NZiDep

A New Zealand Index of Socioeconomic Deprivation for Individuals

Clare Salmond [1]
Peter King [2]
Peter Crampton [1]
Charles Waldegrave [2]

18 March 2005

1 Department of Public Health
Wellington School of Medicine and Health Sciences
University of Otago
Wellington

2 The Family Centre Social Policy Research Unit
Lower Hutt
Wellington

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About the authors

Clare Salmond (BSc (Hons); MSc) was a Senior Lecturer in Biostatistics in the Department of Public Health at the Wellington School of Medicine and Health Sciences during this research. Clare has thirty-five years experience working as a biostatistician at the Otago Medical School, the Wellington Hospital Epidemiology Unit, and the Wellington School of Medicine and Health Sciences. Clare was one of the authors, with Peter Crampton and Frances Sutton, of the NZDep91, NZDep96 and NZDep2001 small-area indexes of relative socioeconomic deprivation for New Zealand. Clare then led a project, in collaboration with Peter, that developed and tested a methodology to provide a non-occupational classification for individuals based on deprivation indicators available from the 1996 Census. The NZiDep research is a natural extension of that work, exploring a much wider variety of deprivation markers than is available from the Census.

Peter King (BA (Hons); PhD) is a Senior Researcher and sociologist in the Family Centre Social Policy Research Unit, working in the areas of social and economic development with particular reference to resource distribution, housing, poverty, and living standards in New Zealand, as part of the New Zealand Poverty Measurement Project. He is presently developing applications of social network analysis and social capital theory for research into the overlapping fields of poverty, living standards and deprivation research. The NZiDep research is a natural extension of his work in the fields of poverty and living standards research. Currently, Peter is an Objective leader within a five and a half year FRST funded research programme that has the aim of enhancing wellbeing in an ageing society.

Peter Crampton (MB ChB; PhD; MPH, FAFPHM) is Professor and Head of Department in the Department of Public Health at the Wellington School of Medicine and Health Sciences, where he teaches classes in public health and health systems. He was one of the authors, with Clare Salmond and Frances Sutton, of the NZDep91, NZDep96 and NZDep2001 small-area indexes of relative socioeconomic deprivation for New Zealand. Peter's research into the use of indices of need in resource allocation formulas for primary care provided impetus for, and elaborated the theoretical foundation for the small-area NZDep research and development. Peter and Clare then developed and tested a methodology to provide a non-occupational classification for individuals based on deprivation indicators available from the 1996 Census, which was the springboard for the present research.

Charles Waldegrave (MA (Hons) Waik, MA (Hons) Camb) leads the Family Centre Social Policy Research Unit. He is also a joint leader of the New Zealand Poverty Measurement Project and the Enhancing Wellbeing in an Ageing Society research programme. Charles's work in quantitative poverty measurement and qualitative descriptions of people's experiences in poverty has profoundly affected social policy directions in New Zealand. He has published extensively in social research areas and is regularly contracted internationally to lead workshops in applied social policy. His experience in poverty and culturally-based research has provided a sound basis for this collaboration with the Wellington School of Medicine and Health Sciences to develop NZiDep.

Acknowledgements

We are indebted to Dr Catherine Love and Taimalieutu Kiwi Tamasese for their invaluable contributions of Maori and Pasifka cultural knowledge to the questionnaire development and survey fieldwork.

We are indebted, also, to the survey interviewers who undertook the difficult and challenging task of locating and recruiting over 900 participants in accordance with tightly defined sample quota.

This research was funded by grant 00/290 from the Health Research Council of New Zealand.

Executive summary

Aim

To identify a small set of indicators of an individual's deprivation that is appropriate for all ethnic groups in New Zealand and can be combined into a single and simple index of individual socioeconomic deprivation.

Methods

The NZiDep index was derived using the same theoretical basis as the national census-based small-area indices of relative socioeconomic deprivation: NZDep91, NZDep96, and NZDep2001. The index has been created and validated from analysis of representative sample survey data obtained from approximately 300 Maori, 300 Pacific, and 300 non-Maori non-Pacific adults. Twenty-eight deprivation-related characteristics, derived from New Zealand and overseas surveys, were analysed by standard statistical techniques (factor analysis, Cronbach's Coefficient Alpha, item-total correlations, principal component analysis). The index was validated using information on tobacco smoking, which is known to be strongly related to deprivation. The index is intended to be reviewed periodically for the relevance and validity of the deprivation variables it employs because the importance of these is likely to change over time.

Result

The NZiDep index is based on eight simple questions which take about two minutes to administer. The index is a significant new (non-occupational) tool for measuring socioeconomic position for individuals.

Questionnaire items for NZiDep

The eight questions for the five-point individual-level index of socioeconomic deprivation are shown below. The order of the eight questions is not important, although they are listed here in the estimated decreasing order of occurrence. The simple scoring system is described after the questions.

A suggested lead-in to these questions is: "The following few questions are designed to identify people who have had special financial needs in the last 12 months. Although these questions may not apply directly to you, for completeness we need to ask them of everyone."

The eight questions are:

1 **In the last 12 months have you personally been forced to buy cheaper food so that you could pay for other things you needed?** (yes/no)

2 **In the last 12 months, have you been out of paid work at any time for more than one month?** (yes/no)

NOTE: *This unemployment question is defined as* no *for those 60 and over, and for full-time care-givers/home-makers.*

3 Looking at Showcard 1, did you <u>yourself</u> get income in the 12 months ending today from any of these sources? (yes/no)

NOTE: *Means-tested benefits are listed on a showcard (see below)*

4 In the <u>last 12 months</u> have you <u>personally</u> put up with feeling cold to save heating costs? (yes/no)

5 In the <u>last 12 months</u> have you <u>personally</u> made use of special food grants or food banks because you did not have enough money for food? (yes/no)

6 In the <u>last 12 months</u> have you <u>personally</u> continued wearing shoes with holes because you could not afford replacement? (yes/no)

7 In the <u>last 12 months</u> have you <u>personally</u> gone without fresh fruit and vegetables, <u>often</u>, so that you could pay for other things you needed? (yes/no)

8 In the <u>last 12 months</u> have you <u>personally</u> received help in the form of clothes or money from a community organisation (like the Salvation Army)? (yes/no)

Creating the NZiDep index

(i) Add the 'yes' responses (count any missing data as 'no').

(ii) Re-code the count of deprivation characteristics into the following five ordinal categories (relatively few people will have the largest number of deprivation characteristics):

1	no deprivation characteristics
2	one deprivation characteristic
3	two deprivation characteristics
4	three or four deprivation characteristics
5	five or more deprivation characteristics

Showcard 1

- Domestic Purposes Benefit
- Emergency maintenance allowance
- Transitional Retirement Benefit
- Independent Youth Benefit
- Sickness/Invalids Benefits
- Orphans and Unsupported Child Benefit
- Widows Benefit

NOTE: *This list of means-tested benefits was current as of 31 December 2003, but it could change in the future. This list deliberately excludes the unemployment benefit, which is means tested but is captured in the unemployment question.*

Conclusions

The NZiDep index of socioeconomic deprivation has advantages over existing measures, including a specific focus on deficits, applicability to all adults (not just the economically active), and usefulness for all ethnic groups. Its strengths include simplicity, utility, acceptability across ethnic groups, construct validity, statistical validity, criterion validity (measured with reference to tobacco smoking), and relevance to the current New Zealand context. The index is indicative of deprivation, in general, and is designed for use as a variable in research, and for elucidating the relationships between socioeconomic position and health/social outcomes.

Section 1: Background

Introduction

The principal aim of this research has been to develop a non-occupational, deprivation-based, socioeconomic index for individuals. This index, named NZiDep, has been developed for use as a tool in research into the social and economic determinants of health and any other research for which a parsimonious, efficient measure of socioeconomic position is required.

The term *socioeconomic position* is used in this report to indicate "the social and economic factors that influence what position(s) individuals and groups hold within the structure of society" (Lynch & Kaplan, 2000, p.14). In the broader body of research into social stratification, the term 'status' is used more frequently than 'position'. However, because the focus of this research is to provide a means to locate an individual on a continuum of material and social deprivation, the emphasis is more upon 'position' than 'status', and we therefore use the term 'position' as a generic term in this report.

NZiDep has a five-category scale of individual deprivation. Individuals are located on this scale on the basis of their responses to eight questions. Deriving these eight questions has been the focus of this research and the means by which they were derived are the subjects of Sections 2 to 6 of this report. The purpose of this section is to discuss the theoretical basis of the NZiDep index being proposed and locate it in the context of the broader substantive fields of social stratification, socioeconomic status and position, social class, deprivation, poverty, and living standards, with reference to research carried out in New Zealand and internationally.

The availability of an easy-to-use and widely applicable socioeconomic index for individuals is important because socioeconomic factors, along with ethnicity, are perhaps the most important determinant of health status and broader socioeconomic wellbeing in developed countries, after age and gender.

As well as the vast international literature on the relationships between socioeconomic position and health and wellbeing, there is a substantial body of New Zealand evidence (see, for example, Ministry of Health reports (Howden-Chapman & Tobias, 2000; Ministry of Health, 2004), National Health Committee reports (Howden-Chapman & Cram, 1998), and results of the New Zealand Census Mortality Study (Ajwani et al., 2003; Blakely, 2002; Blakely et al., 2002). Recent New Zealand evidence suggests that the mortality gradient across socioeconomic groups is not necessarily decreasing as one might hope: absolute inequalities in mortality among males and females aged 25 to 77 years were stable on average over the 1980s and 1990s, and relative inequalities actually increased (Blakely et al., In press).

Socioeconomic position is concerned with the conditions that people experience. Variations in socioeconomic position are associated with a combination of factors such as resource ownership and control, behaviours and attitudes, and power differentials. These factors lead to differentials in wellbeing. In this wider area of wellbeing, continued inter-generational transmission of the inequalities associated with poor outcomes in the areas of education, employment, and income

highlight the significance of socioeconomic status for the social and economic outcomes that people experience (Williams, 1997) (Johnson, 2004).

It is clear that socioeconomic measures are fundamental in most research that relates to measurement of health status and wellbeing, because socioeconomic factors feature both as key determinants of health status and wellbeing, and as powerful confounding variables in research which aims to examine other associative or causal relationships. However, despite the large body of theoretical work and the wide range of socioeconomic measures in routine use around the world, researchers face a frequently difficult choice of socioeconomic measure for individuals. Some measures have become favoured for particular areas of research and policy interest. For example, an income poverty threshold based on 60 percent of median disposable household income can be applied to measuring the success or otherwise of poverty reduction programmes. It is the case, however, that there is no single universally accepted 'gold standard' measure for application in all situations. In view of the complex, politicised, and inherently contentious nature of the underlying construct, though, the absence of an accepted single gold standard measure of socioeconomic position is not surprising.

The need for robust socioeconomic measures has been responded to in New Zealand with the development of a body of research aimed at providing a socioeconomic basis for measuring and monitoring the impacts of government policies and changing social and economic conditions, on the one hand, and supporting decision-making about the targeting of funding in areas of social expenditure, such as health, on the other. Jensen et al (2002, p.11) identify three streams within this body of research: income-based poverty research; outcome-based deprivation research; and what they term 'broad spectrum research'. While the poverty and deprivation research focuses on the lower end of the socioeconomic continuum, the broad or full spectrum research aims to cover the full socioeconomic spectrum.

Within the first stream is the work of the New Zealand Poverty Measurement Project (NZPMP) which began in 1992 and is carried out by the Family Centre Social Policy Research Unit (FCSPRU) in association with the Victoria University of Wellington School of Government (Stephens & Waldegrave, 2001; Waldegrave et al., 2003).[1] Within the second stream is the New Zealand Index of Deprivation (NZDep) that was created within the Department of Public Health at the Wellington School of Medicine and Health Sciences (WSMHS) and first released in 1997 (Crampton et al., 2004; Crampton et al., 2000; Crampton et al., 1997; Salmond & Crampton, 2001; Salmond et al., 1998a). Within the third stream is the living standards research programme that began in 1999 with a study of the living standards of older people that was initiated by the Super 2000 Taskforce (Fergusson et al., 2001a). After the Super 2000 Taskforce was disbanded in 2002, the research was continued by the New Zealand Ministry of Social Development under its Living Standards Research Programme (LSRP) which yielded the Economic Living Standards Index (ELSI) (Jensen et al., 2002). In addition to the measures identified with these streams, which are all non-occupational measures, there are occupation-based measures, the most recent being the New Zealand Socioeconomic Index of Occupational Status (NZSEI) (Davis et al., 1997b).

[1] Originally the NZPMP was carried out by FCSPRU in association with Paul Frater of the BERL economic consultancy.

While both the Poverty Measurement and the Living Standards Research programmes were developed with a broad social and economic policy monitoring role in mind, the small-area Deprivation Indexes and the New Zealand Socioeconomic Index of Occupational Status were developed initially with a public health policy focus. NZDep was developed with a particular focus on supporting decision making about needs-based targeting of health funding on an area basis. Subsequently, both NZDep and NZSEI have been used by researchers as indicators of socioeconomic position for purposes other than health related research, policy development, and implementation. Additionally, although NZDep is an area measure, it is increasingly used as a convenient, although often imprecise, proxy individual measure. With the creation of NZiDep, as set out in this report, researchers and policy makers will have a genuine individual measure of deprivation that can be used on its own as well as alongside other measures of socioeconomic position and wellbeing, both individual and area-based.

These four research programmes – NZPMP, LSRP, NZDep, and NZSEI – have each approached the measurement of socioeconomic position from different perspectives, but together they have produced a richer and more evidential picture of socioeconomic hardship in New Zealand. As will be discussed further, no single measure provides a full canvas. Income poverty research for example, is essential for policy development because tax and benefit transfers are the primary instruments used to redistribute money in modern post-industrial states. In these circumstances, measures of income thresholds and people's relative position in relation to them are required.

Income measures on their own, however, essential as they are, do not always discern the different living conditions experienced by households. Some poor families are more asset rich than others, some have better networks and community supports, some have high status work connections, and some have existed on a low income for longer than others. To gain an accurate measurement of socioeconomic position for a person or household, a range of conceptual measures is required.

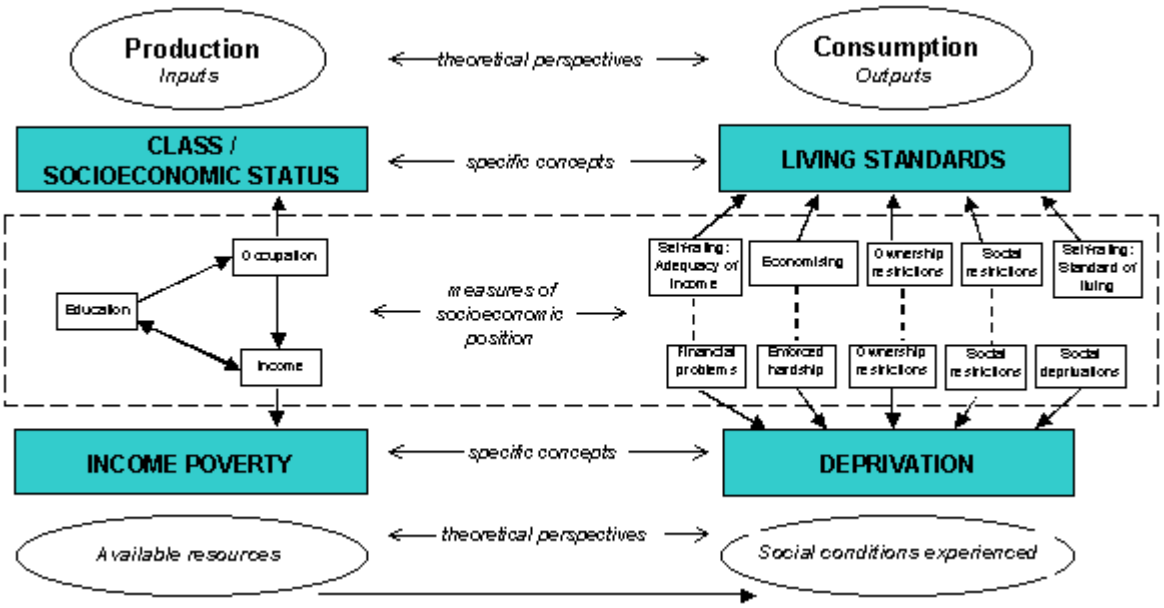
This present research is indebted to the earlier and continuing work noted above. It endeavours to add a further and innovative dimension to socioeconomic measurement in New Zealand by bringing together the deprivation research team (WSMHS) and an income poverty research team (FCSPRU) to develop this first New Zealand deprivation index for individuals. NZiDep has been produced in a way that ensured that Maori and Pacific deprivation characteristics were fully considered, both by the use of equal sampling among three ethnic groups – Maori, Pacific, and non-Maori non-Pacific New Zealanders – and by a process of analysis that investigated deprivation within each group.

Theoretical perspectives

Socioeconomic position

There are two broad approaches to the measurement of socioeconomic position. One is based on the production side of the economic equation, and emphasises the differential availability of resources to people. The other is based on the consumption side of the equation, and emphasises the conditions actually experienced by people. Figure 1 summarises the ways in which four key concepts and approaches to the study and measurement of socioeconomic position are aligned with the production and consumption approaches. Figure 1 also summarises the factors that are taken into account when measuring socioeconomic position on the basis of the four key measurement concepts of Class/Socioeconomic status, Income poverty, Living standards, and Deprivation. An examination of these factors reveals that, for the purposes of measurement criteria, they can be divided into occupational and non-occupational measures, with Class/Socioeconomic Status being the only concept that is occupationally measured. The measures with the longest history are those based on income, education and occupation. Underlying all of these are the theory-based concepts of social stratification, class, position and status.

Figure 1: Some approaches to measuring socioeconomic position



In the study of social inequality a number of theoretical approaches are employed, each with its associated concepts. Four key theoretical concepts are social stratification, class, socioeconomic status, and deprivation. These can be understood as being either quite distinct or overlapping, according to the ways in which they are defined and applied.

Social stratification

The idea of social stratification is a more general concept than either class or socioeconomic status, each of which represents a particular way of approaching the question of social stratification. On its own, the concept of stratification is essentially descriptive of differentials in status or position and the distribution of social, cultural and economic resources, and, as Aronowitz suggests, 'designates distinction without conflict' (Aronowitz, 2003). Through its geological metaphor, the concept also carries connotations of stability and permanence (at least in the immediate term, pending a socially cataclysmic event). Furthermore, the concept carries no necessary recognition of any relationships between a person's location within the hierarchy and the social and economic outcomes they experience. In other words, by thinking in terms of stratification, alone, it is possible to imagine that the negative outcomes associated with certain strata can be ameliorated by redistributing resources among the strata. But such moves tend eventually to result in opposition from the occupants of wealthier strata who think they are, in effect, funding the redistribution. This political reality belies the 'distinction without conflict' assumption and illustrates the utility of a concept like 'class' to account for the relations and power dynamics among strata.

Class

The concept of class is applied in ways ranging from meaning a particular position within a system of social stratification, in which case it is synonymous with the concept of socioeconomic status, to the Marxist definition which is based upon a fundamental division of society based upon the ownership or non-ownership of the means of production, distribution and exchange.

Socioeconomic status

The concept of socioeconomic status refers to a person's overall standing or position within a system of social stratification. A person's status can be defined according to criteria such as: relationship to the ownership and control of the means of production, distribution and exchange; occupation; education; and income. In practice, as is discussed further below, occupational and educational measures of socioeconomic status, are essentially income-based measures in which occupation or education are proxies for income level. However, status is not always associated with income or economic wealth, as evidenced by some potentially high status but often low income occupations such as writer and artist, for example.

Socioeconomic groupings are delineated, conceptually, on the basis of the extent to which their members share a similar degree of access to, and control of, the available resources. Different measures of socioeconomic position tend to emphasise different types of resources as being important determinants of socioeconomic position. For example, Marxist-based theories of social stratification emphasise economic resources and define social classes according to whether or not their members own the means of economic production, distribution and exchange. Weberian-based theories of socioeconomic status also consider access to economic resources as important, but extend the criterion from ownership of the means of production to include market power derived from wealth and income not necessarily obtained from actually owning the means

of production. Weberian-based theories also include non-economic factors such as social status and prestige which are not necessarily directly derived from economic sources. These theories of social stratification state a relationship between socioeconomic status and the ability to gain access to socioeconomic resources. The conceptual linking of socioeconomic status with capacity to command socioeconomic resources is reflected in the range of socioeconomic status indicators which have been proposed: income, wealth, education, and occupation.

Deprivation

Socioeconomic deprivation provides one approach to conceptualising and measuring the broader construct of socioeconomic position. As has been discussed already, there are a number of theoretical and practical approaches to measuring socioeconomic position, as well as a number of ways of conceptualizing socioeconomic position.

In all approaches to social stratification, the phenomenon is associated with the differential distribution of wealth and resources among the members of a society or social formation, whether that is extra-national, national, or sub-national. Such distributions are almost universally uneven, resulting in a socioeconomic hierarchy and the consequent observation of a social stratification. The consequences of these differential distributions are the focus of the concepts of poverty, living standards, and deprivation.

Socioeconomic deprivation measures have been largely developed and used over the past three decades. While deprivation has to some extent underpinned conceptions of social class and socioeconomic position, area-based and individual measures of deprivation represent a relatively new theoretical and practical approach to measuring the relative position of people in society (Townsend, 1990). Compared with the large body of literature relating to practical and theoretical aspects of occupation-based measures of socioeconomic position, knowledge about deprivation is still expanding rapidly, and the theory relating to deprivation continues to be refined. Consequently, the development of a non-occupational classification of socioeconomic position based upon the concept of deprivation requires some conceptual clarification because although the concept of deprivation (in common with the concept of poverty) is related to the concept of socioeconomic position (as well as the concepts of social stratification and inequality), it is concerned with the symptoms or consequences of social stratification, rather than with stratification itself. While social stratification is theorised in terms of the ownership and distribution of resources, deprivation is theorised in terms of the living standards and conditions which result from, or are associated with, a particular pattern of resource ownership and distribution. It is possible, for example, for the concept of deprivation to be employed without regard to the factors underlying the differential distributions of resources, which cause conditions of deprivation. It is not possible, however, to employ the concept of social stratification without regard to the living conditions and standards which result from it because it is these which provide the immediate empirical basis for the concept of stratification in the first place. The idea of social stratification is based upon the observation of socioeconomic hierarchies in which differential access to, and control of, material resources are embedded in structures of social relationships which maintain and reproduce inequality through the legal, economic, political and ideological arrangements that they embody.

