NEW ZEALAND LIVING STANDARDS: THEIR MEASUREMENT AND VARIATION, WITH AN APPLICATION TO POLICY

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Abstract

This paper describes the recently published ELSI scale for measuring living standards. It discusses results with major significance for social policy (including living standard distributions for vulnerable groups such as families with dependent children, beneficiaries and those on low market incomes), indicates some of the implications of these results, identifies new research questions that they raise, and comments on plans for future research to address those questions.

INTRODUCTION

The Centre for Social Research and Evaluation (CSRE) has embarked on an extensive programme of research to: (a) measure the living standards of New Zealanders; (b) establish and report on the pattern of variation that is occurring within the population (especially between and within social and ethnic groups that have been a focus for social policy analysis and intervention); and (c) develop understanding of the social and economic processes that generate living standard variation.

This paper draws on recent research carried out within CSRE's living standards research programme. The paper describes work on three distinct (though related) topics. Although the paper is not directed at providing an explanation for living standard differences, other authors have sought to address this issue (see Perry 2002 for a recent example).

Underpinning all this work is a new social measurement tool, the Economic Living Standard Index (ELSI). The ELSI scale consolidates a large amount of information about different aspects of individual economic wellbeing into a single score. The score has been shown to be a valid and reliable measure of an individual's standard of living, and is readily interpretable within the context of familiar ideas about living standards and the language commonly used to express those ideas.

This paper is divided into three main parts. Part 1 describes the ELSI scale and its interpretation, Part 2 provides a broad description of the living standards of the population

using the ELSI scale, and Part 3 gives some initial results from an analysis of factors associated with hardship amongst families who have dependent children.

PART 1: THE ELSI SCALE

The analysis and results presented in this paper are based on data collected as part of the large-scale research project on the living standards of older New Zealanders. That project was initiated by the Super 2000 Taskforce, which commissioned three separate sample surveys. Two were surveys of older New Zealanders: a general sample and a supplementary older Māori sample. In each case the field data collection was carried out by Statistics New Zealand. The third survey was a sample of working-age people, with the data collected by a private survey and research firm, AC Neilson NZ Ltd. For the purposes of the research, older New Zealanders were specified as those aged 65 years and older and working-age people as those aged 18–64 years.

The purpose of the older people's survey was to gather data for analysing the living standards of older New Zealanders. To boost the number of older Māori in the research, a supplementary older Māori survey was undertaken which enabled a detailed examination of the living standards of older Māori. The purpose of the working-age survey was to enable the living standards of older people to be examined in the wider context of overall New Zealand living standards. Three reports have been published documenting the first analyses (Fergusson et al. 2001a, 2001b, Cunningham et al. 2002).

At an early stage of the project on older people, the Ministry decided that the data provided by the surveys should be used as the foundation for a continuing programme of research on living standards. This paper is based on the first publications to result from that programme (Krishnan, Jensen and Ballantyne 2002, Jensen et al. 2002). The work has involved extensive analysis of the survey data to develop a general living standard measure suitable for examining living standards within the population as a whole as well as sub-groups of the population, and the use of that measure to produce a variety of results, some of which are presented in this paper.

The primary sampling unit for the surveys was the household. From each household, one adult was selected as a survey respondent. The respondent was asked questions both about him/herself and their economic family unit (EFU).[1]

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[1] The economic family unit (EFU) refers to a person who is financially independent or a group of people who usually reside together and are financially interdependent according to current social norms. An economic family unit in practice is either a "single adult", "sole-parent family with dependent children", "two-parent family with dependent children", or a "couple-only family unit".

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Economic Living Standard Index (ELSI)

The research on which this paper is based has been carried out by further exploiting a data set created in part for the purpose of developing a broad-spectrum measure of living standards for older people. The further analysis has been undertaken with the goal of developing a broad-spectrum measure for the whole population.

The objective of that research was to construct a scale of economic living standards that:
• measured across the full continuum;
• was a direct measure, which used a wide range of descriptive indicators;
• was unidimensional;
• was valid and reliable;
• was versatile;
• provided valid comparisons between sub-populations; and
• provided scores which were readily interpretable.

The Economic Living Standard Index, or ELSI, is based on what people are consuming, their various forms of recreation and social participation, their household facilities and so on, rather than being calculated from the resources (income, financial and assets) that enable them to do these things (Mack and Lansley 1985, Nolan and Whelan 1996, Townsend 1979).

Although the theoretical basis of the ELSI scale is complicated, as is the statistical analysis used to produce it and establish its credentials, the measure itself is simple. It uses information from 40 items, specified in a standard way. The information from the items is combined by means of a standard procedure to give a numerical score for each person. To summarise, the approach used:
• is a theory-based approach;
• employs a scale based on latent variable scaling;
• conceptualises living standards as a latent variable that is reflected in specified living standard indicators; and
• defines indicators by sets of living standard measurement items of various types.

The latent variable:
• cannot be observed directly;
• is inferred from the pattern of statistical associations between the indicator variables;
• has been specified using the method of Confirmatory Factor Analysis (CFA);
• is hypothesised as being a single, unidimensional construct;
• is hypothesised as being able to account for the associations between the indicator variables; and
• is only accepted as existing if the data can be shown to fit the CFA model based on the indicator variables.

The items in the ELSI measure are indicated in Table 1. As previously noted, information from the 40 items is combined according to a standard procedure to produce the ELSI score. This can range from 0 (very low living standard) to 60 (very high living standard). The score range has been divided into seven standard score intervals (referred to as living standard levels 1 to 7).

Table 1   Items on the ELSI Scale (2000)

Economising items	Ownership restrictions (did not own because of cost)	Social participation restrictions (did not do because of cost)	Self-assessments of standard of living
Less/cheaper meat Less fresh fruit/vegetables Bought second-hand clothes Worn old clothes Put off buying new clothes Relied on gifts of clothes Worn-out shoes Put up with cold Stayed in bed for warmth Postponed doctor's visits Gone without glasses Not picked up prescription Cut back on visits to family/friends Cut back on shopping Less time on hobbies Not gone to funeral	Telephone Secure locks Washing machine Heating in main rooms Good bed Warm bedding Winter coat Good shoes Best clothes Pay TV Personal computer Internet Contents insurance Electricity	Give presents to family/friends on special occasions Visit hairdresser once every 3 months Holiday away from home every year Overseas holidays once every 3 years Night out once a fortnight Have family or friends over for a meal at least once a month Space for family to stay the night	Standard of living self-rating Adequacy of income self-rating Satisfaction with standard of living self-rating

Calibration of the ELSI Scale

In order to allow interpretation of the score range, a series of analyses was undertaken to calibrate the scale. This included identifying the extent to which:
- people lacked basic items of consumption;
- people had comforts and luxuries;
- people had financial problems;
- which people had problems with their accommodation; and
- families with dependent children lacked children's basic items of consumption.

The calibration results are summarised in Table 2, which gives information describing each of the seven living standard levels. It includes the labels that have been given to the levels. One area of application of the scale is to the study of hardship, and the bottom three levels can be interpreted as indicating varying degrees of hardship.

