a minimum standard of living (material hardship). Using these measures, the New Zealand government monitors the performance of child poverty reduction approaches. In addition, income-based indicators can be modelled to inform the policy development process and to demonstrate the impacts of economic shocks, such as those driven by the Covid-19 pandemic.

### Relative-income poverty measures

Most of New Zealand's official child poverty measures are income-based, relative poverty measures. Income-based poverty measures have many advantages (UNECE Task Force on Poverty Measurement, 2017).

- Disposable income is a desirable indicator for welfare measures because it is considered to be a good monetary indicator of material wellbeing and living standards.

supports and are unlikely to be suffering low levels of economic wellbeing.

- Income for some groups, such as self-employed, temporarily unemployed and seasonal workers, may be particularly susceptible to short-term fluctuations. These fluctuations are normally not reflected in achieved living standards.

Meyer and Sullivan (2012) considered these issues and investigated expenditure data in the US. Their study found that

information on household income, savings,<sup>3</sup> expenditure and wealth, and demographic information on individuals and households. The sample consists of people who are resident in New Zealand and live in private dwellings. HES provides detailed data on income and housing cost expenditure every year, but detailed expenditure data (e.g., expenditure on food and petrol) is only collected every three years. The latest HES with detailed expenditure data is HES 2018/19. The detailed expenditure dataset contains an individual's annualised expenditure on food, housing and household utilities, services, clothing, durable goods, health, alcohol, tobacco, drugs, bills, recreation, transport, education, communication, miscellaneous goods and travel.

The analysis in this study investigates child poverty based on relative household expenditure using HES data and compares the results with analogous income-based relative child poverty estimates. All indicators are calculated using HES 2018/19 data, covering the period from July 2018 to June 2019 (Statistics New Zealand, 2021a).

Although the HES 2018/19 data contains detailed expenditure records, these households are subsamples of the full survey. More specifically, HES 2018/19 selected 21,163 sample households, and all these households completed the survey income and housing cost questionnaire. However, only a subsample of 3,932 households were selected to complete an extra, detailed expenditure questionnaire. The 2019 official income-based child poverty measures were calculated based on the full 21,163 sample households, but for consistency with the expenditure data, this study calculates income-based child poverty rates using the smaller subsample.

### Looking into the HES expenditure data

Figure 1 shows the difference between the household income and expenditure deciles in HES 2018/19. Only income decile one and income decile two are selected in this figure because these two deciles are where the most in-poverty households are concentrated. According to Figure 1, nearly half of the population in each income decile has a much higher expenditure decile (expenditure decile four and above). This indicates that using

## The analysis in this study investigates child poverty based on relative household expenditure using HES data and compares the results with analogous income-based relative child poverty estimates.

- Income-based poverty measures can be directly influenced by existing policy levers. For example, social welfare payments can be targeted to families below the poverty line.
- Income can be disaggregated into different sources, such as wages, pensions and benefits. This provides additional information about the circumstances of groups in poverty and potential causes of income poverty.
- Income data are relatively easier and more cost-effective to collect than other data sources such as material hardship data, which are collected through a survey.

However, as recognised by New Zealand's multi-measure approach to child poverty, income-based measures do not tell the complete story (Statistics New Zealand, 2012; UNECE Task Force on Poverty Measurement, 2017):

- Income-based measures do not account for additional costs such as expenses related to disabilities and childcare.
- Income-based poverty measures do not account for people who have access to economic resources from wealth or other

expenditure-based poverty measurements captured more of the most disadvantaged than those based on income, by accounting for savings, ownership of durable goods, access to credit, and the use of anti-poverty programmes. It is important to note that New Zealand's suite of income-based poverty indicators are different from the poverty measurement regime in the US: they do account for the progressivity of the tax and transfer system and the impact of housing costs, which comprise the biggest component of a household's expenditure. Nonetheless, this article investigates the insights into child poverty that can be derived from detailed expenditure data.

Inspired by Meyer and Sullivan's study, this analysis defines a measure of low household expenditure that is analogous to the income-based child poverty measures to explore what this additional data can tell us about poverty in New Zealand.

### The Household Economic Survey (HES)

The Household Economic Survey is an annual survey that runs from July to June and is designed to measure the economic wellbeing of New Zealanders. It collects

household expenditure to measure child poverty might provide a slightly different picture from income-based child poverty.

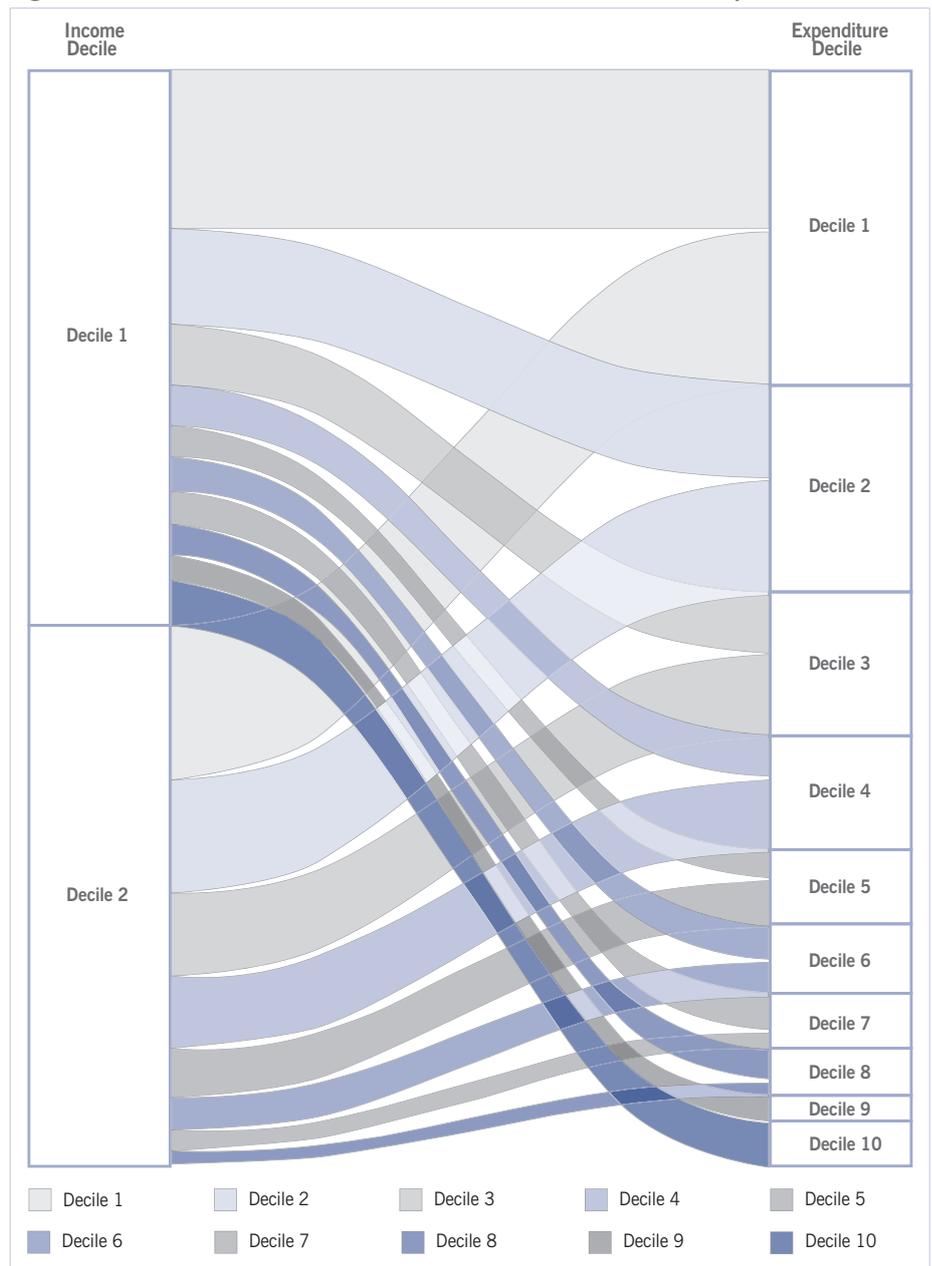
**Defining relative low-expenditure measures**