Socioeconomic deprivation reflects a 'neo-materialist' standpoint (that places emphasis on relative rather than absolute material conditions), taking the view that people have material, social, cultural and spiritual needs that are linked to the norms of their society and culture, and that it is possible to be deprived in one or more of these respects. Deprivation has been defined as a state of observable and demonstrable disadvantage relative to the local community or the wider society or nation to which an individual, family or group belongs (Townsend, 1987). A distinction is drawn between material and social deprivation, where material deprivation involves the material apparatus, goods, services, resources, amenities and physical environment and location of life (Townsend, 1987). Social deprivation involves the roles, relationships, functions, customs, rights and responsibilities of membership of society and its subgroups. While a primary distinction is made between material and social deprivation, sub-categories of both concepts have also been distinguished (Townsend, 1993, p.82). As a result, some people may be thought of as experiencing multiple deprivation, and others as experiencing only a single form of deprivation. Townsend distinguishes the concept of deprivation from that of poverty by arguing that while poverty is associated with the availability of resources, deprivation is associated with the conditions experienced. Accordingly, to be in a state of poverty is to lack the resources necessary to avoid material and social deprivation. This means that to be in poverty is, by definition, to be in a state of deprivation. On the other hand, it is possible for a person to be in a state of deprivation, as defined by the conditions they experience, while not being in poverty, if, for example, they have access to the resources necessary to avoid material and social deprivation, but chose not to use them.

From a structural perspective, individual characteristics such as education and income are determined by broader social factors that in turn provide the primary route for social policy interventions. The Weberian tradition has exerted a strong influence in the social sciences and epidemiology, expressed through the widespread use of individual characteristics such as occupation and income as measures of socioeconomic position. One of the effects of this emphasis on individual characteristics may be the implication that the solution to social inequalities is to be found in individuals' behaviour rather than in addressing - in Marxian terms - exploitative economic and social relations structurally embedded in society. This difference in emphasis is important insofar as structurally-mediated solutions to social inequalities are generally, and inherently, more radical than individually-mediated solutions that tend to focus on incremental alterations to the status quo. Area-based measures of deprivation, although mainly aggregates of individual characteristics, move towards reflecting structural elements related to area and community - that is, they are more likely to reflect aspects of the physical and social infrastructure of communities than single variable individual measures such as income. However, area-based measures of deprivation clearly fall short of including the more fundamental structural features of society that determine social position, such as exploitive economic and social relations.

The development of the census-based small-area indexes of deprivation, NZDep91, NZDep96, and NZDep2001, utilised the deprivation theory discussed above. However, the increasing use of these small-area indexes as convenient, although often inadequate, proxy individual measures, highlights the need for a deprivation index with a focus on the individual.

Existing measures of socioeconomic position

The factors that are taken into account when measuring socioeconomic position on the basis of the four key concepts of Class/Socioeconomic status, Income poverty, Living standards, and Deprivation, were summarised in Figure 1. An examination of these factors reveals that, for the purposes of measurement criteria, they can be divided into occupational and non-occupational measures, with Class/Socioeconomic Status being the only concept that is occupationally measured. The measures with the longest history are those based on income, education and occupation. These measures and their development and application in New Zealand will now be discussed.

Income-based measures

On the face of it, income and wealth are likely to yield the most direct indication of ability to command socioeconomic resources. However, in practice, the measurement of income has proved to be too complicated for it to be achieved in a few simple questions because it is necessary, also, to establish certain contextual features associated with the income, such as the numbers of people who are dependent upon a particular income, or the possession of assets which affect the potential utility of a particular level of income. It is not the purpose of this report to provide a comprehensive discussion of these issues, which have been well reviewed by Davis, et al. (Davis et al., 1997a, p.9-11). However, the following brief notes serve to highlight the issues.

(1) Income often derives from more than one source, so a range of questions is necessary for these to be identified and recorded.

(2) Where more than one person is dependent upon a particular income, it is necessary to identify their number and demographic composition so that the income they share can be equivalised.

(3) It is necessary, also, to take into account the assets and facilities possessed by, or otherwise available to, those people dependent upon a particular income, because these will influence the uses to which the income may be put and might serve to increase the disposable portion of the income by rendering certain expenditures unnecessary – for example, as might be the case for farmers or other self-employed people who are able to use business associated resources for their personal use. The difficulties associated with measuring assets are shared by the measurement of wealth for use as a proxy measure of socioeconomic status.

(4) Consumption needs vary over the life course, so recorded income must be adjusted to account for this, also.

More fundamentally, however, a measure based solely upon income serves to conflate different occupations that yield similar incomes. This is a problem because social differentiation is based upon more than distributions of economic resources, important though these are. In a consumer society, important markers of social differentiation are based upon consumption patterns, and

people with similar incomes differentiate themselves from one another through the types of things they consume. Thus, for example, the hypothetical plumber and physician who enjoy identical incomes are likely to lead quite different lives, eat different foods, live in different areas, drive different cars, and participate in different cultural and recreational activities.[2] These differences are not insignificant and have clear potential to yield different outcomes in areas such as health.

The issue then, is not that income and wealth are not useful indicators of socioeconomic position, because they clearly are. Rather, their measurement, in a way that is meaningful for the indication of socioeconomic position, is complicated by contextual factors, including consumption, that must also be measured or otherwise taken into account. This might not be a serious concern when the measurement of socioeconomic status is all that is being attempted, but it is usually the case that socioeconomic status is only one of many conceptual variables that a questionnaire is attempting to capture. In such cases the need for a variable to be able to be measured in as few questions as possible is very high. In order to address this need, researchers have considered the use of proxy measures of income such as education and occupation.

Education-based measures

Education has been found to be a robust indicator of socioeconomic status when investigating relationships between socioeconomic status and health (see Davis et al., 1997a). However, a number of complicating factors combine to render the consistent measurement of educational achievement, and its relationship to socioeconomic status, just as problematic as the measurement of income and wealth was found to be. Briefly, the problems may be summarised as follows:

(1) Difficulties with comparing qualifications which have taken similar lengths of time to complete but are otherwise incommensurable (for example, university degrees and on-the-job training).

(2) The tendency for people to be concentrated at the lower end of the educational continuum, with a minority (albeit substantial) gaining advanced tertiary qualifications, makes it difficult to differentiate within the majority of a population (Davis et al., 1997a) when attempting to establish relationships – for example, between socioeconomic status and health.

(3) The use of education as a proxy for socioeconomic status is predicated upon assumptions about economic returns to education through employment, but these returns have been found to vary significantly among the members of a population on the basis of at least two other dimensions or bases of social differentiation: gender and ethnicity.

(4) Finally, historical and cross-national comparisons are rendered difficult by the growing availability of higher education in contemporary societies which results in younger members of society tending to have significantly higher levels of education, at least when measured in years of education, than older members.

[2] The significance of consumption practices as a factor in favour of moving from occupationally-based measures to non-occupationally-based measures is discussed later in this section.

Occupation-based measures

While the two indicators discussed so far are proxies for income, wealth and a capacity to command socioeconomic resources, neither deals directly with what has, arguably, been the primary site of the social relationships and processes underlying social stratification in industrialised societies: employment. The determination of socioeconomic position must, by definition, involve consideration of social and economic factors. The precise manner in which these factors combine to produce a socioeconomic hierarchy, in any particular social formation, varies according to its economic basis and the social relationships which maintain and reproduce it. The key social relationship upon which capitalist/industrial societies have been based is the employment relationship which is, itself, defined by what Marx termed the relations of production: the relationship between capital and labour. The proponents of occupation-based indicators of socioeconomic status have defended their measures by emphasising the fundamental importance of the employment relationship and arguing, further, that to know a person's occupation is to know about their living conditions, working lives, social and community lives, financial resources, residential circumstances, cultural practices and experiences, health outcomes, and life opportunities for them and their children (Johnson and Hall, 1995:250, cited in Davis (1997b, p.13).

Occupation-based measures used in New Zealand
Three examples of occupational scales that have been used in New Zealand are the Elley-Irving scale, the British Registrar General Scale, and the New Zealand SocioEconomic Index (NZSEI).

The *Elley Irving Scale* has, historically, been the most widely used measure of socioeconomic status in the context of health research in New Zealand. The Elley Irving socioeconomic scale was developed in 1972 (Elley & Irving, 1972; Elley & Irving, 1976) and subsequently revised in 1976 and 1983 (Johnston, 1983). In 1977 Irving and Elley published the Irving Elley index of female occupations (Johnston, 1983). The Elley Irving scale consisted of a list of 315 specific occupations within the male labour force, classified into six levels, according to an equal weighting of income and educational attainment. It therefore classified individuals and families according to the income and educational attainment of the (male) head of house.

The *British Registrar General Scale* has also been used in health research in New Zealand. The British Registrar General scale is based solely on occupation and employment status. Occupations are categorised on the basis of skill, status and prosperity (Jones & Cameron, 1984; Whitehead, 1992).

More recent research carried out by Davis and others (Davis et al., 1997b) has led to the development of an occupational scale of socioeconomic status, the *New Zealand Socioeconomic Index* (NZSEI). This index aimed to replace existing occupational indexes (for example, the Elley Irving index). The NZSEI is based upon Ganzeboom et al's development of an International Socioeconomic Index of Occupational Status (ISEI) (Ganzeboom et al., 1992; 1996). Both the ISEI and NZSEI frameworks are based on the 'returns to human capital' model of social stratification, in which occupation functions as a latent, intermediate variable which converts education into income (Davis et al., 1997b, p.19)

Problems associated with occupational measures

Despite the strong sociological justification for the occupational approach, there are problems that are inherent to all occupation-based measures and are largely unavoidable. Many researchers have identified the most serious problem arising with occupation-based indices as being related to their coverage of only economically active people (Benzeval et al., 1995; Carr-Hill, 1990; Whitehead, 1992). Hence there are problems classifying the unemployed, women not in the workforce, children and retired people. Other problems arise due to the variation in size of occupational groups, and the cultural/temporal specificity of occupational classifications.

The use of large groupings of occupations for the construction of occupational classifications leads to the problem of measurement error. For example, analysis has shown that use of the Elley-Irving scale is likely to have underestimated the magnitude of association between socioeconomic disadvantage and health (Roberts, 1994). Roberts found that in each of the Elley-Irving strata the proportion of people in the study with car access was significantly lower in the Maori and Pacific Island group than in the non-Maori and non-Pacific Island group. Likewise, apart from in the highest socioeconomic group, where numbers of Maori and Pacific Islanders were small, the proportion of subjects who were owner occupiers was significantly lower in the Maori and Pacific Island group compared with the non-Maori and non-Pacific Island group, in each stratum.

Similar observations have been made of another occupational measure of social class, the British Registrar General's scale. In a study of socioeconomic position and mortality, Wannamethee and Shaper (1997) found that although social class is strongly associated with car and home ownership, within all social classes both car and home ownership contributed significantly to differences in mortality within the broad socioeconomic categories. These findings complemented those of the Whitehall Study, and the Office of Population Censuses and Surveys Longitudinal Study, which showed considerably wider mortality differentials when asset-based measures such as income, housing tenure and car ownership were combined with social class, than was seen with social class alone (Davey Smith et al., 1990; Goldblatt, 1990). Wannamethee and Shaper (1997) concluded that material wellbeing is a factor in determining differences in mortality observed between occupational groups.

A further general criticism of occupation-based scales focuses on the culture bound nature of socioeconomic status, especially when based on the socially-determined construct of occupational hierarchies, a view supported by Durie in respect of Maori (1994, p.485).

Additionally, the approaches which form the bases of occupation-based measures were themselves developed during a phase of capitalist development that was characterised by an emphasis upon production through the harnessing of technological, social, human, and material resources to the production of material goods and services. The dominant ethical imperative associated with this phase was the work ethic, which became a crucial ideological support for overcoming people's unwillingness to accept the discipline and alienation associated with the industrial workplace (Bauman, 1998). In the contemporary social and economic environment animated by an ethic of participation in consumption rather than participation in production, the extent to which an occupational classification can encapsulate the essential social relationships underlying the socioeconomic hierarchy must be limited.

In view of the deficiencies of personal measures of socioeconomic position based on occupation (whichever methodological approach is used), and the need to explore causality using multilevel modelling, researchers have identified the need for new approaches to measurement of socioeconomic position at an individual or household level (Jones & Cameron, 1984; Rose & O'Reilly, 1997; Whitehead, 1992). For example, Whitehead (1992) describes a new approach based on household class, focussing on the occupation of the spouse who is economically dominant. If any one variable is not available a score can still be obtained for the family by adjusting the index accordingly. The Social Index has been found to be more sensitive to social inequalities in childhood than the British Registrar General's scale. Jones and Cameron (1984) claim: "If what is required is an analysis of society showing the importance of some circumstance which society can change for the better, and about which we have a theory on the genesis of this or that disease, then we should make the analysis of that circumstance". Rose and O'Reilly (1997) suggest that a non-occupational classification could summarise both the degree to which people have control over their lives and the resources that they command, and both are related to health.

The development of NZiDep was intended to explicitly address some of these problems with occupation-based measures, particularly the problems of incomplete coverage of the population, measurement error and, to a more limited extent, culture-specificity. Also, the move to a non-occupational deprivation-based approach, with its focus upon consumption outcomes, is compatible with the shift in emphasis from production to consumption that has been a feature of the post-industrial moral landscape.

Non-occupation-based measures developed and used in New Zealand

Three non-occupational concepts are identified in Figure 1: Income Poverty, Living Standards, and Deprivation. As shown in Figure 1, the income poverty approach is on the production, or inputs side of the equation, while the living standards and deprivation approaches are on the consumption side. In New Zealand, these approaches constitute two streams of the research being carried out into socioeconomic wellbeing, the monitoring of policy impacts and effectiveness, and the needs-based targeting of funding, as discussed in the introduction to this section. This New Zealand work is now described and discussed in terms of the measurement issues raised by factors such as the mismatches that have been identified when income poverty and living standards poverty measures are compared, for example.

Income poverty

The New Zealand Poverty Measurement Project (NZPMP) began a comprehensive poverty measurement programme of research in 1992 funded by the Foundation for Research, Science and Technology. At the time a number of small scale community studies were identifying increasing hardship, but these were not national projects, nor were they statistically based. The NZPMP was undertaken by three organisations: Business Economic Research Limited (BERL), The Public Policy Group at Victoria University, and the Family Centre Social Policy Research Unit. From 1993 to the present day, continuous focus group sampling of low income householders in urban, mid-city, and small towns throughout New Zealand has taken place seeking transparent information about minimum adequate budgets. These data have been used to create a realistic poverty line for use in social and economic policy setting that involves the participation of those who live on low incomes. The unit record data in the Household Economic Survey (HES) has been

used to develop national estimates of the numbers in poverty, the types of households involved, and the depth of poverty (Stephens & Waldegrave, 2001; Stephens et al., 1995; Stephens et al., 2000; Waldegrave et al., 1997; Waldegrave & Stephens, 2000; Waldegrave et al., 2003; Waldegrave et al., 1996). Surveys and numerous qualitative studies have sought information on the consumer behaviour, methods of budgeting, survival strategies and un-affordable expenditures of low income households (Waldegrave et al., 1999; 2000)

The NZPMP employs a living standards-based approach to derive a minimum adequate level of income necessary for the purchase a basket of necessary basic goods and services. These estimates provide the basis for establishing a poverty line that is expressed as a percentage of median disposable household income. The approach is living standards-based by virtue of its focus upon the level of income necessary to support a standard of living that is deemed to be minimally adequate by people who are accustomed to living on a low income – one that falls within the first quintile of the income distribution. Estimates of the minimum adequate level of income are obtained from focus groups comprised of low income householders, with separate groups being convened for Maori, Pacific, and non-Maori non-Pacific householders, respectively. The focus group participants are asked to develop consensual estimates of what they consider to be the minimum weekly expenditure necessary to purchase a range of goods and services that are essential to maintain a household of a specified composition. An average of these estimates is then expressed as a percentage of the median disposable household income for a household of the same composition as derived from the results of the current Household Economic Survey (HES). The dollar value of this percentage of median household income defines the poverty threshold, or line.

Through the application of equivalence scales, the poverty line can be defined for any particular household type. Focus groups are conducted annually and their results compared to the actual median income when HES data become available. During the twelve years that the NZPMP has been running, the estimates of minimum adequate expenditure have consistently been very close to 60 percent of median household income, and this figure has become a de facto New Zealand poverty line by being used as a threshold for low income by the Ministry of Social Development (Ministry of Social Development, 2004) and as a 'poverty value measure' by the New Zealand Government (2004). The 60 percent threshold is also used in the UK and European Union as a standard against which to measure the effectiveness of poverty reduction strategies. The NZPMP produces poverty lines for both before and after payment of housing costs and their preferred focal measure has been 60% of median, equivalent, disposable, household income after adjusting for housing costs. This 'relative' measure of poverty emerges from the 'absolute' assessments of minimum adequate budgets by the low income householders in the focus groups. For more details of the methods and results of the NZPMP see Stephens, et. al (2001; 1995), and Waldegrave, et. al. (1999; 1997; 1999; 2003; 1996).

As a tool for monitoring social policy and its impacts, a poverty line has advantages and disadvantages. As a threshold, it characterises people as being either above or below the line. On its own, it does not distinguish further among people who are on either side of the line. But when used in conjunction with income distribution data and demographic data, it enables the extent and severity of poverty to be measured for the general population and for particular groupings of people within it. A poverty line has useful applications in monitoring the effects and impacts of changes in social and economic policy, for example. It is useful in this regard because if the policy changes which impact upon people's incomes can be determined, it is relatively easy to determine

the movements of particular groups in relation to the poverty line in terms of whether they are becoming relatively more, or less, poor. In New Zealand, this feature was used to good effect in monitoring the impact of a decision to reduce the level of New Zealand Superannuation in 1999 (Waldegrave et al., 2003).

However, the application of an income poverty measure is dependent upon knowing the actual disposable income of a person or a household. This is not straightforward, as was identified in the earlier discussion of occupational measures, and will be discussed again in the discussion of living standards research.

Living standards

The living standards research conducted by MSD has resulted in the Economic Living Standards Index (ELSI), which is a living standards measure applicable to the general population. The ELSI scale is based on a number of living standards-related items associated with personal and household consumption, recreation, social participation, and household facilities. The consumption, or outputs, emphasis of ELSI is reflected in the measurement of the living standards-related items that people actually have, irrespective of their income and other financial resources, rather than calculating what living standards-related items people might be expected to have on the basis of their level of income and resources. For a full account of the development and application of ELSI, see Krishnan, et. al. (2002) and Jensen et al. (2002). Conceptually, the living standards approach is very close to the deprivation approach in its emphasis upon outcomes and conditions experienced. The major difference between the two is that the living standards approach aims to cover the full socioeconomic continuum, while the deprivation approach focuses upon the deprived end and cannot discriminate among those who have no marked degree of deprivation.

Research in New Zealand and overseas has identified a "significant mismatch between poverty measured using an income approach and poverty measured directly in terms of observed deprivation or other indicators of unacceptably low living standards" (Perry, 2002). In other words, if questions relating to income measures are applied to the same random sample who are asked questions that relate to living standards measures, only a percentage are shown to be both income poor and living standards poor. Perry notes the mismatch is substantial and is typically in the range of 50% to 60%. Interestingly, despite this, the gross numbers of those who are measured as being poor in both income and living standards measures in any given country are often very similar. While considerable work remains to be carried out into understanding the factors underlying this mismatch, it seems that it is likely to result from contextual factors, such as a person's life stage, previous employment history, non-market income, assets, inherited wealth, family support, and social networks, to name just a few, that combine to confound any necessary, direct, relationship between current income and current actual living conditions. For example, a fifty year old who has recently been made redundant may be income poor but for the time being will not qualify as being living standards poor because of his/her accumulated goods and assets. If such a person remained on a low income for a long period of time, their assets could be expected to diminish and they would become living standards poor as well. Once again, the problem is related substantially to the measurement of income and the difficulties associated with capturing the often complex contextual features associated with the income, as was identified in the earlier discussion of the arguments advanced in favour of occupation-based measures. In his analysis of

this issue, Perry acknowledges the multi-dimensional nature of poverty and concludes that it is not realistic to rely upon a single measure in order to understand the phenomenon (Perry, 2002, p.121)

New Zealand Index of Deprivation

The New Zealand Index of Deprivation (NZDep) was created in response to requests from a wide group of individuals employed in the health and social services sectors in government, university, and various social agencies, who wanted a small-area measure of 'need'. NZDep has been created from Census data. The small areas are based on meshblocks, the smallest administrative area used by Statistics New Zealand. Three versions of NZDep – NZDep91, NZDep96, and NZDep2001– have been developed from the 1991, 1996, and 2001 Censuses, respectively. NZDep is based on the proportions of people in the small area with each of nine characteristics related to deprivation (ten in the case of the first index) (Salmond & Crampton, 2001; Salmond & Crampton, 2002b; Salmond et al., 1998b). While designed originally for use in resource allocation, health research, and advocacy, NZDep has become a widely used social research tool.