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Table 2   Calibration Summary (2000)

ELSI score range	ELSI level	Calibration Results	Label
0–15	Level 1	Lack 35% of basics Have 10% of comforts/luxuries Have 47% of the financial problems Have 35% of the accommodation problems Lack 22% of the child basics	"Very restricted" living standard
16–23	Level 2	Lack 22% of basics Have 16% of comforts/luxuries Have 36% of the financial problems Have 29% of the accommodation problems Lack 13% of the child basics	"Restricted" living standard
24–31	Level 3	Lack 11% of basics Have 24% of comforts/luxuries Have 20% of the financial problems Have 23% of the accommodation problems Lack 5% of the child basics	"Somewhat restricted" living standard
32–39	Level 4	Lack 6% of basics Have 31% of comforts/luxuries Have 12% of the financial problems Have 17% of the accommodation problems Lack 3% of the child basics	"Fairly comfortable" living standard
40–47	Level 5	Lack 2% of basics Have 45% of comforts/luxuries Have 5% of the financial problems Have 11% of the accommodation problems Lack 1% of the child basics	"Comfortable" living standard
48–55	Level 6	Lack 0.4% of basics Have 65% of comforts/luxuries Have 2% of the financial problems Have 7% of the accommodation problems Lack 0% of the child basics	"Good" living standard
56–60	Level 7	Lack 0% of basics Have 88% of comforts/luxuries Have 1% of the financial problems Have 4% of the accommodation problems Lack 0% of the child basics	"Very good" living standard

The essential elements of the calibration are represented diagrammatically in the following two figures.

Figure 1 Average Proportion of Population Lacking Basics and Having Comforts/Luxuries, by ELSI Score Levels, 2000
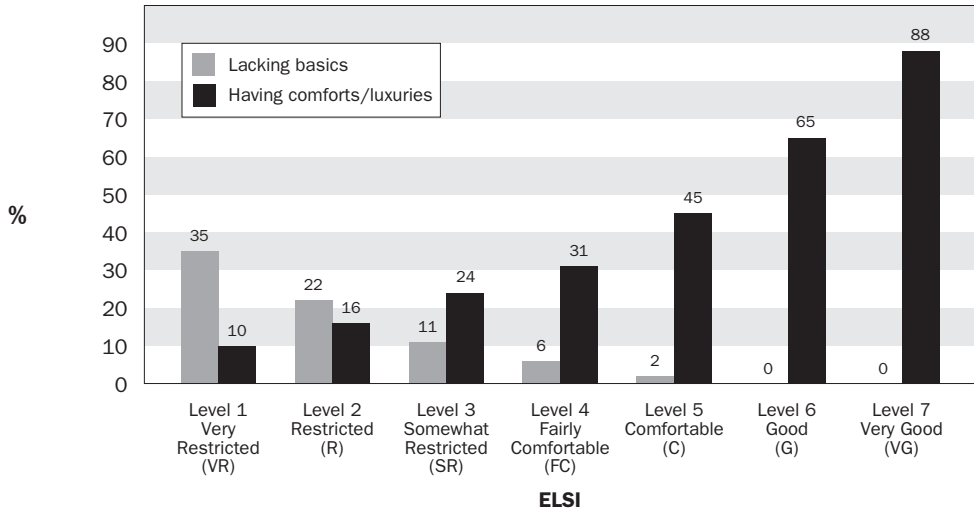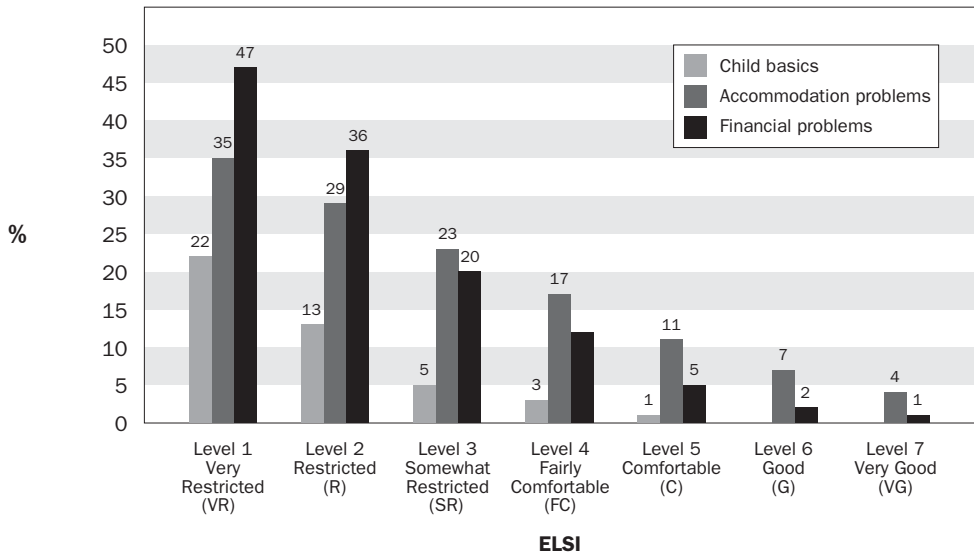

Figure 2 Average Proportion Lacking Child Basics and Having Financial and Accommodation Problems, 2000

The properties of the ELSI scale have only been briefly summarised here. A comprehensive account is given in Jensen et al. (2002).

The ELSI Short Form (ELSI$_{SF}$)

The Ministry of Social Development is currently developing a short form of the ELSI scale which is suitable for inclusion in a wide range of social surveys, enabling widespread use of the ELSI measurement procedure for social monitoring and research.

A preliminary specification of the short form has been produced. It has the essential properties of the ELSI scale, including good levels of validity and reliability. The specification closely reproduces results obtained by the full ELSI scale, while being able to be administered quickly and efficiently. Present indications are that the administration would take four to six minutes.

The Ministry of Social Development will release a report on the ELSI$_{SF}$ in 2003.

PART 2: LIVING STANDARDS OF THE POPULATION

This section provides broad descriptions of the living standards of the New Zealand population using the ELSI scale.

Overall Distribution

Part 1 described the ELSI scale and its associated seven standard score intervals (called living standard levels 1 to 7). The overall distribution shows that 80% of the population have living standard scores that place them in the "fairly comfortable" to "very good" living standards categories. One in five New Zealanders, however, have living standard scores that place them in the "somewhat restricted" to "very restricted" categories of the scale. The mean ELSI score for the total population is 41.9, which falls within the score range characterised as "comfortable". The standard deviation for this mean is 12.2 (see Figure 3).

