Living Standards and Health: New Zealand 2006/07
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Foreword

The critical importance of living standards for health has long been recognised. Yet living standards have not been routinely monitored in New Zealand health surveys. For this reason, the Ministry of Health decided to include two candidate living standard instruments, both developed in New Zealand, in the 2006/07 New Zealand Health Survey. These instruments were the Economic Living Standards Index (ELSI), developed in the early 2000s by the Ministry for Social Development, and the New Zealand Individual Index of Deprivation (NZiDep), developed at around the same time by the University of Otago.

The Health and Disability Intelligence Unit of the Ministry of Health has used the data from the 2006/07 New Zealand Health Survey to carry out a head-to-head comparison of the two instruments, in order to select a living standard instrument for inclusion in the sociodemographic module of the new continuous New Zealand Health Survey, which will be going into the field in April 2011.

The analysis presented in this report confirms the importance of regular monitoring of living standards as a key determinant of health and health equity. The continuous New Zealand Health Survey will provide an ideal vehicle for such monitoring.

The authors welcome comments on this report, and on the selection of fit-for-purpose living standard measures for inclusion in health surveys and related studies. Please address correspondence to martin_tobias@moh.govt.nz.

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Ministry of Health
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Executive Summary

Background

Living standards are a direct measure of an individual’s or family’s actual consumption of goods and services necessary for wellbeing. People with low living standards experience a lack of material goods, do not fully participate in social activities and are forced to economise in order to afford the basics.

Many factors influence an individual’s living standards, including income, assets (such as home ownership), non-income contributions (such as subsidised government services), special demands on income (for example monetary assistance provided to family or church), adverse life events (for example marriage dissolution) and human and social capital (for example household budgeting efficiency, and access to material support from family and friends).

Measures of income (or other measures of socioeconomic position) do not always correlate closely with measures of living standards. Both income and living standards need to be monitored if we are to understand social inequalities in health and the impact of social and economic policies on health equity. Until now, however, there have been no studies undertaken on the association between living standards and health in the general New Zealand population.

The objectives of this study were to compare the psychometric properties of the two candidate living standard instruments available for use in New Zealand; to estimate the distribution of the New Zealand population across the levels of living standards (in the context of a health survey); to investigate associations between living standards and a range of health-related variables; and to estimate the extent to which living standards mediate the association between socioeconomic position and health.

Methods

The data source for this study was the 2006/07 New Zealand Health Survey (NZHS), which surveyed a nationally representative sample of 12,488 adults aged 15 years and over drawn from the usually resident population of New Zealand. The survey collected data on self-reported physical and mental health status, doctor-diagnosed chronic conditions, risk and protective behaviours, body mass index, use of health services and sociodemographic characteristics, including living standards.

Two measures of living standards were included in the survey: the Economic Living Standards Index short form (ELSI{\text{SF}}) and the New Zealand Individual Deprivation Index (NZiDep). The ELSI{\text{SF}} is a 25-item instrument developed between 2000 and 2002 by the Ministry of Social Development, which has since included it in four population-based surveys. The NZiDep is an eight-item instrument developed by the Wellington School of Medicine (University of Otago, Wellington) in 2001–2002. Its developers describe it as a measure of ‘individual-level deprivation’: a construct similar to ‘living standard’ as that term is used in this document. The NZiDep has not previously been included in any population-based survey, although it is included in the ‘Health’ supplement to the Survey of Families, Income and Employment (SoFIE).
Logistic regression was used to investigate associations between living standards and health, adjusting for the confounding factors of sex, age, ethnicity, urban/rural residence, sole parenthood status, housing tenure, employment status, education, equivalised household income and (in some models) private health insurance. All results were weighted to the estimated 30 June 2007 New Zealand population aged 15 years and over.

Key findings

Norms

- Most New Zealanders enjoy good living standards, with about two in three adults experiencing ‘comfortable’ or better living standards, in ELSI$_{SF}$’s terms, or no individual-level deprivation characteristics, in NZiDep’s terms. However, about one in ten adults experience low living standards (‘hardship’ according to ELSI$_{SF}$; five or more deprivation characteristics according to NZiDep).
- Whether measured by ELSI$_{SF}$ or NZiDep, women, young adults and people of Pacific or Māori ethnicity were more likely to experience low living standards.

Head-to-head comparison of the two living standards instruments

- Both the ELSI$_{SF}$ and NZiDep instruments performed well in the 2006/07 NZHS with respect to psychometric properties such as acceptability, reliability and validity. ELSI$_{SF}$ had slightly better reliability and validity, but imposed more respondent burden. NZiDep had better acceptability but (by design) a much greater ceiling effect, placing 66 percent of the population in the ‘no deprivation’ category. The decision as to which instrument to use for a particular survey or study should therefore depend on the purpose and context of the project.

Associations between health and living standards

- A strong, direct and graded association exists between living standard and health status (mental and physical), health risks and access to primary health care. This association is generally slightly reduced by adjustment for other socioeconomic variables (such as income and education). The associations are similar whether ELSI$_{SF}$ or NZiDep is used as the measure of living standards.
- Adjusting for a wide range of demographic and socioeconomic factors (including income), adults experiencing severe hardship/individual-level deprivation were:
  - nine times more likely to suffer psychological distress
  - five to six times more likely to have experienced an unmet need for a general practitioner in the past year
  - twice as likely to be current smokers
  - 20–25 percent more likely to be obese
  - twice as likely to have asthma
  - 60 percent more likely to have coronary heart disease
  - 80 percent more likely to have arthritis
than those with good or very good living standards (according to ELSISF) or experiencing no deprivation (according to NZiDep).

- No interactions were found between ethnicity and living standards. That is, the associations of living standards with health outcomes were similar for all ethnic groups.

- While low living standards can cause poor health, poor health can also negatively affect living standards: for example by restricting people’s ability to participate in social activities. The relative risks listed above therefore overestimate the causal link between living standards and health outcomes. Even if only half the association is causal, however, the relationship between living standard (independent of income and other factors) and health is still very strong.

### Living standards and income

- Equivalised household income (an indicator of socioeconomic position) was also found to influence most of the health outcomes studied, as expected. However, the strength of the associations with income always reduced significantly after adjusting for living standards. Depending on the specific health outcome, between 20 and 80 percent of the effect of income on health was found to be mediated by the effect of living standard. Again, the findings were similar whether living standard was measured by ELSISF or NZiDep.

- These findings indicate that living standard is an important mediator or pathway variable through which income (or socioeconomic position) affects health. However, it should be noted that income also affects health through non-material pathways.

#### Key findings

- Living standards are significantly associated with health outcomes, health risk behaviours and health service use. These associations are direct, strong and graded.

- There are particularly strong associations between living standards and psychological distress, as well as between living standards and rates of unmet need for a general practitioner in the past year.

- Living standards act on health independently of income, as well as (partially) mediating the effect of income.

- Living standards should continue to be monitored in future New Zealand health surveys, along with measures of socioeconomic position such as equivalised household income.

- Both of the two candidate instruments (ELSI_{SF} and NZiDep) are recommended for use in future studies or surveys: the choice between the two should depend on the specific context and purposes of the research.
Implications for policy

- In New Zealand, social assistance has typically taken the form of income support. However, the findings from this study suggest that living standards also contribute to health, independently of income (or other measures of socioeconomic position).

- Policies that provide non-monetary social assistance to improve living standards – such as subsidised home insulation, subsidised health care and subsidised child care – could usefully complement income redistribution policies in order to improve health outcomes overall and simultaneously achieve gains in health equity.

- Non-financial barriers to primary health care access among those with low living standards need to be addressed, in addition to financial barriers. Non-financial barriers to access barriers may include opening hours, waiting times, geographic location of facilities, availability and affordability of public and private transport, cultural safety, health literacy and availability of service information.
Introduction

What do we mean by ‘living standards’?

An individual’s or family’s standard of living is their level of consumption of goods and services necessary for wellbeing.

Living standard indicators measure consumption directly, rather than inferring consumption from the resources available to enable consumption (that is, income).

People with low living standards experience a lack of material goods, do not fully participate in social activities and are forced to economise in order to be able to afford the basics.

How do living standards relate to income?

Income is a measure of economic resources, and as such is often used as an indicator of social status or position.

Income is also often used as a proxy indicator for living standards. Not surprisingly, there is a strong relationship between level of consumption and level of resources available to enable consumption. Yet the relationship is not straightforward: while a high income virtually eliminates the risk of a low standard of living, a low income does not preclude a high living standard.

Most policy interest relates to people on a low income. New Zealand studies (eg, Jensen et al 2006) have shown that those whose main source of income is a means-tested benefit generally experience a low standard of living. However, people with similarly low incomes whose income comes from market sources (mainly employment) generally have moderate living standards. New Zealand superannuitants generally enjoy good living standards, despite low incomes.

Why might a low income not necessarily imply a low living standard? There are several reasons (see Figure 1).

- Assets (particularly home ownership) can buffer low income.
- Non-income contributions to living standards may be available (eg, subsidised government services for people on low incomes).
- Efficient budgeting and purchasing may stretch a limited income further.
- Extra demands on income may be reduced or forgone (eg, financial contributions to family or church).

* ‘Income’ is defined here as ‘current income’ (that is, income over the past 12 months). This is the definition conventionally used in health and other social surveys and in most administrative data collections. If income is defined as ‘permanent’ or ‘lifetime’ income, the correlation with living standards will be higher, through the inclusion of assets.
Why measure living standards?

Indicators of living standards directly measure people’s actual consumption of goods and services essential for wellbeing. Living standards provide a direct, proximate measure of economic wellbeing, which has a profound effect on health.

Moreover, as explained above, current income cannot be used as a reliable proxy measure for living standards, especially at the low end of the income scale – where most policy interest lies. This limitation does not imply that income should no longer be measured as a determinant of health. Income is not just an economic measure; it also indicates social rank or status. Social position affects health, both through and independent of living standards (see Figure 2).

A better understanding of the links between social stratification and health requires measures of social position or resources (such as income and education) and also measures of consumption (such as living standards and deprivation). Moreover, it should be remembered that causality flows in both directions: low income and low living standards affect health, but health can also affect consumption (eg, by restricting an individual’s ability to participate in social activities) and income (eg, by restricting an individual’s capacity for employment).

Beyond increasing understanding of socioeconomic inequalities in health and other social outcomes, direct monitoring of living standards has further specific policy applications. In New Zealand, as in other welfare states, social assistance has typically taken the form of income support, and income-based measures are essential for monitoring the effect of this. Monitoring both income and living standards may redirect the focus of social assistance policies towards non-income contributions (such as targeted government services or home insulation). Inclusion of options for social assistance beyond income redistribution in the social policy debate could yield a better health dividend.
**Figure 2:** Conceptual model of social determinants of health (SDH) and health inequality

- **Globalisation**
- **Social structure**
  - Political system
  - Economy
  - Social systems
- **Culture**
  - Ideologies
  - Social norms
  - Values
  - Religion
  - Human rights
- **SDH**
- **History**
- **Urban/rural divide**
- **Segregation**
- **Social stratification**
- **Social position**
  - Socioeconomic position
    - Income
    - Education
    - Occ class
  - Ethnicity
  - Gender
  - Region
- **Social identity**
  - Social exclusion
  - Cohesion
- **Macro-economic and social policy**
- **Welfare mix**
  - Markets
  - State
  - Family
- **Identity politics**
  - Group membership
- **Social policy**
  - Recognition
  - Treaty
  - Anti-discrimination
- **Discrimination**
- **Over different settings***

- **Risk exposure**
- **Risk selection**
  - Over the lifecourse**

- **Health selection**
  - (Differential consequences)

- **Health outcomes**
  - Functional limitation
  - Premature mortality

- **Morbid processes**
  - Disease (chronic)
  - Injury

- **Physiological states**
- **Psychological states**
  - Addiction

- **Identity politics**
- **Group membership**
- **Social policy**
  - Recognition
  - Treaty
  - Anti-discrimination
- **Discrimination**
- **Over different settings***

- **Health care**
- **Health system**
  - Access
  - Quality
  - Amelioration of health selection
  - Advocacy
  - HIA/Monitoring

- **Multiple/persistent disadvantage**
- ** Poverty**
- **Income**
- **Education**
- **Occupation**
- **Ethnicity**
- **Gender**
- **Age**
- **Region**
- **Healthcare access**
- **Healthcare utilisation**

- **Health policy**

---

* Distribution of SDH (power/privilege)  ** Critical window/accumulation/trajectory  *** Family/neighbourhood/community  † Only major causal links shown

Source: Derived by the first author from multiple sources.
Notes on Figure 2

The left-hand side of the figure illustrates the ‘social determinants of health’ – political, economic and social systems, and ideologies, cultural norms and values – that largely determine the level of health of the population. The socio-cultural/historical context also determines the extent to which society is socially stratified. People come to occupy distinct social positions, depending on social identity (including class, gender and ethnicity). Health inequalities result from the unequal distribution of the social determinants of health by social position, often intensified through residential and occupational segregation (although note that there is little evidence relating to residential segregation in New Zealand). The steepness of the social gradient is influenced by the welfare mix – the extent to which society relies on the state, the market and the family to distribute and redistribute power, privilege, knowledge, opportunity and wealth. In principle, pro-equity macro-social and macroeconomic policies can create (and sustain) a more egalitarian society.