Six of New Zealand’s child poverty indicators are income-based (Statistics New Zealand, 2021b).

- BHC50: the number of children in households with income below 50% of the weighted median equivalised disposable household income of all households, before paying housing costs, for the financial year;
- fixed-AHC50: the number of children in households with income below 50% weighted median equivalised disposable household income of all households after paying housing costs for the base financial year, currently set as 2018;
- BHC60: the number of children in households with income below 60% weighted median equivalised disposable household income of all households before paying housing costs for the financial year;
- AHC60: the number of children in households with income below 60% weighted median equivalised disposable household income of all households after paying housing costs for the financial year;
- AHC50: the number of children in households with income below 50% weighted median equivalised disposable household income of all households after paying housing costs for the financial year;
- AHC40: the number of children in households with income below 40% weighted median equivalised disposable household income of all households after paying housing costs for the financial year.

These relative thresholds were chosen as proxies for a minimum standard of living that can be measured using available data. They allow for international comparisons and have also been confirmed through previous focus group studies to provide reasonable poverty thresholds. Household equivalised disposable income refers to the level of total household gross income after tax is deducted. Disposable income is equivalised to allow comparison across various household sizes and composition.

**Figure 1: Differences between the household income and household expenditure deciles**



Source: author’s calculations

For example, after equivalisation, we can directly compare the income of a two-parent household with one child with that of a single-parent household with three children.

Statistics New Zealand uses the modified OECD (MOECD) equivalisation

scale (Statistics New Zealand, 2019a). This scale assigns a value of 1 to the first adult, 0.5 to each additional member of the household aged 14 and over (GTE14) and 0.3 to each child under the age of 14 (LT14) (Hagenaars et al., 1995):

$$(1)$$

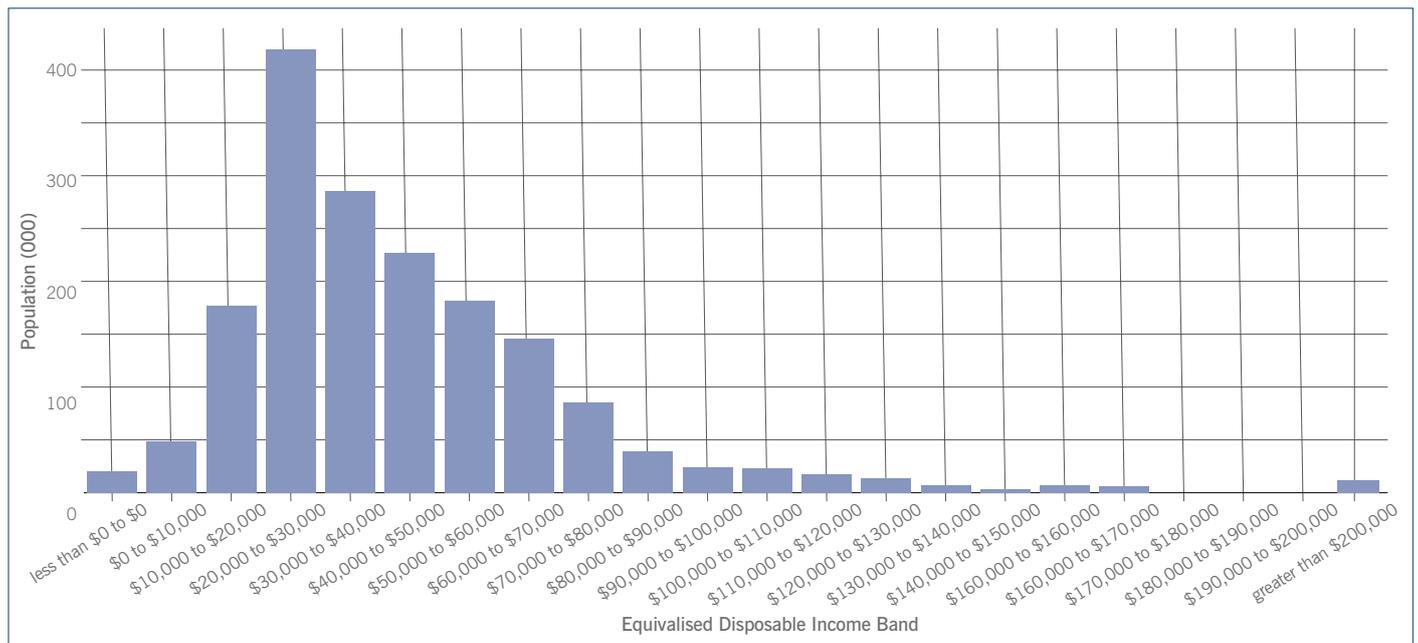
$$MOECD \text{ equivalisation factor} = 1 + 0.5 \times (GTE14 - 1) + 0.3 \times (LT14)$$