Used as a numerical measure, the index is being used in funding formulae for groups of people (Crampton et al., 2002; Hefford et al., in press). This is an entirely appropriate use of the small-area measure because aggregates are the unit of analysis. Any funding adjustments that are made on the basis of a local NZDep distribution will result in funding flowing either to areas or to groups of people, rather than being targeted to individuals. NZDep cannot be used to target funding to individuals, since the inherent measurement error would result in discrimination for some people. For example, a student is entitled to a Community Services Card and hence to an increased subsidy for general practitioner consultations, yet a student living in a relatively non-deprived area would be required by such a funding application to pay full general practitioner costs.

Currently, deprivation research in New Zealand and elsewhere is regionally based. This has advantages for a range of policy applications including the development of equitable regional funding formulae. It does not however, measure socioeconomic position accurately for individuals or households where wealthy people live in poorer areas or poorer people live in richer areas. In New Zealand, such a mix of households is very common even at meshblock level. It is primarily for this reason that the authors of this report decided to undertake research that would lead to the development of a robust individual deprivation measure.

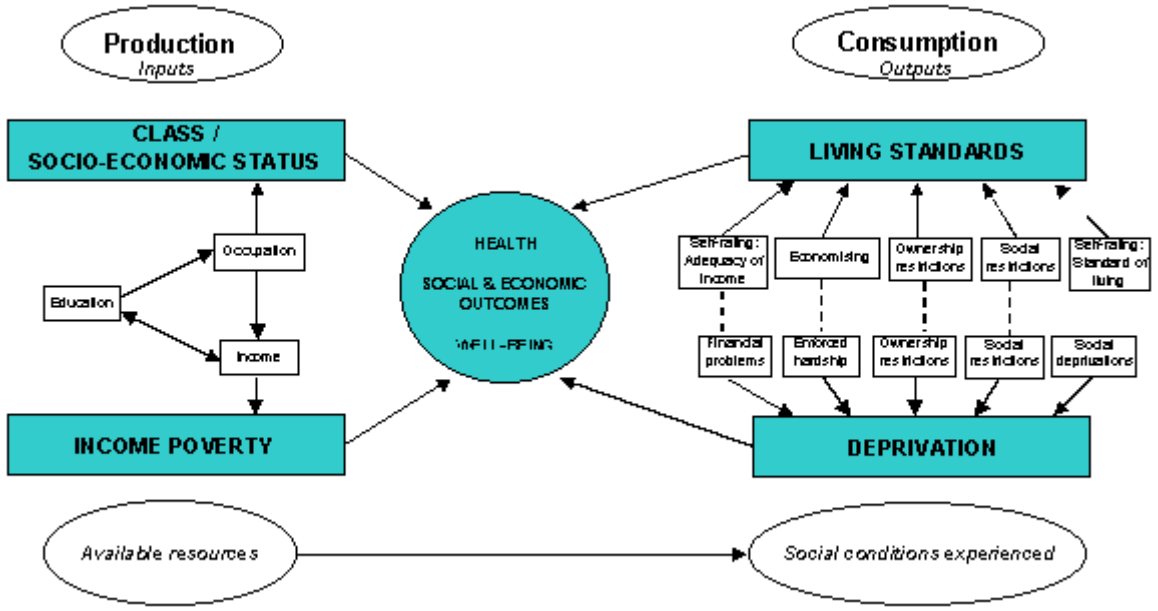
The development of NZiDep

In the present research, we have developed our non-occupationally-based measure from a theoretical foundation like NZDep, of socioeconomic deprivation. To the best of our knowledge there has been very little prior published research describing the development of scales for individuals using deprivation as the theoretical basis, although a number of area-based scales have been developed.[3] One example of an individual deprivation measure based on census-type questions is cited in Jarvis (1999). A non-occupation scale such as NZiDep will fulfil a similar role as occupation-based indices – that is, as a socioeconomic measure for research about socioeconomic wellbeing, in a broad sense, and health outcomes and health behaviours.

As a measure of socioeconomic position, the individual deprivation approach (in company with the living standards approach) places emphasis upon outputs and constraints associated with consumption and access to resources, rather than upon the inputs associated with income, and the ownership or control of resources, which are the focus of class-based approaches. Figure 2 provides a summary of the relationship between different measures of socioeconomic position and their links to social and economic outcomes, such as wellbeing, and health. The figure highlights the production basis of class and income measures and the consumption basis of living standards and deprivation approaches.

[3] However, a number of problems arise with the use of area-based measures of socioeconomic deprivation. A more complete discussion of these problems can be found elsewhere (Crampton et al., 2004). For the purposes of applying area-based measures to individuals, one problem is particularly relevant: measurement error. Measurement error inevitably occurs when area-based measures of socioeconomic position are applied to individuals — because not all people in deprived areas are deprived, and not all socioeconomically deprived people live in deprived areas (Blakely et al., 2002; McLoone, 2001). For example, NZDep96 has been shown to be only weakly correlated with an individual deprivation index (Salmond & Crampton, 2001;2002a). The effect of this measurement error generally will be to reduce the strength of observed associations between socioeconomic position and health outcomes. Researchers have found that the use of small spatial areas, such as meshblocks, diminishes the extent of measurement error (Crayford et al., 1995; Hyndman et al., 1995). The development of NZiDep was aimed, in part, at addressing the problem of measurement error associated with the use of area-based measures.

Figure 2: Relationships between measures of socioeconomic position and observable outcomes



A personal index of deprivation has several very important advantages in comparison to occupation-based measures. Firstly it includes people who are not economically active, such as children, students, home-makers, the unemployed and the retired. Secondly, it allows accurate stratification of deprivation, thereby overcoming the problem of large, heterogeneous occupation-based or area-based groups. Thirdly, it represents a move away from measures of socioeconomic position based on culture-specific theoretical constructs that form the basis of occupational status.

The individual deprivation-based index of socioeconomic position developed by this research identifies a person's location on a socioeconomic continuum by reference to the directly measured constraints upon their income, their capacity to consume essential market goods, and their dependence upon non-market support. However, by emphasising the deprivation end of the continuum, the index in its present form does not provide the basis for a comprehensively graded scale that can differentiate among the approximately 50 percent of people who possess none of the deprivation characteristics upon which the index is based. To discriminate among that 50 percent of people, it would be necessary to adopt a broader living standards approach that would include reference to items of luxury and conspicuous consumption. To do that, however, would be inconsistent with the deprivation focus of NZiDep which has been developed primarily as a parsimonious and efficient measure of socioeconomic position that focuses on the deprived end of the socioeconomic continuum.

Finally, by basing NZiDep upon the analysis of responses to deprivation-related survey questions, the Index has an empirical basis that can, and should, be reviewed periodically in order to adjust for changes in the relative importance of deprivation variables over time. For example, while the inclusion of receipt of a means tested benefit is appropriate at present, potential future changes to the system of government transfers might reduce the importance of that variable as an indicator of deprivation.

Section 2: Gathering data

Introduction

The primary aims of this research have been to develop an instrument for the measurement of deprivation at the individual level and an associated scale of individual deprivation. The instrument is intended for use on a stand-alone basis as well as for inclusion in any survey or other questionnaire for which a parsimonious measure of individual socioeconomic position, as indicated by material and social deprivation, is required. The goal was to end up with somewhere between four and twelve questions that could be asked of any New Zealand resident in order to locate them on a scale of individual deprivation. This goal was achieved by conducting a survey of 975 individuals using a questionnaire consisting of 53 questions designed to measure known deprivation characteristics. Establishing correlations among these characteristics was a necessary prelude to constructing the index. This section of the report describes and discusses the conduct of this survey and the methodological issues associated with it.

Questionnaire development

The aim of the questionnaire development process was to create a structured survey questionnaire able to be administered face to face in twenty to thirty minutes and covering the areas of financial, material, and social deprivation. Questions were derived from questionnaires and question lines used in the following studies: The Survey of Living Standards in London carried out between 1985 and 1987 under the leadership of Peter Townsend (Owen, 1987); the Poverty and Social Exclusion Survey of Britain carried out in 1999 by the Office for National Statistics on behalf of a consortium of experts from the universities of York, Bristol and Loughborough and funded by the Joseph Rowntree Foundation; the New Zealand National Nutrition Survey; instruments developed for the New Zealand Poverty Measurement Project by the Family Centre Social Policy Research Unit (FCSPRU) including a structured questionnaire used in a national survey of New Zealand households, and focus group and in-depth interview question lines (Waldegrave et al., 1999; Waldegrave et al., 2000); the NZ Super 2000 Taskforce research on the living standards of older people (transferred later to the Ministry of Social Policy (Fergusson et al., 2001b)); and the New Zealand Census of Population for the census years 1996 and 2001.

Questions from these structured questionnaires and semi-structured question-lines were grouped into five domains according to whether they were measuring: material deprivation; social deprivation; material *and* social deprivation; income level; and demographics. Questions from the New Zealand Census were included to enable comparability with an existing prototype non-occupational classification (NOC) of individual deprivation derived from the 1996 census (Salmond & Crampton, 1998). Each potential question was ascribed one or more of the following reasons for inclusion: validation to enable comparison with the prototype non-occupational classification (NOC); demographic sub-group determination; measuring activities undertaken to make ends meet; direct or indirect measure of wealth; direct or indirect measure of low personal income; income-based constraints upon expenditure; and characteristics of the built environment in a person's neighbourhood. A draft questionnaire that covered these domains was developed

with input from Maori and Pacific researchers that was informed by consultations with their communities. A 53-item questionnaire (see Appendix) was finalised and piloted before the commencement of survey fieldwork in October 2001.

The fieldwork was managed by the Family Centre Social Policy Research Unit which is a three tikanga (three cultures) community-based research organisation with three cultural sections: Maori, Pacific, and Pakeha (European New Zealanders). This organisational structure informed the sampling strategy and logic applied to the survey which covered equal numbers of Maori, Pacific people, and Pakeha or Other. It was important to have a sample that was weighted in favour of the numerically smaller Maori and Pacific people because they are the sections of New Zealand society most affected by deprived living conditions, and their experiences are therefore essential for informing the definitions of deprivation that the research aimed to develop.

The survey

The sampling frame

The survey was designed to provide data that would enable the measurement of correlations among deprivation characteristics and identify the deprivation characteristics that were most correlated with a latent "deprivation" factor. It was necessary to do this in order to achieve the research's goal of developing an index based upon a small number of questions that could reliably capture that underlying deprivation factor. Because this information is best provided by people with several deprivation characteristics, it was necessary to ensure a sample that contained sufficient people with more than one deprivation characteristic. It was also necessary to include people with one and no deprivation characteristics in order to establish unbiased national correlation coefficient values by providing information on the numbers of people without deprivation characteristics, or with one specific characteristic. Consequently, a sample was sought that encompassed all deprivation strata, but was weighted towards those most likely to possess more than one deprivation characteristic.

A total sample of 900 respondents was sought in the greater Wellington urban area consisting of 50 individuals in each of 18 ethnic/gender/age categories. The ethnic categories were self identified Maori, Pacific, and Other (neither Maori nor Pacific). The age categories were 18-39 years, 40-59 years, and 60 years and over. The sample was divided first on the basis of ethnicity, with 300 respondents in each category. The constituents of each ethnic category were equally divided among the three age categories, which were, in turn, equally divided among men and women.

Equal numbers of Maori, Pacific, and Other (predominantly Pakeha/European New Zealander) respondents were recruited in order to ensure that the deprivation characteristics of each of these major ethnic groups could be analysed with equal strength. In order to encourage the participation of Maori and Pacific respondents, and minimise culturally-based barriers to full participation, participants and interviewers were ethnically matched, with Maori participants being recruited and interviewed by Maori interviewers, and Pacific participants being recruited and interviewed by Pacific interviewers.

In order to meet the needs of this recruitment and interviewing strategy, an area-based sampling frame was developed with separate areas allocated for the recruitment and interviewing of Maori, Pacific, and Other participants, respectively. The sampling frame was developed to yield a random sample of 150 start-points each located in a Statistics New Zealand meshblock, with 50 each for Maori, Pacific, and Other participants. A quota of one person from each of the six gender/age categories was to be recruited and interviewed in each meshblock.

Because the representation of Maori and Pacific people in the survey sample exceeded their representation in the general population, it was necessary to devise a strategy that would maximise the probabilities of survey interviewers locating and recruiting Pacific and Maori respondents. This strategy involved ranking the meshblocks in the greater Wellington urban area according to the proportions of Pacific and Maori resident in them and developing separate sampling frames each for Maori, Pacific, and Other.

In order to maximise the chances of finding our target groups, meshblocks were selected on the basis of the estimated efficiency with which Maori and Pacific people could be located and recruited in meshblocks across the range of NZDep96 ratings. Initially, an efficiency level of at least 0.3 was sought – that is, at least 30% of the meshblock population belonged to the relevant ethnic group, according to the Census – but this proved too high to yield sufficient numbers of meshblocks for the Pacific and, to a lesser extent, the Maori sampling frames. This was compounded by the low representation of Maori and Pacific people in the meshblocks with lower levels of deprivation. In the end, two efficiency cut-points were decided upon: a "low" efficiency for the lower deprivation level meshblocks (NZDep 1-4) and a "high" efficiency for the higher deprivation level meshblocks (NZDep 5-10). The low efficiency cut-points were: 0.10 for Pacific people; 0.15 for Maori; and 0.20 for Other. The high efficiency cut-points were: 0.20 for Pacific people; 0.25 for Maori; and 0.30 for Other. Additional criteria for meshblock inclusion were: that they had more than six adults overall, and more than six adults in at least one ethnic category in order to render the achievement of the quota for each meshblock at least theoretically possible within that particular meshblock; and a proportion of adults greater than 0.5.

The procedure for selecting meshblocks and allocating them to one or other of the three ethnic groupings was as follows. The efficiency was first checked for the Pacific group and if this was appropriate, the meshblock was allocated to the Pacific sampling frame. If a meshblock had not then been allocated to the Pacific sampling frame, its efficiency was checked for Maori and, if appropriate, it was allocated to the Maori sampling frame. Finally, if a meshblock had not been allocated to either the Pacific or Maori sampling frames, its efficiency for non-Maori and non-Pacific people was checked and, if appropriate, it was allocated to the Other sampling frame. This procedure yielded 2,808 meshblocks: 229 for the Pacific sampling frame; 215 for the Maori sampling frame; and 2,364 for the Other sampling frame. The distributions of these meshblocks among the NZDep96 categories by ethnic subgroup are shown in Table 1.

Table 1: Distribution of sampling frame meshblocks among deprivation categories, by ethnic subgroup

Number of meshblocks with high efficiency levels for recruiting:	NZDep96					Total
	1 to 4	5 to 6	7 to 8	9	10	
Pacific Islanders	8	9	26	43	143	229
Maori	47	18	51	47	52	215
All other ethnic groups	1407	455	331	111	60	2364
Total	1462	482	408	201	255	2808

Using the random number generator in Excel, an initial sample of 50 meshblocks was drawn for each of the three ethnic subgroups from their respective sampling frames. Address lists for these meshblocks were purchased and these were used to determine the start-point for each meshblock. In each case, the start-point was to be the address with the lowest street number in the meshblock. When the lowest number was shared by houses in a number of streets, the house in the street whose name began with the letter of the alphabet closest to "A" was selected. In the event that two or more streets met this criterion, one was to be selected by lot.

Obtaining the sample

Survey interviewers worked from the designated start-points to obtain the following quota of respondents from each start-point: six people of one ethnicity; three male and three female; one of each gender to be aged between 18 and 39, one of each to be aged between 40 and 59, and one of each to be aged 60 or above. Following a prescribed walk pattern outlined in their written instructions (see Appendix), interviewers were required to speak to a member of every household along the route in order to determine its eligibility in terms of having a household member with the correct ethnic, age and gender characteristics. At least two, and up to three, call-backs were made as necessary in order to establish eligibility and establish contact with the selected household member. Following this walk pattern, participants were recruited in accordance with the procedures specified in a Screening Questionnaire (see Appendix).

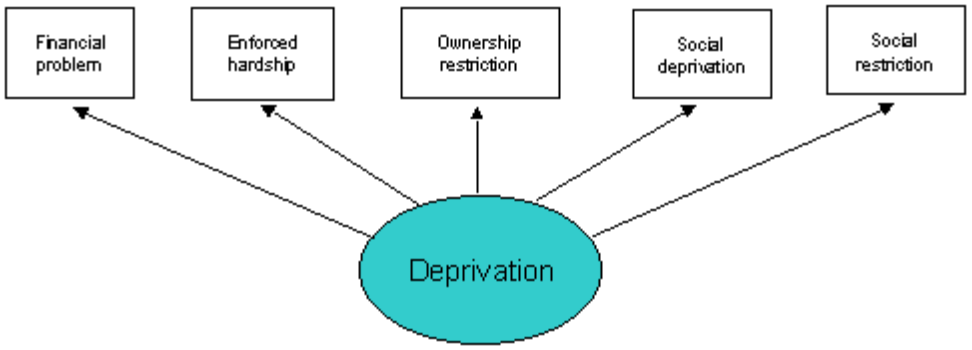
The walk pattern did not ensure that interviewers remained in the meshblock within which the start-point was located, and it was possible for interviewers to cross into adjoining meshblocks. For this reason, each questionnaire was geo-coded by address in order to establish its meshblock and associated area-based NZDep96 rating. To compensate for a shortfall in the numbers of respondents located who were living in areas with NZDep96 ratings of 7 to 10, 75 additional interviews were conducted in a further 14 meshblocks (3 Maori and 11 Other). An overall response rate of 58 percent was achieved, with 50 percent for Other, 58 percent for Maori, and 77 percent for Pacific people.

The Variables

Questionnaire variables

An initial conceptual diagram was created using the work on the Economic Living Standards Index as a guide (Jensen et al., 2002, p.66). An underlying unmeasurable variable called deprivation is assumed which can have a number of consequences. Following the Townsend dichotomy of material and social deprivation, five possible sub-scales of deprivation were identified (Figure 3).

Figure 3: Conceptual diagram of components of deprivation



Twenty-eight deprivation characteristics were measured in the survey, along with personal and household demographic information. The deprivation characteristics included nine that were used in the small-area census-based indexes of relative socioeconomic deprivation, known as NZDep96 and NZDep2001, and others drawn from the FCSPRU's survey of 'Monetary Constraints and Consumer Behaviour in New Zealand Low Income Households', and the other sources listed at the beginning of this Section.

The deprivation characteristics are shown in Table 2. All variables have been given short but descriptive names, both for convenience in presentation in future tables, and for ease in distinguishing these base variables from adaptations to be described later. On their first use in the text, each abbreviated variable name is followed by a description of the information covered by the variable, in parentheses. Details of the questions from which the information was gleaned are shown in the Glossary (*see* pages 76 and 77).

Table 2: Basic deprivation characteristics

Variable name*	Information	Deprivation sub-category	Objective, subjective, modifiable †	In NZDep2001	Unit
		Financial problem			
SCHQUAL	no school qualification	cause of	obj, mod	yes	person
WRKLOOK	looking for work	cause of	obj, mod	yes	person
SINGLEPAR	in single parent family	(or social dep.)	obj	yes	person
BENEFIT	on means-tested benefit	primary indicator	obj	yes	person
HHINCOME	low household income	primary indicator	obj	yes	house
ELECPRB	electricity bill problems	secondary indicator	obj, mod		house
MORTPRB	mortgage problems	secondary indicator	obj, mod		house
PHONPRB	phone bill problems	secondary indicator	obj, mod		house
RENTPRB	problems paying rent	secondary indicator	obj, mod		house
		Hardship, enforced			
BRWMPRB	borrowing money problem		obj, mod		person
COMMHLP	obtaining community help		obj, mod		person
FOODHLP	obtaining food help		obj, mod		person
BADSHOES	wearing worn-out shoes		subj		person
CHPFOOD	buying cheap food		subj		person
FEELCOLD	feeling cold to save heating costs		subj		person
INSURE	uninsured		obj		house
NOFRVEG	going without fresh fruit/veges		subj		person
PAY4OTHR	problems paying for other items		subj		person
HUNGER	going hungry		subj, mod		person
		Ownership restriction			
CARS	no car access		obj	yes	house
RENT	in rented accommodation		obj	yes	house
CROWDED	in 'crowded' accommodation		obj, mod	yes	house
PHONE	no access to a phone		obj, mod	yes	house
		Social deprivation			
PARK	no park-like space nearby	neighbourhood	obj		local
VANDAL	vandals nearby	neighbourhood	subj		local
ADVICE	could not get advice if needed	support	subj		person
STRANDED	could not get help if stranded	support	subj		person
		Social restriction			
NOHOLS	no holidays		subj		person

* Additional letters (Y, R, M) may be appended to the name to indicate a modification (see *Analytic variables* below)

† obj = objective, subj = subjective, mod = modifiable

Sixteen of these basic deprivation characteristics are measured at the personal level, and another two are characteristics of the local neighbourhood. The household information is more problematic in that it may not be known to all members of the household.

Analytic variables

The questionnaire variables were adjusted for analytic purposes in several ways, indicated by R, Y, or M appended to the base variable name.

Re-coded variables (additional R)

Many of the variables were re-coded from the questionnaire values – where '0' was reserved for the number zero and yes and no were coded '1' and '2' – so that all analytic variables were coded with '0' representing 'not deprived'. Most of the deprived categories were coded '1', but when the variables have been modified by the number of times a deprivation event had occurred, the value '1' is reserved for 'once' and '2' for 'more than once' (since investigation showed little, if any, discriminating value for the precise number of times greater than 1). To indicate that a variable had been re-coded from the questionnaire value, an 'R' was appended at the end of the base variable name.

Some questionnaire variables could be modified by incorporating extra information obtained from follow-on questions.

Why modifications (additional Y)

One type of additional question established whether the noted lack was a result of deprivation or not.

For example, the information about lack of access to a car can be combined with the follow-up information about whether a car was desired, in order to distinguish between someone who was deprived of such personal transport availability, and someone living in, say, an inner-city apartment who had no perceived need for a car. Thus the 'no cars' variable could be adjusted with information about why there was a lack of a car to produce a 'no cars why' variable, or 'NOCARSY' for short.