The central part of the model illustrates the pathways whereby social position (indicative of power, or command over resources, and generally measured by income, educational attainment or occupational social class) may lead to differential health outcomes. Low social position is strongly correlated with exposure to health risks. These include low living standards, unhealthy lifestyles, psychosocial stressors and major adverse life events. Thus living standard is only one of several pathways linking social position to health, although the pathways are not necessarily fully independent of each other (eg, low living standards may induce stress and increase the probability of adverse life events such as marriage dissolution).

The right-hand side of the diagram illustrates the process of embodiment. Differential exposure (and vulnerability) to health risks by social position leads to adverse psychological and physiological states (such as depression and addiction) that in turn develop into the diseases and injuries that directly determine health status – including both disability (functional limitation) and premature mortality.

Health status itself in turn influences social position (indicated by the broken arrow labelled ‘health selection’ in the diagram – poor health ‘selects’ individuals into low social positions). For example, mental illness may be a trigger for stigmatisation, job loss, marriage dissolution and downward social mobility. The health system (also represented on the right-hand side of the diagram) can affect social inequalities both positively and negatively. On the one hand, social position may influence access to and use of health services, thus exacerbating health inequalities. On the other hand, the health sector can ameliorate such inequalities by ensuring access for all to high-quality services; advocating for macro-social and macroeconomic policies designed either to diminish social stratification or to break the link between social position and exposure to health risks; reducing the feedback effect of health selection by providing additional support and assistance for the chronically ill and disabled; and monitoring health inequalities and the effectiveness (and cost-effectiveness) of policies and interventions designed to reduce these inequalities.
How can living standards be measured?

We are fortunate in New Zealand to have two candidate living standards measures: ELSI and NZiDep. Both instruments are included in the 2006/07 New Zealand Health Survey questionnaire (available online: www.moh.govt.nz/moh.nsf/indexmh/2006-07-nzhs-adult-and-child-questionnaires).

It should be noted that both measures look specifically at consumption. ELSI is a broad measure of consumption, describing a spectrum from very good living standards to severe restrictions on possible consumption. By contrast, NZiDep focuses on experienced hardships, and thus describes restrictions on possible consumption only. For the purposes of monitoring the impact of living standards on health, both measures are considered to tap the same underlying latent variable (although their range differs).

Economic Living Standards Index

ELSI was developed by Jensen and colleagues at the Ministry of Social Development (MSD) between 2000 and 2002. The short form version of the instrument (ELSI\textsubscript{SF}) has been used in four population-based MSD surveys (Krishnan et al 2002, Jensen et al 2006), and was included in the 2006/07 NZHS. In this report, ‘ELSI’ refers to the short form of ELSI as used in the 2006/07 NZHS.

ELSI belongs to a well-established tradition of direct measures of living standards, which typically tap three or four living standard domains:

- enforced lack of ownership of items necessary for everyday life (ownership restrictions)
- enforced lack of participation in social activities (participation restrictions)
- need to economise on spending (economising behaviours)
- self-rating of standard of living.

An ‘enforced lack’ occurs when cost restricts a respondent from owning an item or participating in a social activity.

Instruments such as ELSI elicit information through a list of specially designed questions to be put to a sample population. Responses are then scored in a specific manner (see below) and categorised to produce a scale indicative of the experience of the population at large. Questions in ELSI were derived mainly from similar instruments in use internationally, modified for the New Zealand situation. A bank of questions was created and the most useful ones identified by factor analysis (which also confirmed that all questions were tapping into a single underlying latent variable).

The scale was tested to establish its psychometric performance in several populations, and further information has since been derived from the three major surveys of living standards fielded by MSD (Perry 2009). The instrument has also been included in Statistics New Zealand’s Household Economic Survey since 2007. ELSI’s completion rates are high, its reliability is excellent, and it shows good construct validity. However, the scale has not previously been validated against health outcomes.
The ELSI short form comprises 25 questions (see Table 1), can be administered by multiple modes and takes approximately four to six minutes to complete. The ownership restrictions and participation restrictions subscales comprise seven questions each, the economisingbehaviours subscale comprises eight questions and the self-rating subscale comprises three questions.

Responses are scored in such a way that the two restrictions subscales together have similar weight to the economising behaviours subscale, while the self-rating subscale is weighted less. The total score will correspond to one of a set of seven classifications identified by developers to describe living standard, ranging from 'severe hardship' to 'very good' (see Table 2). For the purposes of this report, these intervals have been further collapsed (combining 'severe hardship' and 'significant hardship', and combining 'good' and 'very good' living standards) in order to match the five-interval NZiDep scale.

Table 1:  ELSI items

<table>
<thead>
<tr>
<th>Items</th>
<th>Ownership restrictions</th>
<th>Participation restrictions</th>
<th>Economising behaviours (to keep down costs)</th>
<th>Self-rated standard of living</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone</td>
<td>Presents for family/friends – birthdays etc</td>
<td>Gone without fresh fruit and vegetables</td>
<td>How would you rate your material standard of living?</td>
<td></td>
</tr>
<tr>
<td>Washing machine</td>
<td>Hairdresser – three-monthly</td>
<td>Continued wearing clothing that was worn out</td>
<td>How satisfied are you with your material standard of living?</td>
<td></td>
</tr>
<tr>
<td>Heating – all main rooms</td>
<td>Holiday away from home – yearly</td>
<td>Put off buying clothes</td>
<td>How well does your income meet your everyday needs?</td>
<td></td>
</tr>
<tr>
<td>Good shoes</td>
<td>Holiday overseas – three-yearly</td>
<td>Put off visit to the doctor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Best outfit – special occasions</td>
<td>Night out – fortnightly</td>
<td>Not picked up a prescription</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal computer</td>
<td>Family/friend over for meal – monthly</td>
<td>Spent less time on hobbies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home contents insurance</td>
<td>Enough room for family to stay the night</td>
<td>Done without or cut back on trips to the shops</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stayed in bed to avoid heating cost</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Response indicating poorer living standards: ‘Don’t have it because of cost’

Table 2: Score ranges for ELSI_{SF}

<table>
<thead>
<tr>
<th>ELSI score</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–8</td>
<td>Severe hardship</td>
</tr>
<tr>
<td>9–12</td>
<td>Significant hardship</td>
</tr>
<tr>
<td>13–16</td>
<td>Some hardship</td>
</tr>
<tr>
<td>17–20</td>
<td>Fairly comfortable</td>
</tr>
<tr>
<td>21–24</td>
<td>Comfortable</td>
</tr>
<tr>
<td>25–28</td>
<td>Good</td>
</tr>
<tr>
<td>29–31</td>
<td>Very good</td>
</tr>
</tbody>
</table>

Living Standards and Health
It should be noted that the unit of measurement for some items included in the scale is the individual, while for others it is the family (strictly, the ‘economic family unit’). Thus ELSI can be interpreted at either level.

It should also be noted that ELSI covers the full range of living standards (from hardship through to good and very good living standards).

**New Zealand Individual Index of Deprivation**

NZiDep was developed in 2001–2002 by Salmond and Crampton at the Wellington School of Medicine (University of Otago, Wellington) (along with King and Waldegrave from the Family Centre Policy Research Unit) as an individual-level measure of ‘deprivation’, intended to complement the small area-level measures previously developed (NZDep) (Salmond, Crampton and Atkinson 2007).

While identified by the developers as a measure of ‘social conditions experienced (consumption) rather than social class (available resources)’, the provenance of NZiDep is said to be social deprivation theory rather than the living standards measurement tradition per se (Salmond et al 2006).

Questions for possible inclusion in the NZiDep scale were gathered from the English Survey of Living Standards, the British Poverty and Social Exclusion Survey, ELSI, the New Zealand Nutrition Survey and the New Zealand Census. Factor analysis was then used for variable reduction, resulting in the selection of eight of the original 28 items for inclusion in the scale (see Table 3). The scale comprises two distinct groups of questions (four each):

- economising behaviours (similar to equivalent items in ELSI)
- indicators of low income – those with a high probability of correlating with low living standards.

**Table 3:** NZiDep items

<table>
<thead>
<tr>
<th>Economising behaviours</th>
<th>Indicators of ‘deprivation’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bought cheaper food</td>
<td>Made use of food grants or food banks</td>
</tr>
<tr>
<td>Put up with feeling cold</td>
<td>Received help (clothes or food) from community group</td>
</tr>
<tr>
<td>Continued wearing shoes with holes</td>
<td>Received a means-tested benefit</td>
</tr>
<tr>
<td>Gone without fresh fruit and vegetables</td>
<td>Was unemployed for more than one month</td>
</tr>
</tbody>
</table>

The scale was psychometrically tested in a survey of 975 individuals, including 300 Māori and 300 Pacific participants. It was found to be acceptable (with little missing data), to have good reliability, and to have adequate construct validity. (The latter is based on NZiDep finding a strong correlation between living standards and tobacco smoking: see notes on validity under ‘Head-to-head comparison of living standard measures’ below.) NZiDep has been included in the longitudinal Survey of Families, Income and Employment – Health Extension (SoFIE-Health). The results from this study showed that increasing individual-level deprivation was related to worse self-rated health, a higher prevalence of mental distress and/or perceived stress and a higher
prevalence of some chronic diseases (including asthma) (Carter, Hayward and Richardson 2008).

The eight questions in NZiDep all involve yes/no answers. Each is scored equally, and then summed to give the scale score. Scores correspond to one of five classifications identified by the developers, ranging from ‘no deprivation characteristics’ to ‘five or more deprivation characteristics’ (see Table 4). For the purposes of this report, corresponding descriptors from ‘no deprivation’ through to ‘severe deprivation’ have been applied. It must be emphasised that these descriptors refer to deprivation at the individual level, not the meshblock or Census area unit level.

### Table 4: Score ranges for NZiDep

<table>
<thead>
<tr>
<th>NZiDep score (number of deprivation characteristics)</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No deprivation</td>
</tr>
<tr>
<td>1</td>
<td>Slight deprivation</td>
</tr>
<tr>
<td>2</td>
<td>Mild deprivation</td>
</tr>
<tr>
<td>3–4</td>
<td>Moderate deprivation</td>
</tr>
<tr>
<td>5–8</td>
<td>Severe deprivation</td>
</tr>
</tbody>
</table>

Scores were not imputed, so respondents who refused to respond to one or more items could not be attributed a scale score.

While most items included in the scale relate to individual behaviour or experience, some effectively refer to the economic family unit. To date, this instrument has been used only with the individual as the unit of measurement, however.

Note that NZiDep is designed to cover only the lower end of the living standards scale (that is, from low to ‘neutral’). This is not necessarily a serious limitation, as policy is concerned mainly with low living standards.

**Why were both ELSI and NZiDep included in the 2006/07 NZHS?**

As outlined above, there is a need for direct measurement of living standards in health surveys, to complement income-based measures of socioeconomic position (SEP) and area-based measures of deprivation. Living standards measurements indicate an individual’s or family’s level of consumption of essential goods and services, providing direct information as to their experience of hardship or deprivation. Including a living standards instrument in the 2006/07 NZHS along with measures of income enabled measurement of the impacts on health of both socioeconomic position and living standards (independently), and thus quantification of the material pathway linking SEP to health. Given the policy importance of monitoring and reducing socioeconomic inequalities in health, collection of data on both SEP and living standards in health surveys seems warranted.

Given that the two instruments developed for use in New Zealand have contrasting strengths and weaknesses, it was decided to include both in the 2006/07 NZHS adult
questionnaire, to enable a head-to-head comparison to guide the choice as to which living standard instrument to include in future surveys.

The 2006/07 New Zealand Health Survey

The 2006/07 NZHS, fielded from October 2006 to November 2007, collected data from a nationally representative sample of the usually resident non-institutionalised New Zealand population, comprising 12,488 adults (and 4922 children, although children’s responses are not encompassed by this report: see below). The adult sample included approximately 3160 Māori, 1033 Pacific people and 1513 Asian people aged 15 years and over (Ministry of Health 2008). The survey employed a multi-stage, stratified, probability-proportionate-to-size sample design, with increased sampling of some ethnic groups through a ‘screened’ sample. Interviews were conducted in respondents’ homes by specially trained interviewers.