The equivalised disposable income is then defined as

$$(2)$$

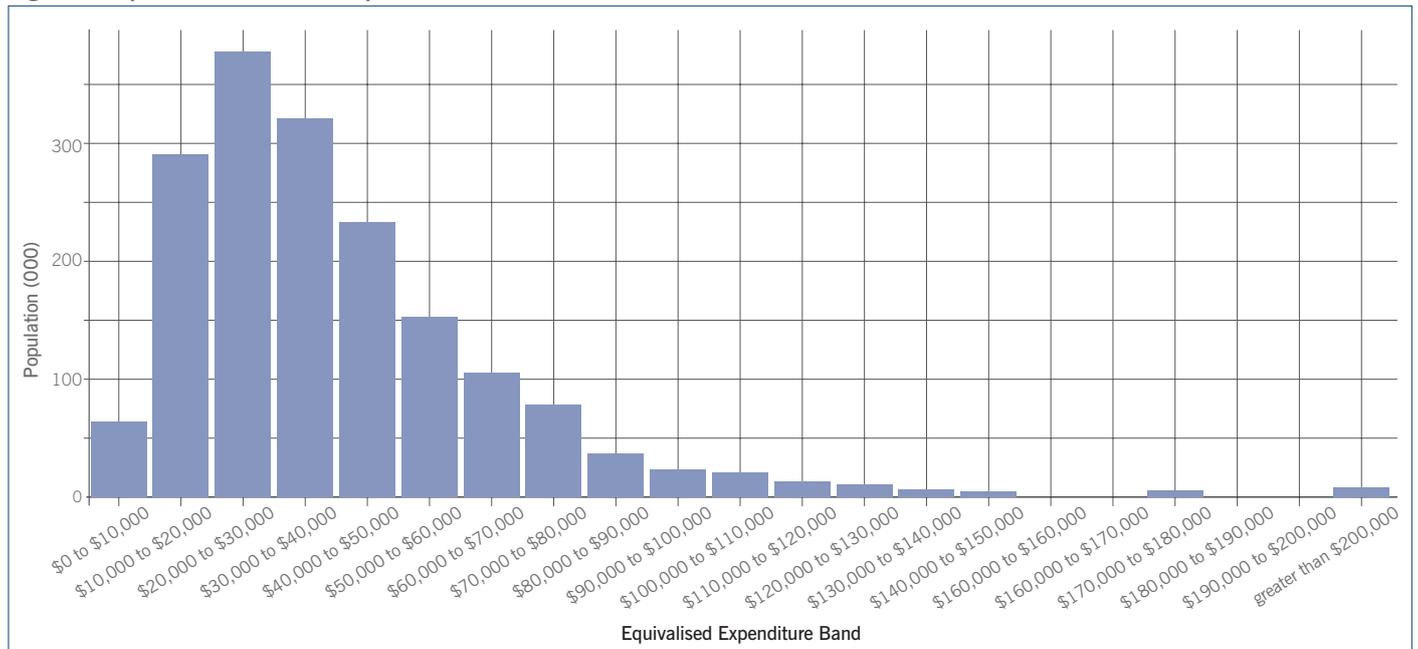
$$Equivalisation \text{ disposable income} = \frac{Disposable \text{ income}}{MOECD \text{ equivalisation factor}}$$

Figure 2: Equivalised household disposable income distribution



Source: author's calculations

Figure 3: Equivalised household expenditure distribution



Source: author's calculations

This analysis also applied MOECD equivalisation to household expenditure to allow for comparisons across various household sizes and composition. This may not appropriately allow for the resources needed in larger households or economies of scale, and is a pragmatic choice given that there is no established expenditure-based equivalisation scale. In addition, this article defines expenditure poverty thresholds that result in similar estimates to the income-based poverty measures.

Figures 2 and 3 show the equivalised household disposable income distribution

and the equivalised household expenditure distribution in 2019. These figures demonstrate that the distributions have similar shapes and the general population concentrated at similar bands, so, as a reasonable comparison, the analysis compares income- and expenditure-based poverty thresholds that are set at 40%, 50% or 60% of the respective median. Thus, we compare the following.

- EXP50 and EXP60 use thresholds based on 50% and 60% of the weighted median equivalised expenditure, which are directly compared to BHC50 and BHC60.

- NHEXP60, NHEXP50 and NHEXP40 use thresholds based on 60%, 50% and 40% of the weighted median equivalised expenditure without including the housing expenditure, which are directly compared to the AHC60, AHC50 and AHC40.

For simplicity, we refer to these new methods as expenditure-based poverty. The fixed-AHC50 threshold is based on a median household in 2017/18 after paying for housing costs; expenditure data for 2017/18 is not available, so this measure is omitted.

**Comparing income-based child poverty measures with low-expenditure measures**

Table 1 presents income-based child poverty rates using the income records from the 3,932 household subsample and the expenditure-based measures. According to Table 1, the expenditure-based relative child poverty rates are very similar to the income-based child poverty rates – some are slightly higher and some are slightly lower – with the exception of the 60% after-housing-costs threshold. This could indicate that the expenditure-based child poverty measures are telling a slightly different story from the income-based ones.

Although the numbers of children below the comparable thresholds are similar, it is also important to investigate whether expenditure-based indicators capture the same group of children in poverty as do the income-based indicators, or a new group not captured in the income-based analysis, and whether the expenditure-based estimates overlap with material hardship estimates. The data can also tell us which types of households are more likely to have relatively low expenditure levels and whether these households are currently receiving government support. It is also possible to identify whether they are experiencing deep deprivation, such as not having sufficient food.