Figure 3 Living Standard Distribution of the Total New Zealand Population, 2000

Mean ELSI score – 41.9
Standard Deviation – 12.2
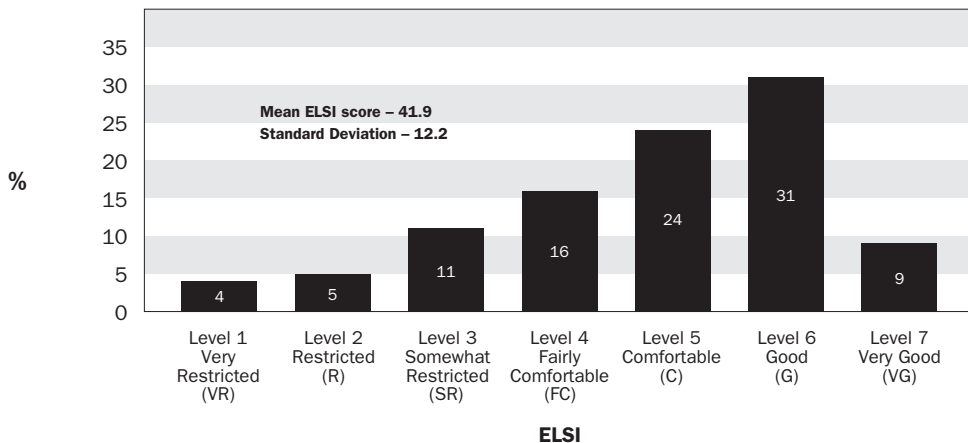
Ethnicity[2]

The following analysis provides a brief overview of the living standards of Māori, Pacific, European, Chinese, Indian and other ethnic groups.

The distribution of living standards by ethnicity reveals marked differences for the different ethnic groups. The European population on the whole has a favourable distribution, with the majority of the population having living standards which are described as "fairly comfortable" to "very good". In contrast, the distributions for the Pacific population and Māori population are less favourable, with higher proportions at the lower and middle parts of the scale and lower proportions at the higher end of the scale. The distribution for the Indian population shows a very favourable distribution, with very few concentrated at the bottom end of the scale. While the distribution of living standards for the Chinese and other (non-European) ethnic groups is more favourable than those of the Māori and Pacific populations, it is less so than that of the European population (see Figure 4).

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[2]   Ethnicity is based on total responses to the ethnicity question. For example, if any adult respondent or child of the respondent had Pacific specified as one of their ethnicities, they are counted as part of the Pacific ethnic group. This procedure is followed for all the ethnic groups, therefore the ethnic categories are not mutually exclusive.

Figure 4 Living Standards of Population, by Ethnicity, 2000
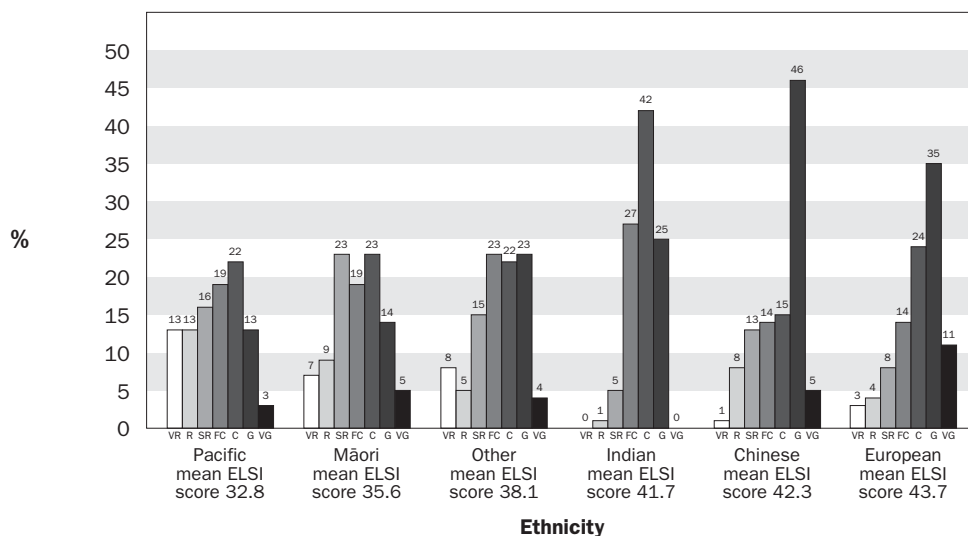
Economic Family Unit Type[3]

Average living standard scores varied widely between the different types of economic family units. Sole-parent families with dependent children had the lowest average living standard score of any family type (M = 29.7). Sole parents with dependent children were at least four times less likely than any other family type to have a living standard score that placed them in the upper (levels 6 and 7) range, twice as likely as any other family type to have an ELSI score that placed them in the "restricted" (level 2) category, and at least four times as likely to have a score placing them in the "very restricted" (level 1) category (see Figure 5).

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[3] Unless otherwise stated, the analysis here is based on counts of people in the different economic family units. For example, where we refer to sole-parent families we mean the population in sole-parent families.

Figure 5 Living Standards of Population, by Economic Family Unit Type, 2000

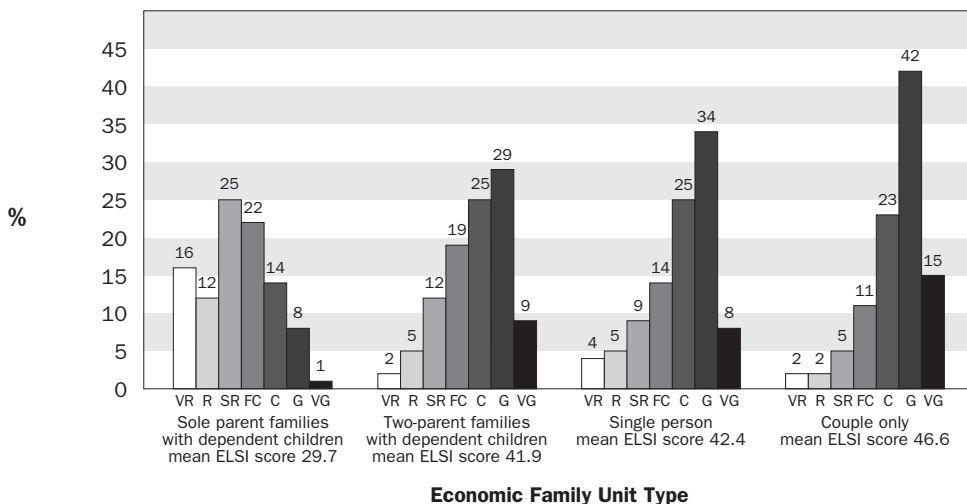**Economic Family Unit Type**

Table 3 suggests that it is the considerable overlap between source of income and family composition that underlies the results portrayed for families with dependent children. The table makes clear that there are large differences in mean ELSI scores between economic family units that receive income from benefit and those that receive income from market sources, regardless of whether they are one-parent or two-parent families. These differences in mean range between 10.6 and 17.6. The majority of sole-parent families (68%) received income from benefit sources whereas the majority of two-parent families received income from market sources (95%).

The overall lower living standard distribution for families with dependent children is not so much due to the presence of children, since two-parent families have similar mean ELSI scores as those without children. It is also not so much the fact of sole parenthood, but that this is so strongly associated with receipt of income-tested benefits. It appears that much of the reason why families with dependent children tend to have a lower mean ELSI score than families without dependent children may be due to the relatively large proportion of all families with dependent children (29%) that are sole-parent families.