The survey collected data on self-reported physical and mental health status, doctor-diagnosed chronic conditions, risk and protective behaviours, measured weight and height (to calculate body mass index) and waist circumference, and use of health services. Measured sociodemographic characteristics included social position (personal and family income, education, occupation, NZDep score), asset wealth (e.g., house ownership), employment status, extent of household crowding and experience of racism – as well as living standards, measured by both ELSI and NZiDep.

A final response rate of 68 percent was achieved for the adult sample, with good participation among all ethnic groups.

All results in this report refer to the total New Zealand adult population aged 15 years and over. Children were excluded because of a large number of missing responses (1600 children were included in the survey in the absence of an adult from the same household also completing the questionnaire, so living standards data for these children are missing – children’s living standards are assumed to be the same as their household’s).

What are the objectives of this report?

The data collected in the 2006/07 NZHS through the two living standards measurement instruments allows this report to meet the following objectives.

1. Inform health and wider social policy sector workers of the importance of measuring both income (or other measures of SEP) and living standards in health surveys, so that the economic drivers of poor health can be understood and social and health policy formulated accordingly.

2. Norm both available living standard measures (ELSI and NZiDep) for the New Zealand adult population in the context of a health survey.

3. Carry out a head-to-head psychometric comparison of these two measures, so that the optimal measure can be selected for future surveys (or other data collection vehicles), depending on the purposes and requirements of the survey.

4. Analyse the independent relationship of living standards to a wide range of health outcomes, adjusting for appropriate covariates (confounders).
5. Estimate the extent to which the impact of SEP (eg, income) on health is mediated through material pathways (that is, operates via living standards).

6. Identify key implications of this information for policy and monitoring.

**Audience**

This report will be of interest to the policy and research communities. Its authors hope it will assist anyone planning a health survey or cohort study to decide upon the most appropriate data collection instrument as a direct measure of living standards.
New Zealand Norms

Norms (baseline measures for a reference population) are needed for three reasons:

- to monitor trends in living standards over time
- to understand variation between population groups (e.g., age groups or ethnic groups)
- to interpret results for specific groups (e.g., results obtained from a survey of a particular primary health organisation’s enrolled population).

Economic Living Standards Index

Total New Zealand adult population

The distribution of ELSI scores in the New Zealand adult population from the 2006/07 NZHS is shown in Table 5.

Table 5: Prevalence of living standards in New Zealand adults aged 15 years and over, 2006/07, according to ELSI

<table>
<thead>
<tr>
<th>ELSI category</th>
<th>Prevalence (95 percent confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good</td>
<td>19.3 (18.4–20.2)</td>
</tr>
<tr>
<td>Good</td>
<td>43.2 (41.9–44.5)</td>
</tr>
<tr>
<td>Comfortable</td>
<td>20.2 (19.3–21.1)</td>
</tr>
<tr>
<td>Fairly comfortable</td>
<td>9.2 (8.6–9.8)</td>
</tr>
<tr>
<td>Some hardship</td>
<td>4.6 (4.1–5.1)</td>
</tr>
<tr>
<td>Significant hardship</td>
<td>2.1 (1.8–2.3)</td>
</tr>
<tr>
<td>Severe hardship</td>
<td>1.5 (1.2–1.7)</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

Approximately 62 percent of New Zealand adults experienced ‘very good’ or ‘good’ living standards, according to the seven-category ELSI. A further 30 percent experienced ‘comfortable’ or ‘fairly comfortable’ living standards, while about 8 percent experienced some, significant or severe hardship.
Gender

The distribution of ELSI scores by gender in the New Zealand population from the 2006/07 NZHS is shown in Figure 3.

**Figure 3:** ELSI score distribution, total adult population, by sex, 2006/07 (unadjusted prevalence)

Source: 2006/07 NZHS

In a bivariate analysis, women were significantly more likely than men to experience severe hardship, significant hardship or some hardship (9.9 percent of women reported any degree of hardship, compared to 6.2 percent of men).
Age groups

The ELSI score distributions from the 2006/07 NZHS by age group are shown in Figure 4.

Figure 4: ELSI score distribution, total adult population, by age group, 2006/07 (unadjusted prevalence)

Source: 2006/07 NZHS

Youth aged 15–17 years and older people aged 65+ years were least likely to report any degree of hardship (about 3.5 percent of both groups). Adults aged 25–44 years were most likely to report any degree of hardship (over 10 percent).
Ethnic groups

The ELSI score distributions from the 2006/07 NZHS by total response ethnic group are shown in Figure 5.

Figure 5: ELSI score distribution, total adult population, by ethnic group, 2006/07 (unadjusted prevalence)

Source: 2006/07 NZHS
Note: Total response standard output for ethnic groups has been used.

One-quarter of Pacific people (24 percent), approximately 16 percent of Māori, 7 percent of Europeans and 6 percent of Asians reported any degree of hardship. Over 5 percent of Pacific and 3 percent of Māori reported severe hardship; this response was much less prevalent (approximately 1 percent) among the European and Asian ethnic groups.
New Zealand Individual Index of Deprivation

Total New Zealand adult population

The distribution of NZiDep scores in the New Zealand adult population from the 2006/07 NZHS is shown in Table 6.

Table 6: Prevalence of individual deprivation in New Zealand adults aged 15 years and over, 2006/07, according to NZiDep

<table>
<thead>
<tr>
<th>NZiDep category</th>
<th>Prevalence (95 percent confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No deprivation (0 deprivation characteristics)</td>
<td>66.2 (65.1–67.4)</td>
</tr>
<tr>
<td>Slight deprivation (1 deprivation characteristic)</td>
<td>17.8 (16.9–18.6)</td>
</tr>
<tr>
<td>Mild deprivation (2 deprivation characteristics)</td>
<td>7.2 (6.6–7.8)</td>
</tr>
<tr>
<td>Moderate deprivation (3–4 deprivation characteristics)</td>
<td>6.1 (5.5–6.6)</td>
</tr>
<tr>
<td>Severe deprivation (5 or more deprivation characteristics)</td>
<td>2.7 (2.4–3.1)</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

Approximately 66 percent of New Zealand adults experienced no deprivation according to the five-category NZiDep scale. Approximately 25 percent experienced slight or mild deprivation, while almost 9 percent experienced moderate or severe deprivation.

Gender

The distribution of NZiDep scores by gender in the New Zealand adult population is shown in Figure 6.

Figure 6: NZiDep score distribution, total adult population, by sex, 2006/07 (unadjusted prevalence)

Source: 2006/07 NZHS
In a bivariate analysis, women were significantly more likely than men to experience moderate or severe deprivation (approximately 10 percent, as opposed to 7 percent).

**Age groups**

The NZiDep score distributions from the 2006/07 NZHS by age group are shown in Figure 7.

**Figure 7:** NZiDep score distribution, total adult population, by age group, 2006/07 (unadjusted prevalence)

People aged 65 years or older were least likely to report moderate or severe deprivation, followed by youth aged 15–17 years (almost 3 percent of older people and 4 percent of youth). Adults aged 18–44 years were most likely to report moderate or severe deprivation (over 10 percent).
Ethnic groups

The NZiDep score distributions from the 2006/07 NZHS by total response ethnic group are shown in Figure 8.

Figure 8: NZiDep score distribution, total adult population, by ethnic group, 2006/07 (unadjusted prevalence)

Source: 2006/07 NZHS

Note: Total response standard output for ethnic groups has been used.

One-quarter of Pacific people, approximately 20 percent of Māori, 7 percent of Europeans and 6 percent of Asians experienced moderate or severe deprivation. Almost 7 percent of both Pacific and Māori reported severe deprivation; this was much less prevalent (approximately 1–2 percent) among people in the European/Other and Asian ethnic groups.

Comparison with previous norms

ELSI

The MSD has recently carried out three dedicated living standards surveys using ELSI (in 2000, 2004 and 2008). All showed a higher proportion of the population suffering hardship and a lower proportion experiencing very good living standards (that is, a right-shifted distribution of scores) when compared to the 2006/07 NZHS.
This difference may reflect (at least in part) the sensitivity of direct measures of living standards such as ELSI to the context in which the data is being collected. It suggests that ‘health survey’ norms and ‘dedicated living standards survey’ norms should not be compared. Differences in survey design, questionnaire structure and fielding could also partly explain this difference.

NZiDep

No previous nationally representative population-based surveys have been carried out using NZiDep, although the instrument is included in SoFIE–Health.
Head-to-Head Comparison of Living Standard Measures

This section compares the performance of the two living standards instruments on the same nationally representative adult population sample. This head-to-head comparison uses ‘classical’ psychometric methods rather than item response theory. In brief, the analysis comprised:

1. evaluation of the acceptability of the questionnaire to respondents (calculation of the percentage of missing data and how this varied across subgroups)
2. descriptive item statistics and scale score distributions
3. assessment of reliability, by estimation of internal consistency (Cronbach’s alpha: see ‘Reliability’ below) for each instrument
4. assessment of discriminant validity, by examination of the pattern of correlations between each instrument and selected health outcomes.

Acceptability

Table 7 shows the percentage of missing data for each instrument for the adult population as a whole and for major sociodemographic subgroups, in the context of the 2006/07 NZHS.

Table 7: Percentage of missing data, by living standard instrument, 2006/07 NZHS, by sociodemographic group

<table>
<thead>
<tr>
<th>Sociodemographic group</th>
<th>ELSI</th>
<th>NZIDep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1.5% (n=167 out of 12,488)</td>
<td>0.2% (n=26 out of 12,488)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>1.4%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Females</td>
<td>1.6%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15–17 years</td>
<td>10.6%</td>
<td>0.5%</td>
</tr>
<tr>
<td>18–24 years</td>
<td>3.4%</td>
<td>0.1%</td>
</tr>
<tr>
<td>25–34 years</td>
<td>0.9%</td>
<td>0.1%</td>
</tr>
<tr>
<td>35–44 years</td>
<td>0.4%</td>
<td>0.1%</td>
</tr>
<tr>
<td>45–54 years</td>
<td>0.2%</td>
<td>0.2%</td>
</tr>
<tr>
<td>55–64 years</td>
<td>0.2%</td>
<td>0.0%</td>
</tr>
<tr>
<td>65+ years</td>
<td>0.8%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Ethnic group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>European/Other</td>
<td>1.2%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Māori</td>
<td>2.5%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Pacific</td>
<td>5.1%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Asian</td>
<td>2.5%</td>
<td>0.4%</td>
</tr>
</tbody>
</table>
Overall, both instruments showed reasonable acceptability, although ELSI had higher rates of missing data than NZiDep. ELSI recorded particularly high rates of missing data among people aged 15–17 years (10.6 percent missing) and Pacific peoples (5.1 percent missing). Further analysis shows that the ELSI item with the highest rate of missing data was the question about whether the respondent had home contents insurance, with 103 respondents (mainly youth) answering ‘don’t know’.

**Descriptive statistics**

Item responses were well distributed for all items and all subgroups, in that all levels (response choices) for each item were observed (see Table 8 and Figures 9 and 10). On the other hand, the distribution of item responses in both instruments was skewed, with a large proportion of respondents endorsing the higher response choices (reflecting better living standards). This is to be expected in a general population sample.

Estimates of central tendency and dispersion for the scale scores of the total population for both instruments are summarised in Table 8. Analysis shows that 66.2 percent of respondents scored the best living standard score on the NZiDep instrument (that is, a score of zero). If higher as well as lower living standards are of interest, then NZiDep cannot be used, in view of its high ceiling effect (note that NZiDep was deliberately designed this way).

**Table 8:** Descriptive statistics for ELSI and NZiDep, total adult New Zealand population, 2006/07 NZHS

<table>
<thead>
<tr>
<th>Statistic</th>
<th>ELSI</th>
<th>NZiDep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of items</td>
<td>25</td>
<td>8</td>
</tr>
<tr>
<td>Possible range of scores</td>
<td>0 (worst living standards) to 31 (best living standards)</td>
<td>0 (best living standards) to 8 (worst living standards)</td>
</tr>
<tr>
<td>Observed range of scores</td>
<td>0 to 31</td>
<td>0 to 8</td>
</tr>
<tr>
<td>Mean score</td>
<td>24.5</td>
<td>0.7</td>
</tr>
<tr>
<td>5th percentile</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>25th percentile</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>50th percentile – median</td>
<td>26</td>
<td>0</td>
</tr>
<tr>
<td>75th percentile</td>
<td>28</td>
<td>1</td>
</tr>
<tr>
<td>95th percentile</td>
<td>30</td>
<td>4</td>
</tr>
</tbody>
</table>
The mean score for ELSI lay between ‘comfortable’ and ‘good’, while the median score was ‘good’. For NZiDep, the mean score lay between ‘no deprivation’ and ‘slight deprivation’, while the median score was ‘no deprivation’.