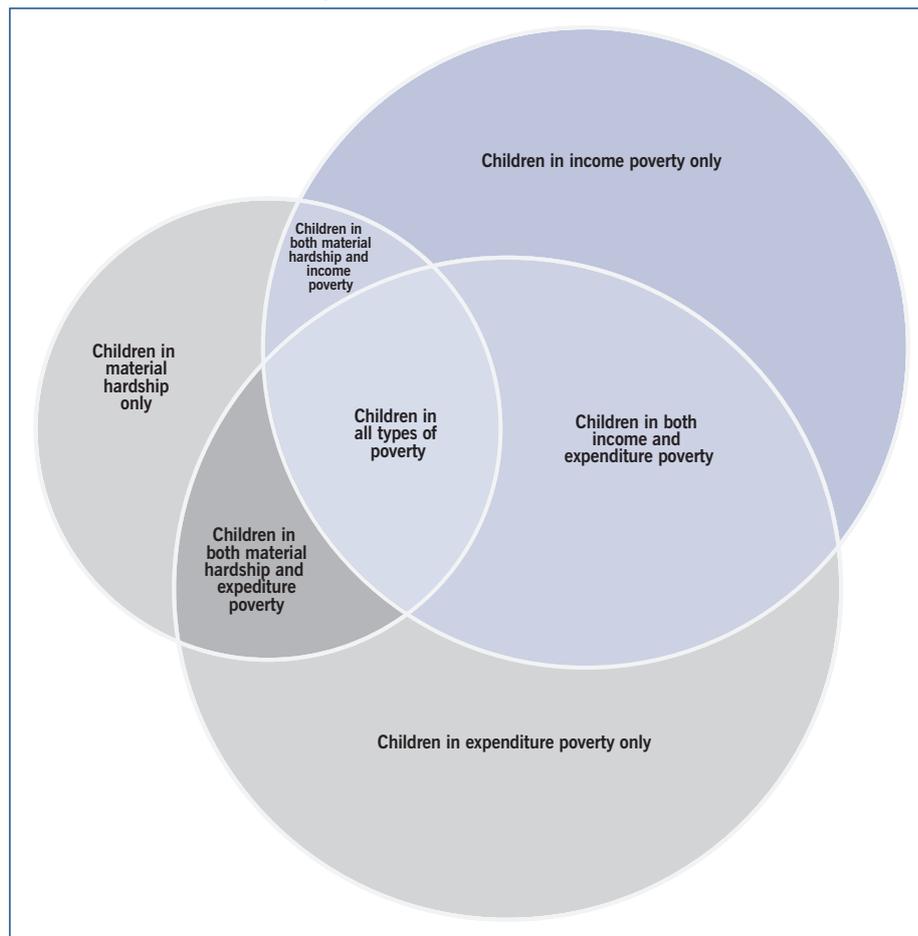
Figure 4 shows the overlaps of children who fall into income-based poverty,<sup>4</sup> expenditure-based poverty<sup>5</sup> and material hardship. The size of each circle in the figure is proportional to the number of children. Any children who fall below the 60% before- or after-housing-costs income-based relative poverty threshold are defined as in income poverty because the 60% threshold incorporates the 50% and 40% thresholds; in other words, children who are in 60% threshold poverty will be in 50% and 40% threshold poverty as well. For the same reason, any children who fall below the 60% before- or after-housing-costs expenditure-based relative poverty threshold are defined as in expenditure poverty. The material hardship results are calculated based on the material deprivation index. Children are defined as being in material hardship if their household material deprivation index score

**Table 1: Comparisons of income-based and expenditure-based proportions of children under different thresholds**

Threshold	Income-based	Expenditure-based
1 50% before housing cost threshold	12.5%	12.8%
2 60% before housing cost threshold	20.1%	21.6%
3 60% after housing cost threshold	26.3%	29.1%
4 50% after housing cost threshold	19.6%	20.7%
5 40% after housing cost threshold	13.4%	13.0%

Source: author's calculations

**Figure 4: Interaction of children in income-based poverty, expenditure-based poverty and material hardship**



Source: author's calculations

is 6 or more, which is the same as the official definition (Statistics New Zealand, 2019b).

Figure 4 shows that the measures partially overlap, which indicates that the three types of poverty measures have at times captured the same group of children. However, there are also parts that are exclusive to each circle, which means some children are in one type of poverty but not others. There are a significant number of children who are defined as being solely in expenditure-based relative poverty. This suggests that the expenditure-based measures capture a slightly different group

of children to the income-based and material hardship measures. In more detail, Table 2 shows the numbers that underlie the diagram in Figure 4. There are around 157,000 children who are only in expenditure poverty, which is about 13.7% of New Zealand children.

Looking further into these 157,000 children who are only in expenditure-based poverty, we found that around 8,000 children (5.1%) are in single-parent households, around 105,000 children (66.7%) are in two-parent households, and 44,000 children (28%) are in multiple-family households.<sup>6</sup> Most of the children

**Table 2: Number of children in income-based poverty, expenditure-based poverty and material hardship**

Poverty Type	Number of Children	Percentage of Total Child Population
Only in income relative poverty	144,000	12.6%
Only in expenditure relative poverty	157,000	13.7%
Only in material poverty	39,000	3.4%
In both income and expenditure poverty	119,000	10.4%
In both income and material hardship poverty	15,000	1.3%
In both expenditure and material hardship poverty	35,000	3.1%
In all three kinds of poverty	54,000	4.7%

Source: author's calculations

**Table 3: Sensitivity of the results to the equivalence scale used**

	MOECD	1988 Revised Jensen	Square Root
50% before housing cost threshold (EXP50)	12.8%	12.1%	12.8%
60% before housing cost threshold (EXP60)	21.6%	19.6%	19.8%
60% after housing cost threshold (NHEXP60)	29.1%	27.9%	27.1%
50% after housing cost threshold (NHEXP50)	20.7%	19.6%	19.9%
40% after housing cost threshold (NHEXP40)	13.0%	11.8%	11.8%

Source: author's calculations

in expenditure-based poverty only are living in two-parent households. Also, looking at the benefit status of these 157,000 children's households, around 63,000 children's households do not have any social welfare transfer records, such as the Working for Families tax credit, a core benefit, etc., which represents approximately 40.1% of the children who are only in expenditure-based poverty.

Household expenditure can be affected by people's choice of lifestyle. Some people might just choose to spend less in order to save more. However, no matter how much people wish to save, they still need to spend a certain amount of money on food to meet their daily nutrition needs. Therefore, this analysis looks at the food security status of these 157,000 children. From food expenditure records in the dataset, we can see which households' annual food expenditure is below the basic food expense line. The basic food expense line used is based on research from the University of Otago's Department of Human Nutrition (2019). They found that the average food expense for an adult to meet everyday basic nutrition needs is around \$71 per week, which is \$3,692 per year.

To set the basic food expense line for different types of households and make them directly comparable, equivalisation

is needed for the \$3,692 line. The MOECD equivalisation scale is used to be consistent with other equivalised numbers in the study. The food expenditure records in our dataset also need to be equivalised using the MOECD scale for the same reason. The results show that of these 157,000 children, around 26,000 children's households are spending less than \$3,692 per year, which means that about 16.6% of the children who are in expenditure-based poverty only do not have sufficient food to meet their everyday basic nutrition needs.

According to Figure 4 and Table 2, there are also a significant number of children who are defined as being solely in income-based relative poverty. This suggests that these children have low household income but good material wellbeing and sufficient household expenditure. There are around 144,000 children who are only in income poverty, which is about 12.6% of New Zealand children.