Table 3 Living Standards of Economic Family Units (EFUs), by Income Source*
and Presence of Dependent Children Among the Population Aged
Under 65 Years, 2000

EFU type**		Income-tested benefits	Market income
Sole-parent families	% of sole-parent families	67.9%	32.1%
	Mean ELSI score	27.3	37.9
Two-parent families	% of two-parent families	4.4%	95.2%
	Mean ELSI score	25.3	42.9
EFUs with no children	% of families with no dep. children	20.8%	76.3%
	Mean ELSI score	33.0	45.4
Total	% of all EFUs	21.4%	76.5%
	Mean ELSI score	31.1	44.5

* The analysis here divides the population into two mutually exclusive groups:
• those in economic family units where there was receipt of an income-tested benefit (core benefit) in the last 12 months
   and no one was in full-time employment at the time of the survey; and
• those in economic family units who were not in the above category and therefore their income is primarily from market
   sources.
Some of the population here may have been in receipt of an income-tested benefit at some time during the past 12 months,
but were in full-time employment at the time of the survey. Some in the income-tested benefits group may also have received
income from market sources during the year but were not in full-time employment at the time of the survey.
** The unit of reporting here is the economic family unit.

Restrictions in Consumption Experienced by Children

In seeking to better understand how low family living standards can adversely affect children's
development and achievement, it is helpful to examine explicitly the restrictions on children's
activities and care that occur.

Table 4 gives an indication of what life is like for children in families with ELSI scores that
place them at different points on the scale. Children have been grouped into the four broad
living standard categories from "restricted" (levels 1 and 2 combined), "somewhat restricted"
(level 3), "comfortable" (levels 4 and 5 combined), and "good" living standards (levels 6 and
7 combined). In 2000, 13% of all dependent children were in the "restricted" category, 16%
were in the "somewhat restricted" category, 41% were in the "comfortable" category while
30% were in the "good" living standards category. Table 4 examines the propensity for
children in each living standard category to experience a constraint in consumption of the
item examined. For example, 31% of children in the "restricted" category were in families
where there was not suitable wet weather clothing for each child because of cost. This
compares with 7% of children in the "somewhat restricted" category, 3% of children in the
"comfortable" category and no children in the "good" living standards category.

Constraints on consumption of child-specific goods and services are experienced by a greater
proportion of children with ELSI scores that place them at the lower end of the scale. For

those with scores that place them in the "restricted" or "somewhat restricted" categories of the scale, it is at least twice as likely that they will experience postponement of trips to the doctor or dentist or not have suitable wet weather clothing. It is also at least twice as likely that books (including school books) will go unbought, computers or internet access will be unavailable at home, school outings will be skipped, cultural lessons and sports involvement will be forgone, and childcare services will go unpurchased (see Table 4).

Table 4 Constraints in Consumption Experienced by Children, by their Standard of Living, 2000

	"Restricted" living standards (levels 1 & 2) %	"Somewhat Restricted" living standards (level 3) %	"Comfortable" living standards (levels 4 & 5) %	"Good" living standards (levels 6 & 7) %
Items not obtained & Activities not participated in because of cost				
Suitable wet weather clothing for each child	31	7	3	0
A pair of shoes in good condition	17	3	1	0
Child's bike	24	9	4	0
Playstation	29	23	9	1
Personal computer	59	29	20	2
Internet access	59	30	19	3
Pay for childcare services	28	13	8	1
Have children's friends over for a meal	13	5	2	0
Have enough room for children's friends to stay the night	15	2	2	1
Have children's friends to a birthday party	14	3	2	0
Items of consumption cut back on (a little or a lot) because of cost				
Not gone on school outings	51	23	7	1
Not bought school books/supplies	38	18	5	1
Not bought books for home	58	38	17	3
Postponed child's visit to the doctor	31	13	3	0
Postponed child's visit to the dentist because of cost	18	10	4	2
Child went without glasses	9	8	1	0
Child went without cultural lessons	54	41	20	4
Child's involvement in sports limited	54	34	13	1
Child wore bad-fitting clothes or shoes	57	31	13	3
Children share a bed	21	18	3	0
Limited space for children to study or play	45	28	12	5

Living Standards of the Low-Income Population

Over the past 15 years the characteristics of the bottom third of the income distribution have changed. Sole-parent families with dependent children, income-tested beneficiaries and unemployed people have come to make up a greater proportion of those with incomes that place them in the bottom third of the distribution. Factors that have contributed to this include New Zealand's economic performance and its effect on the demand for labour; rising

unemployment in the late 1980s and early 1990s; and the 1991 cuts to income-tested benefits which combined with other changes to further reduce the incomes of many low-income New Zealand families (Mowbray 2001).

Over the past decade there has been keen interest in how those with low incomes have been faring. Most of this work has dealt with the shape of the income distribution, the characteristics of those whose incomes fall below particular thresholds, and changes in the incomes of particular sub-groups of the population in relation to others (Podder and Chatterjee 1998). This type of work provides useful information on trends and can be based on routinely collected statistical information (for example, information collected by Statistics New Zealand's regular Household Economic Survey). Its limitation is that it does not recognise that families with the same income can have differing living standards (resulting from differences in their levels of financial assets, levels of debt, etc.), and it does not take account of differences in incomes among those below a particular income threshold (Krishnan, Jensen and Rochford 2002). Relatively little New Zealand work has attempted to make an explicit link between particular income levels and the real-world implications that a particular income level might have for an achieved standard of living.[4]

The analysis in this section examines the living standard scores of those in economic family units whose equivalised disposable incomes place them in the bottom third of the distribution of equivalent income. Because of the policy interest in low-income families, this group has been further sub-divided into three mutually exclusive groups:
- those in economic family units where there was receipt of an income-tested primary benefit in the last 12 months and no one was in full-time employment at the time of the survey;
- those in economic family units where there was receipt of New Zealand Superannuation;[5] and
- those in economic family units who are in neither of the above two categories and who therefore received their income primarily from market sources.

There are no surprises in the finding that there is a large contrast in the living standards distribution between those in the bottom third of the income distribution and those in the top two-thirds of the income distribution. Those in the bottom third had appreciably lower

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[4] One exception has been the work of Stephens et al. 1995, who have employed family focus groups to establish the face validity of income levels below which their recipients might reasonably be expected to be experiencing difficulty.

[5] Some of the population here may have been in receipt of an income-tested benefit at some time during the past 12 months, but were full-time employed at the time of the survey. Similarly, some NZS recipients may have received an income-tested benefit before qualifying for NZS during the year. Some in the income-tested benefits group may also have received income from market sources during the year but were not in full-time employment at the time of the survey.

living standard scores than those in the top two-thirds. Among those in the bottom third, 35% had scores on the ELSI scale that placed them in the lowest three categories of the seven category scale, 45% had scores that placed them in the "fairly comfortable" or "comfortable" categories and 21% had scores that placed them in the "good" or "very good" living standards categories. The proportions for those with equivalised incomes that placed them in the top two-thirds of the income distribution were 11%, 37% and 52%, respectively (see Figure 6).