**Figure 9:** ELSI score distribution, 2006/07 NZHS

Source: 2006/07 NZHS

Notes: All results are weighted to the total adult New Zealand population. The higher the score, the better the living standard.
Source: 2006/07 NZHS
Notes: All results are weighted to the total adult New Zealand population. The lower the score, the better the living standard.

Reliability

‘Reliability’ refers to the ability of an instrument to generate reproducible measurements. Reliability can be assessed in several ways, including test–retest reliability, inter-rater reliability and internal consistency (item-own scale correlations). For this report, only data to calculate internal consistency was available.

Internal consistency is a measure of how well the individual items of an instrument measure the same underlying construct. For this report, Cronbach’s alpha was used to measure internal consistency (Graham and Lilly 1984). It is a measure of squared correlation between observed scores and true scores, produced by the following formula:

\[
\alpha = \left( \frac{k}{k-1} \right) \left( 1 - \frac{\sum_{g=1}^{k} S_{xg}^2}{S_x^2} \right)
\]

where \( \alpha \) lies between 0 and 1, \( k \) is the number of items in the test, \( S_{xg}^2 \) is the variances of scores \( x_g \) on the \( g \)th item, and \( S_x^2 \) is the variance of scores on the total test.
A value of 0.7 for Cronbach’s alpha is considered the minimum acceptable for sufficient reliability for group comparisons, and a value of 0.9 is considered the minimum acceptable for individual-level comparisons (Ware et al 1993).

Estimates from the 2006/07 NZHS using Cronbach’s alpha were 0.86 for ELSI and 0.75 for NZiDep, using weighted data. That is, both instruments had sufficient internal reliability for group comparisons, ELSI having a higher reliability than NZiDep. Neither instrument met the minimum value for reliability required for individual-level comparisons.

Validity

Validity refers to the ability of an instrument to measure what it was intended to measure. Unlike reliability, validity is not a uni-dimensional construct, capable of being summarised in a single number. Rather, evidence of the validity of a scale for a particular purpose in a particular population accumulates over time as the instrument is used in practice. The evidence available from the use of both instruments in the 2006/07 NZHS on discriminant validity is hereby presented. In the absence of a ‘gold standard’ test it is not possible to assess criterion validity.

To assess validity, two health outcomes that are well known (from international studies) to be strongly associated with living standards were selected – smoking and psychological distress. Validity of the scales was then assessed by comparing scores for respondents who self-reported current tobacco smoking or who had psychological distress compared to scores for those who did not. Effect size was estimated from the formula:

\[ \text{Effect size (d)} = \frac{\text{mean living standard score}_A - \text{mean living standard score}_B}{\text{standard deviation of living standard scores}_A} \]

where, for example, subgroup A = respondents who were current smokers and subgroup B = respondents who were not current smokers.

An effect size of > 0.2 is considered to indicate a clinically and epidemiologically significant difference (Cohen 1977) and to be predictive of satisfactory scale responsiveness (sensitivity to change). In the context of the 2006/07 NZHS, effect sizes were recorded for both ELSI and NZiDep that exceeded this criterion for both tests (see Tables 9 and 10).

Table 9: Discriminant validity estimates for living standards scales, current smokers

<table>
<thead>
<tr>
<th>Statistic</th>
<th>ELSI</th>
<th>NZiDep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean score for subgroup A – current smokers</td>
<td>21.23</td>
<td>1.57</td>
</tr>
<tr>
<td>Mean score for subgroup B – non-smokers</td>
<td>24.48</td>
<td>0.67</td>
</tr>
<tr>
<td>Standard deviation of scores for subgroup A</td>
<td>6.76</td>
<td>1.93</td>
</tr>
<tr>
<td>Effect size (d)</td>
<td>0.48</td>
<td>0.47</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS
Table 10: Discriminant validity estimates for living standards scales, psychological distress

<table>
<thead>
<tr>
<th>Statistic</th>
<th>ELSI</th>
<th>NZiDep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean score for subgroup A – psychological distress</td>
<td>17.88</td>
<td>2.44</td>
</tr>
<tr>
<td>Mean score for subgroup B – no psychological distress</td>
<td>24.21</td>
<td>0.75</td>
</tr>
<tr>
<td>Standard deviation of scores for subgroup A</td>
<td>7.83</td>
<td>2.25</td>
</tr>
<tr>
<td>Effect size (d)</td>
<td>0.81</td>
<td>0.75</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

Note: Psychological distress is indicated by a score of 12 or more on the K10 scale (see ‘Mental health’ in the ‘Living standards and health outcomes’ section below), representing a high or very high probability of having an anxiety or depressive disorder.

Summary

In summary, the psychometric properties of both living standards scales were acceptable in this general adult population sample, including in terms of adequate acceptability, reliability and discriminant validity.

Acceptability was higher for NZiDep than it was for ELSI, probably reflecting the latter instrument’s greater respondent burden (its mean completion time was four–six minutes, compared with the 2–3 minutes required to complete NZiDep).

Reliability was adequate for group comparisons for both instruments (as measured by Cronbach’s alpha). However, alpha was slightly higher for the longer instrument, ELSI.

Both instruments exceeded the 0.2 threshold of discriminant validity (d) for both tests (smoking and mental health), although, again, ELSI scored slightly higher than NZiDep (more significantly in the case of psychological distress).

Both instruments demonstrated some disadvantages: ELSI imposed a higher respondent burden, and NZiDep produced (by design) a markedly skewed distribution with a substantial ceiling effect (over 66 percent of adults fell into the highest living standards category).

These results suggest that both instruments could safely be used in a health survey or cohort study. The decision as to which instrument to choose should be guided by the specific purpose and context of the study in hand, so as to optimise the trade-off between ELSI’s slightly better psychometric properties and NZiDep’s slightly better acceptability and lower respondent burden. If higher as well as lower living standards are of interest then NZiDep should not be used, in view of its high ceiling effect.
Living Standards and Health Outcomes

This section investigates the relationship between living standards and health outcomes, adjusting for potential confounders.

Statistical methods

Logistic regression was used to examine the association between living standards (as measured by NZiDep or ELSI) (the exposure) and each health-related variable (the outcome), while controlling for a wide range of demographic and socioeconomic variables (potential confounders). Methods are described in more detail below.

Selection and definition of health-related outcome variables

A subset of health-related variables was selected from the 2006/07 NZHS to cover physical health, mental health, health risks and health service use. They comprised: current smoking, obesity (measured body mass index), psychological distress (according to the K10 instrument: see ‘Mental health’ below), arthritis, coronary heart disease, asthma and unmet need for a general practitioner (GP) in the past year. The variables were selected using two criteria: ability to represent the health domain of interest, and ability to be reliably measured in the survey context.

Selection and definition of covariates

Potentially confounding variables included in the regression models were age group, gender, prioritised ethnic group (in the order Māori, Pacific, Asian, European/Other), urban or rural residence (main urban, secondary urban, minor urban or rural), employment status (working, unemployed or not in the labour force), housing tenure (owns a house or does not own a house), family structure (sole parent, not sole parent or unknown), equivalised household income (equivalised for household size and composition by the modified Jensen method (Jensen 1988) and expressed as lowest income, middle income or highest income tertile), education (post-secondary school qualification, secondary school qualification or no secondary school qualifications) and, for the ‘unmet need for GP’ analysis, private health insurance status (insured or not insured).

Note that 13.1 percent of equivalised household income values were imputed because of missing income data for one or more household members. For missing data for people in single-person households, personal income was used instead of household income; for other respondents, hot-deck imputation was carried out using other information, including household type, age, whether the respondent was on a benefit, whether they had health insurance, and small area deprivation (on the NZDep2006 scale).
Modelling strategy

The modelling strategy was to begin with all demographic variables in the model (age group, gender and ethnic group), then add socioeconomic variables sequentially until the full model was reached.

The change-in-estimate criterion was used to test whether the model needed to include interaction terms between covariates (Rothman and Greenland 1998). This method compares the odds ratios of the exposure variable of interest (in this case, NZiDep or ELSI) in the full model (that is, with all two-way interactions between the covariates) and in the reduced (main effects) model. If none of the odds ratios changed by more than 10 percent, the reduced model was used. Only interaction effects between NZiDep or ELSI and other factors in the final (fully adjusted) model for each health outcome were tested for. These were regarded as significant if the p-value was less than 0.05.

Regression modelling

Logistic regression was carried out using SAS v9.1 and SUDAAN. The complex survey design was taken into account in analyses using these programs, to either adjust for the sample design (which used stratification and clustering) or by using the jack-knife method to calculate standard errors for estimates.

Adjusted prevalence rate ratios

Predicted marginal prevalences were estimated and prevalence rate ratios (relative risks) were adjusted using the final fully adjusted model (without any NZiDep/ELSI interaction effects) (Bieler et al 2010).

Summarisation and presentation of model output

Results are presented both as odds ratios and as prevalence rate ratios (in each case, along with their 95 percent confidence intervals).

Odds ratios can be interpreted as indicating how much higher the odds are that an individual at any given living standard level will have a particular health outcome than an individual at the highest living standard level (the reference category). An odds ratio that is significantly greater than one indicates higher odds.

Correspondingly, the prevalence rate ratio (described as ‘relative risk’) can be interpreted as indicating how many times more likely an individual at any given living standard level is to have a particular health outcome than an individual at the highest living standard level. Again, a relative risk that is significantly greater than one indicates an excess risk.

Results are shown both for the ‘demographic only’ model (adjusted only for age, sex and ethnicity) and the ‘full’ model (adjusted for age, sex, ethnic group, urban or rural residence, sole parenthood status, housing tenure, employment status, equivalised household income, education and – for the ‘unmet need for GP’ analysis – private health insurance status). Results for ‘intermediate’ models are available from the authors on request.
Mental health

The Kessler 10-item scale (K10) is a well-established measure of psychological distress (Kessler et al 2003). The higher the K10 score, the more likely a person is to have a mental illness meeting the Diagnostic and Statistical Manual of Mental Disorders criteria (APA 1994). Specifically, a score of 12 or more on the K10 scale indicates a high or very high probability of a clinically diagnosable anxiety or depressive disorder, that is, psychological distress (Andrews and Slade 2001). This threshold has recently been validated in a general New Zealand population sample (Oakley Browne et al 2006).

The 2006/07 NZHS found that 6.6 percent (6.0–7.1) of adults aged 15 years and over had psychological distress.

NZiDep

Results of the analysis regressing psychological distress on living standard according to NZiDep score, adjusting for possible confounding variables, are shown in Table 11.

Table 11: Odds ratios of psychological distress, by NZiDep category

<table>
<thead>
<tr>
<th>Model variables</th>
<th>No deprivation</th>
<th>Slight deprivation</th>
<th>Mild deprivation</th>
<th>Moderate deprivation</th>
<th>Severe deprivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZiDep + age + sex + ethnic group</td>
<td>1.00</td>
<td>2.28 (1.71–3.05)</td>
<td>4.20 (3.09–5.70)</td>
<td>6.98 (5.20–9.37)</td>
<td>19.13 (14.08–25.98)</td>
</tr>
<tr>
<td>NZiDep + age + sex + ethnic group + urban + housing tenure + employment + sole parent + income + education</td>
<td>1.00</td>
<td>2.01 (1.50–2.70)</td>
<td>3.27 (2.38–4.51)</td>
<td>5.35 (3.90–7.35)</td>
<td>13.41 (9.52–18.89)</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

Table 11 shows that individual-level deprivation is strongly associated with psychological distress, both before and after adjustment for demographic and socioeconomic covariates. This indicates an independent effect of low living standards on the probability of mental illness. Furthermore, a clear dose–response relationship is evident, the odds of psychological distress increasing steadily with increasing deprivation level.

Translating the odds ratios into prevalence rate ratios (or relative risks) provides a better estimation of the excess risk of mental illness associated with low living standards. Figure 11 shows that people suffering severe deprivation were about nine times more likely to experience psychological distress than people suffering no deprivation. The association is strong, graded and direct.
**Figure 11**: Relative risk of psychological distress, by NZDep category (adjusted prevalence rate ratios)

![Graph showing relative risk of psychological distress by NZDep category]

Source: 2006/07 NZHS

Note: Prevalence rate ratios are given for each NZDep category compared to the 'No deprivation' category (which has a value of 1), adjusting for sex, age, ethnic group, urban category, employment status, sole parenthood status, housing tenure, equivalised household income and education status.

**ELSI**

Table 12 presents the results of the regression analysis of psychological distress on living standards according to ELSI score, adjusting for possible confounding variables.