Other modifications (additional M or MM)

Other types of additional information included the number of times a deprivation event occurred.

These variables, such as how many times in the last year community help was requested, have an appended 'M', for 'modified' on the base variable name. Later, a further modification was made by restricting the number of categories to three for 0, 1, and 2 or more times. This variable, being a modification of a modification, is indicated by two M's at the end of the short-form descriptor.

Constructed variables

Household income and household occupancy (pejoratively called crowding as a convenient short-hand) were adjusted for household composition in line with previous NZDep work. Briefly, household income was equivalised using the Jensen equivalisation (Jensen, 1978; Jensen, 1988) and the threshold to distinguish low-income households was the value printed on the showcard used by the interviewers. Household occupancy was calculated using the relatively simple OECD definition from information in the questionnaire about the age and sex

of all household members and the number of bedrooms available to them. The OECD definition is the number of person-equivalents per bedroom, and a person-equivalent was defined following Morrison (1994): children aged 10 and over are equivalent to one adult; children under 10 are equivalent to half and adult.

One further variable was constructed. To be consistent with the earlier work on indexes of deprivation, unemployment was obtained in the questionnaire by using the census questions, which thus establish unemployment over the previous four weeks. For the present work, however, we included extra questions to establish unemployment in the previous year, to be consistent with the one-year period for all the other deprivation characteristics. Thus a new variable was created (UNEMPLOYR) to establish unemployment for more than one month over the previous year.

Section 3: Analytic framework

Statistical Methods

Overview

The objective of the statistical analyses was to establish a simple and reliable index of socioeconomic deprivation based on a small set of coherent deprivation descriptor variables.

After an initial cull of unreliable variables, such as those derived from inadequately completed questions, variable reduction was accomplished by exploring factor analyses.

Coherence of the variable sets was established through factor analyses, item-total correlations, and Cronbach's Coefficient Alpha.

A 'best' index was derived via principal component analysis, from which simpler, and more practical, indexes were constructed.

All analyses were accomplished using SAS (SAS Institute Inc., 1999-2001).

Weighting

Analyses were undertaken using weighted data. The sample data were weighted such that the weighted sample reflected the age/sex/ethnic/NZDep96 breakdown in New Zealand, these variables being used in the sampling procedure. Thus, for example, the weighted correlation coefficients estimate the national coefficients under the assumption that the sample obtained was representative of national deprivation 'norms'.

Principal component analysis

Principal component analysis makes no assumptions about the structure of the data. All it requires is a positive definite matrix of measures of association between variables, such as is guaranteed with Pearson product moment correlation coefficients. By exploring the correlations among the variables, the procedure finds a 'best' set of mathematical transformations of the source variables, which in turn explain decreasing amounts of variation in the data. Diagrammatically, if there were only three variables in the set, the usual co-ordinate system would be rotated to form the principal axes of the ellipsoidal swarm of data points in a 3-D scatter-plot. In particular, the first principal component is the longest principal axis of the ellipsoid, along which the data points are most spread out. This particular component is thus the weighted sum of the variables which explains the greatest proportion of the overall variation in the data. The first principal component is therefore the best single way to combine the information from the constituent variables.

The various NZDep indexes of relative socioeconomic deprivation for small areas are each based on the first principal component of the constituent variables. In these cases, the source data were proportions of people in a small area with a certain characteristic, such as receiving a means-tested benefit. Although the proportions are bounded by 0 and 1, in practice the national data derived from census information yielded interval-level data for which Pearson correlation coefficients were very good indicators of associations among the variables.

Preliminary work (Salmond & Crampton, 1998) on finding an individual-level index of socioeconomic deprivation used anonymous unit-record census data and showed that the above process could also be used for variables that were scored on a binary scale, for then the calculated Pearson correlation coefficients were identical to the Phi coefficient, a measure of the strength of a relationship in a 2x2 table that is not dependent on the sample size (Fleiss, 1981, p.59). Principal component analysis could therefore be used for development of a deprivation index based on binary data by using ordinary correlation coefficients.

Factor analysis

In the NZDep analyses, the variables chosen for exploration were theoretically deprivation variables. It was therefore not necessary to explore the structure of the data in any detail except as a check on the theory. In the present circumstances, however, it was desirable to thoroughly explore the structure of the data both to check for a consistent deprivation nature, and to investigate the possibility of deprivation sub-scales. Factor analysis was used for this purpose.

Unlike principal component analysis, factor analysis assumes that the co-variation in the observed variables is due to the presence of one or more latent factors that exert causal influence on the observed variables. The latent factors are not directly measurable. In the present setting, we assume that there is an unmeasured factor called 'deprivation' which may be manifest in a number of different ways. For example, a relatively deprived individual may find himself/herself unemployed as the result of a number of concomitant circumstances which might only be captured by an extensive in-depth interview, and may choose to go without fresh fruit and vegetables in order to use the money saved on something that the individual considers of more immediate 'value' – such as smoking cigarettes as a relief from the stresses resulting from their deprived circumstances (Graham, 1993). Another individual in the same unemployed circumstances may cope with the general deprivation differently – for example, by forgoing a holiday or wearing worn-out shoes.

The difficulty with factor analysis is to assess the likely portion(s) of any observed variable that is a feature common to all in a set (or subset, if more than one underlying factor is suggested). We have taken the simplest approach, using the squared multiple correlation coefficient as the initial measure of communality, and a standard orthogonal rotation method (Varimax) to find a simple structure to aid interpretation of the underlying common factor(s).

We have followed standard practices in deciding how many factors are indicated to underlie any particular set of variables (SAS Institute Inc., 1999). We have checked the values of the eigenvalues of the *raw* correlation matrix to retain only the number of factors which have eigenvalues greater then 1.0, preferably much greater (for 1.0 indicates that the factor explains the

same amount of variance as a single variable, on average). We have also looked at the proportion of variance accounted for by each factor, for low such proportions indicate weak or insignificant factors. In both the principal component analyses and the factor analyses we have looked for natural breaks in the decreasing sequence of eigenvalues (the scree plot). In the factor analyses, we have also looked at a 'proportion' criterion: technically, the proportion of common variance to be accounted for by the retained factors using the prior communality estimates, set at 100%. In cases where these criteria suggest different numbers of important underlying factors, we have investigated each suggestion.

Finally, we have checked for interpretability in the rotated solution of the retained number of factors – do the variables that load at least moderately well on a particular factor conform to one of our conceptually expected subsets of deprivation? The loadings here are equivalent to bivariate correlations between the observed variables and the underlying factors. Furthermore, any factor which has fewer than three such moderate or high loadings is unlikely to point to a major sub-category of deprivation

The process described briefly above is an exploratory factor analysis. Our over-riding theory might suggest a single underlying factor ('deprivation'), though the initial conceptual diagram (see figure 3) might suggest as many as five distinct aspects of deprivation (factors). Or, perhaps the data would suggest two factors, one an indicator of material deprivation and the other an indicator of social deprivation. We kept an open mind on the number of factors underlying the sample data.

Measures of internal consistency

The first indication of an internally consistent set of variables is a moderate to high loading of each variable on a factor, and a low to zero loading for the remaining variables.

Cronbach's Coefficient Alpha and item-total correlations are formal measures of internal consistency. A multiple-item instrument, measuring an underlying construct, is internally consistent if its items are highly inter-correlated. Cronbach's Alpha measures this internal consistency. The 'item-total correlation' measures the consistency between one variable (item) in the instrument and the remaining variables. It is the correlation between the variable and the total of the remaining variables.

Validation of sample

Prototype deprivation index from 1996 Census

Since unemployment is a variable in the NZDep small area indexes, and was therefore also used in the prototype individual index created from census data at the unit level, we needed to include it in any index created from the sample data. However, unemployment is defined by Statistics New Zealand as not currently working and actively seeking work in the last four weeks. Unemployment therefore is not relevant for those people who have retired. The age at retirement is varied, but usually occurs at age 60 or later. Therefore, comparisons between the census-based index and the survey-based version were derived for individuals under 60, in our case for those aged 18-59.

Survey version of prototype index

The survey data are not derived from a simple random sample and are therefore weighted to represent the national population (see Section 3; Weighting). The first principal component was derived from a weighted correlation matrix of the same variables as those used for the census-based analysis. The results are compared in table 3.

Table 3: First principal components of nine deprivation characteristics obtained from 1996 census data and 2001 survey data.

Deprivation characteristic	National census, 1996	Local survey,* 2001
on means tested benefit	0.66	0.76
low household income	0.66	0.70
in single parent family	0.62	0.50
no access to car	0.56	0.56
no access to phone	0.49	0.51
not in owned home	0.48	0.49
unemployed	0.33	0.56
no qualifications	0.28	0.41
high household occupancy	0.11	-0.10
percent variance explained	24.8%	29.1%
eigenvalue	2.23	2.62

* All items were weighted to reflect national distributions.

Reassuringly, there is considerable similarity between the two first principal components. Some differences are to be expected as national circumstances changed in the five years between the two data sources. The variables that showed differences between the two sets of loadings greater than 0.1 were those relating to unemployment, high household occupancy, no qualifications, and being in a single parent family. The loading change for unemployment is consistent with the decline in prevalence between the 1996 and 2001 censuses (Statistics New Zealand website). As a result, the importance of unemployment as an indicator of deprivation in 2001 would increase, with a consequent expected increase in the loading, as found. The number of people without any qualifications also declined between the 1996 Census and the 2001 Census (Statistics New

Zealand website). This would have the effect of increasing the importance of no qualification as an indicator, and thus its loading, as found. Single parent families became more common (Statistics New Zealand website), which would be expected to decrease its importance as an indicator of deprivation, with a consequent decrease in the loading, also as shown.

Finally, the high household occupancy measure was a relatively poor performer in the 1996 NZDep index for small areas, and it is an even poorer performer at the individual level, in both the census-derived and survey versions. This is partly due to the nature of the occupancy calculation – the revised variable in NZDep2001, which is fairly consistent with the other eight variables in that index, was based on the more discriminating Canadian definition of occupancy which not only takes more account of age, but also considers the sex of people who are permitted to share a bedroom without any suggestion of possible crowding (Statistics New Zealand, 2003).

Thus the differences between the two sets of loadings have likely explanations that are external to any consideration of sampling inadequacy. Furthermore, the general similarity of the two indexes provides affirmation of the weighting process in the present sample survey.

Potential variables for a new index

Twenty-eight deprivation variables were available from the questionnaire data. The ultimate task was to choose a subset of these to form a practical index of deprivation that could be used in future survey work.

The first step in the data reduction process was to establish if any of the 28 variables were unsuitable for inclusion for primary reasons such as too much missing data, or too rare a deprivation event. Table 4 lists the 28 variables, in alphabetical order of their short-form name, together with information about missing data and the proportion deprived. The likely levels of missing data (either unknown or accidentally missed) in a future random sample of the population are shown in the 'weighted' columns, which adjust the sample data to reflect the demographic profile of the country as a whole.

Table 4: Response and deprivation information for analytic variables

Variable	Missing - in sample* *number*	Missing - weighted† *percent*	Deprived - in sample* *percent*	Deprived - weighted† *percent*	Possible problem (see text)
ADVICER	11	0.5	27.6	18.4	
BADSHOESR	5	0.3	13.9	8.2	
BENEFITR	12	0.8	34.1	22.6	
BRWMPRBR	5	0.1	16.6	6.9	
CHPFOODR	10	0.7	36.4	29.6	
COMMHLPR	6	0.2	7.4	5.1	
CROWDEDR	3	0.2	35.3	25.6	
ELECPRBR	40	0.7	16.6	10.8	too many missing in subgroup?
FEELCOLDR	4	0.1	22.3	20.6	
FOODHLPR	4	0.1	12.8	9.7	
HHINCOMER	6	0.1	33.0	22.4	
HUNGERR	8	0.1	10.7	7.1	
INSURER	54	2.1	35.7	22.5	too many missing in subgroup?
MORTPRBR	55	1.3	3.1	1.4	too many missing in subgroup? too few deprived
NOCARSYR	7	0.2	18.5	13.0	
NOFRVEGR	9	0.2	20.5	15.6	
NOHOLSR	18	0.7	35.7	27.3	
NOPHONEYR	6	0.1	15.9	5.4	
PARKR	12	0.5	11.4	4.2	too few deprived
PAY4OTHRR	32	3.3	21.0	12.8	too many missing?
PHONPRBR	46	1.1	18.1	10.6	too many missing in subgroup?
RENTPRBR	49	0.8	11.5	6.3	too many missing in subgroup?
RENTR	24	0.4	40.1	32.8	too many missing in subgroup?
SCHQUALR	5	0.7	49.1	27.5	
SINGLEPARR	5	0.5	12.2	8.8	
STRANDEDR	9	0.5	9.7	5.2	
UNEMPLOYR	0	0.0	22.4	24.8	
VANDALR	56	4.7	22.2	18.9	too many missing?

* There were 975 individuals in the sample, with approximately equal numbers in the three ethnic subgroups.

† Weighting was used to estimate the likely national distribution.

On the basis of the information in table 4, seven of the 28 variables were excluded from further consideration, as discussed below.

If the number of individuals not providing data for an item is relatively high, but the estimated national proportion is low, there is likely to be a high rate in just some of the subgroups. Six items fall into this category – ELECPRBR, INSURER, MORTPRBR, PHONPRBR, RENTPRBR, and RENTR (electricity bill problems, uninsured, mortgage problems, phone problems, rent problems, being in rented accommodation). They are all household-level characteristics, a signal that for an individual index of deprivation, including household information may not be ideal, even though individuals may be deprived because of their own and/or their family circumstances. Five of these items were therefore dropped from further consideration, the exception being RENTR which was retained at this stage because of its importance in both the small-area level index of deprivation and the prototype census-based individual-level index of deprivation (see table 3).

Two items had relatively high levels of missing data, both in the sample and expected in a future random sample of the population. Missing data in a future survey would mean that either the

individual could not have an index value assigned, or that some form of imputation would be needed. The estimated levels of 3.3% and 4.7% were considered unacceptably high for a good index, so the variables concerned – PAY4OTHRR (problems paying for other items), and VANDALR (vandals nearby) – were dropped from further consideration.

Two items showed a relatively low estimated level of deprivation in the community at large. An arbitrary cut-off of under five percent was used. One item – MORTPBRR – with an estimated 1.4% of the population having this mortgage payment problem, was already suspect because of missing data and was dropped from further consideration. The other item – PARKR (no park-like space nearby) – was marginal as only 4.2% or the population would be likely to be deprived of an open space for children to play, or somewhere to walk a dog. However, it was retained at this stage, but marked for possible exclusion later, particularly as the number of social deprivation items available was severely limited.

In summary, the seven variables dropped from further consideration because of data limitations were ELECPRBR, INSURER, MORTPRBR, PAY4OTHRR, PHONEPRBR, RENTPRBR and VANDALR. This left 21 deprivation items to be statistically whittled down to an undetermined, but relatively small number of key items which could form a suitable index of deprivation for individuals.

Section 4: Analyses for adults under 60

Analysis of 21 deprivation characteristics

As already noted, unemployment is a characteristic that has no meaning after an individual has formally retired. This is often at age 60 or 65, but increasingly is not necessarily at either of those ages. However, unemployment is a clear indicator of deprivation both in the small-area index and in the census-derived prototype individual index. Other potential variables may have different meanings for the older individual than for a younger person, since the older person has had more time to accumulate wealth and assets which could act as a stop-gap resource in times of stress. For these reasons it was decided to analyse the group aged 18-59 years first and to consider and add the older group later.

The first analysis of the 21 variables investigated their structure through a factor analysis (Table 5). Did the 21 assumed deprivation variables exhibit any of the sub-groups suggested in Figure 3?

Investigation of the eigenvalues of the correlations among the 21 variables showed unclear evidence – there was very good support for one factor, with the (unadjusted) eigenvalue (5.60) much greater than the others, which simply affirms that all variables were related to deprivation in varying degrees. The next eigenvalues were 1.60, 1.36, 1.26 and 1.11. Being the only ones 1.0 (and thus explaining more variance than that explained by any one variable), this might suggest five factors for a principal component analysis, though not necessarily for a factor analysis (Armitage & Colton, 1998, p. 1480). A specific factor-analytic criterion ('proportion' criterion) based on the eigenvalues, adjusted for communalities, which are used in factor analyses suggested four factors, while scree plots of both unadjusted and adjusted eigenvalues suggested three factors. However, in order to investigate fully, two-, three-, and four-factor solutions were obtained. The three-factor solution was very close to the four-factor solution with factors 2 and 3 combined into one factor. For convenience, only the two- and four-factor solutions are shown, on the right and left respectively, in table 5. Rotated solutions are shown as these help to clarify the meaning of the factors.

Table 5: Rotated four-factor and two-factor models for 21 deprivation variables, age under 60

	Factor					Factor	
Variable	**1**	**2**	**3**	**4**	**Sub-group**	**1**	**2**
NOQUAL	(0.16)		0.42		***financial problem***		(0.27)
UNEMPLOYR	0.56						0.49
SINGLEPARR	0.45						(0.29)
BENEFITR	0.64		(0.34)			0.36	0.54
HHINCOMER	0.45		(0.30)	(0.29)			0.56
BRWMPRBM		0.49			***enforced hardship*** - objective	0.53	
COMMHLPM		0.60				0.58	
FOODHLPM	0.44	0.47				0.58	
BADSHOESR		0.52	0.37		***enforced hardship*** - subjective	0.61	
CHPFOODR	0.41		0.49			0.41	0.58
FEELCOLDR			0.53			0.39	0.43
NOFRVEGM			0.56			0.49	
HUNGERM		0.57	(0.33)			0.63	
NOCARSYR	0.39	(0.32)		(0.35)	***ownership restriction***	0.35	0.44
RENTR	0.41						0.35
EQBEDS							
NOPHONEYR	(0.28)	(0.34)				0.38	(0.23)
PARKR				0.48	***social deprivation***		0.38
ADVICER				(0.33)			0.35
STRANDEDR				0.54			(0.33)
NOHOLSR			0.45		***social restriction***	0.37	0.47

Notes: (1) Any loading 0.35 *either* has been deleted to aid identification of the main pattern, *or* has been put in brackets to aid understanding of the conceptual groups. Each loading is a correlation between the variable and the factor shown.
(2) Analysis based on data weighted to reflect national distributions

Investigation of table 5 leads to a reduction in the number of variables considered for the individual index. Three variables were dropped at this stage: EQBEDS, NOQUAL, and HHINCOMER, describing, respectively, household occupancy, lack of a qualification, and low household income. These are discussed in turn below.

Considering the four-factor model first, the fourth factor loads heavily only on two variables (at 0.48 and 0.54), both in the *social deprivation* group, although the third variable in that group loads moderately (at 0.33). Thus there is not strong evidence to drop the fourth factor, though it should still be considered as a possibility.

One variable – EQBEDS (occupancy as measured by the ratio of OECD-equivalised people and the number of bedrooms available) – does not load above 0.15 on any factor in either model. Information was not available from our questionnaire for construction of the more sophisticated Canadian equivalisation method. It would undoubtedly have fared better in the models, just as it did in the development of NZDep2001 when compared to the OECD version in NZDep96. However, it is a household-level variable and takes several questions to establish as the age and sex of all household members is required as well as the count of bedrooms. Thus, from a practical

as well as a possible theoretical reason, the measure of occupancy was dropped from further consideration.

The *financial problem* group clearly shows that the NOQUAL variable (no qualification taking 3 months or more to get, yes/no) doesn't really belong – which is not surprising as it could be seen (and was) as a *pre-cursor* to the other financial problems. It was put with that group as there seemed nowhere else to put it in our conceptual framework. The NOQUAL variable was a modification of the SCHQUALR variable (school qualifications, yes/no). In work not reported here, this was found to work reasonably well but the recent developments of the NZCEA (NZ Certificate of Educational Achievement) mean that SCHQUALR, as defined by our questionnaire, would be unhelpful for future survey work.

NOQUAL is not a major variable in either factor in the two-factor model, and loaded at only 0.16 in the relevant factor (1) of the four-factor model which has heavy loadings on all the other *financial problem* variables. Given the changes in education over time, with the current emphasis on skills acquisition, it is likely to be an increasingly blunt instrument for identifying deprivation, just as much as the SCHQUALR variable. Given also that we needed to reduce our group of 21 variables to some smaller set for practical applications, NOQUAL was dropped from further work.

Household income below a threshold (HHINCOMER) is a problematic variable because the value of money changes over time so that different proportions of people will be below a constant threshold as the years pass. Thus it was dropped from further consideration. It is useful to note, however, that it does fit with the hypothesised *financial problem* group.

Turning to the two-factor solution, there is some support for the sub-scale groupings. Possible anomalous variables are CHPFOODR (buying cheap food) and FEELCOLDR (feeling cold to save heating costs), since they load somewhat on both factors but correlate better with the *financial problem* variables. This is understandable for cheap food, and probably also for feeling cold if lack of heating is considered a consequence of financial problems. But the latter argument also applies to the other subjective *enforced hardship* variables. Another somewhat anomalous variable is NOPHONEYR (not having a phone and wanting one) as it does not correlate well with the NOCARSYR variable (not having a car and wanting one) in the second factor. NOHOLS (no holidays) is also a bit anomalous as it fits reasonably (in factor 2) with the other social variables and the financial group, yet also correlates with the *enforced hardship* group (in factor 1). While these anomalies are noted, there was insufficient reason to drop these variables at this stage.

Analysis of 18 deprivation characteristics

The 18 variables still left in the list of potential items for the individual index were subjected to another factor analysis. The reduction in number of variables meant that 57 observations were dropped from these analyses because of missing data, whereas 65 had been dropped when 21 variables were considered.