Figure 6 Living Standards Distribution by Equivalent Disposable Income, 2000
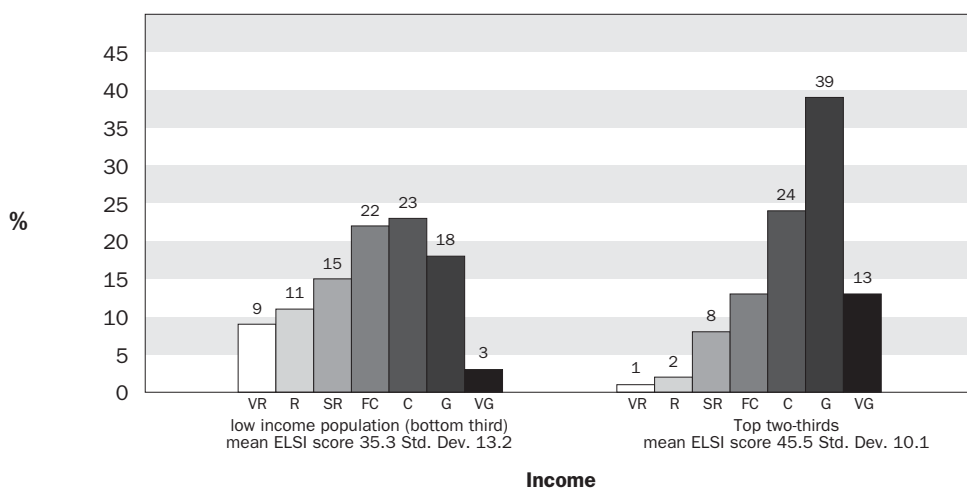
While the living standard scores of those in the bottom third of the income distribution were considerably lower than those in the top two-thirds, there was wide variation between the scores of those in the bottom third depending on their source of income. Overall, those receiving income-tested benefits had lower scores than those receiving market income, who in turn had lower scores than those receiving New Zealand Superannuation. For those in receipt of income-tested benefits, 57% had ELSI scores that placed them in one of the three lowest scale categories. This proportion decreased to 25% for those in receipt of market income and declined further to 9% for those in receipt of New Zealand Superannuation. Only 5% of those receiving benefit income had ELSI scores that placed them in the "good" or "very good" living standards categories of the scale. This proportion increased to 22% for those receiving market income and increased further to 50% for those receiving New Zealand Superannuation (see Figure 7).

Figure 7 Living Standards of the Bottom Third of the Income Distribution, by Income Source, 2000
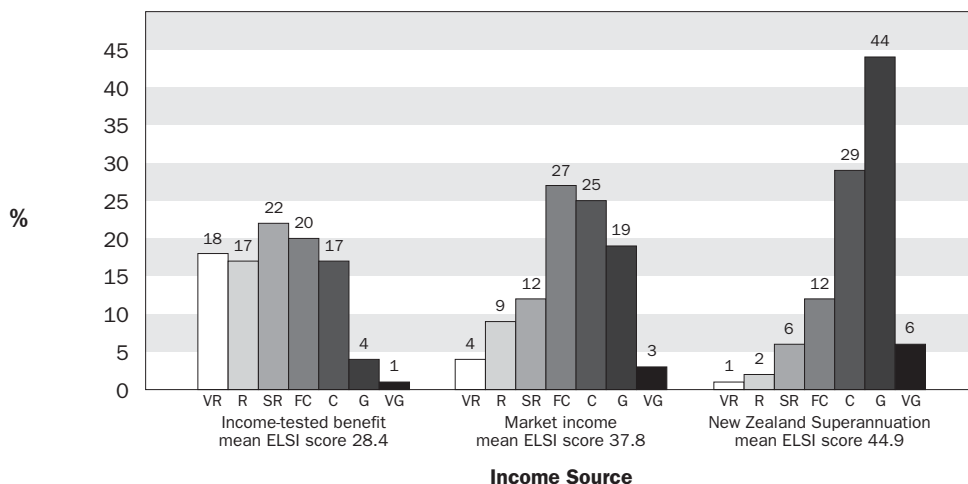
Those on income-tested benefits had an average ELSI score that was substantially below the national average (13 points lower). In contrast, those receiving New Zealand Superannuation had an average ELSI score that was somewhat higher than the national average (*M* = 44.9 compared with *M* = 41.9).

The question naturally arises as to what factors are associated with this variation. Earlier work on the living standards of older New Zealanders identified income, accommodation costs, tenure, asset position and education as being factors associated with variations in living standards among older New Zealanders. These factors are also shown to be associated with variation in living standards found amongst the population as a whole.

The identification of factors that underlie differences in living standards is of great relevance to social policy directed at reducing poverty, and will be an important focus of future living standards research. This research will be directed at not just ascertaining what factors play a role, but their relative importance and the ways in which they interact. This task will require collecting data on a wider range of variables than those used above. These variables might include information on:
- past experiences of economic misfortune;
- the effects of marital dissolution, relationship formation and re-formation;
- levels of debt;
- the extent to which there is support from other family members (which could raise living standards);
- the extent to which family responsibilities cause some income to be diverted to assisting people outside the household (and could lower living standards);

- the extent to which there is persistence of poverty;
- the extent to which there are resources (financial and other) which buffer against the effects of low income;
- health status differences and the impact of health care costs;
- the extent to which there is buffering provided by resources available in neighbourhoods, schools and the local community environment;
- effects of unavoidable costs such as childcare; and
- differences in location that may give rise to variations in prices, unavoidable transport costs, etc.

The description of the living standards of the population provided here has necessarily been brief. A more comprehensive account of the living standards of New Zealanders can be found in Krishnan, Jensen and Ballentyne (2002).

PART 3: CAN LIVING STANDARDS MEASUREMENT ASSIST THE TARGETING OF SOCIAL ASSISTANCE? FACTORS ASSOCIATED WITH HARDSHIP AMONG FAMILIES WITH DEPENDENT CHILDREN

Part 2 of this paper made use of the ELSI scale to present an overview of the living standards of New Zealanders. This third part provides an illustration of another type of application. The scale is used to identify some of the factors associated with hardship among families with dependent children, and to demonstrate how combinations of these factors can be used to specify groups of families that display particularly high (or low) prevalences of hardship.

Analysis of this type has the potential to contribute to: (i) identifying priority groups for intervention, (ii) developing social assistance policies that achieve better targeting of assistance, and (iii) modifying operational procedures to achieve greater effectiveness.

The analysis does not seek to go further than identifying combinations of family characteristics that are statistically associated with differential prevalence of hardship; nor does it seek to establish causal mechanisms that give rise to, or mitigate, hardship. However, some of the findings might serve to suggest hypotheses that might fruitfully be explored in research on causal mechanisms.

Definition of Hardship Adopted for the Research

The first part of this paper (describing the ELSI scale) included calibration data to enable interpretation of the ELSI score ranges (called living standard levels). On the basis of the calibration results it was suggested that people in the bottom three living standard levels could be described in a common-sense way as having some degree of hardship.