**Table 12**: Odds ratios of psychological distress, by ELSI category

<table>
<thead>
<tr>
<th>Model variables</th>
<th>Very good or good</th>
<th>Comfortable</th>
<th>Fairly comfortable</th>
<th>Some hardship</th>
<th>Significant or severe hardship</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELSI + age + sex + ethnic group</td>
<td>1.00</td>
<td>2.23 (1.68–2.97)</td>
<td>3.89 (2.91–5.20)</td>
<td>6.47 (4.75–8.82)</td>
<td>18.54 (14.26–24.10)</td>
</tr>
<tr>
<td>ELSI + age + sex + ethnic group + urban + housing tenure + employment + sole parent + income + education</td>
<td>1.00</td>
<td>2.06 (1.52–2.80)</td>
<td>3.41 (2.49–4.66)</td>
<td>5.25 (3.75–7.36)</td>
<td>13.93 (10.25–18.92)</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS
Table 12 shows that low living standards, as measured by ELSI, were highly associated with psychological distress. This association was moderately reduced by adjusting for other measures of social or economic conditions (such as housing tenure, employment status and sole parent status), as can be seen by comparing the ‘demographic only’ model with the ‘full’ model. However, a strong association remained after adjustment for all covariates in the full model, demonstrating an independent effect of low living standards on the odds of psychological distress.

Figure 12 translates the odds ratios into multi-variably adjusted prevalence rate ratios, thus providing a more accurate estimate of the relative risk of psychological distress by living standard category.

**Figure 12:** Relative risk of psychological distress, by ELSI category (adjusted prevalence rate ratios)

Source: 2006/07 NZHS

Notes: Prevalence rate ratios are given for each ELSI category compared to the 'Very good or good' category (which has a value of 1), adjusting for sex, age, ethnic group, urban category, employment status, sole parenthood status, housing tenure, equivalised household income and education status.

Figure 12 shows a clear dose–response relationship, individuals with comfortable living standards being twice as likely to have a mental illness as those in the reference category (very good or good living standards), all else being equal. Individuals suffering severe or significant hardship are about nine times more likely to experience psychological distress, after adjusting for a wide range of potential confounders. The relationship is direct, strong and graded.

These results are all almost identical to the results for NZiDep (see above).
Physical health

Asthma

For the purposes of this report, asthma was defined as self-reported doctor-diagnosed reversible airways obstruction in individuals under 45 years of age (to avoid confusion with chronic obstructive pulmonary disease) who were currently using inhalers, aerosols or tablets for this condition (that is, sufferers of ‘medicated asthma’).

The 2006/07 NZHS found that 11.7 percent (10.7–12.7) of adults aged 15–44 years had medicated asthma.

NZiDep

Table 13 presents the results of the regression analysis of medicated asthma on living standards according to NZiDep score, adjusting for possible confounding variables.

Table 13: Odds ratios of medicated asthma, among people aged 15–44 years, by NZiDep category

<table>
<thead>
<tr>
<th>Model variables</th>
<th>Odds ratio (95 percent confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No deprivation</td>
</tr>
<tr>
<td>NZiDep + age + sex + ethnic group</td>
<td>1.00</td>
</tr>
<tr>
<td>NZiDep + age + sex + ethnic group + urban + housing tenure + employment + sole parent + income + education</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

The odds of having medicated asthma increase with increasing individual-level deprivation (according to NZiDep score), demonstrating a dose–response relationship between living standard and the odds of having medicated asthma.

Comparing the ‘demographic’ with the ‘full’ model demonstrates that the strength of this effect is unaffected by adjustment for rurality, housing tenure, employment, sole parent status, equivalised household income and education.

Figure 13 translates these odds ratios into multi-variably adjusted prevalence rate ratios. Adults suffering severe deprivation are over twice as likely to have medicated asthma as those suffering no deprivation, after adjusting fully for demographic and (other) socioeconomic factors.
**Figure 13:** Relative risk of medicated asthma, among people aged 15–44 years, by NZiDep category (adjusted prevalence rate ratios)

<table>
<thead>
<tr>
<th>Individual deprivation (NZiDep)</th>
<th>Prevalence rate ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>No deprivation</td>
<td>1.00</td>
</tr>
<tr>
<td>Slight deprivation</td>
<td>1.18</td>
</tr>
<tr>
<td>Mild deprivation</td>
<td>1.13</td>
</tr>
<tr>
<td>Moderate deprivation</td>
<td>1.52</td>
</tr>
<tr>
<td>Severe deprivation</td>
<td>2.34</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

Notes: Prevalence rate ratios are given for each NZiDep category compared to the ‘No deprivation’ category (which has a value of 1), adjusting for sex, age, ethnic group, urban category, employment status, sole parenthood status, housing tenure, equivalised household income and education status.

**ELSI**

Table 14 presents the results of the regression analysis of medicated asthma on living standards according to ELSI score, adjusting for possible confounding variables.

**Table 14:** Odds ratios of medicated asthma, among people aged 15–44 years, by ELSI category

<table>
<thead>
<tr>
<th>Model variables</th>
<th>Odds ratio (95 percent confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very good or good</td>
</tr>
<tr>
<td>ELSI + age + sex + ethnic group</td>
<td>1.00</td>
</tr>
<tr>
<td>ELSI + age + sex + ethnic group + urban + housing tenure + employment + sole parent + income + education</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS
These results show that people suffering significant or severe hardship had significantly higher odds of having medicated asthma than people with very good or good living standards. This association remained relatively stable after adjusting for a range of demographic and socioeconomic covariates.

The relative risk of asthma by ELSI category, expressed as multi-variably adjusted prevalence rate ratios, is shown in Figure 14.

**Figure 14:** Relative risk of medicated asthma, among people aged 15–44 years, by ELSI category (adjusted prevalence rate ratios)

![Graph showing relative risk of medicated asthma](image)

Source: 2006/07 NZHS

Note: Prevalence rate ratios are given for each ELSI category compared to the 'Very good or good' category (which has a value of 1), adjusting for sex, age, ethnic group, urban category, employment status, sole parenthood status, housing tenure, equivalised household income and education status.

These results show that people suffering 'some' hardship were about 40 percent more likely to have medicated asthma than people with very good or good living standards, all else being equal. People with 'severe or significant' hardship were over twice as likely to have medicated asthma, after fully adjusting for confounding factors.

These results are consistent with those found using NZiDep as the living standard measure (see above).
Arthritis

For this purposes of this report, arthritis was defined as self-reported doctor-diagnosed arthritis of any type, including osteoarthritis, rheumatoid arthritis, gout or any other type of arthritis.

The 2006/07 NZHS found that 14.8 percent (14.2–15.3) of adults aged 15 years and over reported doctor-diagnosed arthritis.

NZiDep

Table 15 presents the results of the regression analysis of arthritis on living standards according to NZiDep score, adjusting for possible confounding variables.

Table 15: Odds ratios of arthritis, by NZiDep category

<table>
<thead>
<tr>
<th>Model variables</th>
<th>Odds ratio (95 percent confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No deprivation</td>
</tr>
<tr>
<td>NZiDep + age + sex + ethnic group</td>
<td>1.00</td>
</tr>
<tr>
<td>NZiDep + age + sex + ethnic group + urban + housing tenure + employment + sole parent + income + education</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

The odds of having arthritis increased with increasing individual-level deprivation (as measured by NZiDep) in a smooth dose–response fashion. For people suffering severe deprivation, the odds ratios were similarly high for both models, indicating that the effect is largely independent of other social or economic factors.

Figure 15 presents the relative risk of having arthritis by NZiDep category, expressed as multi-variably adjusted prevalence rate ratios.
Figure 15: Relative risk of arthritis, by NZiDep category (adjusted prevalence rate ratios)

Source: 2006/07 NZHS

Notes: Prevalence rate ratios are given for each NZiDep category compared to the 'No deprivation' category (which has a value of 1), adjusting for sex, age, ethnic group, urban category, employment status, sole parenthood status, housing tenure, equivalised household income and education status.

This figure shows that adults experiencing severe deprivation were over twice as likely to have arthritis, and even adults experiencing slight deprivation were about 20 percent more likely to have arthritis, than adults experiencing no deprivation, all else being equal.

ELSI

Table 16 presents the results of the regression analysis of arthritis on living standards according to ELSI score, adjusting for possible confounding variables.

<table>
<thead>
<tr>
<th>Model variables</th>
<th>Very good or good</th>
<th>Comfortable</th>
<th>Fairly comfortable</th>
<th>Some hardship</th>
<th>Significant or severe hardship</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELSI + age + sex + ethnic group</td>
<td>1.00</td>
<td>1.19 (0.99–1.43)</td>
<td>1.90 (1.38–2.61)</td>
<td>1.81 (1.28–2.56)</td>
<td>2.98 (2.18–4.08)</td>
</tr>
<tr>
<td>ELSI + age + sex + ethnic group + urban + housing tenure + employment + sole parent + income + education</td>
<td>1.00</td>
<td>1.13 (0.94–1.36)</td>
<td>1.75 (1.27–2.41)</td>
<td>1.66 (1.20–2.31)</td>
<td>2.63 (1.87–3.71)</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS
The odds of having arthritis increased with increasing hardship as measured by ELSI. While adjusting for socioeconomic factors decreased the odds ratio slightly, the association between arthritis and living standards still remained strong.

Multi-variably adjusted prevalence rate ratios are presented in Figure 16.

**Figure 16:** Relative risk of arthritis, by ELSI category (adjusted prevalence rate ratios)

Source: 2006/07 NZHS

Note: Prevalence rate ratios are given for each ELSI category compared to the ‘Very good or good’ category (which has a value of 1), adjusting for sex, age, ethnic group, urban category, employment status, sole parenthood status, housing tenure, equivalised household income and education status.

Overall, people experiencing significant or severe hardship were about 80 percent more likely to have arthritis than people experiencing good or very good living standards, after adjusting for a range of potentially confounding variables (including household income and education).

Once again, these results are consistent with those obtained using NZiDep as the measure of living standards.

**Coronary heart disease**

For the purposes of this report, coronary heart disease was defined as a respondent reporting that they had ever been admitted to hospital with a heart attack or had ever been told by a doctor that they have angina (chest pain on exercise).
The 2006/07 NZHS found that 5.2 percent (4.7–5.6) of adults aged 15 years and over had coronary heart disease according to this definition.

NZiDep

Table 17 presents the results of the analysis regressing coronary disease prevalence on living standards according to NZiDep score, adjusting for possible confounding variables.

Table 17: Odds ratios of coronary heart disease, by NZiDep category

<table>
<thead>
<tr>
<th>Model</th>
<th>Odds ratio (95 percent confidence interval)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No deprivation</td>
<td>Slight deprivation</td>
<td>Mild deprivation</td>
<td>Moderate deprivation</td>
</tr>
<tr>
<td>NZiDep + age + sex + ethnic group</td>
<td>1.00</td>
<td>1.49 (1.10–2.00)</td>
<td>1.42 (0.95–2.13)</td>
<td>3.82 (2.51–5.81)</td>
<td>4.10 (2.40–7.01)</td>
</tr>
<tr>
<td>NZiDep + age + sex + ethnic group + urban + housing tenure + employment + sole parent + income + education</td>
<td>1.00</td>
<td>1.23 (0.91–1.66)</td>
<td>1.04 (0.68–1.59)</td>
<td>2.44 (1.61–3.70)</td>
<td>2.46 (1.38–4.38)</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

Adults experiencing moderate or severe deprivation had significantly higher odds of having coronary disease compared with those experiencing no deprivation, after fully adjusting for demographic and socioeconomic factors. Interestingly, there was evidence for a step change in the association with coronary disease rather than a smooth dose–response relationship across the deprivation spectrum, as had been indicated for most of the other health outcomes.

The prevalence rate ratios in Figure 17 show that people suffering moderate or severe deprivation were twice as likely to have coronary disease as people suffering no deprivation, after fully adjusting for demographic and socioeconomic factors. The step change in the association that occurs between ‘mild’ and ‘moderate’ deprivation is again clearly visible.
**Figure 17:** Relative risk of coronary heart disease, by NZiDep category (adjusted prevalence rate ratios)

Source: 2006/07 NZHS

Notes: Prevalence rate ratios are given for each NZiDep category compared to the 'No deprivation' category (which has a value of 1), adjusting for sex, age, ethnic group, urban category, employment status, sole parenthood status, housing tenure, equivalised household income and education status.

**ELSI**

Table 18 presents the results of the analysis regressing coronary disease prevalence on living standards according to ELSI score, adjusting for possible confounding variables.