Looking further into these 144,000 children who are only in income poverty, we found that around 63,000 of them (43.8%) have their household expenditure decile above or equal to decile 5, i.e. above the median expenditure. Also, 137,000 of the 144,000 children have household expenditure greater than the household income (negative savings), which is 95.1%

of the population only in income poverty. The negative savings could mean these households have other sources of support, have access to credit or live on savings. This can also be a data quality issue.

**Testing sensitivity to the equivalence scale**

As mentioned earlier, this study applies MOECD equivalisation to household expenditure, which may not appropriately allow for the resources needed in larger households or economies of scale. It is a pragmatic choice, given that there is no established expenditure-based equivalisation scale. How sensitive the results are to the equivalence scale has then been tested to support this decision. The 1988 Revised Jensen Scale and the square root scale are selected for the sensitivity test, and the results are compared with MOECD scale results, as shown in Table 3. According to Table 3, the expenditure-based relative child poverty rates using the MOECD equivalisation scale are very similar to the rates using the other two scales, which suggests that using the MOECD equivalisation scale is a reasonable choice.

HES data, except for income such as wages, benefits, etc., which can be collected through administrative sources, is collected through a survey. This means the data only captures respondents' situations at the time when answering the questionnaires. In the case of demographic changes, such as households separating or combining over the year, which may have a significant impact on their income and expenditure structure, the data is unable to capture such changes. Further, in the case of self-employed respondents experiencing income loss during the time the data is collected but who have significant income gain during other times, again the data is unable to capture such information. The lag of self-employment income might also be one of the reasons some households have low income but not low expenditure or material hardship.

As observed above, it might be argued that a plausible reason for households having low expenditure but not low income or material hardship could be people's choice of lifestyle: people might just prefer to spend less in order to save more. However, as this analysis discovered, a

decent number of children live in households with low expenditure but not low income or material hardship, but who are not spending enough on food to meet their basic nutrition needs. Therefore, although there might be an element of lifestyle choice, at least people would not choose to starve in order to save.

## Conclusions

This study explored using expenditure data to add to our understanding of child poverty in New Zealand. Motivated by the work of Meyer and Sullivan (2012), we defined relative low-expenditure measures to compare with income-based poverty and material hardship.

The results of expenditure-based child poverty analysis told us a different story from the income-based one. There is a group of children in households that have relatively low expenditure levels but who are not experiencing material hardship or income poverty. Among these children, most come from two-parent households, but quite a few come from single-parent households or multiple-family households. Of these households, 40.1% are not

receiving any social welfare transfers, and around 26,000 children live in a state of food insecurity.

With the expenditure-based measures added to the child poverty measurement system, we have also identified a group of children who are in income poverty but not experiencing any material hardship, nor have low-level expenditure. Among these children, the household expenditure of almost half of them is above the median expenditure, and most of their households have negative savings.

The aim of this study was to explore a new dimension of child poverty in New Zealand and provide data to build a comprehensive understanding of the issues. This highlighted how using a range of different lenses can provide new insights and help address child poverty in New Zealand.

- 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 study 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 The income and expenditure data from the HES are used to estimate savings as residual.
- 4 Includes both before-housing-costs and after-housing-costs poverty.
- 5 Includes both before-housing-costs and after-housing-costs poverty.
- 6 Meaning more than two adults in the household. Apparent inconsistencies in totals are due to rounding.

## Acknowledgements

I would like to thank Meghan Stephens and Patrick Nolan from the Treasury analytics and insights team, as well as Stephanie D'Souza and Mohammad Salimifar from the Public Policy Institute of the University of Auckland, for their useful comments.

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and Meghan Stephens<sup>1,2</sup>

# Modelling Child Poverty and Wellbeing the Treasury's TAWA microsimulation model

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## Abstract

Large tax–transfer microsimulation models can play a key role in guiding tax–transfer analysis and reform. This article discusses the Treasury's microsimulation model of the tax–transfer system (the Tax and Welfare Analysis (TAWA) model), including how it is used and the standard outputs it produces. The article also considers whether these standard outputs continue to be fit for purpose. This includes a discussion of different ways of estimating poverty impacts, the role reporting should give to financial incentives to work, and the opportunities provided by improved data. This final point is particularly important for understanding take-up and the prospect for extending the model to cover non-financial measures.

**Keyword** poverty measurement, microsimulation modelling

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## Technological change, evidence and policy

Technological change is transforming governments' ability to monitor and understand activity. As Eppel and Lips (2021) noted, there is a trend towards more sophisticated digital government and the use/reuse of data and information from these transactions to improve the design and delivery of government services.

One of the most high-profile recent examples of this trend in New Zealand is Statistics New Zealand's Integrated Data Infrastructure (IDI) (see Box 1). As Jones (et al, 2022) noted, this is having an impact in a number of areas, ranging from modelling the performance of the benefit system, to better targeting school-based equity funding, to modelling the potential spread of Covid-19.

This growing availability of data, along with improved modelling techniques, is also having an impact in areas like poverty measurement. As Stephens (2022) notes, we have an opportunity to use tools like

microsimulation models to better understand the incidence and causes of poverty and, in turn, help lift the living standards of New Zealand's poorest families.

#### The role of the TAWA model

Tax–transfer reform has always required hard choices (e.g., the Beveridge Report (1942), discussed in Nolan, 2006). A balance needs to be struck between alleviating poverty, improving financial incentives to work and minimising fiscal costs (or maximising revenue) to the government (Nolan, 2018b). These trade-offs can be difficult to evaluate given the complexity of tax–transfer systems and population heterogeneity.

As Alinaghi, Gemmill and Creedy (2021) noted, large tax–transfer microsimulation models can play a key role in helping answer practical policy questions and encouraging rational policy development. Microsimulation models can take cross-sectional datasets and apply tax and transfer rules to them. They can cope with the complexities of both the tax–transfer system and population heterogeneity. This article discusses the Treasury's microsimulation model of the tax–transfer system (the Tax and Welfare Analysis (TAWA) model).

TAWA is the only model in the public sector with combined person/family/household-level microsimulation capability. It is used to estimate fiscal costs and the distributional impacts of tax–transfer reforms and produce child poverty projections for the child poverty report (Stephens, 2022). As the model utilises data from the IDI, it is also used for a range of analytical projects to help inform strategic policy advice, including on wealth (Symes 2021, 2022), expenditure (Wang, 2022) and climate change (Davis, 2022).