For the purposes of the present analysis, three standards of hardship have been used. This has been done to ensure robustness and to show how the results are affected by using differing hardship standards. The three hardship standards are as follows:

- *severe hardship:* operationally defined as having a living standard in the "very restricted" range (ELSI level 1)
- *severe or moderate hardship:* operationally defined as having a living standard in the "very restricted" or "restricted" range (ELSI level 1 or 2)
- *any degree of hardship:* operationally defined as having a living standard in the "very restricted" or "restricted" or "somewhat restricted" range (ELSI level 1 to 3).

Family Characteristics Examined in the Analysis

The analysis is based on the information on family and respondent characteristics contained in the questionnaires for the two surveys used to create the living standards data set (described in the first section). As with the analyses described previously, the term "family" refers to an economic family unit (or EFU).

The information drawn on for the analysis derives from survey questions intended to provide general demographic and contextual information about the families (e.g. housing tenure) or to permit tests of the scale's robustness and validity (e.g., family composition, ethnicity, income). The data available are not ideal for the present purpose, and do not include all the various sorts of information the literature would suggest as having possible relevance to hardship (e.g. disability). Therefore, this analysis – which seeks to identify factors associated with hardship – is an opportunistic use of data that were collected for another purpose, and has some of limitations that inevitably accompany such use. Nonetheless, it includes many of the variables indicated by the literature as being of central importance, and is capable of providing results that may be fruitful in planning more authoritative research on hardship.

To select a set of analysis variables, the various types of information collected in the surveys were considered in relation to the literature on hardship and hardship-prone groups, as were the perceptions of frontline operational staff about the sorts of circumstances that are associated with the need for additional assistance by beneficiaries. This led to the following types of information being singled out for the first stage of the analysis:

- income;
- main source of income (benefit or market income);
- financial assets;
- housing costs;
- housing tenure;
- whether the family (EFU) was a one-parent or two-parent family;
- whether the family (EFU) made up the whole household, or was part of a household with

two or more EFUs (i.e. was in a multi-EFU household);
* mother's age;
* number of dependent children;
* educational qualifications of parent; and
* ethnicity (derived from every member of the family).

Specification of the Analysis Variables

A series of exploratory analyses was conducted using logistic regression. This included an examination of how best to specify the analysis variables to reveal their statistical associations with hardship, and examining the extent to which it was possible to identify a core set of variables that captured most of the information about hardship contained within the full set. Achieving parsimony in the number of variables is helpful in the present context of seeking to identify informative combinations of family characteristics, because it reduces the possible number of combinations. The exploratory analyses were carried out using each of the three hardship standards, and the results compared to identify commonalities. The focus was on identifying relationships that were robust with respect to the choice of standard, and so could be regarded as characterising hardship in a general sense (rather than having high sensitivity to a particular hardship standard).

The exploratory analyses indicated that there are strong and striking interactions between the variables. In particular, the variables have a somewhat different pattern of interrelationships for benefit recipients than for families where the main income source was from market income. This led to the previous logistic regression analyses being repeated separately for each of these sub-populations.

The result of this exploratory work was the identification of a core set of eight analysis variables:
* natural log of equivalised disposable income;
* main source of income (benefit or market);
* housing tenure (owned or rented);
* whether a single-EFU household (single-EFU household or multi-EFU household);
* whether mother is a "younger" mother (aged less than 25 / aged 25 or older);
* whether a "larger" family (three or more dependent children / one or two dependent children);
* whether Māori/Pacific ethnicity (Māori or Pacific ethnicity / other ethnicity);
* number of types of financial investments (apart from the family home).

Of the types of information examined through the logistic regressions, three types are not represented in the above list because they were found not to contribute additional information about hardship over and above the information contained in the above core set: parental

education, whether the EFU was a sole-parent family, and housing costs (specified as outgoings on accommodation costs as a proportion of disposable income). Each of these variables has a simple correlation with hardship, but this is found to be "accounted for" through the association of those variables with the variables in the core set (i.e. through sole-parent families and two-parent families, for example, having differences in income, home ownership, etc. that account for the sole parents' higher prevalence of hardship).

An examination was then made of whether differential prevalences of hardship are found among families with different combinations of family characteristics. This examination was made by means of a hierarchical partitioning (or "splitting") procedure. This type of analysis provides a means of identifying combinations of collectively discriminating variables and representing the results in a succinct way.

One of the problems encountered in applying this approach was the large number of splits produced by the income and investment variables. This compounded the number of combinations and increased the complexity of the results. However, the earlier exploratory analyses had shown that these variables were highly correlated and also had broadly similar patterns of association with other variables. (This was found for the sample as a whole and separately for the larger sub-groups.) This made it possible to combine the two variables into a single composite variable without major loss of information to the analysis. The composite – which has been termed "financial position" – was expressed as three categories,[6] enabling most of the relevant income/investment information to be captured by the analysis while greatly reducing the number of partitions.

To recap, preparatory work for the hierarchical partitioning analysis resulted in the specification of a core set of seven variables (after income and investment types had been combined together to form the financial resources variable). The core set parsimoniously captures all of the information about hardship contained in the initial, larger set of variables. Each variable in the core set has a statistical association with hardship independent of all the other variables considered initially. In other words, each of the items in the core set retains an association with hardship even when the effects of all of the other variables are controlled for statistically. This means that the removal of certain variables from the initial set has not reduced the amount of information relating to hardship contained by the set, but that the removal of any variable from the core set would result in a loss of information.

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[6] Information on each family's disposable income and investment types has been used to put the family into one of three categories. The bottom category comprises families that have low equivalised income (less than $10,000) and do not have assets of any of the types covered in the surveys. This situation has been labelled "poor financial position". By contrast, the label of "good financial position" has been used for families with an equivalised income of at least $10,000 and at least two types of investments or an equivalised income of at least $20,000 and at least one type of investment. Other situations have been labelled "moderate financial position". These categories are referred to as indicating the families' overall financial position.

Use of the Core Set of Variables to Produce a "Hardship Tree"

The hierarchical splitting procedure progressively splits the sample to generate a tree structure defined by combinations of characteristics associated with both high and low prevalences of hardship.

The initial step was to partition the whole sample according to the economic family unit's main source of income (market-income or income-tested benefit). The initial partition was made using main source of income because the exploratory analyses had indicated that, for many of the other independent variables, the statistical relationship with hardship is mediated by whether the family is a "benefit-income family" or a "market-income family". For the market-income group, an examination was then made of the relationship between hardship and each of the remaining independent variables. This was done separately using each of the three specifications of hardship (severe hardship, severe or moderate hardship, and any degree of hardship). A judgement was then made about which variables could be regarded as having a substantial and consistent relationship with hardship across the three specifications. Of those, the one with the strongest average relationship with hardship was selected as the basis for partitioning the group. In the case of the market-income group, the variable thus selected was the composite income-assets variable (called financial position). This is atypical of the independent variables in not being a dichotomy (as are the rest) but rather in being specified as three ordered categories (labelled as "poor financial position", "moderate financial position" and "good financial position"). The market income group was then partitioned on the basis of each family's financial position.

In a similar way, the group of benefit-recipient families was examined on the basis of the independent variables, which resulted in a partition between those families that made up the whole of the household (single-family households) or were part of multi-family households.