**Table 18:** Odds ratios of coronary heart disease, by ELSI category

<table>
<thead>
<tr>
<th>Model</th>
<th>Very good or good</th>
<th>Comfortable</th>
<th>Fairly comfortable</th>
<th>Some hardship</th>
<th>Significant or severe hardship</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds ratio (95 percent confidence interval)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELSI + age + sex + ethnic group</td>
<td>1.00</td>
<td>1.40 (1.07–1.83)</td>
<td>2.25 (1.42–3.57)</td>
<td>2.79 (1.64–4.75)</td>
<td>3.31 (2.11–5.20)</td>
</tr>
<tr>
<td>ELSI + age + sex + ethnic group + urban + housing tenure + employment + sole parent + income + education</td>
<td>1.00</td>
<td>1.19 (0.91–1.56)</td>
<td>1.69 (1.08–2.64)</td>
<td>1.90 (1.15–3.13)</td>
<td>1.87 (1.13–3.08)</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

Table 18 shows that there is a significant association between heart disease and living standards, even after adjusting for a wide range of socioeconomic factors.
Figure 18 translates these odds ratios into prevalence rate ratios, and shows that adults experiencing ‘fairly comfortable’ living standards, ‘some hardship’ or ‘significant or severe hardship’ were about 50–70 percent more likely to have coronary heart disease than adults with ‘very good or good’ living standards.

Results for both living standards measures are consistent, although the threshold effect is less clear using ELSI.

**Figure 18:** Relative risk of coronary heart disease, by ELSI category (adjusted prevalence rate ratios)

![Graph showing relative risk of coronary heart disease by ELSI category](image)

Source: 2006/07 NZHS

Note: Prevalence rate ratios are given for each ELSI category compared to the ‘Very good or good’ category (which has a value of 1), adjusting for sex, age, ethnic group, urban category, employment status, sole parenthood status, housing tenure, equivalised household income and education status.

**Health risks**

**Current smoking**

For the purposes of this report, current smoking was defined as a respondent having smoked more than 100 tobacco cigarettes (factory made or roll-your-own) in their lifetime and currently smoking at least once a month.

The 2006/07 NZHS found that 19.9 percent (18.9–20.8) of adults aged 15 years and over were current smokers according to this definition.
Table 19 shows the results of the regression analysis of current smoker status on living standards according to NZiDep score, adjusting for possible confounding variables.

### Table 19: Odds ratios of being a current smoker, by NZiDep category

<table>
<thead>
<tr>
<th>Model variables</th>
<th>Odds ratio (95 percent confidence interval)</th>
<th>No deprivation</th>
<th>Slight deprivation</th>
<th>Mild deprivation</th>
<th>Moderate deprivation</th>
<th>Severe deprivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZiDep + age + sex + ethnic group</td>
<td></td>
<td>1.00</td>
<td>1.36 (1.17–1.58)</td>
<td>2.08 (1.74–2.50)</td>
<td>3.02 (2.47–3.68)</td>
<td>4.30 (3.35–5.51)</td>
</tr>
<tr>
<td>NZiDep + age + sex + ethnic group + urban + housing tenure + employment + sole parent + income + education</td>
<td></td>
<td>1.00</td>
<td>1.21 (1.04–1.41)</td>
<td>1.61 (1.31–1.97)</td>
<td>2.00 (1.62–2.47)</td>
<td>2.71 (2.06–3.58)</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

This analysis found a significant association between living standards and current smoking. In particular, the odds ratios show a clear and steady dose–response relationship between level of deprivation and odds of being a current smoker. The association was reduced by adjustment for other socioeconomic factors, but remained strong.

Figure 19 shows that, translating the odds ratios into prevalence rate ratios, there appears to be a steady increase in the adjusted prevalence of being a current smoker with increasing individual-level deprivation. People suffering severe deprivation are twice as likely to be current smokers as people suffering no deprivation, after fully adjusting for demographic and (other) socioeconomic factors.
**Figure 19:** Relative risk of being a current smoker, by NZiDep category (adjusted prevalence rate ratios)

<table>
<thead>
<tr>
<th>Individual deprivation (NZiDep)</th>
<th>Prevalence rate ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>No deprivation</td>
<td>1.00</td>
</tr>
<tr>
<td>Slight deprivation</td>
<td>1.15</td>
</tr>
<tr>
<td>Mild deprivation</td>
<td>1.40</td>
</tr>
<tr>
<td>Moderate deprivation</td>
<td>1.62</td>
</tr>
<tr>
<td>Severe deprivation</td>
<td>1.95</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

Notes: Prevalence rate ratios are given for each NZiDep category compared to the 'No deprivation' category (which has a value of 1), adjusting for sex, age, ethnic group, urban category, employment status, sole parenthood status, housing tenure, equivalised household income and education status.

**ELSI**

Table 20 shows the results of the regression analysis of current smoking on living standards according to ELSI score, adjusting for possible confounding variables.

**Table 20:** Odds ratios of being a current smoker, by ELSI category

<table>
<thead>
<tr>
<th>Model variables</th>
<th>Very good or good</th>
<th>Comfortable</th>
<th>Fairly comfortable</th>
<th>Some hardship</th>
<th>Significant or severe hardship</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELSI + age + sex + ethnic group</td>
<td>1.00</td>
<td>1.53 (1.30–1.79)</td>
<td>2.28 (1.90–2.74)</td>
<td>2.45 (1.96–3.08)</td>
<td>4.36 (3.49–5.46)</td>
</tr>
<tr>
<td>ELSI + age + sex + ethnic group + urban + housing tenure + employment + sole parent + income + education</td>
<td>1.00</td>
<td>1.33 (1.13–1.56)</td>
<td>1.77 (1.47–2.13)</td>
<td>1.68 (1.31–2.16)</td>
<td>2.73 (2.11–3.55)</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

Under this analysis, low living standards were significantly associated with current smoking. While adjusting for other socioeconomic variables decreased the odds, the association remained strong.
Figure 20, which translates the odds ratios into prevalence rate ratios, suggests that adults experiencing severe or significant deprivation are twice as likely to be current smokers as adults with very good or good living standards, all else being equal.

**Figure 20:** Relative risk of being a current smoker, by ELSI category (adjusted prevalence rate ratios)

![Graph showing relative risk of being a current smoker by ELSI category](image)

Source: 2006/07 NZHS

Note: Prevalence rate ratios are given for each ELSI category compared to the 'Very good or good' category (which has a value of 1), adjusting for sex, age, ethnic group, urban category, employment status, sole parenthood status, housing tenure, equivalised household income and education status.

**Obesity**

For the purposes of this report, obesity was defined as a measured body mass index (BMI) of 30 or over (where BMI is weight in kilograms divided by height in metres squared). In the 2006/07 NZHS, participants were weighed and had their height measured using professional anthropometric equipment and standardised techniques.

The 2006/07 NZHS found that 26.5 percent (25.5–27.5) of adults aged 15 years and over were obese.
Table 21 presents the results of the regression analysis of obesity on living standards according to NZiDep score, adjusting for possible confounding variables.

### Table 21: Odds ratios of obesity, by NZiDep category

<table>
<thead>
<tr>
<th>Model variables</th>
<th>Odds ratio (95 percent confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No deprivation</td>
</tr>
<tr>
<td>NZiDep + age + sex + ethnic group</td>
<td>1.00</td>
</tr>
<tr>
<td>NZiDep + age + sex + ethnic group + urban + housing tenure + employment + sole parent + income + education</td>
<td>1.00</td>
</tr>
<tr>
<td>Interaction between NZiDep and gender</td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>1.00</td>
</tr>
<tr>
<td>Women</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

Note: The ‘full’ model results are presented firstly for the total population (the main effects model), and then by gender, to reflect the significant interaction term between living standards and gender in this model.

This analysis shows that individual-level deprivation was moderately associated with obesity, after adjusting for demographic and socioeconomic variables. In particular, there was a small but significant independent increase in the odds of obesity among people suffering severe deprivation, compared with people suffering no deprivation.

The fully adjusted model shows a significant interaction between living standards and gender: a significant association exists between living standards and obesity among women, but not among men. Among women, there was a significant association between living standards and deprivation (an odds ratio of approximately 1.6) for individuals experiencing moderate or severe deprivation, but not for those experiencing lesser degrees of deprivation.

Figure 21, which translates the odds ratios in the fully adjusted model (without the gender interaction effect) into prevalence rate ratios, shows that adults suffering severe deprivation were about 20 percent more likely to be obese than those suffering no deprivation, after fully adjusting for demographic and socioeconomic factors.
Figure 21: Relative risk of obesity, by NZiDep category (adjusted prevalence rate ratios)

Source: 2006/07 NZHS

Note: Prevalence rate ratios are given for each NZiDep category compared to the ‘No deprivation’ category (which has a value of 1), adjusting for sex, age, ethnic group, urban category, employment status, sole parenthood status, housing tenure, equivalised household income and education status.

ELSI

Table 22 presents the results of the regression analysis of obesity on living standards according to ELSI score, adjusting for possible confounding variables.

Table 22: Odds ratios of obesity, by ELSI category

<table>
<thead>
<tr>
<th>Model variables</th>
<th>Very good or good</th>
<th>Comfortable</th>
<th>Fairly comfortable</th>
<th>Some hardship</th>
<th>Significant or severe hardship</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELSI + age + sex + ethnic group</td>
<td>1.00</td>
<td>1.20 (1.02–1.41)</td>
<td>1.27 (1.06–1.53)</td>
<td>1.43 (1.11–1.84)</td>
<td>1.61 (1.31–1.98)</td>
</tr>
<tr>
<td>ELSI + age + sex + ethnic group + urban + housing tenure + employment + sole parent + income + education</td>
<td>1.00</td>
<td>1.15 (0.98–1.36)</td>
<td>1.18 (0.97–1.43)</td>
<td>1.28 (0.98–1.67)</td>
<td>1.39 (1.10–1.76)</td>
</tr>
<tr>
<td>Interaction between ELSI and gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>1.00</td>
<td>1.11 (0.90–1.36)</td>
<td>1.20 (0.89–1.62)</td>
<td>0.67 (0.45–1.00)</td>
<td>0.92 (0.64–1.33)</td>
</tr>
<tr>
<td>Women</td>
<td>1.00</td>
<td>1.22 (1.01–1.47)</td>
<td>1.15 (0.91–1.47)</td>
<td>1.90 (1.41–2.57)</td>
<td>1.62 (1.24–2.10)</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

Notes: As in the NZiDep results above, the ‘full’ model results are presented here firstly for the total population (the main effects model), and then by gender, to reflect the significant interaction term between living standards and gender.
Similarly to the NZiDep analyses, Table 22 shows a significant association between obesity and living standards among women, but not among men. Women living under some hardship, significant hardship or severe hardship had significantly higher odds of being obese, compared with women experiencing good or very good living standards; this association was not apparent for men.

Figure 22, which translates odds ratios to relative risks (multi-variably adjusted prevalence rate ratios), shows that, in the fully adjusted model (without taking account of the gender interaction) individuals suffering significant or severe hardship were almost 25 percent more likely to be obese than those experiencing very good or good living standards.

**Figure 22**: Relative risk of obesity, by ELSI category (adjusted prevalence rate ratios)

![Graph showing relative risks of obesity by ELSI category]

Source: 2006/07 NZHS

Note: Prevalence rate ratios are given for each ELSI category compared to the ’Very good or good’ category (which has a value of 1), adjusting for sex, age, ethnic group, urban category, employment status, sole parenthood status, housing tenure, equivalised household income and education status.

**Health services**

**Unmet need for a GP for any reason in the past year**

In the 2006/07 NZHS, respondents were asked whether they had needed to see a GP for their own health in the previous 12 months but were unable to do so for any reason (not necessarily affordability); that is, whether they had had an unmet need for a GP.

The 2006/07 NZHS found that 6.3 percent (5.8–6.9) of adults aged 15 years and over had had an unmet need for a GP in the past year.
NZiDep

Table 23 shows the results of the regression analysis of ‘unmet need for a GP in the past year’ on living standards according to NZiDep score, adjusting for possible confounding variables.

Table 23:  Odds ratios of unmet need for a GP in the past year, by NZiDep category

<table>
<thead>
<tr>
<th>Model variables</th>
<th>Odds ratio (95 percent confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No deprivation</td>
</tr>
<tr>
<td>NZiDep + age + sex + ethnic group</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(1.20–2.15)</td>
</tr>
<tr>
<td>NZiDep + age + sex + ethnic group + urban + housing tenure + employment + sole parent + health insurance + income + education</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(1.24–2.27)</td>
</tr>
<tr>
<td>Interaction between NZiDep and sole parenthood</td>
<td></td>
</tr>
<tr>
<td>Sole parent</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(0.16–0.83)</td>
</tr>
<tr>
<td>Not sole parent</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(1.26–2.44)</td>
</tr>
<tr>
<td>Unknown sole parent status</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(1.11–2.75)</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

Note: The results for the second model are presented firstly for the total population, and then by sole parenthood category, to reflect the significant interaction term between living standards and sole parenthood in this model.