The eigenvalues of the raw correlation matrix for this set of variables were 5.10, 1.55, 1.33, 1.14, 0.95, ... etc., suggesting that one, or just possibly four factors should be modelled in the factor

analysis. The fact that the first eigenvalue is so much larger than the others again augurs well for a single index as the end-product. In the factor analysis, the 'proportion' criterion suggested a three-factor model. Therefore, both a three-factor model and a four-factor model are shown in Table 6, the one-factor model being uninformative for the present purposes.

Table 6: Rotated three-factor and four-factor models for 18 deprivation variables, age under 60

	Factor					Factor		
Variable	1	2	3	4	Sub-group	1	2	3
UNEMPLOYR	0.56						0.59	
SINGLEPARR	0.44				***financial problem***		0.45	
BENEFITR	0.65	(0.29)					0.69	
BRWMPRBM			0.48			0.50		
COMMHLPM			0.63		***enforced hardship*** - objective	0.58		
FOODHLPM	0.45		0.48			0.48	0.45	
BADSHOESR		0.46	0.45			0.58	(0.25)	
CHPFOODR	0.42	0.53				(0.32)	0.52	0.35
FEELCOLDR		0.59			***enforced hardship*** - subjective	0.37	(0.32)	0.37
NOFRVEGM		0.50	(0.27)			0.44	(0.30)	
HUNGERM		0.41	0.51			0.63		
NOCARSYR	0.38		(0.26)	(0.34)		(0.29)	0.40	(0.33)
RENTR	0.38				***ownership restriction***		0.37	
NOPHONEYR	(0.26)		(0.32)			(0.33)	(0.27)	
PARKR				0.45				0.42
ADVICER				(0.33)	***social deprivation***			(0.30)
STRANDEDR				0.54				0.34
NOHOLSR	(0.32)	0.47			***social restriction***	(0.31)	0.40	0.54

Notes: (1) Any loading 0.35 *either* has been deleted to aid identification of the main pattern, *or* has been put in brackets to aid understanding of the conceptual groups. Asterisks denote values in excess of 0.4. Each loading is a correlation between the variable and the factor shown.
(2) Analysis based on data weighted to reflect national distributions

The general idea of the conceptual pattern is still supported, since the variable groupings are roughly in line with the higher loadings.

In the three-factor model, some of the *enforced hardship* variables also have aspects of *financial problems* (factor 2), which is hardly surprising. The lack of a holiday, NOHOLSR, fits best with the predominantly-financial factor 2. Note, however, that factor 3 has substantial loadings for only two variables, so by the standard criterion of interpretability – that there should be at least three high-loading variables – factor 3 could be dropped.

In the conceptually-relevant four factor model (assuming our concept is sensible), we again have some problems with the idea of *enforced hardship* being distinguishable from *financial problems* and *ownership restrictions*. The *social restriction* variable could clearly be re-labelled as an *enforced hardship*, and it also has something in common with the *financial problem* variables, which is not surprising.

As discussed with the 3-factor solution, the fourth factor here could be dropped as it only has two variables that load substantially.

The only really problematic variable is FOODHLPM (obtaining food help) which loads moderately on two factors. This might be due to unnecessary weighting of those people who sought food help many times. A three-point scale – never/once/more-than-once – works better, with the adjusted variable then weighting on only the first factor. This suggested that all the times-in-the-last-year modified variables should be further modified in the same way. These variable descriptors end in a double 'M'. The factor analyses of the 18 variables, with three modified in this way – FOODHLPMM, COMMHLPMM (obtaining community help), and BRWMPRBMM (borrowing money problems) – produced results sufficiently similar to those in table 6 that they are not shown here. These modified versions were retained in the following analyses.

Another way to investigate the 18 variables is to calculate the squared multiple correlations which indicate the level of overlap between one variable and all the other variables. This information is shown in table 7.

Table 7: Squared multiple correlations among 18 deprivation variables, age under 60

Variable	Squared multiple correlation coefficient	Rank	
FOODHLPMM	0.50	1	
CHPFOODR	0.49	2	
BENEFITR	0.45	3	
BADSHOESR	0.43	4	
NOCARSYR	0.41	5	
FEELCOLDR	0.39	6	
HUNGERM	0.36	7	
NOFRVEGM	0.36	8	
NOHOLSR	0.35	9	
UNEMPLOYR	0.35	10	
COMMHLPMM	0.35	11	
BRWMPRBMM	0.25	12	
SINGLEPARR	0.24	13	
NOPHONEYR	0.23	14	
RENTR	0.22	15	
STRANDEDR	0.21	16	(*social deprivation*)
PARKR	0.16	17	(*social deprivation*)
ADVICER	0.12	18	(*social deprivation*)

Note: Analysis based on data weighted to reflect national distributions

The three social deprivation variables, as a group, have the least in common with the remaining variables. In a principal component analysis, they loaded least on the first principal component, the best single weighted sum of all the variables – PARKR (no park-like space nearby): 0.17, ADVICER (could not get advice if needed): 0.31, STRANDEDR (could not get help if stranded): 0.23. The remaining loadings were all <= 0.42.

To explore this further, single factor solutions in three models were undertaken. The factor analysis solution explored a postulated underlying single factor. The first principal component indicated the loadings on the best single linear combination of all the variables. These are shown in table 8. In addition, a form of non-parametric factor analysis was explored, which avoids the

assumption of underlying multivariate Normality usual in factor analyses. Unfortunately, for technical reasons – sparse data, and relatively small sample size – the solution (not shown) was somewhat problematic. Nevertheless, it confirmed the rank order of the social deprivation variables indicated in table 8.

Table 8: Single factor solutions for 18 deprivation variables, age under 60

Variable		Principal component analysis		Factor analysis	
		loading	rank	loading	rank
CHPFOODR		0.71	1	0.69	1
FOODHLPMM		0.71	2	0.68	2
BADSHOESR		0.66	3	0.63	3
BENEFITR		0.65	4	0.62	4
NOHOLSR		0.64	5	0.60	5
FEELCOLDR		0.62	6	0.58	6
NOCARSYR		0.61	7	0.57	7
UNEMPLOYR		0.58	8	0.54	8
NOFRVEGM		0.58	9	0.54	9
HUNGERM		0.56	10	0.53	10
COMMHLPMM		0.56	11	0.52	11
BRWMPRBMM		0.50	12	0.46	12
NOPHONEYR		0.49	13	0.44	13
RENTR		0.42	14	0.38	14
SINGLEPARR		0.41	15	0.38	15
ADVICER	(*social deprivation*)	0.31	16	0.27	16
STRANDEDR	(*social deprivation*)	0.23	17	0.20	17
PARKR	(*social deprivation*)	0.17	18	0.15	18

Note: Analyses based on data weighted to reflect national distributions

The first principal component closely parallels the single factor from the parametric factor analysis. The three social deprivation variables have low to very-low loadings showing that they are not measuring the same thing as the rest of the variables, which is not surprising as the other variables are all aspects of material deprivation.. Therefore, in the interest of reducing the number of variables to be included in an individual index of deprivation, these three social deprivation variables – PARKR, ADVICER, and STRANDEDR – were (somewhat reluctantly) dropped.

Analysis of 15 and fewer deprivation characteristics

As the number of variables decrease it becomes increasingly difficult to find meaningful sub-groups of deprivation characteristics. For example, any useful sub-group should have at least three variables in it. Given also that the first factor has always been by far the strongest, attention was turned away from the underlying factor structure and towards construction of a meaningful index. For this purpose, principal component analysis is appropriate, together with measures of the internal consistency among the variables.

Having reduced the original 28 deprivation items by nearly one half on various statistical grounds, it was important to investigate any variations in the underlying structure of those remaining across the three ethnic groups. The sample had been constructed to maximise the chance of locating any anomalies by attempting to interview the same number in each of the ethnic groups. Because of the difficulties with some variables, particularly unemployment – which is still in the favoured list – these analyses were still conducted on the 18-59 year age group.

Ethnic-specific principal component analyses

To compare the shape of the sample space for the three ethnic groups, ethnic-specific principal component analyses were conducted. Their eigenvalues, proportions of variance explained, and cumulative such proportions, are shown in table 9.

Table 9: Ethnic-specific principal component analyses of 15 deprivation variables, age under 60

	Non-Maori, non-Pacific			Maori			Pacific		
Factor	eigen-value	propor-tion	cumulative proportion	eigen-value	propor-tion	cumulative proportion	eigen-value	propor-tion	cumulative proportion
1	4.07	0.27	0.27	6.85	0.46	0.46	4.16	0.28	0.28
2	1.49	0.10	0.37	1.31	0.09	0.54	1.88	0.13	0.40
3	1.27	0.08	0.46	(0.98)	(0.07)	(0.61)	1.39	0.09	0.50
4	1.19	0.08	0.53				1.25	0.08	0.58
5	1.07	0.07	0.61				1.00	0.07	0.65

Notes: (1) Analysis based on data weighted to reflect national distributions
(2) Brackets indicate that the eigenvalue is less than the average (1.0)

The first, very strong factor, in each ethnic group again suggests the possibility of a single underlying main eigenvector (factor), although two factors could also be postulated because the drop in eigenvalue between the second and third factors is bigger than that between subsequent factors.

Clearly, Maori exhibit a quite different pattern to the other two ethnic groups, which needs investigating. Table 10 shows the loadings on the first principal component (first eigenvector) for each ethnic group.

Table 10: Ethnic-specific first principal components of 15 deprivation variables, age under 60

Variable	Non-Maori, non-Pacific		Maori		Pacific	
		rank		*rank*		*rank*
CHPFOODR	0.73	*1*	0.73	*5*	0.66	*3*
FOODHLPMM	0.71	*2*	0.75	*1*	0.64	*5*
NOHOLSR	0.64	*3*	0.74	*4*	0.43	*10*
BENEFITR	0.64	*4*	0.71	*7*	0.50	*9*
FEELCOLDR	0.59	*5*	0.75	*2*	0.56	*8*
UNEMPLOYR	0.59	*6*	0.70	*8*	0.33	*13*
NOCARSYR	0.56	*7*	0.69	*9*	0.27	*14*
BADSHOESR	0.55	*8*	0.75	*3*	0.67	*1*
NOFRVEGM	0.50	*9*	0.68	*10*	0.66	*2*
COMMHLPMM	0.46	*10*	0.66	*11*	0.61	*6*
NOPHONEYR	0.36	*11*	0.57	*13*	-0.05	*15*
RENTR	0.34	*12*	0.43	*15*	0.43	*11*
HUNGERM	0.31	*13*	0.72	*6*	0.66	*4*
SINGLEPARR	0.27	*14*	0.50	*14*	0.41	*12*
BRWMPRBMM	0.20	*15*	0.65	*12*	0.58	*7*

Notes: (1) All items are weighted to reflect national distributions.
(2) Major differences between the ethnic groups are indicated by the highlighted cells.

The most discrepant variable is NOPHONEYR, where the Pacific loading is essentially negligible. It suggests that, among Pacific Islanders, not having, but wanting, a phone is as often unrelated to deprivation as it is related to deprivation. This is consistent with the results of an approximate t-test which showed that the distribution of the (logarithm of the) deprivation variable counts was similar in the two NOPHONEYR groups (that is, the yes and the no groups) for the Pacific group ($p = 0.27$) – though this does not look at the specific deprivation variables. In contrast, for example, the distribution of the (logarithm of the) deprivation variable counts was very different for the two FOODHLPMM groups ($p < 0.0001$), for the two UNEMPLOYR groups ($p < 0.0001$), and for the two RENTR groups ($p < 0.0001$).

Borrowing money and feeling hungry (BRWMPRBMM, HUNGERM) are less important indicators of deprivation among the majority ethnic group – presumably because these are, in fact, relatively rare among the non-Maori, non-Pacific in our sample, where only 12 in that group had borrowed money, and only eight had felt hungry (compared to at least five times that number in the other groups).

No holidays, unemployment and not having access to a car (NOHOLSR, UNEMPLOYR, NOCARSYR) are apparently of less importance in describing 'deprivation' for Pacific Islanders.

Internal consistency of 15 deprivation characteristics

Item-total correlations were used to investigate the degree to which an individual variable, in the group of 15, correlated with the postulated latent variable ('deprivation'). In table 11, the correlation coefficients capture the results for the age group 18-59, overall and by ethnic group.

Table 11: Internal consistency of 15 deprivation variables by ethnic group, age under 60

Variable*	Total < 60		Non-Maori, non-Pacific		Maori		Pacific	
Item-total correlations		*rank*		*rank*		*rank*		*rank*
FOODHLPMM †	0.640	*1*	0.601	*2*	0.700	*1*	0.513	*5*
CHPFOODR	0.630	*2*	0.637	*1*	0.679	*5*	0.520	*4*
BADSHOESR	0.584	*3*	0.461	*6*	0.689	*3*	0.524	*3*
BENEFITR	0.572	*4*	0.512	*4*	0.651	*7*	0.450	*7*
NOHOLSR	0.543	*5*	0.522	*3*	0.683	*4*	0.307	*12*
NOCARSYR	0.522	*6*	0.452	*8*	0.637	*9*	0.239	*14*
FEELCOLDR	0.515	*7*	0.470	*5*	0.690	*2*	0.418	*9*
UNEMPLOYR	0.493	*8*	0.460	*7*	0.645	*8*	0.277	*13*
NOFRVEGM	0.492	*9*	0.359	*10*	0.615	*10*	0.530	*2*
HUNGERM	0.489	*10*	0.234	*13*	0.660	*6*	0.523	*1*
COMMHLPMM †	0.471	*11*	0.364	*9*	0.597	*11*	0.482	*6*
BRWMPRBMM †	0.427	*12*	0.140	*15*	0.581	*12*	0.438	*8*
NOPHONEYR	0.413	*13*	0.267	*11*	0.507	*13*	-0.014	*15*
SINGLEPARR	0.349	*14*	0.177	*14*	0.437	*14*	0.361	*10*
RENTR	0.343	*15*	0.248	*12*	0.378	*15*	0.360	*11*
Cronbach's Alpha ‡	*0.860*		*0.786*		*0.912*		*0.788*	

Notes: (1) All items are weighted to reflect national distributions.
(2) Correlations ranked 1-7 are highlighted.

* Variables are standardised, and thus conform to the parallel tests assumptions needed for Cronbach's Coefficient Alpha, and weighted to reflect the national age/sex/ethnic/NZDep distribution which was the basis of sampling. Variable names end with key letters: 'Y' = why; 'R' = recoded to 0,1; 'M' indicates for lack of money ; 'MM' is 'M' modified by times in the last year.

† These variables are scored 0 for no deprivation, 1 for one episode in the last year, 2 for more than one in the last year. The other variables are coded 0 for not deprived, 1 for deprived.

‡ Two assumptions underlie the use of Cronbach's Coefficient Alpha - the parallel test assumption, and the use of a simple sum of the items to form the index:

(i) The parallel test assumption assumes roughly equal means and standard deviations for all the variables. The means and standard deviations are certainly not equal, but the standard deviations may be considered 'roughly' equal. They *are* equal if all the variables are standardised (z-scores). This is why the standardised version of Cronbach's Alpha has been used above, although numerically it differs little from the raw version, perhaps as a consequence of the binary nature of most of the variables.

(ii) The use of a simple sum for the eventual index was not pre-determined, as the index could be a score on the first principal component, as used for the area-level index. Ultimately a simple sum is, in fact, suggested.

Possibly problematic variables, considered here as variables with item-total correlations less than 0.25, are not consistent across the groups:

total under 60:	(*none*)
non-Maori non-Pacific:	BRWMPRBMM SINGLEPARR HUNGERM RENTR
Maori:	(*none*)
Pacific:	NOPHONEYR NOCARSYR

These six variables might be considered unsuitable for a global classification system in this age range, 18-59 years. However, in the overall analysis there is no such evidence for their exclusion, and the Cronbach Alpha measure of internal consistency is very good.

Cronbach's Coefficient Alpha measures the 'internal consistency' of the 15 items. Values in the range 0.70 - 0.80 are considered respectable, 0.80 - 0.90 are very good, and values > 0.90 indicates that the group of items could be shortened without important loss of information. (Armitage & Colton, 1998). However, the Health Survey SF36 manual gives further advice (Ware et al., 1993, 2000, p.7:2):

> "Acceptable reliability differs depending on what is being analyzed: comparison among individuals ... require[s] high reliability (values > 0.90); group comparisons, needed to compare average health status scores ... do not require as high a reliability (values of 0.50 or 0.70 or higher are acceptable)."

Highlighting the top seven correlations in each group yields four variables that the three ethnic groups have in common. These four variables might be considered as the basic ingredients of a short classification. However, a variable measuring benefit status is not relevant beyond the time of transitional retirement because the six (means-tested) benefits asked about were: *community wage, domestic purposes benefit, transitional retirement benefit, independent youth benefit, invalid's benefit*, and *orphans and unsupported child benefit.* Therefore, the benefit variable would not be relevant for most of those over 60. This leaves three variables as, potentially, a shortest form of individual deprivation indicator - FOODHLPMM, CHPFOODR, and BADSHOESR (wearing worn out shoes). However, reliability (as measured by Cronbach Alpha) is reduced too much. Overall it is just 0.663, and in the three ethnic groups it is 0.593, 0.749, and 0.639. This is not greatly surprising as there are only three items measuring the single latent variable.

Re-arranging table 11 to highlight the ethnic variability of the item-total correlations indicates that a number of the 15 variables currently considered are problematic (table 12).

Table 12: Item-total correlation variation across ethnic groups, age under 60

Variable *	Non-Maori, non-Pacific	Maori	Pacific	*Range †*	*Reason(s) to delete*
RENTR	0.248	0.378	0.360	*0.130*	*correlation too low*
CHPFOODR	0.637	0.679	0.520	*0.159*	
FOODHLPMM	0.601	0.700	0.513	*0.187*	
BENEFITR	0.512	0.651	0.450	*0.201*	*?less relevant for over 60 (or over 65) year olds*
BADSHOESR	0.461	0.689	0.524	*0.228*	
COMMHLPMM	0.364	0.597	0.482	*0.233*	
NOFRVEGM	0.359	0.615	0.530	*0.256*	
SINGLEPARR	0.177	0.437	0.361	*0.260*	*correlation too low*
FEELCOLDR	0.470	0.690	0.418	*0.272*	
UNEMPLOYR	0.460	0.645	0.277	*0.368*	*ethnic variability too high*
NOHOLSR	0.522	0.683	0.307	*0.376*	*ethnic variability too high*
NOCARSYR	0.452	0.637	0.239	*0.398*	*correlation too low; ethnic variability too high*
HUNGERM	0.234	0.660	0.523	*0.426*	*correlation too low; ethnic variability too high*
BRWMPRBMM	0.140	0.581	0.438	*0.441*	*correlation too low; ethnic variability too high*
NOPHONEYR	0.267	0.507	-0.014	*0.521*	*correlation too low; ethnic variability too high*

Notes: (1) All items are weighted to reflect national distributions.
(2) Problematic cells (discussed in the text) are highlighted.
* Variables are standardised
† (maximun - minimun) item-total correlations, indicating 'variability' across ethnic groups

There are natural 'breaks' in the range of the correlations across the three ethnic groups, indicated by the two blank rows in the table. The group of variables which are more consistent across the ethnic groups, with the smaller ranges, are at the top, while four of the six variables with considerable ethnic variability also exhibit item-total correlations less than 0.25 in at least one ethnic group, which is considered rather low. Two of the nine variables at the top of the table are, however, also problematic because of low or borderline item-total correlations, while a further variable may not be suitable for the older members of the population, since few of them would be eligible for a means-tested benefit. This table therefore suggests a group of six variables for the eventual index of deprivation – CHPFOODR, FOODHLPMM, BADSHOESR, COMMHLPMM (obtaining community help), NOFRVEGM (going without fresh fruit/vegetables), and FEELCOLDR.

Internal consistency of reduced numbers of characteristics

Several reduced sets of variables have been explored in detail (Table 13). The purpose here is to investigate their internal consistency rather than to find a definitive sub-set of variables that could be used as a short-form classification.

Six out of the 15 variables in Table 11 were considered for dropping because of their low item-total correlations (BRWMPRBMM, SINGLEPARR (in single parent family), HUNGERM (going hungry), RENTR, NOPHONEYR, NOCARSYR) even though the measure of internal consistency is respectable, so the first reduced set considered in table 13 consists of the remaining nine variables.

Analysis of these nine variables still gave respectable internal consistency (table 13). This group of nine variables included BENEFITR (on a means tested benefit) and UNEMPLOYR, neither of which are

relevant to most people over 60, so these two were dropped for a seven-variable analysis. The seven variable analysis showed that COMMHLPMM was ranked least important (smallest item-total correlation) in all ethnic groups. However, these seven variables included all six of the variables suggested by the analysis in table 12. The additional variable was NOHOLS, implying that COMMHLPMM should remain. Since COMMHLPMM was a variable scored on a 0-2 scale, unlike the others which were binary, a six-variable analysis was undertaken to explore the effects of the extra category. A later analysis (table 16) re-explores the possibility of using NOHOLS instead of COMMHLPMM.

The six-variable analysis is consistent within each ethnic group as there are no major differences in the item-total correlations within the groups. However, there is a clear difference between the groups, with Maori, in particular, having greater coherence among the variables. This may indicate some underlying differences in the concept of deprivation, or it may be a consequence of the larger estimated numbers who are deprived, or a combination of these.

One of the variables remaining in this smallest subset is scored 0-2. In case this has an undesirable effect on these analyses, a version which was scored 0,1 was also computed ('ditto, all binary'), but this change made negligible difference. This may imply that the extra sub-question to find out how often in the last year various forms of help were required is not necessary.

There are substantial variations in item-total correlations among the ethnic groups for BENEFITR, NOHOLSR, FEELCOLDR, BADSHOESR, NOFRVEGM, UNEMPLOYR, and COMMHLPMM - just about all the variables. BADSHOESR is a particularly strong example. This does not seem to reflect differing numbers of people experiencing the problem (see table 14). For example, RENTR shows huge differences in the proportions affected in each ethnic group, and CHPFOODR shows substantial differences, yet neither appears on the above list of variables with substantial variations in item-total correlations. Therefore, the substantial variations in item-total correlations possibly indicate differences in the meaning of deprivation among the ethnic groups. These differences are discussed next.