This partitioning procedure was repeated for each group created. A group was not partitioned further when either (a) none of the remaining independent variables showed a substantial and consistent relationship with hardship; or (b) further partitioning would result in a group with too few sample members for the prevalence of hardship to be adequately estimated.

The result of such progressive partitioning is to produce an inverted tree structure (referred to in some texts as a dendrogram). In this tree, the whole sample of families comprises the trunk, and the partitions define a pattern of increasingly fine branches. The ends of the branches define a set of terminal groups, each of which corresponds to distinct set of family

characteristics. For each group in the tree structure, respondent sample weights have been used to make an estimate of the prevalence of hardship among families with the specified set of characteristics.[7]

Estimates of the prevalence of hardship have been made for each of the three hardship thresholds. The results are presented in the form of three tree diagrams, one for each hardship standard. The diagrams have the same structure (i.e. they represent the same set of splits) but give different prevalences because they relate to different hardship standards.

Results: The Tree Structure Produced by the Splitting Procedure

The results of applying the previously described sample partitioning procedure are shown in Figures 8, 9 and 10.

Figure 8 Tree Diagram for Families in Severe Hardship

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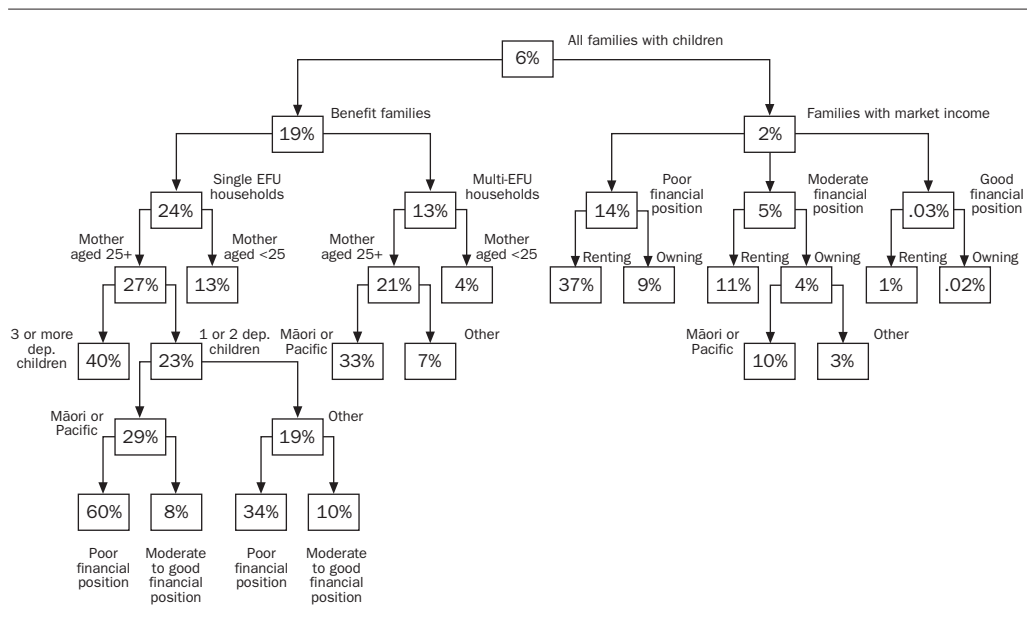
[7] Some adjustments have been made to the order in which partitions are presented in the tree to make more readily apparent the commonalities between the partitioning variables appearing on some of the adjacent branches. This has been done only to enhance presentation and has not altered the terminal groups produced by the partitioning procedure.

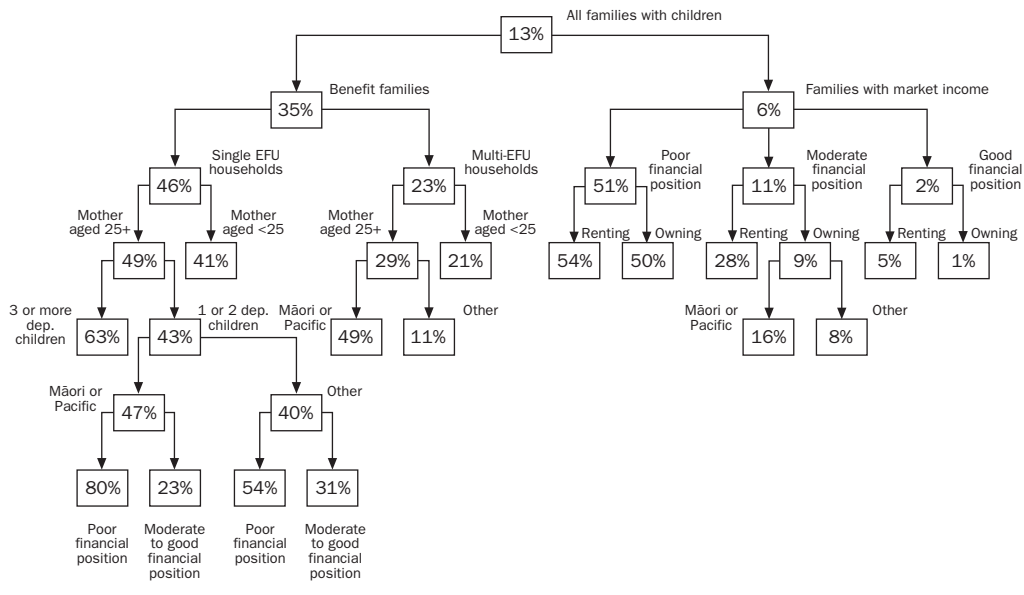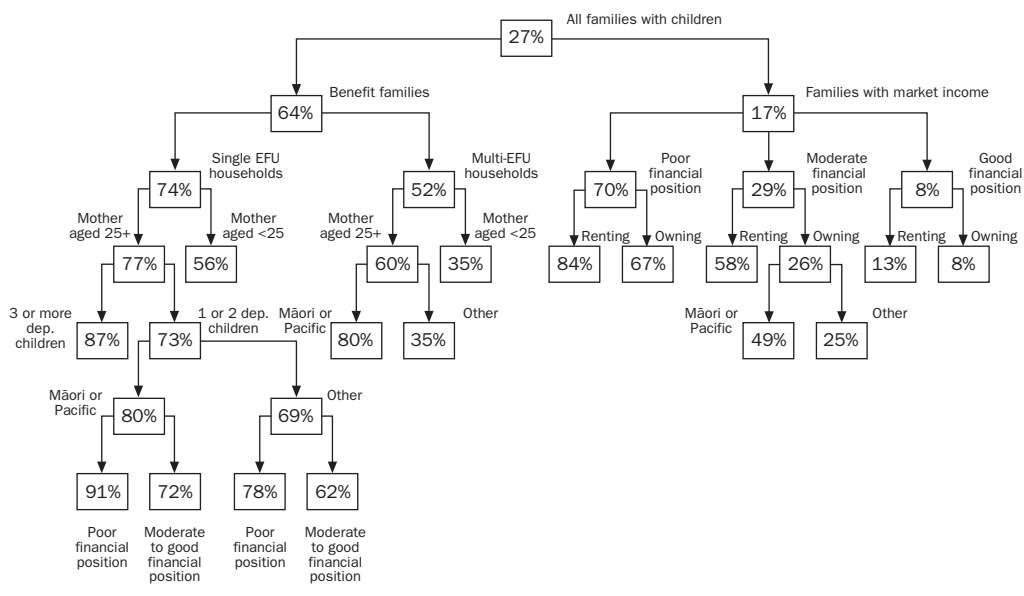## Figure 9 Tree Diagram for Families in Severe or Moderate Hardship