This analysis shows a very strong association between individual-level deprivation and unmet need for a GP in the past year. After adjusting for a wide range of demographic and socioeconomic factors, adults experiencing severe deprivation had over seven times the odds of having had an unmet need for a GP in the past year as those suffering no deprivation, all else being equal.

However, this relationship between unmet need for GPs and individual-level living standards did not hold among sole parents, for whom there was no statistically significant association. For all other subgroups, a clear and reasonably smooth dose–response relationship was found between increasing NZiDep level and having had an unmet need for a GP in the previous year.

Figure 23 presents the multi-variably adjusted prevalence rate ratios of having had an unmet need for a GP in the past year by NZiDep category (not taking into account the interaction effect between NZiDep and sole parenthood). This graph shows that adults suffering severe deprivation were almost 5.5 times more likely to have had an unmet need for a GP in the past year (for any reason) than those suffering no deprivation. Even adults suffering slight deprivation were about one and a half times more likely to have had unmet need for a GP in the past year, than people suffering no deprivation.
Figure 23: Relative risk of unmet need for a GP in the past year, by NZiDep category (adjusted prevalence rate ratios)

Source: 2006/07 NZHS

Notes: Prevalence rate ratios are given for each NZiDep category compared to the ‘No deprivation’ category (which has a value of 1), adjusting for sex, age, ethnic group, urban category, employment status, sole parenthood status, housing tenure, health insurance, equivalised household income and education status.

ELSI

Table 24 presents the results of the regression analysis of ‘unmet need for a GP in the past year’ on living standards according to ELSI score, adjusting for possible confounding variables.

Table 24: Odds ratios of unmet need for a GP in the past year, by ELSI category

<table>
<thead>
<tr>
<th>Model variables</th>
<th>Very good or good</th>
<th>Comfortable</th>
<th>Fairly comfortable</th>
<th>Some hardship</th>
<th>Significant or severe hardship</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELSI + age + sex + ethnic group</td>
<td>1.00 (1.39–2.38)</td>
<td>1.82 (1.52–2.50)</td>
<td>1.95 (3.12–5.73)</td>
<td>4.23 (5.00–9.18)</td>
<td></td>
</tr>
<tr>
<td>ELSI + age + sex + ethnic group + urban + housing tenure + employment + health insurance + sole parent + income + education</td>
<td>1.00 (1.48–2.59)</td>
<td>1.96 (1.65–2.96)</td>
<td>2.21 (3.70–7.12)</td>
<td>5.13 (5.72–12.19)</td>
<td>8.35 (5.00–9.18)</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS
This shows a very strong association between living standard and unmet need for a GP in the past year, which increased slightly after full adjustment for demographic and (other) socioeconomic variables. Unlike in the case of NZiDep, no significant interaction was found between sole parent status and living standard using ELSI.

Figure 24 presents the corresponding multi-variably adjusted prevalence rate ratios. Adults experiencing significant or severe hardship were six times more likely to have had an unmet need for a GP in the past year than those experiencing good or very good living standards. Even adults with comfortable or fairly comfortable living standards were about twice as likely to have had an unmet need for a GP in the past year (adjusting for all potential confounders).

**Figure 24:** Relative risk of unmet need for a GP in the past year, by ELSI category (adjusted prevalence rate ratios)

Source: 2006/07 NZHS

Note: Prevalence rate ratios are given for each ELSI category compared to the 'Very good or good' category (which has a value of 1), adjusting for sex, age, ethnic group, urban category, employment status, sole parenthood status, housing tenure, health insurance, equivalised household income and education status.
Summary

Table 25 summarises associations of each living standard measure with each health outcome, expressed as a prevalence rate ratio for the ‘worst’ compared to the ‘best’ living standard group, fully adjusted for a wide range of potentially confounding demographic and socioeconomic factors (including measures of SEP). Note that the estimated strength of association between living standard and each health outcome will be affected by residual confounding, measurement error and reverse causation – all of which will vary by outcome.

Table 25: Summary results of associations between living standards and health outcomes

<table>
<thead>
<tr>
<th>Health measures</th>
<th>Prevalence rate ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NZiDep</td>
</tr>
<tr>
<td>Psychological distress (K10)</td>
<td>8.93 (6.89–11.57)</td>
</tr>
<tr>
<td>Asthma (among 15–44 year olds)</td>
<td>2.34 (1.65–3.31)</td>
</tr>
<tr>
<td>Arthritis</td>
<td>2.12 (1.76–2.54)</td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td>1.99 (1.33–2.97)</td>
</tr>
<tr>
<td>Current smoking</td>
<td>1.95 (1.64–2.31)</td>
</tr>
<tr>
<td>Obesity</td>
<td>1.20 (1.02–1.41)</td>
</tr>
<tr>
<td>Unmet need for a GP in the past year (for any reason)</td>
<td>5.41 (3.93–7.45)</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

Note: Prevalence rate ratios compare adults experiencing the worst living standards (that is, significant or severe hardship, or severe deprivation) with those experiencing the best living standards (that is, good/very good living standards, or no deprivation characteristics). All ratios are multi-variably adjusted for a wide range of potentially confounding demographic and socioeconomic variables.

The key findings are as follows.

- Living standards, whether measured by ELSI or NZiDep, are independently related to health outcomes, including physical and mental health status, health risks and health service use. That is, the relationship is independent of demographic and (other) socioeconomic factors such as income or other measures of SEP.

- The relationships between living standard and health outcomes are direct, strong and graded. The strongest effects are seen in mental health, smoking habits and access to or use of primary care (unmet need for GP services).

- The absence of any significant interaction in the models between living standards and ethnicity confirms that living standards act in much the same way as a determinant of health among all ethnic groups.

- The two candidate living standards measures show similar associations between living standards and all health outcomes tested, confirming the validity analysis reported in the ‘Head-to-head comparison of living standard measures’ section of this report.
Socioeconomic Position and Health

Association of income with health

Using the same regression modelling approach as in the previous section, this section turns the analysis around, and asks the question: to what extent are socioeconomic inequalities in health mediated through living standards?

In this section, the measure of socioeconomic position (SEP) used is equivalised current household income. It should be noted that this is just one possible measure of SEP: no single measure can fully capture all aspects of the concept. Individuals with the lowest tertile of equivalised household incomes are here compared with a reference group comprising individuals with the highest tertile of equivalised household incomes. Results are not reported for the intermediate income group (although these results are available from the authors on request). Note that for approximately 13 percent of respondents, household income was imputed (because of missing income data for one or more household members).

The analysis is based on a comparison between the model taking all variables into account (age, sex, ethnicity, urban/rural residence, housing tenure, employment status, sole parent status) except living standard (NZiDep or ELSI), and the full model, including living standard. The extent to which the odds ratio (for a low-income person experiencing a particular health outcome compared to a high-income person experiencing the same outcome) reduces when living standard is included in the model indicates the extent of mediation (see Table 26).
Table 26: Odds ratios of selected health outcomes for a low- compared to a high-income individual, with and without inclusion of living standards in the model

<table>
<thead>
<tr>
<th>Health outcome</th>
<th>Model</th>
<th>Odds ratio (95 percent confidence interval)</th>
<th>Extent of mediation*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NZiDep</td>
<td>ELSI</td>
<td>NZiDep</td>
</tr>
<tr>
<td>Psychological distress (K10)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without living standards</td>
<td>2.05 (1.55–2.71)</td>
<td>2.05 (1.55–2.71)</td>
<td>80%</td>
</tr>
<tr>
<td>With living standards</td>
<td>1.21 (0.91–1.62)</td>
<td>1.14 (0.83–1.56)</td>
<td></td>
</tr>
<tr>
<td>Asthma (among 15–44 year olds)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without living standards</td>
<td>0.94 (0.70–1.27)</td>
<td>0.94 (0.70–1.27)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>With living standards</td>
<td>0.79 (0.57–1.08)</td>
<td>0.78 (0.56–1.10)</td>
<td></td>
</tr>
<tr>
<td>Arthritis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without living standards</td>
<td>1.37 (1.12–1.68)</td>
<td>1.37 (1.12–1.68)</td>
<td>51%</td>
</tr>
<tr>
<td>With living standards</td>
<td>1.18 (0.94–1.47)</td>
<td>1.16 (0.95–1.42)</td>
<td></td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without living standards</td>
<td>1.81 (1.31–2.50)</td>
<td>1.81 (1.31–2.50)</td>
<td>25%</td>
</tr>
<tr>
<td>With living standards</td>
<td>1.61 (1.15–2.25)</td>
<td>1.59 (1.15–2.19)</td>
<td></td>
</tr>
<tr>
<td>Current smoking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without living standards</td>
<td>1.63 (1.38–1.93)</td>
<td>1.63 (1.38–1.93)</td>
<td>51%</td>
</tr>
<tr>
<td>With living standards</td>
<td>1.31 (1.08–1.58)</td>
<td>1.30 (1.09–1.56)</td>
<td></td>
</tr>
<tr>
<td>Obesity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without living standards</td>
<td>1.21 (1.05–1.40)</td>
<td>1.21 (1.05–1.40)</td>
<td>19%</td>
</tr>
<tr>
<td>With living standards</td>
<td>1.17 (1.02–1.35)</td>
<td>1.11 (0.96–1.29)</td>
<td></td>
</tr>
<tr>
<td>Unmet need for a GP in the past year for any reason</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without living standards</td>
<td>1.22 (0.95–1.57)</td>
<td>1.22 (0.95–1.57)</td>
<td>100%</td>
</tr>
<tr>
<td>With living standards</td>
<td>0.83 (0.64–1.08)</td>
<td>0.78 (0.60–1.01)</td>
<td></td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS

Notes: Models adjust for the following variables: sex, age group, ethnic group, urban category, sole parenthood status, housing tenure and employment status (and health insurance in the 'unmet need for a GP in the past year' analysis).

* The extent of mediation is equivalent to the ‘explained fraction’ (Whitehead et al 2000):

\[
\text{Explained fraction} = \frac{[\text{OR}_a - 1] - ([\text{OR}_b - 1])}{\text{OR}_a - 1}
\]

For example, for psychological distress this is calculated as \([2.05 - 1] - (1.21 - 1)) / (2.05 - 1)\] x 100%.

Table 26 confirms the well-known association between income and (most) health outcomes (Marmot 2002). Adjusting for a wide range of covariates except living standards, there is a statistically significant independent association between low income and risk of all selected health outcomes (except asthma), with odds ratios ranging from approximately 1.2 to 2.1.
Mediation of the income–health association by living standards

Table 26 also shows that when a direct measure of living standard is included in the model, the odds ratio for income decreases, and sometimes becomes no longer statistically significant. From this we conclude that living standards mediate some, but generally not all, of the effects of income on health, depending on the specific health outcome concerned. In other words, the association between SEP and health is partly mediated by material pathways (living standards) and partly by other pathways (see Figure 2 in the Introduction to this report, listing non-material pathways).

For physical health outcomes, including living standards in the model appears to reduce the odds ratio by about one-third to one-half. For psychological distress (K10), the reduction is more or less complete. The same goes for the health services variable modelled (‘unmet need for a GP in the past year’). More work would be required, using a wider selection of health outcomes in a variety of datasets, to robustly quantify the precise extent of mediation – which may in any case vary across populations and over time.

The estimated degree of mediation of the income effect on health by living standards is similar using both measures of living standards for all health outcomes studied (except for obesity, which yields a higher estimate using ELSI than NZiDep). This provides further confirmation that both living standards instruments tap the same underlying construct, and do so approximately equally well. This finding also enhances confidence that the mediation of the SEP–health relationship by living standards is a real finding, rather than a measurement artefact of one particular instrument.

The key conclusion from the perspective of this report is that not only is living standard a key socioeconomic determinant of health in its own right, but it is also an important mediator or pathway through which income (or SEP more generally) ‘gets under the skin’ to affect health.
Implications for Policy and Monitoring

This section summarises key findings from this report. It also briefly discusses implications of these findings for future policy advice and monitoring.

Key findings

Norms

One objective of this project was to norm ELSI and NZiDep in the context of a health survey (the 2006/07 NZHS).

In brief, both scales exhibited similar population distributions: approximately two out of three adults enjoy good living standards, while approximately one in 10 experience hardship/severe deprivation. Patterning by age and ethnicity was also similar for both instruments: older people are least likely to experience hardship (less than 5 percent) while adults aged 25–44 years are most likely (over 10 percent); Pacific people are approximately three times, and Māori two times, more likely to experience hardship than European or Asian people.