The uses that the model has been put to have changed over time and this can be expected to continue. Trends for the model's use include:

- being used to answer more complex distributional questions. At the Treasury, microsimulation modelling was originally developed to help with policy costings, which is a very different exercise from producing distributional estimates and projections. In particular,

## BOX 1 The Integrated Data Infrastructure (IDI) and Longitudinal Business Database (LBD)

The Integrated Data Infrastructure consists of over 400 tables across 33 distinct data supplies, comprising over 6 billion rows of data centred around people and households. The database is updated three times a year, and the latest update added an additional 700GB of data. Along with these regular refreshes of data, Statistics New Zealand processes about 15 additional datasets per quarter on an ad hoc basis; these are datasets related to Covid-19 and Statistics New Zealand official statistics production which require data to be made available earlier than usual data refreshes.

The Longitudinal Business Database consists of over 250 tables from 13 distinct data supplies, and holds over 1 billion rows of business-centred data. The LBD is updated annually, with each update holding around 200GB of data.

#### Data lab researchers, projects and research outputs

As of June 2022 there are 991 people with active access to the data. Two-thirds of these people work with the data directly for their projects, while the remaining third have viewing access and provide a support role to the research (e.g., as a supervisor or subject matter expert).

There are currently 330 active projects from a range of organisations: government, tertiary sector and other organisations (such as private sector research firms). There are many types of projects that researchers undertake, from society/community-related research to modelling for different agencies.

In 2021 over 2,000 research outputs were checked for confidentiality and released, following similar levels in 2019 and 2020. There is likely to be an increase in the total research outputs submitted for checking in 2022.

Source: Statistics New Zealand (personal correspondence)

distributional questions are relatively more sensitive to data issues at the top and bottom of the income distribution and projections are sensitive to the economic forecasts used.

- being used as an analytical tool for strategic policy. As the model can draw on a range of data, it can be used to consider broader questions, such as the wealth distribution, expenditure distribution or the distributional impacts of climate change mitigation policy. A useful feature of the model is its ability to estimate offsets (e.g., the degree to which the tax–transfer system offsets the impacts of a policy change).
- increasing interest in non-financial measures. The TAWA model was primarily developed to model income transfers (taxes and cash benefits), but there is growing interest in understanding the interaction of a wider range of government programmes (such as consumption taxes and spending in kind (Crawford and Johnston, 2004; Aziz et al., 2012)) and outcomes like subjective wellbeing (Crichton and Nguyen, forthcoming).

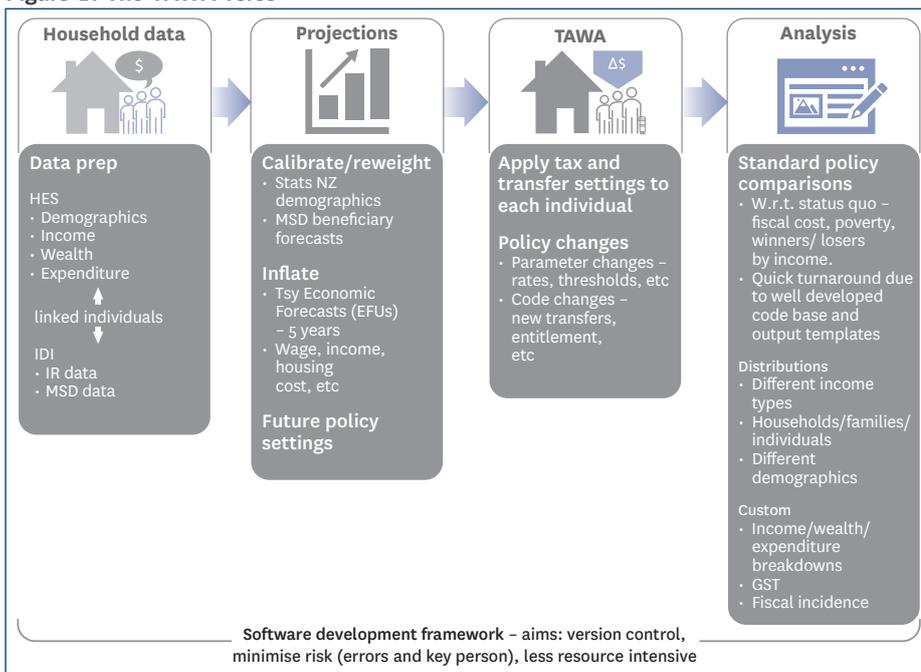
- increasing expectations regarding model governance. Not only is the model being used for more complex tasks, but there is a diminishing appetite for modelling errors. Addressing this requires a focus on ensuring both that the modelling process is transparent and safe and that uncertainties in the model's outputs are properly understood by users (Beer, 2018). These issues will continue to grow in importance, given the increasing role of data and models in the policy process.

#### The TAWA-verse

TAWA can best be seen as a modelling system covering the core input dataset, data for reweighting the population and inflating incomes and costs, code for modelling the tax–transfer system and policy changes, and the code that produces the model outputs. This system is pictured in Figure 1.

TAWA is a simplified version of an individual, family or household's economic reality for a tax year. It provides a 'snapshot' of their situation. This simplification is a necessary feature, not a bug. As Rogers

Figure 1: The TAWA-verse



Source: Symes and Davis, 2020

(2018) noted, just as with maps (which are ‘highly stylized, unrealistic models of real topography’), ‘[t]he trick is to have ... just enough detail to let me get from point A to point B without confusing me with superfluous details and without omitting important details ... unrealism is precisely what makes it useful’. There is still, however, value in discussing how the model operates and the key modelling assumptions. This is not a question of judging whether a model is ‘right’ or ‘wrong’, but is instead a question of better understanding how it operates and the sensible uses to which it could be put. Is it, in other words, the right map for the journey?

**Data and forecasts**

A processed dataset is used as an input to the model. This contains data on household and family structures, demographics (including age and ethnicity), housing costs, regions and material hardship from the Household Economic Survey (HES), which is then linked with individual wage, salary or self-employment income, and core beneficiary status from the IDI. In the input dataset approximately 95% of the adult HES survey respondents are linked to the administrative data. For the remaining records, HES survey responses are used.

TAWA can be used to project up to five years into the future. To do this, the survey data is transformed to align with various

economic and demographic characteristics of the target tax year. For tax years in the future, forecasts of these characteristics produced by Stats NZ, the Ministry of Social Development and the Treasury are used. There are two transformations to time-shift the raw HES data: inflating and reweighting. These transformations are applied sequentially, so the reweighting step uses the output of the inflation step.

In the inflation step, variables are scaled by the relative change in certain economic indices. For example, raw wage income is scaled by the relative change in an average earnings index. In the reweighting step, each household’s weight is scaled such that the weighted sums of particular variables align with benchmarked aggregate values. For example, the number of men and women in five-year age bands is benchmarked to the population projections of Statistics New Zealand.