Table 13: Internal consistency of sets of 9, 7, and 6 deprivation variables by ethnic group, age under 60

Variables*	Total < 60		Non-Maori, non-Pacific		Maori		Pacific	
Item-total correlations								
9-variables		*rank*		*rank*		*rank*		*rank*
FOODHLPMM	0.636	*1*	0.602	*1*	0.683	*4*	0.508	*4*
CHPFOODR	0.617	*2*	0.588	*2*	0.684	*3*	0.544	*1*
BENEFITR	0.562	*3*	0.508	*4*	0.663	*6*	0.429	*7*
NOHOLSR	0.551	*4*	0.508	*3*	0.696	*1*	0.398	*8*
FEELCOLDR	0.541	*5*	0.495	*5*	0.688	*2*	0.457	*6*
BADSHOESR	0.524	*6*	0.396	*8*	0.682	*5*	0.522	*3*
NOFRVEGM	0.519	*7*	0.443	*7*	0.586	*8*	0.534	*2*
UNEMPLOYR	0.504	*8*	0.474	*6*	0.616	*7*	0.329	*9*
COMMHLPMM	0.426	*9*	0.334	*9*	0.547	*9*	0.470	*5*
7-variables								
CHPFOODR	0.602	*1*	0.578	*1*	0.644	*5*	0.589	*2*
FOODHLPMM	0.570	*2*	0.518	*3*	0.649	*4*	0.473	*4*
FEELCOLDR	0.559	*3*	0.523	*2*	0.685	*2*	0.472	*5*
NOHOLSR	0.539	*4*	0.497	*4*	0.678	*3*	0.419	*7*
BADSHOESR	0.539	*5*	0.399	*6*	0.718	*1*	0.591	*1*
NOFRVEGM	0.515	*6*	0.429	*5*	0.595	*6*	0.527	*3*
COMMHLPMM	0.434	*7*	0.344	*7*	0.560	*7*	0.420	*6*
6-variables								
CHPFOODR	0.620	*1*	0.596	*1*	0.658	*5*	0.609	*1*
FEELCOLDR	0.571	*2*	0.532	*2*	0.698	*2*	0.508	*3*
NOHOLSR	0.549	*3*	0.508	*3*	0.682	*4*	0.436	*5*
FOODHLPMM	0.523	*4*	0.471	*4*	0.607	*6*	0.406	*6*
NOFRVEGM	0.521	*5*	0.452	*5*	0.585	*3*	0.502	*4*
BADSHOESR	0.515	*6*	0.374	*6*	0.712	*1*	0.577	*2*
Cronbach's Alpha †								
6 variables	0.797		0.750		0.863		0.763	
ditto, all binary	0.796		0.747		0.865		0.767	
7 variables	0.804		0.753		0.871		0.776	
9 variables	0.834		0.794		0.892		0.781	
15 variables	0.860		0.786		0.912		0.788	

Note: All items are weighted to reflect national distributions

* Variables are standardised, and thus conform to the parallel tests assumptions needed for Cronbach's Coefficient Alpha, and weighted to reflect the national age/sex/ethnic/NZDep distribution which was the basis of sampling. Variable names end with key letters: 'Y' = why; 'R' = recoded to 0,1; 'M' indicates for lack of money ; 'MM' is 'M' modified by times in the last year.

† In all cases the value of Cronbach's Coefficient Alpha is at least 'respectable'. The gradual (but small) general decline in the value of Alpha as the number of variables decreases may be artifactual since the coefficient is a measure of reliability adjusted to *reduce*, but not entirely eliminate, dependency on the number of items.

Table 14: Estimated national proportions exhibiting certain deprivation characteristics by ethnic group, age under 60 *

Variables		Total < 60		Non-Maori, non-Pacific		Maori		Pacific	
			rank		*rank*		*rank*		*rank*
RENTR		38.8	*1*	32.9	*1*	72.7	*1*	46.3	*2*
CHPFOODR		34.9	*2*	30.4	*2*	57.4	*2*	49.4	*1*
UNEMPLOYR		31.5	*3*	29.0	*3*	47.2	*5*	32.2	*5*
NOHOLSR		30.6	*4*	27.2	*4*	49.3	*3*	40.0	*3*
BENEFITR		24.1	*5*	19.6	*6*	48.2	*4*	34.5	*4*
FEELCOLDR		23.8	*6*	21.3	*5*	37.3	*6*	28.4	*7*
NOCARSYR		12.0	*7*	9.1	*8*	27.0	*11*	20.8	*9*
FOODHLPMM	*1*	*3.6*		*2.8*		*8.0*		*5.3*	
	2	*8.3*		*6.4*		*19.5*		*10.0*	
	1+2	11.9	*8*	9.2	*7*	27.5	*10*	15.2	*11*
SINGLEPARR		10.7	*9*	7.2	*9*	30.9	*7*	13.9	*12*
BADSHOESR		10.2	*10*	6.6	*10*	29.5	*9*	18.4	*10*
BRWMPRBM	*1*	*2.6*		*1.1*		*9.0*		*11.3*	
	2	*5.5*		*2.3*		*21.0*		*18.7*	
	1+2	8.1	*11*	3.3	*13*	30.0	*8*	30.0	*6*
NOFRVEGM		6.8	*12*	4.8	*11*	17.2	*14*	13.4	*13*
NOPHONEYR		6.6	*13*	2.6	*14*	24.8	*12*	24.6	*8*
COMMHLPMM	*1*	*3.1*		*2.1*		*9.5*		*2.2*	
	2	*3.1*		2.3		7.2		6.0	
	1+2	6.2	*14*	4.3	*12*	16.6	*15*	8.2	*15*
HUNGERM		5.3	*15*	2.5	*15*	20.3	*13*	11.6	*14*

Note: All items are weighted to reflect national distributions

* Values are proportions in the deprived category (1, implied), or categories (1 and 2, as shown)

Extent of deprivation in each ethnic group

Since the various groups of variables presented in table 13 are reasonably internally consistent, this section explores the degree of deprivation in each ethnic group. The cumulative distribution for the 15 deprivation characteristics is shown in table 15. This is equivalent to examining an index where every variable is weighted equally (after sampling weights were applied in this research).

Clearly, the ethnic groups have very different patterns of numbers of deprivation characteristics. While over half of the non-Maori non-Pacific group have no characteristic, or just one, such as living in rented accommodation (together, 56.4%), the other two ethnic groups have less than, or equal to, half that number (28.5%, 21.4%). At the other extreme, just one in ten non-Maori non-Pacific (11.0%) have six or more of these deprivation characteristics, compared to 43.0% for Maori and 26.8% for Pacific people.

Table 15: Estimated national cumulative distributions of 15 deprivation characteristics by ethnic group, age under 60 (percent)

Number of deprivation characteristics	Total < 60	Non-Maori, non-Pacific	Maori	Pacific
0	27.7	31.2	11.4	9.0
1	51.3	56.4	28.5	21.4
2	63.8	69.2	37.5	38.9
3	72.2	77.8	44.4	48.3
4	78.9	84.4	50.2	60.2
5	84.1	89.0	57.0	73.2
6	87.4	91.7	61.8	80.9
7	90.0	94.4	63.1	86.0
8	93.3	96.6	72.2	92.1
9	95.5	98.3	78.2	92.9
10	96.8	99.0	83.4	94.0
11	98.1	99.8	87.8	94.5
12	98.7	100.0	90.1	99.1
13	99.0		92.6	99.6
14	99.2		94.2	100.0
15	100.0		100.0	
6 or more		11.0	43.0	26.8

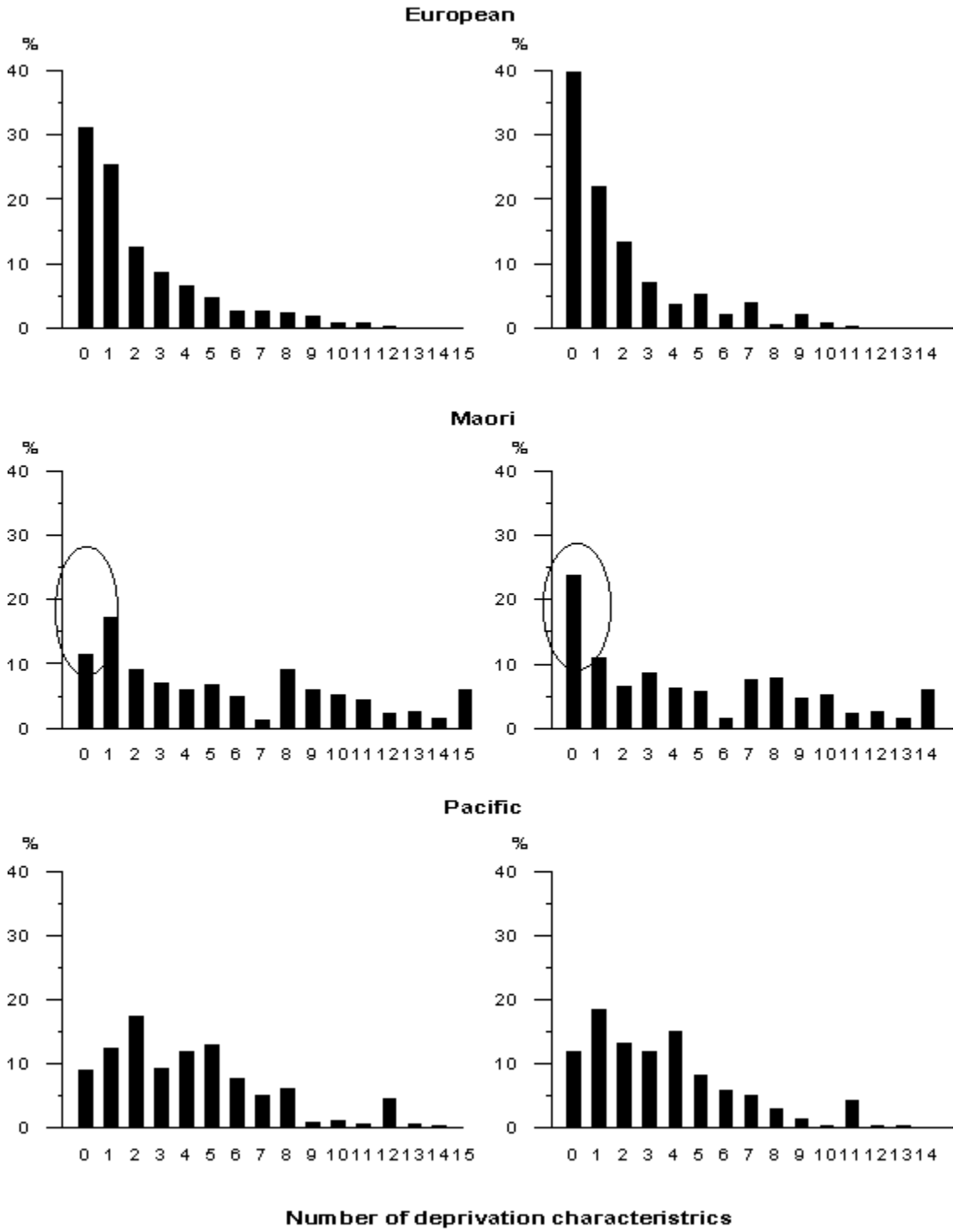
Note: All items are weighted to reflect national distributions

The underlying differences between the ethnic groups are clear from the left-hand graphs in figure 4. One concern with the graphs on the left is the extent to which RENTR might be driving the differences, since renting is such a common occurrence. Indeed, it could be argued that renting is a family characteristic which, although shared by the family members, may, or may not, be under the control of the individual concerned, and thus is not, strictly, a personal deprivation characteristic *in the same way* that the remaining 14 variables are, with the possible exception of NOCARSYR and NOPHONEYR.

To investigate the effect of RENTR, the right-hand graphs are based on the remaining 14 variables. They do not show any marked change in the shapes of the distributions apart from the doubled number of Maori with no deprivation characteristics (23.7% instead of 11.4%). In the 14-variable case, 5% more of the European ethnic group have no, or just one characteristic (61.7%, compared to 56.6% when RENTR was included), and the other two ethnic groups have increased a similar amount (4% and 7%) and are roughly half the proportion in the majority ethnic group (34.6%, 30.3% compared to 28.5%, 21.4% when RENTR was included). At the other extreme, still about one in ten Europeans (9.1%) have six or more of these 14 deprivation characteristics (it was 11.0% for 15 characteristics), while this figure is 38.5% for Maori and 21.2% for Pacific people, compared to 43.0% and 26.8% when RENTR was included.

Thus there does not seem to be compelling analytic evidence that RENTR is a problematic 'personal deprivation' variable and should be dropped. However, removing it from the list would avoid labelling nine out of ten Maori and Pacific people as '*deprived in one or more respects*', as depicted in the left hand graphs. In addition, the first principal component weights suggest that RENTR is not providing as much information as other deprivation variables. In the interests of parsimony, therefore, RENTR was the next variable to be dropped.

Figure 4: Estimated national distributions of deprivation characteristics, age under 60



Analysis of 14 and fewer deprivation characteristics

Ethnic group variation in internal consistency

Considering correlations with the 14-variable first-principal component scores, the first principal component scores based on the newer six-variable group (version 'b'), which uses COMMHLPMM, has better properties than the first principal component scores based on the older group (version 'a') which includes NOHOLSR instead (table 16).

Table 16: Correlations between first principal component scores by ethnic group, age under 60

	Correlation of first principal component score for 14 variables with first principal component scores for			
Ethnic group	9 variables	7 variables	6 variables (a) (uses NOHOLSR)	6 variables (b) (uses COMMHLPMM)
Non-Maori, non-Pacific	0.976	0.949	0.935	0.927
Maori	0.979	0.967	0.952	0.962
Pacific	0.946	0.908	0.874	0.914
Total under 60	0.970	0.950	0.934	0.938

Note: All items are weighted to reflect national distributions.

The Pacific ethnic group is rather different from the others. Of particular concern is the (relatively) low correlation of 0.874 between the current 'gold standard' 14-variable score and the version 'a' 6-variable score. Version 'b' performs better, with a correlation of 0.914, implying that the substitution of COMMHLPMM for NOHOLSR has improved the consistency of meaning of the latent deprivation variable across the ethnic groups. This suggests that a lack of holidays is not considered such a deprivation among Pacific people as it is among the other two groups, as was also suggested by the lowered item-total correlations in table 13 (0.44, compared to 0.51 and 0.68 in the other ethnic groups). Consequently, the lack of holidays does not register as a deprivation among Pacific people, reflecting a general lack of holidays as a standard feature of island societies. Whatever the reason for this difference, for a generic NZ-wide index we want to include only those variables that are considered deprivation characteristics universally. Thus NOHOLSR was dropped.

Thus a potential candidate for a non-occupational classification of deprivation, having a reasonable number of items, but not too many, is version 6 'b' involving the six variables CHPFOODR, FEELCOLDR, FOODHLPMM, NOFRVEGM, BADSHOESR, and COMMHLPMM. However, the Cronbach Alpha coefficients are 0.777 overall, and 0.716, 0.849, 0.764 for the three ethnic groups, which may suggest that another variable or two should be included. One possibility would be benefit status, which is investigated in table 17.

Table 17: Correlations between first principal component scores, and Cronbach's Coefficient Alpha, by ethnic group, age under 60

Ethnic group	Correlation of first principal component score for 14 variables with first principal component score for			*Cronbach's Coefficient Alpha*	
	7 variables 'a' (from table 16)	6 variables 'b'	7 variables 'b' (6b + BENEFITR)	*version 6b*	*version 7b*
Non-Maori, non-Pacific	0.949	0.927	0.952	*0.716*	*0.744*
Maori	0.967	0.962	0.972	*0.849*	*0.864*
Pacific	0.908	0.914	0.942	*0.764*	*0.770*
Total under 60	0.950	0.938	0.957	*0.777*	*0.799*

Note: All items are weighted to reflect national distributions.

The correlations with the 'gold standard' 14-variable index are now highly consistent across the three ethnic groups (version 7b). However, the Cronbach Coefficient Alpha for version 7b has improved only a little over version 6b. In both cases, the coefficients indicate 'respectable' internal consistency. Benefit status is the only reasonably objective member of this potential small group of seven variables and was retained at this stage for this reason.

Ethnic group variation in factor structure of 7 variables

Table 18 shows the factor structure of the seven variables in the 'best' version to date, version 7b (CHPFOODR, FEELCOLDR, FOODHLPMM, NOFRVEGM, BADSHOESR, COMMHLPMM, and BENEFITR). The first latent variable (i.e. the first eigenvector) is consistently strong across all ethnic groups (that is, the eigenvalues are large), and reasonably consistent across the seven variables. There is no good evidence for a second latent variable (using the 'proportion' criterion). Thus, version 7b appears to represent a single latent dimension of deprivation .

Table 18: Factor structure of 7 deprivation variables by ethnic group, age under 60

	Total < 60	Non-Maori, non-Pacific	Maori	Pacific
Loadings for first factor				
FOODHLPMM	0.69	0.67	0.72	0.57
CHPFOODR	0.65	0.64	0.70	0.61
FEELCOLDR	0.61	0.58	0.73	0.53
BADSHOESR	0.58	0.44	0.74	0.68
NOFRVEGM	0.58	0.51	0.67	0.65
BENEFITR	0.58	0.55	0.65	0.43
COMMHLPMM	0.49	0.40	0.60	0.53
Eigenvalues				
1	2.53	2.10	3.33	2.32
2	0.24	0.30	0.23	0.40

Note: Analyses are weighted, to reflect national distributions.

Section 5: Analyses including older adults

Analysis of older adults

Ethnic group variation among older people

Analyses of the older group in the sample are based on a minimum of 286 respondents aged 60 years and over, variations being due to missing data. Respondents were not evenly distributed among the ethnic groups, with slightly more non-Maori, non-Pacific respondents in the sample. As a rough guide, though, the ethnic group-specific analyses are based on data from about 100 people.

Internal consistency of the deprivation items applicable to the older respondents – 12 out of the 14 items favoured for the under 60 age group – varies considerably by ethnic group, as shown in table 19.

Table 19: Item-total correlation variation among 12 deprivation variables by ethnic group, age 60 and over

Variables*	Total 60+	Non-Maori, non-Pacific†	Maori	Pacific
FOODHLPMM	0.575	0.452	0.620	0.363
BADSHOESR	0.531		0.646	0.552
COMMHLPMM	0.499		0.625	0.359
BRWMPRBMM	0.484	0.442	0.658	0.341
CHPFOODR	0.448	0.417	0.700	0.612
HUNGERM	0.404		0.458	0.414
NOHOLSR	0.400	0.512	0.555	-0.043
FEELCOLDR	0.300	0.155	0.690	0.628
NOPHONEYR	0.287		0.296	0.043
BENEFITR	0.259	0.222	0.343	-0.188
NOFRVEGM	0.180	0.008	0.524	0.380
NOCARSYR	0.125	0.064	0.296	0.207
Cronbach's Alpha	0.739	0.568	0.857	0.654

Note: (1) All items are weighted to reflect national distributions.
(2) Major differences between the ethnic groups are indicated by the highlighted cells.
* Excludes two variables from the larger group of 14 used for those under 60 since they are rarely meaningful for those 60 and over (unemployment and single parent family)
† Excludes four variables for whom no one in this age/ethnic group was deprived

For Pacific people, two variables have negative correlations with the overall group, suggesting that the more deprived a Pacific person is, the *less* likely they are to have that characteristic. One is not having a holiday, which is thus not a deprivation issue for older Pacific people. The other variable is being on a means-tested benefit. Overall, out of the 307 who provided this information, 130 older respondents were apparently on such a benefit – that is one of: community wage, domestic purposes benefit, transitional retirement benefit, or invalids benefit – or two out of five older people, although there were only two in thirteen older people in the majority ethnic group. The

negative correlation for benefit status for the Pacific people, then, may reflect a misunderstood question, at least in part, although the proportion of older Maori (44%) and older Pacific (38%) respondents apparently receiving a means tested benefit were similar (contrasting with the 15% among the remainder). Another possibility is that this is a consequence of differing cultural patterns of looking after older people.

Other apparent anomalies concern the correlations for the lack of a car, and for lacks in fresh fruit and vegetables, both among the majority group. Low numbers explains the latter – only two respondents out of 119 in the majority ethnic group had problems with fruit and vegetables – but not the former, as there were 22 out of the 119 without a car who also wanted one.

The lowered Cronbach Alpha for the non-Maori non-Pacific group is a function of the fewer variables available for analysis by virtue of the lack of variability for four of them – no one in our sample used community help, had worn un-mended shoes, wanted a phone but did not have one, or had gone hungry.

The factor structure of the most favoured (to date) short-form group of seven items for those under 60 years (table 18) is repeated for the older group in table 20.

Table 20: Factor structure of 7 deprivation variables by ethnic group, age 60 and over

	Total 60+	Non-Maori, non-Pacific*	Maori	Pacific
Loadings for first factor				
FOODHLPMM	0.70	0.41	0.73	0.48
COMMHLPMM	0.69		0.77	0.58
BADSHOESR	0.65		0.67	0.65
CHPFOODR	0.43	0.54	0.72	0.74
FEELCOLDR	0.33	0.32	0.74	0.73
BENEFITR	0.24	0.22	0.28	-0.05
NOFRVEGM	0.22	-0.04	0.62	0.43
Eigenvalues				
1	1.78	0.62	3.12	2.25
2	0.36	0.29	0.50	1.10

Note: Analyses are weighted, to reflect national distributions.