Psychometrics of living standards instruments

The inclusion of both ELSI and NZiDep in the 2006/07 NZHS provided the opportunity to carry out a head-to-head comparison of these two measures of living standards.

Respondent burden and acceptability were key issues. The mean completion time for ELSI was 4–6 minutes, compared with only 2–3 minutes for NZiDep. This is not surprising, given that the former scale comprises 25 items and the latter only eight. Nevertheless, both instruments had very low rates of missing data – in the sample as a whole and across all sociodemographic subgroups (with the exception of 10 percent missing data for ELSI among 15–17 year olds). Thus the acceptability of both instruments is very good, in the context of a health survey.

Beyond these practical considerations, score distributions, reliability and validity are key instrument performance measures. Both instruments showed highly skewed score distributions when applied to a general population sample. However, only NZiDep exhibited marked ceiling effects, two-thirds of respondents returning a score representing the best living standards. For this reason, NZiDep would be unsuitable to elicit information at the upper as well as at the lower end of the living standard spectrum. Usually, however, policy interest focuses on the latter, so this inherent limitation of NZiDep will generally be of little concern.

This report’s analysis shows that both instruments had adequate reliability for comparing groups (but not individuals) – the conventional threshold of alpha >0.7 was exceeded, both in the population as a whole and in all major sociodemographic subgroups. However, ELSI, with an alpha of 0.86, was more reliable than NZiDep, which had an alpha of 0.75.
Validity is more challenging to assess, and analysis was restricted to one dimension of the concept: the ability of the scale to distinguish between groups considered a priori to have high or low scores. For this analysis, two outcomes known from international studies to be strongly linked to economic factors in general and living standards in particular were selected: smoking and mental health. Both instruments exhibited adequate validity for both outcomes, the effect sizes (the ‘d’ statistic) being similar for both instruments, although slightly higher for ELSI.

In brief, ELSI has sounder psychometric properties than NZiDep (except for acceptability, which is higher for NZiDep but adequate for both instruments). Yet ELSI is also the longer instrument, imposing a greater respondent burden. Does the added benefit (better reliability, possibly slightly better validity and markedly lesser ceiling effect) outweigh the extra cost (two minutes of respondent time on average) and slightly lower acceptability? This depends entirely on the context of use. For example, ELSI would be the better choice for a dedicated living standard survey, but not necessarily for a health or general social survey. This decision needs to be made on a case-by-case basis, carefully weighing the advantages and disadvantages of each instrument in the specific context and for the specific purpose of the intended study.

Living standards and health

This study confirms the importance of including a direct measure of living standards in any study aimed at understanding or monitoring the social determinants of health and of health inequalities. For all health outcomes tested, the relationship with living standards was strong, direct and graded using both ELSI and NZiDep.

The strongest association was evident in mental health: hardship is linked to a nine-fold greater prevalence of clinical anxiety or mood disorder, adjusting for a wide range of sociodemographic variables. The corresponding increase in prevalence for poor physical health is two- to three-fold. Not surprisingly, this is linked to higher rates of risk factors such as smoking and obesity (the latter for females only).

Hardship/severe deprivation is also linked to health service use variables, such as an unmet need for GP services. People living in hardship were over five times more likely to have had an unmet need for a GP in the past year.

A key finding from this report was that associations between living standards and health-related variables were consistent across both measures of living standards. This suggests that these associations are not an artefact of measurement: whatever the measure, the associations with all studied health variables were similar.

Interpreting the causality of the associations

Part of the association between living standards and health is likely to reflect health selection (Manor et al 2003). That is, individuals or families may have low living standards because of poor health, rather than the other way round. Given that causality operates in both directions, the odds ratios and prevalence rate ratios estimated in the cross-sectional study will overestimate the strength of the causal relationship running from living standards (the exposure) to health (the outcome). Longitudinal studies (such
as SoFIE-Health) are required to better understand causality; such studies also have advantages over cross-sectional studies in terms of control of residual confounding and measurement error.

**Mediation of socioeconomic health inequalities by living standards**

This study confirms that most health measures are associated with SEP, as measured by equivalised household income. However, the association is generally weaker than that seen with living standards – typically low-income earning families or individuals experience between 1.5 and 2 times the risk of adverse health outcomes than those more advantaged (without adjusting for living standards). It should be noted that, to some extent, this difference in estimated strength of association merely reflects the use of a three-point scale (tertiles) for measurement of income: a five- or seven-point scale is used to measure living standards.

More interestingly, the effect of income on health outcomes is always reduced when a direct measure of living standards is included in the model. That is, the effect of income on health (or the link to SEP more broadly) appears to be mediated in part through material pathways, as measured by living standards. The extent of this mediation seems to vary from as little as 20 percent for obesity to approximately 80–90 percent for psychological distress. However, this parameter is likely to vary according to measurement instrument, population and time – so the estimated proportion should not be considered quantitatively robust.

Other pathways through which SEP can ‘get under the skin’ to affect health (wholly or partly independent of living standards) include risky behaviours, psychosocial stress and adverse life events (see Figure 2 and accompanying note in the Introduction to this report).

**Implications for policy advice and monitoring**

**Is there evidence that living standards are linked to health?**

This analysis shows that living standards are linked to health outcomes, health risk behaviours and health service use. Furthermore, this relationship is direct, strong and graded. It applies equally to all social groups (generations, genders and ethnic groups) and is independent of any other economic factor.

One of the key findings from this study was that people living in hardship were over nine times more likely to experience psychological distress (that is, a high or very high probability of an anxiety or depressive disorder), and over five times more likely to have had an unmet need for a GP in the past year, than people experiencing good living standards – after adjusting for a wide range of potentially confounding variables, including equivalised household income.

The results of this report identify people experiencing low living standards, irrespective of income, as a high-need population group in terms of health services.
Should living standards scales be included in health surveys and similar studies?

The results of this study imply that a sufficient understanding of the social determinants of health and health inequalities for policy purposes requires the simultaneous monitoring of both SEP (as measured, eg, by equivalised household income) and living standards: the one does not substitute for the other.

Therefore, this report recommends that a living standards scale be included in future health surveys and related data-collection initiatives.

Which scale should be used?

This analysis demonstrates that ELSI has superior reliability and (possibly) validity in comparison with NZiDep, but that this is offset by its greater respondent burden. The decision as to which instrument should be used will depend on the purpose and context of the particular survey/study contemplated.

What are the implications of such monitoring for policy advice?

This study has found strong, direct and graded associations between living standards and health, particularly in mental health and access to (or use of) primary care. It is recognised that causality cannot be established from a cross-sectional survey: poor living standards may lead to poor health, but poor health can also lead to poor living standards. Nevertheless, the findings of this report have clear implications for policy.

If living standards were merely one way through which income affects health, then income redistribution policies (operating through the tax and benefits system) would be sufficient to ameliorate socioeconomic inequalities in health. However, this analysis shows that this is not the case: living standards act as a pathway for income effects on health, and (to a much greater extent) also act on health independently of income (or any other measure of SEP). This implies that policies aimed at providing non-monetary social assistance – such as subsidised home insulation, subsidised health care and subsidised child care – may yield substantial health and health equity gains, and could usefully complement income redistribution policies. Whether or not ‘assistance in kind’ would actually be more cost-effective than income redistribution in specific settings is beyond the scope of this study.

The strong link this report has shown between living standards (independent of income) and access to primary health care implies that non-financial as well as financial access barriers may need to be addressed in order to assist those experiencing low living standards. Such access barriers could include opening hours, waiting times, geographic location of facilities, availability and affordability of public and private transport, cultural safety, health literacy and availability of service information.
References


Appendix

Tables A1 and A2 present the unadjusted prevalence of selected health outcomes used in this study, by NZiDep and ELSI categories respectively. These give an indication of the burden of these health outcomes among different population groups. It should be noted that these results are confounded by other demographic and socioeconomic factors (such as age and employment status), so cannot be used to compare groups.

Table A1: Prevalence of health outcomes, by NZiDep category (unadjusted prevalence)

<table>
<thead>
<tr>
<th>Health outcome</th>
<th>No deprivation</th>
<th>Slight deprivation</th>
<th>Mild deprivation</th>
<th>Moderate deprivation</th>
<th>Severe deprivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological distress (K10)</td>
<td>3.2 (2.6–3.7)</td>
<td>7.2 (5.9–8.6)</td>
<td>12.6 (9.9–15.4)</td>
<td>19.0 (15.8–22.3)</td>
<td>37.6 (32.4–42.7)</td>
</tr>
<tr>
<td>Asthma (among 15–44 year olds)</td>
<td>9.5 (8.7–10.3)</td>
<td>12.6 (10.8–14.5)</td>
<td>12.5 (9.8–15.2)</td>
<td>17.5 (13.5–21.4)</td>
<td>24.0 (19.0–28.9)</td>
</tr>
<tr>
<td>Arthritis</td>
<td>15.5 (14.7–16.2)</td>
<td>11.9 (10.3–13.5)</td>
<td>12.7 (10.2–15.1)</td>
<td>14.9 (12.0–17.8)</td>
<td>21.5 (17.0–26.0)</td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td>5.5 (5.0–6.0)</td>
<td>3.8 (2.9–4.6)</td>
<td>3.3 (2.2–4.4)</td>
<td>7.1 (5.0–9.2)</td>
<td>6.2 (3.9–8.6)</td>
</tr>
<tr>
<td>Current smoking</td>
<td>15.0 (13.8–16.1)</td>
<td>21.7 (19.8–23.5)</td>
<td>30.8 (27.5–34.1)</td>
<td>41.2 (37.0–45.3)</td>
<td>50.8 (45.4–56.2)</td>
</tr>
<tr>
<td>Obesity</td>
<td>25.0 (23.6–26.4)</td>
<td>25.7 (23.2–28.2)</td>
<td>26.8 (23.6–30.0)</td>
<td>37.9 (33.6–42.2)</td>
<td>42.0 (36.7–47.2)</td>
</tr>
<tr>
<td>Unmet need for a GP in the past year for any reason</td>
<td>4.0 (3.4–4.5)</td>
<td>7.5 (6.0–9.0)</td>
<td>10.7 (8.4–12.9)</td>
<td>14.6 (12.0–17.3)</td>
<td>24.8 (20.4–29.1)</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS
Table A2: Prevalence of health outcomes, by ELSI category (unadjusted prevalence)

<table>
<thead>
<tr>
<th>Health outcome</th>
<th>Very good or good</th>
<th>Comfortable</th>
<th>Fairly comfortable</th>
<th>Some hardship</th>
<th>Significant or severe hardship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological distress (K10)</td>
<td>3.2 (2.7–3.7)</td>
<td>6.8 (5.5–8.1)</td>
<td>11.2 (9.1–13.3)</td>
<td>16.6 (13.0–20.2)</td>
<td>36.8 (32.6–41.1)</td>
</tr>
<tr>
<td>Asthma (among 15–44 year olds)</td>
<td>9.9 (9.1–10.6)</td>
<td>11.0 (9.4–12.6)</td>
<td>13.4 (10.5–16.3)</td>
<td>17.4 (13.2–21.6)</td>
<td>23.2 (18.7–27.7)</td>
</tr>
<tr>
<td>Arthritis</td>
<td>15.6 (14.7–16.4)</td>
<td>12.2 (10.9–13.6)</td>
<td>14.4 (11.5–17.3)</td>
<td>15.1 (11.6–18.6)</td>
<td>19.7 (15.7–23.7)</td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td>5.4 (4.8–6.0)</td>
<td>4.4 (3.5–5.3)</td>
<td>5.0 (3.4–6.6)</td>
<td>6.3 (3.9–8.8)</td>
<td>6.2 (4.1–8.4)</td>
</tr>
<tr>
<td>Current smoking</td>
<td>14.5 (13.6–15.5)</td>
<td>22.6 (20.4–24.8)</td>
<td>31.1 (27.8–34.4)</td>
<td>33.7 (29.0–38.3)</td>
<td>48.6 (43.5–53.6)</td>
</tr>
<tr>
<td>Obesity</td>
<td>24.1 (22.6–25.5)</td>
<td>27.5 (25.1–29.9)</td>
<td>30.5 (27.7–33.3)</td>
<td>37.0 (32.6–41.4)</td>
<td>42.5 (37.8–47.2)</td>
</tr>
<tr>
<td>Unmet need for a GP in the past year for any reason</td>
<td>3.7 (3.1–4.2)</td>
<td>7.5 (6.2–8.7)</td>
<td>8.4 (6.8–10.0)</td>
<td>16.4 (13.4–19.4)</td>
<td>25.4 (21.4–29.4)</td>
</tr>
</tbody>
</table>

Source: 2006/07 NZHS