Figure 10 Tree Diagram for Families in Any Degree of Hardship

Discussion of the Results Shown in the Trees

The trees (Figures 8, 9 and 10) present only some provisional results from an analysis that is still being carried out. Extended interpretation would thus be premature. Interpretation is also made speculative by limitations in the data set. However, the results are richly suggestive about possible social mechanisms that may influence hardship, although some of the hypotheses that come to mind cannot be examined without larger numbers of respondents or information on variables not included in the surveys. Nonetheless, a brief few comments (some speculative) are offered here.

- The independent variables available for the analysis can be characterised as being of two broad types: financial variables (income, home ownership, and other types of financial assets) and social variables (ethnicity, type of household, mother's age and number of children). It is striking that different types of variables are most conspicuous in different parts of the tree. For families with market income, it is the financial variables that combine to define groups with differing prevalences of hardship. The only exception is the ethnicity variable, which appears in one of the branches. For beneficiary families, by contrast, the social variables predominate.

- These results were to some extent foreshadowed by information that appeared in the earlier report *New Zealand Living Standards 2000* (Krishnan, Jensen and Ballantyne, 2002). That report included analyses showing that there is wide living standard variation among people with low income, and that low income families with market incomes have a different living standard distribution to benefit-recipient families.

- Why should there be such marked contrast between the part of the tree relating to beneficiary families and the part for market-income families? The data from the current research do not enable this question to be answered, but some speculations can be offered. Overall, beneficiary families that share households have a lower prevalence of hardship than families that do not share. Many of these sharers are lone parents. In some of these cases, the mothers may be living with their own parents under arrangements that augment their living standards in various ways (including the use of good accommodation and associated facilities). Even when the arrangements do not have the effect of directly subsidising the beneficiary family, they may result in economies of scale that are not otherwise achievable (as when the household comprises two sole-parent families with an integrated domestic economy).

- Among beneficiary families, younger mothers tend to have a lower prevalence of hardship than older mothers (those over 25). Given that the majority of beneficiary families are headed by sole-parents, the finding runs counter to the stereotype of young sole-parents

being particularly at risk of poverty. A possible explanation is that young sole-parents are especially likely to receive help from their own parents (and other family members).

- The main reason that the financial variables are not conspicuous in the part of the tree relating to beneficiaries is probably that the beneficiary families are relatively uniform with respect to those variables (having predominantly small amounts of additional income, low assets and a low level of home ownership). Despite this, the beneficiary families show wide variation in living standards (while having a higher general prevalence of hardship). This implies – as a broad conclusion – that differences in terms of non-financial factors are likely to be important. The variables identified by the analysis offer some clues as to some of the mechanisms that may be producing the variation in living standards.

- It seems safe to assume that few beneficiary families are beneficiaries through planned intention. Most find themselves in that situation as a result of some "life shock" for which they have lacked preparation. (The obvious examples are relationship breakdown, job loss, illness/disability and unintended pregnancy.) It may be hypothesised that the outcome (in relation to whether they can avoid hardship) will depend on whether they have sources of assistance that buffer them from the more severe consequences or are able to make arrangements for themselves that ameliorate the consequences. By contrast, a higher proportion of families with market incomes are likely to be in situations that reflect a significant degree of choice and planning. As a consequence, a change that might have a negative effect on living standards if all things are equal (e.g. an increase in the number of children) may tend to occur in the presence of offsetting factors (e.g. the earlier achievement of home ownership). These sorts of speculations are not – by and large – able to be tested using the current data but may help to sharpen the focus of future research.

- It was said earlier that the focus of the present work was to identify some of the ways in which the characteristics of families combine to define groups with differing prevalences of hardship. In that regard, the tree indicates that hardship has a low prevalence among market-income families in a good financial position (irrespective of other characteristics) and families in moderate financial circumstances who are home owners (especially when they are not of Māori or Pacific ethnicity), and that it also has a comparatively low prevalence among beneficiary families who are sharing a household, particularly where the mother is young (less than 25 years), or where the sharing family has an older mother but is not of Māori or Pacific ethnicity). Other beneficiary families with lower prevalences of hardship are ones that have less than three children and – in contrast with most beneficiaries – are in a moderate (or good) financial position.

- The tree indicates that hardship has a high prevalence among market-income families that are in a poor financial position and are renting their accommodation, and among benefit

families in single-family households where the mother is older and has three or more children (irrespective of other characteristics), or where the mother of a single-family beneficiary household has fewer than three children but is in a poor financial position, or where the mother in a multi-family household is older and of Māori or Pacific ethnicity.

- The patterns described are consistent across the three hardship levels (although there are some differences across levels in the precise relativities between different groups). Some of the terminal groups of the tree contain too few sample members to permit the possibility of further branching to be examined. Greater sample numbers therefore may have produced a tree with additional branching. In addition, it is likely that the availability of a wider range of variables would have produced a richer branching pattern, involving greater differentiation among terminal groups with respect to the prevalence of hardship and better indications of the mechanisms that underlie the differences in prevalence.

CONCLUDING COMMENTS

To develop a comprehensive understanding of the social and economic processes that generate living standard differences it will be necessary to disentangle the roles of many inter-related factors. These include family composition and life stage, financial circumstances, state of health, disabilities, socio-economic position, abilities, lifestyle, and so on. Drawing out the interdependency of these factors, their contribution to living standards, and the pathways through which they exert their effect, will be possible only through the progressive creation of a great deal of new knowledge over time.

The results presented here are part of the Ministry of Social Development's continuing programme of research on living standards. Next in the programme is a major population survey that will collect, among other things, information on the sort of explanatory factors outlined above so that a start can be made on disentangling their contribution to living standards. While the present work has focused on what patterns of differences exist, the next stage will advance our knowledge of why these differences exist.

The results reported here are not only interesting in themselves but also strengthen the knowledge base on which social policy rests. Such tools for the measurement of social outcomes are essential to informed debate on issues such as poverty, inequality and inter-ethnic and inter-generational equity. The authors believe that the ELSI scale shows promise as a measurement tool for this purpose. The ultimate proof of this lies in the utility of ELSI to other researchers and to future research.

These results from ELSI's first applications offer encouraging indications of the scale's potential for policy-oriented research. They are a significant contribution to our understanding of

social assistance needs, the types of assistance that might have the greatest effect, and the ways in which such assistance might best be targeted.

Planned future research, built upon the work described here, offers the promise of a greatly enriched understanding of the social processes that produce living standard differences. This will provide a stronger evidential basis for policies to reduce poverty and social disadvantage.

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