* No one was deprived for two of the variables, which thus could not be included

The considerable difference between the majority ethnic group and the others is largely a reflection of the different number of items in the factor; and the anomalous loading for the lack of fruit and vegetables is explained by the small number of people with this lack.

The differences between the two smaller ethnic groups, however, are more 'real', with benefit status standing out, as expected.

Analysing all adults

Factor structures

There are approximately half the number of people in the subset 60 years and over, compared to the combined sampled groups who are under 60 years. Some differences between the two age groups might be expected on this basis alone, but not to the extent shown in table 21.

Table 21: Factor structure of 7 deprivation variables by age group

	Under 60 (N = 610)	60 plus (N = 298)	Total (N = 908)
Loadings for first factor			
FOODHLPMM	0.69	0.70	0.69
CHPFOODR	0.65	0.43	0.65
FEELCOLDR	0.61	0.33	0.60
BADSHOESR	0.58	0.65	0.59
NOFRVEGM	0.58	0.22	0.55
BENEFITR	0.58	0.24	0.54
COMMHLPMM	0.49	0.69	0.51
Eigenvalues			
1	2.53	1.78	2.47
2	0.24	0.36	0.23

Note: Analyses are weighted, to reflect national distributions.

The three variables that load particularly differently for the older age group are FEELCOLDR, NOFRVEGM and BENEFITR, as highlighted in the table.

Feeling cold may be a general consequence of age, confirmed by the fact that 49 of the 298 respondents felt cold (the unweighted number). This may explain the lowered loading of 0.33, which is nevertheless still in keeping with some older people being possibly deprived in this respect.

The explanation of the relatively low weight for not being able to afford enough fruit and vegetables (0.22) may be different - only 16 people in our sample (the unweighted number) had this problem.

Conversely, the lowered loading of 0.24 for benefit status may imply that at least some people who answered yes to the question about being on a benefit may not have been particularly deprived. This would be consistent with a misunderstanding of the question.

Therefore, for FEELCOLDR and BENEFITR, and probably for NOFRVEGM as well, there is no reason to suppose that these variables should be left out of a global index, though the above may suggest that an index created from weights specific to age-peers may be advisable. However, the all-ages combined column in table 17 is very similar indeed to the under 60 column, which suggests the opposite – that an overall index of deprivation, with one set of weights, is plausible, although perhaps less meaningful for those 60 and over.

Correlation of indexes with 7, 8, 14 and 15 variables

For everyone, regardless of age or ethnicity, the first principal component scores for the 'full' 14-variable index and the reduced seven-variable index (version 7b) correlate very well (r = 0.941). This varies only slightly across the three ethnic groups (0.962, 0.920 and 0.929 for Maori, Pacific, and the remainder, respectively). If RENTR was to be included as an eighth marker of general underlying deprivation, in both the small and fuller versions above, then r = 0.962 overall and 0.957, 0.973, and 0.946 across the ethnic groups. This improves the correlation for the smaller ethnic groups, perhaps suggesting that the addition of RENTR is useful, although the inclusion of renting in the older group is worrying.

Overall, a seven-variable short index of individual deprivation seems possible, as long as sufficient people can be classified as relatively 'deprived' – in order to make collecting the information and using it in analyses useful. The estimated numbers of people, nationally, with from zero to seven of the deprivation characteristics in the version 7b index are shown in table 22. The proportions vary considerably by ethnicity with one third of the Maori and Pacific groups showing none of the deprivation characteristics but three-fifths of the remaining population doing so.

Table 22: Estimated national cumulative distributions of 7 deprivation characteristics, age 18 and over (percent)

Number of deprivation characteristics*	Total	Non-Maori, non-Pacific	Maori	Pacific
0	56.2	60.3	33.7	34.6
1	75.6	79.8	50.5	59.8
2	85.3	89.2	61.1	73.0
3	91.2	94.6	69.5	82.4
4	94.2	96.5	78.1	92.9
5	97.0	98.4	88.1	93.9
6	99.2	100.0	93.2	99.2
7	100.0		100.0	100.0
4 or more	8.8	5.4	30.5	17.6

Note: Analyses are weighted, to reflect national distributions.

* Out of CHPFOODR, FOODHLPMM, BADSHOESR, COMMHLPMM, NOFRVEGM, FEELCOLDR, BENEFITR

If RENTR was to be included as an eighth marker of deprivation, then just under half the population (45.6%) would not exhibit any deprivation characteristics, and one third of the population (32.3%) would be estimated to have two or more such characteristics. However, it does not have a particularly strong item-total correlation (0.337; see table 23), suggesting it may not be a good variable to include in the shorter, 8-item, index, although this is mitigated by a slightly better performance in the longer,15-item, version (0.382).

An alternative, or even additional, item that could be incorporated into a short-form index would involve UNEMPLOYR, either to replace RENTR, or in addition to it, since it works well for those under 60. One way to overcome the difficulty with those 60 and over is to *define* that age group to be 'not deprived' in this respect. The use of unemployment has greater face-validity than the use of

being in rental accommodation, particularly as the latter is an attribute of families as well as one of individuals.

Since RENTR has some problems, an eight-variable version was created replacing it with UNEMPLOYR (Table 23). This results in a slightly improved Cronbach's Alpha of 0.813 (instead of 0.791) and similar item-total correlations, except for a much better performance for the replacement variable (0.530 for UNEMPLOYR, whereas it had been a rather poor 0.337 for RENTR in the earlier 8-variable version).

Table 23: Item-total correlations for 7, 8, 14 and 15 item indexes, age 18 and over

Variables	(1) 7 items	(2) 8 items (uses RENTR)	(3) 8 items (uses UNEMPLOYR)	(4) 14 items	(5) 15 items
FOODHLPMM	0.620	0.635	0.646	0.636	0.643
CHPFOODR	0.573	0.605	0.589	0.619	0.633
BADSHOESR	0.529	0.517	0.521	0.601	0.591
NOHOLSR				0.537	0.540
BENEFITR	0.471	0.483	0.508	0.526	0.531
FEELCOLDR	0.525	0.504	0.517	0.522	0.511
UNEMPLOYR			0.514	0.504	0.509
HUNGERM				0.504	0.493
COMMHLPMM	0.443	0.443	0.440	0.478	0.477
NOFRVEGM	0.494	0.463	0.492	0.490	0.473
BRWMPRBMM				0.433	0.436
NOCARSYR				0.419	0.430
NOPHONEYR				0.400	0.417
RENTR		0.337			0.382
SINGLEPARR				0.360	0.361
Cronbach's Alpha	*0.794*	*0.791*	*0.813*	*0.855*	*0.858*
Range of item-total correlations	*0.177*	*0.298*	*0.206*	*0.276*	*0.282*

Note: All items are weighted to reflect national distributions.

The measure of internal consistency of the seven item index (Cronbach's Alpha) is very closely comparable with the value obtained from an analysis of the under 60 year-olds (0.799, see table 17), suggesting that an all-ages index is plausible.

A number of criteria can be used to compare these indexes – statistical criteria like Cronbach's Alpha, and the variation among the item-total correlations to measure cohesion; face validity; and a utility criterion of cost.

Using *Cronbach's Alpha*, the ranking is from set 1 to set 5, consistent with the generally increasing numbers of theoretically similar (deprivation) variables included, and with set 3 a useful improvement on set 2, each having the same number of variables. Using the least range in the item-total correlations as a measure of *cohesion*, the best set is number 1, with a range of

correlations from 0.620 down to 0.443, followed by set 3, with a range of correlations from 0.646 down to 0.440, and with both substantially smaller than the ranges for the other three sets. In terms of *face validity*, set 3 beats set 2, and set 4 beats set 5. Finally, in terms of *cost to apply*, sets 1-3 are preferable to sets 4 or 5, which would take roughly twice as long to administer in the field.

These criteria suggest that an index based on the eight-variable version with UNEMPLOYR (set 3 in table 23) should be the preferred index.

This conclusion is further supported by examination of the variability of the values of Cronbach's Alpha when individual variables are deleted. For set 2 in table 23, these restricted values of Alpha vary from 0.746 to 0.793, compared to the overall Alpha of 0.791, as shown in the table. Thus RENTR, the only variable whose deletion results in a minute increase in Alpha, might be considered for deletion. The restricted Alpha values are more consistent for set 3, which replaces RENTR with EMPLOYR, the shorter range being 0.774 to 0.804. As the overall value is 0.813, this suggests that none of those eight variables should be deleted, and that they are internally very consistent. This is despite the fact that UNEMPLOYR is considered – structurally – not relevant, and thus 'not deprived', for those 60 and over. In the future, however, as working lives lengthen for many people it will become increasingly relevant for those over 60 .

Table 24 shows the factor structure of these eight variables and confirms that unemployment is a powerful indicator of deprivation.

Table 24: Factor structure of 8 variables including unemployment by ethnic group, age 18 and over

	Total	Non-Maori, non-Pacific	Maori	Pacific
Loadings for first factor				
FOODHLPMM	0.71	0.69	0.73	0.56
CHPFOODR	0.66	0.64	0.71	0.60
FEELCOLDR	0.58	0.54	0.72	0.53
UNEMPLOYR	0.58	0.57	0.65	0.35
BADSHOESR	0.57	0.44	0.72	0.65
BENEFITR	0.57	0.53	0.66	0.44
NOFRVEGM	0.55	0.46	0.65	0.63
COMMHLPMM	0.50	0.40	0.60	0.55

Note: Analyses are weighted, to reflect national distributions.

The best single weighted combination of these variables is provided by the first principal component of their (raw) correlation matrix, which does not postulate a structure for the variables. There is evidence for only one primary dimension (as was also found by the factor analysis, which postulates a common component to each variable as well as a unique part). Evidence suggestive of the number of dimensions (principal components) is provided by any eigenvalue greater than 1.0 (so that its related component explains more variance than a single variable) and a big change from one eigenvalue to the next (suggesting a big drop in the proportion of the overall variance explained by the component). Here, the first principal component has eigenvalue 3.48 and explains 43.5% of the overall variation in these variables. The next principal component has a much smaller, and less-than-average, eigenvalue of 0.92, explaining a further 11.5% of the overall

variation in the data. The coefficients of the eight variables in the first principal component vary from 0.57 (getting community help) to 0.76 (explicit help getting food). The moderate range of these coefficients indicates that the variables are of somewhat similar importance in describing an underlying dimension, which can clearly be labelled ‘deprivation’.

Section 6: Establishing an NZiDep index

Construction of categorical indexes

The first principal component of the eight variables in Table 24 is the best linear combination of the variables. For each individual, the first principal component score is calculated from the 0, 1 or 2 values obtained from their responses to each question. This interval-level score is effectively a ranking. It has far too many values for most practical uses. As with the small-area level NZDep indexes, an index with just a few categories is desirable.

The distribution of the first principal component scores is non-Normal. The shape of the distribution is roughly exponential, with a long tail on the right. However, the distribution is hugely modal at the extreme left because of the large number of people with no characteristics of deprivation, who all score the minimum on the first principal axis.

The precedent of the prototype deprivation index created for individuals from the 1996 Census was therefore followed. That is, everyone who is characterised by having no deprivation characteristic – among those investigated – is in the first category. Furthermore, also following the earlier work, those with just one such deprivation characteristic, who may not necessarily be deprived in any substantive way, are put in the next category, with the proviso that anyone with one deprivation characteristic whose first principal component score is greater than the minimum score for anyone with two such characteristics, is not put in the second category.

For the remaining categories we have departed from our earlier work because we no longer have the luxury of a huge sample size. For the practical purposes of analysing sample survey data, we need a reasonable number of categories (to look for trends) with the likelihood of a reasonable number of people in each category. Thus our previous six extra categories (making eight in total) would be too many as they would each include only about 6% of the sample. In order to obtain at least 15 people in any category (to be statistically useful), a sample of at least 250 would be required. This is not too huge, but if that were to be broken down by gender, say, the sample size would need to be about 500, which is likely to be impractical in many cases. Four- and five-category indexes were therefore investigated, being the most likely to be practically useful.

The first five-category scale, in which the six extra categories used in earlier work are reduced to three, can be *labelled 'T5'*, for convenience – the 'T' indicating the thirds – is thus

(1) no characteristics
(2) one characteristic *and* a first principal component score less than any score involving more than one characteristic
(3) lower third of the remaining distribution
(4) middle third of the remaining distribution
(5) upper third of the remaining distribution

An alternative set of categories could be based on the characteristics of the distributions of the first principal component scores, which have mean 0 and standard deviation 1. Thus, a four-category scale, to be *labelled 'SD4'* as it involves a standard deviation measure, could be

(1) no characteristics (as before)
(2) one characteristic *and* a first principal component score less than any score involving more than one characteristic (as before)
(3) any score not in groups 1, 2 or 4
(4) greater than 1 standard deviation from the mean (0)

An extension of this idea is to examine more closely the deprived part of the underlying distribution while trying to keep category sizes reasonable, by splitting the third category above at 0.5 of a standard deviation. *This scale is labelled ' SD5 '.*

All three of these schemes are strictly ordinal in terms of their deprivation description.

The cut-offs for each of these scales will not be intuitive, as they will be non-integer numbers derived from our sample. In application, some multiplication and division would be required first. For practical purposes, it is therefore of interest to investigate simple counts of deprivation characteristics, but with some collapsing at the upper end of the scale to ensure reasonable numbers of people per category. Thus the following further categorical indexes are also explored:

(i) A simple count of deprivation characteristics, from 0 to 8, *labelled 'Sum8'*. In these counts any community or food help was counted as a deprivation characteristic, regardless of the number of times in the last year such help had been sort.

(ii) A truncated and grouped count, based on Sum8, where the total number of categories is five. This is *labelled 'Sum5'* and the count groups are 0, 1, 2, 3 or 4, 5 or more.

Table 25 gives the estimated national proportions falling into each category of each scale. Considering the 15-variable scale as a possible 'gold standard' it is of interest to note the effect of the extra information provided by the seven variables not in the eight-variable scales. For this reason, 15-variable versions of the T5, SD5, SD4 and Sum5 scales are also included. The Sum5 scale based on 15 variables has counts grouped as 0, 1, 2 or 3, 4 or 5, and 6 or more in order to make it as comparable as possible with the 8-variable version.

Scales where all categories have at least an arbitrary 7.5% of the sample are highlighted. Not surprisingly, both scales with just four categories fall into this group, but they will not be particularly discriminating as they essentially have three meaningful groups – 'none, or possibly none', 'some', and 'moderate or a lot' of deprivation.

Table 25: Estimated distribution of categorical indexes, age 18 and over

		Category*								
Scale type		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Based on eight variables										
T5	**I** †	50.5	20.2	9.7	9.8	9.9				
SD5		50.5	20.2	10.6	4.2	14.5				
SD4		50.5	20.2	14.8	14.5					
SUM5	**II** †	50.5	20.2	10.8	10.6	7.9				
SUM8		50.7	20.3	10.8	5.2	5.3	2.7	2.2	2.0	0.8
Based on fifteen variables										
T5		33.9	20.8	14.8	18.2	12.4				
SD5		33.9	20.8	25.2	7.8	12.3				
SD4		33.9	20.8	33.0	12.3					
SUM5		33.9	23.4	19.5	10.3	12.9				
SUM15		33.9	23.2	12.3	7.8	6.1	4.2	2.7	2.1	7.8

Note: All items are weighted to reflect national distributions.

* In this table, for the indexes SUM8 and SUM15, category 1 has no deprivation characteristic, category 2 has one characteristic, ... , category 8 has seven, and category 9 has eight characteristics for SUM8 and eight or more characteristics for SUM15.

† These scales are considered the best candidates for the preferred index as described in the text below.

Perhaps surprisingly, the 15-variable SD5 scale only just makes it into the arbitrarily-defined group with potentially reasonable proportions (> 7.5%) in each category. The scale indicates the very skewed nature of the distribution of the first principal component scores, with its very long tail on the right, which is indicated *roughly* by the last row of the table, where the simple count of the 15 deprivation characteristics is presented (SUM15).

For the eight-variable indexes, only 30% of the distribution is available to describe multiple deprivation (i.e. categories 3 - 5), and the thirds-based version (T5) performs better than the 5-category version based on standard deviation cut-offs (SD5). Even with 15 variables the percentage available to describe deprivation in any meaningful way climbs to only 45%. While this is good news for individuals, of course, it does make it difficult to create a simple, yet highly discriminating, categorical scale in any circumstances. Furthermore, one could argue that the extra cost of doubling the questionnaire time is not outweighed by a major gain in deprivation discriminatory power. The conclusion, therefore, is that the 15-variable version is not a practical proposition.

In summary, for the eight-variable index, the two best candidates are the 5-category version based on thirds of observed multiple deprivation (T5), and the 5-category version based on the truncated sum of a count of deprivation characteristics (Sum5).

Comparison of potentially useful five-category indexes

Cronbach's Coefficient Alpha was used as one tool to aid the development of an individual index. One of the assumptions underlying its use is that of an ultimate index based on a simple count. Therefore, table 26 compares the T5 and Sum5 indexes, based on the first principal component, with an actual count of deprivation characteristics.

Table 26: Estimated distributions of two five-category indexes, age 18 and over

Count of deprivation characteristics	Category definition		Percentage	Percentage per index category	
	Sum5	T5		Sum5	T5
0	1	1	50.48	50.48	50.48
1	2	2	20.22	20.22	20.22
2	3	3	9.67	10.79	9.67
2	3	4	1.12		9.77
3	4	4	4.74	10.62	
3	4	5	0.49		XXXXX
4	4	4	3.91		XXXXX
4	4	5	1.48		
5	5	5	2.75	7.89	9.86
6	5	5	2.28		
7	5	5	2.05		
8	5	5	0.81		

Notes: (1) All items are weighted to reflect national distributions.
(2) XXXXX indicates a Count row excluded from the boxed rows for which the percentage is shown

In table 26 the divisions used to create the five-category scale for the simple count of characteristics were chosen to minimise the number of 'mis-codes', that is, discrepancies with the statistically-better thirds-based scale (T5). An estimated total of 3.09% of the population (indicated by the highlighted cells) would be mis-coded if the simple count was used instead of the more complicated divisions based on the score on the first principal component. The change in category is no more than one division of deprivation. The practical question is: what difference does that 3.09% make?

There is one further consideration to take into account. Although in general the variables are binary (yes/no), two of the eight variables in the above index were scored (in the first principal component) as 0, 1 or 2 where 1 indicates some deprivation, and 2 indicates more deprivation. Could the simple sum be adapted to reflect something more akin to the first principal component? This was attempted, in the sum of characteristics, by using a count of 1 if the person had 'more' deprivation, and 0.5 if it was only 'some' deprivation. In this way, the maximum count for any variable is 1, so that in the final count, the variables are equally weighted. The resulting association between the adjusted count and the T5 index are shown in table 27 where, as before, the new 'counts' and 'half-counts' are grouped to minimize discrepancies with the T5 index. This adjustment provides no improvement on the scheme shown earlier in table 26.

Table 27: Further estimated distributions of two five-category indexes, age 18 and over

Count of deprivation characteristics (adjusted*)		Category definition		Percentage	Percentage per index category	
		Sum5	T5		Sum5	T5
0	0	1	1	50.48	50.48	50.48
	1	2	2	20.22	20.22	20.22
	1.5	3	3	0.01	10.79	9.66
	1.5	3	4	0.38		XXXXX
	2	3	3	9.65		XXXXX
	2	3	4	0.74		9.77
	2.5	4	4	0.39	10.62	
	3	4	4	4.35		
	3	4	5	0.49		XXXXX
	3.5	4	4	1.08		XXXXX
	3.5	4	5	0.04		XXXXX
	4	4	4	2.83		XXXXX
	4	4	5	1.44		
	4.5	5	5	1.03	7.89	9.86
	5	5	5	1.72		
	5.5	5	5	0.38		
	6	5	5	1.91		
	6.5	5	5	1.08		
	7	5	5	0.98		
	7.5	5	5	0.35		
	8	5	5	0.46		

Notes: (1) All items are weighted to reflect national distributions.
(2) XXXXX indicates a Count row excluded from the boxed rows for which the percentage is shown
* Adjusted by changing the scores for the two variables scored 0, 1, 2 to scores 0, 0.5, 1.

Altogether, at least 4.74% of the population have adjusted scores in the amended scheme, as indicated by half-scores. In fact, more than 4.74% have adjusted scores, because some have such adjustments in more than one variable and thus do not have an integer final count. An estimated 6.6% of the population got help with food 'more than once in the last year' (3.1% obtained this help just once in that time), while for community help the figures were 2.5% for both categories. This suggests that substantially more information is available in the subsidiary questions which probe for more information than the initial yes/no deprivation questions. However, as the previous two tables show, if a simple count is to be used which most closely resembles the index based on the first principal component, there is absolutely no advantage in obtaining the additional information.

One further question in the group of eight used in the above indexes also had a subsidiary question in the actual questionnaire – to separate going without fresh fruit and vegetables 'often' or 'occasionally'. The information was sufficiently limited that only those who 'often' went without were given the 'yes' score indicating deprivation on the binary scale.

External validation of two potentially useful five-category indexes

Smoking

The internal measure of criterion validity available from the sample questionnaire was regular smoking. It would be expected that a good indicator of deprivation would correlate with smoking reasonably well. Table 28 shows the relationships of the two eight-variable indexes with smoking.

Table 28: Relationship of two five-category indexes with smoking, age 18 and over

	Sum5		T5	
Index value	Percent who smoke	Overall percent*	Percent who smoke	Overall percent*
1	15.4	49.9	15.4	49.9
2	21.9	20.4	21.9	20.4
3	29.1	10.9	27.2	9.8
4	43.7	10.8	42.7	9.9
5	72.8	8.0	68.1	10.0

Note: All items are weighted to reflect national distributions. Both distributions are based on the same source population which excludes anyone with a missing value for the T5 index based on the first principal component.

* Total is 100%.

Both relationships are very strong. They are also very similar. The percentage who smoke increases monotonically with increasing level of deprivation.