**Modelling assumptions**

A key assumption in TAWA is that no allowance is made for the possible effects of tax-transfer changes on a modelled individual’s consumption plan or labour supply. The model is, in other words, static arithmetic or non-behavioural (Creedy et al., 2002). Further, take-up of different programmes is modelled in different ways in the model. For core benefits, administrative data is used to determine take-up, while the

accommodation supplement take-up is based on probabilities (Davis, 2021) and Working for Families is assumed to have full take-up.

There are also several other assumptions relating to the incorporation of economic forecasts into TAWA projections (Wang, 2021). These include:

- wage growth is applied uniformly to all observed wages of individuals (the wage distribution is shifted to either the right or the left);
- the same inflator is used for wages and rents (as there is no existing forecast for rents);
- the 90-day rate is used to inflate income from interest, overseas income and trust income;
- the entire working population is upweighted (downweighted) when the forecast number of jobseeker support recipients decreases (increases); and
- if the number of recipients of main benefits increases, these new recipients will have the same characteristics as existing beneficiaries.

**Standard outputs**

The TAWA model produces both standard and custom outputs. Standard outputs are based on a template and are produced with R Markdown so that the process is largely automated. This helps reduce error and supports the communication of risk and uncertainty. These standard outputs cover:

- fiscal impacts: showing the total fiscal cost/revenue – gross or net – and the cost of or revenue from different tax and transfer policies;
- population: showing the total population and population in income deciles; these can also be shown for different family types;
- poverty measures: showing (headcount measures of) the number of children living in households under different poverty measures (both changes and levels). The average income depth of households in poverty in the status quo and scenarios is also shown; measures are reported for the status quo and for scenarios, and the difference between the status quo and scenarios is shown;
- winners and losers: when comparing two policies (or a policy with the status quo) it is possible to show the numbers

advantaged ('winners') and disadvantaged ('losers') in each grouping, and by how much they gain or lose (on average and in total for the group); and

- modelling assumptions and disclaimers: this outlines the key assumptions used in the modelling, along with a risk/reliability assessment. All figures include confidence intervals (reflecting the potential for sampling error, not underlying modelling uncertainty). The IDI disclaimer is included.

### Using the model to measure poverty and wellbeing

#### Benchmarking performance

Model outputs have been compared with Stats NZ data on child poverty. Model outputs have also been benchmarked against Ministry of Social Development research using administrative data (McLeod and Wilson, 2021). Some differences between the different data sources are inevitable, given time frames and differences in methodology. Nonetheless, this benchmarking has shown:

- the importance of take-up, including for Working for Families;
- challenges in modelling family and income dynamics; and
- the inherent uncertainty in prospective estimates – e.g., using a past year's data to model future periods (based on forecasts for economic and employment prospects).

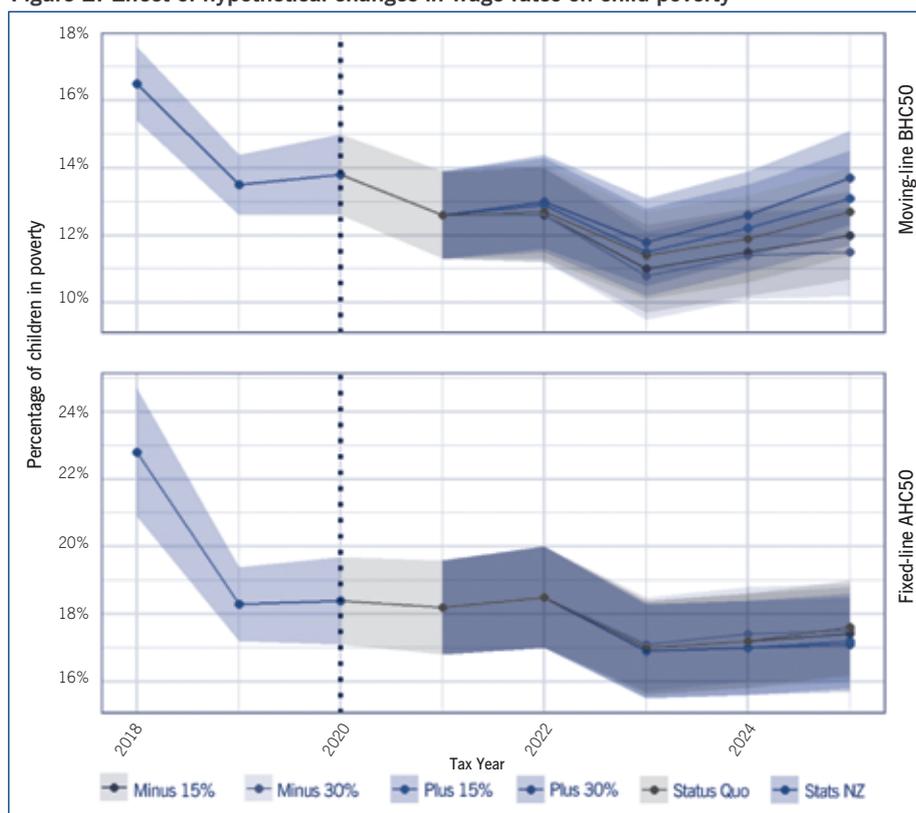
Implications of these issues are discussed in more detail below.

#### Poverty measures

Poverty is measured against a poverty threshold, which defines the level below which income is deemed inadequate. Different levels of inadequacy are reflected in different income thresholds, and these thresholds vary according to a range of characteristics.

They can, for instance, be expressed in absolute (nominal) or relative (inflation-adjusted) terms. An absolute threshold terms people poor if their incomes are below the level necessary to maintain a minimum standard of living that does not change over time, while a relative one terms people poor if their incomes are judged inadequate in relation to those of other

Figure 2: Effect of hypothetical changes in wage rates on child poverty



Source: Wang, 2021

people in society. They also often vary depending on whether they are before or after housing costs.

Figure 2 illustrates why it can be useful to distinguish between absolute and relative child poverty measures. The figure shows the sensitivity of child poverty projections to increases or decreases in wage growth, holding all else constant. As noted above, in TAWA wage growth rates are applied uniformly to all observed wages of individuals in the input data, which means the entire wage distribution is shifted to either the right or the left.

In the figure the 'moving-line BHC50' measure is a relative poverty threshold and the 'fixed-line AHC50' is an absolute one (for further discussion on poverty thresholds used in New Zealand, see Stephens, 2022 and Wang, 2022). A wide range of wage growth shocks are shown – with wages changing from anywhere between –30% and +30%. Looking at the results for the child poverty projections for the final year shows that the relative (BHC50) measure is more sensitive to these hypothetical changes in wage rates.

This should not come as a surprise, as with the fixed-line measure the only effect of an increase in wages is to shift those

people in poverty who have wage income across the poverty line. This assumes no behavioural change and that wage growth applies uniformly. In contrast, with the relative poverty threshold (the BHC50 measure) two things take place: not only is there a change in income among the working poor, but median income changes and, in turn, the poverty threshold moves. This move in the threshold can dominate the increase in incomes among the poorest, meaning that measured poverty increases when wages grow.

This latter effect is often not what people think of when they think about poverty measurement. But both approaches are useful; they illustrate different things. Absolute measures show the incidence of low incomes, while relative ones illustrate broader questions relating to the width of the income distribution.

And the complexities do not stop there. The simplest poverty measures are headcount ones, which show the number or proportion of families below the poverty threshold. However, these measures are only concerned with the fact that these incomes fall below the poverty line. They give no weight to how far families are below the line. A policy that lifts the incomes of

the very poor but fails to bring them above the poverty threshold would be seen to achieve nothing.

It is thus useful to also consider measures that illustrate the extent to which families fall below the poverty threshold (the poverty depth) and the total cost of bringing all the poor up to the poverty line (the poverty gap) (Creedy, 1999). Measures along these lines are already produced as standard outputs in the TAWA model.

Their use is important. For example, consider two hypothetical policies that may lead to the same reduction in absolute poverty (in headcount terms), but one

above the poverty line receive some financial assistance; spill-over to the pre-transfer poor occurs when the transfers received by the pre-transfer poor are greater than those needed to lift their incomes to the poverty threshold (Creedy, 1999; Stephens and Waldegrave, 2001).

#### *Efficiency measures*

As Gemmell (2021) noted, it is important to not lose sight of the efficiency aspects of tax-transfer changes. Indeed, as the Mirrlees Review (2011) noted:

As the TAWA model is able to draw on a range of data, including non-income data, it can be used to answer a wide range of questions, including those related to wealth ..., household expenditure ... and climate change ...

policy may have a larger effect on relative poverty (again in headcount terms). Does this mean that the policy with the larger effect on relative poverty is the better one? Reaching this judgement requires understanding how much of the reduction in relative poverty is due to changes in the median income and the degree to which the very poor have their incomes lifted towards (but not necessarily above) the poverty threshold.

The TAWA model can also produce measures that illustrate how to most effectively reduce poverty. These include poverty reduction effectiveness and targeting efficiency measures.

- Poverty reduction effectiveness shows the ratio of benefits going to the pre-transfer poor to the total benefits needed by that group (Creedy, 1999; Stephens and Waldegrave, 2001).
- Targeting efficiency indicates the extent that expenditure goes to the poor. This is reduced by spillover. Spillover to the pre-transfer non-poor occurs when families with pre-transfer incomes

above the poverty line receive some financial assistance; spill-over to the pre-transfer poor occurs when the transfers received by the pre-transfer poor are greater than those needed to lift their incomes to the poverty threshold (Creedy, 1999; Stephens and Waldegrave, 2001).

It is impossible to take 40% or more of national income in tax – as most advanced economies do – and not have major economic impacts. Most taxes influence people's behaviour in unhelpful ways and all reduce the welfare of those who bear their economic burden. The challenge for tax design is to achieve social and economic objectives while limiting these welfare-reducing side effects. (quoted in Gemmell, 2021, p.2)

One key efficiency dimension is the degree to which tax-transfer changes reduce incentives to work. As noted above, TAWA does not account for the fact that policy changes may lead to people changing their behaviour, although encouraging behavioural changes may be one of the objectives of reform. Yet measuring behavioural responses can be a difficult exercise. Challenges include the sensitivity of results to the assumed labour supply elasticities, and the degree to which earnings elasticities and participation

elasticities are held constant among different population groups.

Nonetheless, in TAWA financial incentives to supply labour can be illustrated on two margins. The extensive margin relates to choices about labour force participation, and the intensive margin relates to choices about hours or weeks of work (Blundell, Bozio and Laroque, 2013).

- The strength of incentives on the intensive margin reflects the impact of the tax-benefit system on the net hourly wage rate.
- The strength of incentives on the extensive margin reflects the income effect of the tax-benefit system. The income effect is the income available for consumption that is independent of the labour supply decision itself.

The effect on the net hourly wage can be illustrated by effective marginal tax rates (EMTRs) (Nolan, 2018a). These show the percentage of an extra dollar earned that the recipient loses due to taxes and loss of transfers. A higher EMTR reduces the incentive for an individual to work an extra hour, so EMTRs are useful when considering work incentives and poverty persistence.

It is also possible to produce budget constraints that can show the net income after taxation and the payment of abated assistance that is received at different levels of time in paid employment. Net income when out of work is the height of the budget constraint at zero hours of work. The height of the budget constraint illustrates the income effect. The slope of the budget constraint is equal to the marginal rate of substitution between time in paid employment and time in other activities. The slope of the budget constraint illustrates the substitution effect. Whether these two effects reinforce or offset each other depends on the case at hand.

#### *Moving into wellbeing*

As the TAWA model is able to draw on a range of data, including non-income data, it can be used to answer a wide range of questions, including those related to wealth (e.g., Symes, 2022), household expenditure (Wang, 2022) and climate change (Davis, 2022).

The model can potentially provide a fuller picture of the interaction of a wider

range of government programmes (such as consumption taxes and spending in kind (Crawford and Johnston, 2004; Aziz et al., 2012)). Fiscal incidence studies can illustrate the distributional effects of indirect taxes and expenditure on key in-kind government services, such as health and education, along with income taxes and transfers.

Work along these lines could potentially be combined with data on subjective wellbeing (e.g., Crichton and Nguyen (forthcoming)) to provide a picture of the wellbeing effects of various policies. This approach would provide a person-centric view of wellbeing across multiple dimensions of wellbeing and complement other approaches which typically consider each wellbeing domain in turn.

## Conclusion

This article has discussed the TAWA model and the uses to which it could be put. One goal was to illustrate how this model operates so that its outputs can be better understood and used. Another goal was to encourage further work in this area to better exploit the potential of the model. To help with this the Treasury also intends to make TAWA freely available to researchers within the IDI. The capabilities of microsimulation models will continue to grow as techniques and data improve, and encouraging people to use these models will help make the most of this potential. This would, in turn, lift understanding of the incidence and causes of poverty and improve the living standards of New Zealand's poorest families.

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- 1 The views, opinions, findings and conclusions or recommendations expressed in this article are strictly those of the authors. 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 authors, not Statistics New Zealand or individual data suppliers.



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