The increased proportion who smoke in the second category – essentially those with just one of the eight deprivation characteristics – as opposed to the first category – those who are not deprived in any of the measured respects – is vindication for keeping this second category distinct from the first.

NZDep96

As a second, less-specific, indicator of validity, these indexes were compared with the area-level index. In this case, some correlation would be expected, but not a high level of correlation, because not everyone living in a deprived area is deprived, and vice versa.

The (weighted, Pearson) correlations with NZDep96 are 0.239 for the Sum5 index and 0.234 for the individually slightly more precise T5 index – very similar indeed, and at a level of correlation which might be expected, given also that NZDep96 has ten categories, while the individual indicators have five. The Sum5 and T5 indexes are, of course, very highly correlated indeed (0.997).

The proposed NZiDep index

The scoring systems for many other indexes use counts – 1 if present or 'bad' in some sense, and 0 otherwise – or short integer scales. This usage may reflect a trade-off between simplicity and some form of exactness. Examples include well-known questionnaires such the GHQ and the SF36, as well as for the recent NZ Economic Living Standards Index (ELSI) (Jensen et al., 2002). For consistency with accepted practice, therefore, as well as for simplicity, the simple count for the eight binary deprivation indicators, grouped into five categories, is the preferred index of individual socioeconomic deprivation.

The binary indicators for community help and food help were not the variables used in the factor and principal component analyses, nor for the item-total correlations and Cronbach's measure of internal consistency. The differences should be very slight, as confirmed in table 29 for the factor structure.

Table 29: Factor structure of NZiDep

	NZiDep	Non-binary version (Table 24)
Loadings for first factor		
FOODHLPMM *	0.73	0.71
CHPFOODR	0.66	0.66
FEELCOLDR	0.58	0.58
UNEMPLOYR	0.58	0.58
BADSHOESR	0.56	0.57
BENEFITR	0.59	0.57
NOFRVEGM	0.55	0.55
COMMHLPMM *	0.52	0.50

Note: Analyses are weighted, to reflect national distributions.
* These variables were coded 0, 1 and 2 in the non-binary version and 0, 1 in the final NZiDep version

In neither the factor analysis nor a principal component analysis is there any support for a second underlying factor. In particular, the first eigenvalue of the (raw) correlation matrix used in the principal component analysis (not shown) is 3.52, far in excess of the next which is 0.94 – and this is also < 1.0 which means that the component explains less variance than a single variable.

The first principal component accounts for 44.0% of the overall variance in the eight binary variables. The coefficients for the first principal component are of similar size, varying from 0.60 for community help to 0.77 for help obtaining food. Scores from the first principal component yield the NZiDep index value for an individual.

The Cronbach Alpha value for the eight binary variables is 0.816, essentially unchanged from 0.813 for the version in which two variables were scored 0, 1 and 2. The range of item-total correlations dropped slightly, from 0.206 to 0.192. Both measures indicate a very small improvement in the internal consistency of the variables. There is some variability in the Cronbach Alpha value for the three ethnic groups, as expected from those shown in Table 13 for analyses of 6, 7, 9, and 15 variables. The values for the non-Maori, non-Pacific and Pacific groups are similar (0.767, 0.763), but the Maori group has a higher value (0.877).

The earlier validations with smoking are unchanged as the initial analysis of the sum of deprivation characteristics was based on the binary, yes/no, indicator.

Demographic structure of the NZiDep index

Area-level deprivation is closely related to the ethnic composition of the area. We should therefore expect that, at the individual level, deprivation should be related to ethnicity (table 30).

Table 30: NZiDep scores by ethnicity (percent)

NZiDep value*	Non-Maori, non-Pacific	Maori	Pacific	Total	(95% CI **)
1	54.4	31.0	29.5	50.7	(45.4 - 56.0)
2	20.9	14.9	21.3	20.3	(16.2 - 24 4)
3	10.5	10.0	19.0	10.7	(7.5 - 14.0)
4	9.6	15.3	17.6	10.5	(6.9 - 14.1)
5	4.7	28.8	12.6	7.8	(5.3 - 10.2)

Note: All items are weighted to reflect national distributions.

* Imputation has been used for the small amount of missing data, which has been scored as not-deprived

** The 95% confidence interval is provided to indicate the overall proportions that might be expected in any future *representative* (random) survey. Because the source data have been weighted, the confidence intervals are wider than would be expected from a simple random survey. For example, under simple random sampling, the 95%CI for the first percentage (50.7) is 47.6 - 53.8%

There are no surprises. There is a clear relationship between deprivation and ethnicity at the individual level.

Since many people obtain more resources as they age, and since some people will die prematurely of poverty-related diseases and disorders, we might expect less deprivation among the elderly when a consistent set of deprivation indicators is used. We might also expect some differences between the sexes as a result of younger women's greater role in parenting than younger men, and their consequently lesser ability to escape from deprivation through earning capacity in middle age. Table 31 presents the age- and gender-specific proportions of the five levels of deprivation.

Table 31: NZiDep scores by age and gender (percent)

NZiDep value*	18-39 years		40-59 years		60 years and over	
	Male	Female	Male	Female	Male	Female
1	44.0	27.1	67.3	53.6	78.7	62.1
2	22.4	22.0	11.6	18.8	16.3	29.7
3	10.3	18.7	7.8	12.4	0.5	5.7
4	9.8	22.0	9.0	6.4	3.8	2.2
5	13.6	10.3	4.3	8.8	0.7	0.4

Note: All items are weighted to reflect national distributions.

* Imputation has been used for the small amount of missing data, which has been scored as not-deprived

Table 31 shows that deprivation, as indicated by the eight variables in the NZiDep index,

(a) decreases with age
(b) is more prevalent among younger men than younger women
(c) is slightly different for middle-aged men and women, and
(d) is less common among the older group

which therefore provides no surprises. Table 32 explores this further and shows, for example, that older Maori are more likely to be in the highest category of deprived than the older members in either of the other two groups. Of particular note is the large proportion of younger Maori in the highest deprivation category – 36.2%, or nearly one in three. It is also clear that, while overall a high proportion in the majority group are not deprived at all, *as measured by our index*, this is much lower for the younger members (37.1% versus 64.4% and 72.2% in the two older groups).

Table 32: NZiDep scores by age and ethnicity (percent)

	18-39 years			40-59 years			60 years and over		
NZiDep value*	Non-M, non-P	Maori	Pacific	Non-M, non-P	Maori	Pacific	Non-M, non-P	Maori	Pacific
1	37.1	29.4	28.5	64.4	34.2	33.2	72.2	32.9	25.6
2	24.4	11.2	20.7	14.9	17.9	16.7	23.0	31.5	40.8
3	15.1	9.7	20.7	9.8	10.5	16.7	2.8	10.9	13.8
4	16.4	13.6	17.5	6.0	19.2	18.1	2.0	15.3	17.2
5	7.0	36.2	12.6	4.9	18.2	15.4	0.0	9.5	2.7

Note: All items are weighted to reflect national distributions.
* Imputation has been used for the small amount of missing data, which has been scored as not-deprived

Questionnaire items for the NZiDep index

The eight questions for an individual-level index of socioeconomic deprivation are shown below. Scoring of the index is based on the count of 'positive' responses. The first two of the questions below are also captured in NZDep (as proportions in an area) although the time frame in the Census is only four weeks for questions about unemployment. The order of the eight questions is not important.

A suggested lead-in to these questions is: "The following few questions are designed to identify people who have had special financial needs in the last 12 months. Although these questions may not apply directly to you, for completeness we need to ask them of everyone."

The eight questions are:

1 **Being on a means-tested benefit**: means-tested benefits were listed on showcard 1:
Looking at showcard 1, did you yourself get income in the 12 months ending today from any of these sources? (yes/no)

2 **Unemployment**: structurally defined as *'no'* for those 60 and over, and for full-time care-givers/home-makers; otherwise:
In the last 12 months, have you been out of paid work at any time for more than one month? (yes/no)

> We did not ask whether people have actively looked for work in that time because we were only interested in the consequences of limitations on income. We were interested in people who had been out of work but who had actually wanted to have paid employment but did not have any. In our full questionnaire, either our prior questions on employment, or the wording used (as above), appeared to have been interpreted correctly because the item was internally consistent with the other deprivation variables. However, we note that it would be prudent to establish whether or not a person was out of paid work from choice or not, and, perhaps, to remove the current relevant age limit of up to 60 years..

3 **Getting community help**:
In the last 12 months have you personally received help in the form of clothes or money from a community organisation (like the Salvation Army)? (yes/no)

> An alternative way to indicate what is meant by a *community crganisation* would be to list all those we know about on a showcard. There is a need for some level of explicitness because we must clearly distinguish organisational help from other help, from family or friends, and also distinguish this form of help from 'other food help' (the next question as listed here).

4 **Help to get food:**
In the last 12 months have you personally made use of special food grants or food banks because you did not have enough money for food? (yes/no)

5 Wearing worn-out shoes:
In the last 12 months have you personally continued wearing shoes with holes because you could not afford replacement? (yes/no)

6 Buying cheap food:
In the last 12 months have you personally been forced to buy cheaper food so that you could pay for other things you needed? (yes/no)

7 Doing without fresh fruit and vegetables: (defined as *yes* for 'yes, often', and *no* otherwise)
(1) In the last 12 months have you personally gone without fresh fruit and vegetables so that you could pay for other things you needed? (yes/no)
(2) In the last 12 months have you personally gone without fresh fruit and vegetables often or only occasionally? (often/occasionally)

These two questions can be combined: In the last 12 months have you personally gone without fresh fruit and vegetables, often, so that you could pay for other things you needed? (yes/no)

8 Feeling cold:
In the last 12 months have you personally put up with feeling cold to save heating costs? (yes/no)

These eight variables are compared in table 33, which shows the question-specific estimated annual period prevalence of deprivation in the overall, and ethnic-specific, communities. The table indicates again the disparities between the ethnic groups.

Table 33: Estimated percentage of the population aged 18 and over with at least one form of deprivation in the last year, as indicated by NZiDep, by ethnicity

Variable	Non-Maori, non-Pacific	Maori	Pacific	NZ
buying cheap food	25.4	55.5	48.1	29.8
unemployed	22.1	42.9	29.4	24.8
on a means-tested benefit	18.5	49.0	36.7	22.7
feeling cold to save on heating costs	18.2	36.1	28.0	20.7
help obtaining food	7.2	26.8	14.1	9.7
wearing worn-out shoes	5.0	27.8	18.1	8.2
going without fresh fruit and vegetables, often	4.1	16.2	13.0	5.8
help from community organisations	3.3	16.2	7.9	5.0

Note: All items are weighted to reflect national distributions.

The variables shown in table 33 are *not* necessarily those in our questionnaire with the highest estimated annual period prevalence and so these proportions could not have been used as the only guide to inclusion in an individual index. For example, among the variables used in NZDep, but not in NZiDep, lack of a car has a period prevalence estimated at 16.6%, while 27.5% lack even a school qualification, yet, for statistical and other reasons, they are not included in the individual index.

For completeness, the estimated 95% confidence intervals are presented in table 34 below. Note that more uncertainty surrounds the values in the smaller ethnic groups, despite the equal sample size, because of the sometimes fewer observations in some of the sample age/gender/NZDep96 groups.

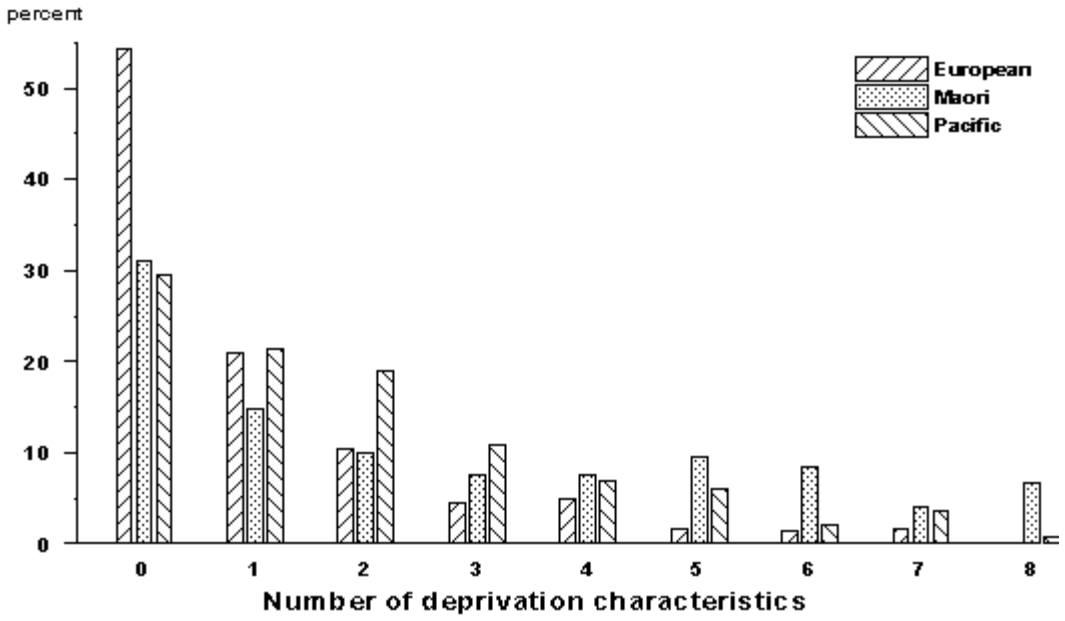
Table 34: Estimated percentage of the population aged 18 and over with at least one form of deprivation in the last year, as indicated by NZiDep, by ethnicity (with 95 percent confidence intervals)

Variable	Non-Maori, non Pacific		Maori		Pacific		NZ	
cheap food	**25.4**	(19.7 - 31.0)	**55.5**	(48.0 - 63.0)	**48.1**	(40.1 - 55.7)	**29.8**	(24.9 - 34.6)
unemployed	**22.1**	(16.8 - 27.5)	**42.9**	(35.4 - 50.4)	**29.4**	(22.2 - 36.6)	**24.8**	(20.2 - 29.5)
benefit	**18.5**	(13.5 - 23.4)	**49.0**	(41.4 - 56.5)	**36.7**	(29.4 - 44.0)	**22.7**	(18.4 - 27.0)
feel cold	**18.2**	(13.3 - 23.1)	**36.1**	(28.7 - 43.4)	**28.0**	(21.0 - 34.9)	**20.7**	(16.4 - 24.9)
food help	**7.2**	(3.7 - 10.7)	**26.8**	(20.2 - 33.3)	**14.1**	(8.7 - 19.5)	**9.7**	(6.6 - 12.8)
worn-out shoes	**5.0**	(2.3 - 7.7)	**27.8**	(21.0 - 34.7)	**18.1**	(12.5 - 23.7)	**8.2**	(5.7 - 10.6)
no fruit/veg.	**4.1**	(1.4 - 6.8)	**16.2**	(10.5 - 21.9)	**13.0**	(7.7 - 18.3)	**5.8**	(3.4 - 8.3)
community help	**3.3**	(1.1 - 5.5)	**16.2**	(10.6 - 21.8)	**7.9**	(4.1 - 11.8)	**5.0**	(3.0 - 7.0)

Note: All items are weighted to reflect national distributions.

Figure 5 plots the ethnic disparities in the number of these eight deprivation characteristics estimated for the population.

Figure 5: Estimated national distribution of NZiDep scores for age 18 and over, by ethnicity



Section 7: Discussion

In developing NZiDep, we took care to ensure that Maori and Pacific people were represented on statistically equal terms with European/Other by ensuring that they each formed one third of the total sample. This was important because Maori and Pacific people are over-represented among those who have one or more deprivation characteristics, so the conditions they experience should be represented with at least equal weight to those of numerically larger sections of the population. Despite the fact that there were clear differences among the three groups represented in this study, the sampling strategy adopted has enabled a generic scale to be developed with confidence.

Strengths of NZiDep

The are seven key strengths of NZiDep. It is focussed and simple, the data for it are easily captured and acceptable, and the index is both internally and externally valid, as discussed below.

Focus

The index is strictly confined to deficits. It focuses on deprivation. Theoretically, people can be thought of as not deprived, singly deprived, or multiply deprived. The NZiDep captures this directly, and incorporates three levels of multiple deprivation so that the index has five levels in all.

Simplicity

The NZiDep score is based on a simple count. The scale has five levels in order to facilitate graphical and tabular presentation and interpretation, while allowing enough gradations to explore relationships between deficits and health outcomes. Furthermore, among a reasonably sized random sample of adult New Zealanders, the number of people in the more deprived categories (3 to 5) should be adequate for statistical purposes such as comparing multiply-deprived groups.

Utility

The proposed index will require the use of eight simple questions, each of which has two possible answers. The time taken for administering the questions is expected to be between two and three minutes.

Acceptability

We have carefully examined the responses of the eight questions in each of three ethnic groups, as well as in three broad age groups. The chosen questions have only a small potential for missing data, and are not culturally-specific. We have also selected questions for the NZiDep which are not differentially culture-specific, and are not dependent on information which may not be available to some respondents – there is no household information, for example.

Construct validity

The index was intended to reflect consumption outcomes in a modern society. Because the index focuses on deprivation, it is the limitations which people experience that are of primary concern, rather than conspicuous consumption.

Two of the questions indicate general limitations on consumption – the fact of being out of work, with its consequent financial constraints; and receiving a means-tested benefit, indicating the recognition within society that, otherwise, there would be unacceptable constraints on consumption. The other six components of the index measure limitations in consumption in specific areas, directly or indirectly. Direct limitations are indicated by buying cheap food, feeling cold to save on heating costs, wearing worn-out shoes for reasons of cost, often going without fresh fruit and vegetables. Indirectly, seeking help from community organisations, and seeking supplementary free food, are indicators of limitations on consumption. Thus, in summary, the components of the index have criterion validity.

Statistical validity

Statistically, there is no evidence for more than one underlying dimension among our eight chosen deprivation variables, either from a factor analysis of their relatively large common component ('deprivation'), or from examination of the eigenvalues of their correlation matrix. A measure of internal cohesion among the eight chosen deprivation variables is Cronbach's Coefficient Alpha. This is 0.81 which indicates good support for a single underlying construct, which we identify as 'deprivation'. Thus several statistical procedures indicate that the index has acceptable statistical validity.

The first principal component is the best weighted linear combination of the eight variables. The relative weights for the eight variables in the first principal component do not vary markedly – the range is 0.60 - 0.77. This is why the simple sum of the number of deprivation characteristics works – effectively, such a sum gives the same weight to each component item.

Analyses specific to each ethnic group, and by age, show some variations, but none that cast doubt on the validity of the proposed measure.

Criterion validity

Tobacco smoking is known to be patterned according to socioeconomic position in New Zealand. The very clear, strong, and expected relationship between smoking and NZiDep at the level of analysis of the individual is powerful support for the index. In addition, the correlation between the individual deprivation indicator, NZiDep, and the area-level deprivation indicator, NZDep96, is also as expected – neither high nor low, but relatively modest. Thus the NZiDep behaves as one would expect of a good individual indicator of deprivation.

Thus, in summary, the NZiDep index of socioeconomic deprivation is both theoretically sound and valid. It is also highly practical.

Limitations of NZiDep

Naturally, there are certain limitations to the index, as described below. The first point is specific to NZiDep, whereas the subsequent four points are generic to many social indexes.

Consequences of political changes

From time to time, the single show-card needed in the eight-question questionnaire may need updating, since it should list all the means-tested benefits *current* at the time of any survey use. Such information should be readily available from the Ministry of Social Development

Time and context limitations

The primary limitation of the NZiDep index concerns temporalities. The questions asked for this index have been used both elsewhere and at other times. Nevertheless, patterns in society change over time and future surveys may be needed to establish whether the component variables remain the best collective descriptors in a short index of individual deprivation. For example, changing patterns of unemployment, or improved and/or cheaper home heating, could alter the importance of the unemployment and feeling-cold variables in a future index – to the extent that there may be more powerful indicators that could be incorporated in an updated index in the future.

Indicative, not definitive

A limitation of *any index* such as the NZiDep is that it captures something that is indicative of a wider-spread entity. Multiple deprivation, for example, can take many forms according to individual circumstances and choices. This variability poses significant challenges for policy development because it complicates the dual tasks of identifying areas of intervention and ranking them in order of importance. NZiDep provides a tool that can assist greatly in meeting these challenges through its ability to identify the components of a many-faceted phenomenon, and can be used analytically to tease out relationships among those facets.

The NZiDep index may also be indicative because of potential response biases in the study. The consent rate, once potential participants had been located, was not high. The overall consent was 58 percent, and higher for Pacific Islanders (77 percent) than either Maori (58 percent) or non-Maori, non-Pacific (50 percent). The effect of the non-consent on the deprivation-representativeness of our sample is not known. The expected strong relationship between our suggested NZiDep index and tobacco smoking is reassuring, and suggests that there may be only limited bias in the correlations between variables that were the starting point for index development. In turn, this external validity suggests that the development of NZiDep through a systematic and careful reduction of the possible variables for inclusion, is likely to be reasonably robust. However, there may be some degree of systematic error in our estimates of the proportions in the community in each of the five categories of individual deprivation as estimated by NZiDep.

Missing data

NZiDep is designed as a tool for use in survey situations, where respondents can be asked the eight questions required. As with all survey-based instruments, the NZiDep faces the problem of missing data if one or more questions are not answered by a respondent. The easiest way to solve such a dilemma is to sum the 'positive' responses from the questions that were answered and use that as the score, recognising that it may underestimate the degree of deprivation of the individual. Whether this is preferable to removing the complete observation from an analysis would be up to the analyst to investigate, perhaps through a sensitivity analysis. Additionally, if more than one question is missing, it may be appropriate to remove the observation from an analysis regardless.

One size does not fit all

Finally, it is important to remember that NZiDep is designed to measure socioeconomic deprivation; that is, it accurately measures the deprived end of the social spectrum but only rather crudely measures the non-deprived end of the spectrum. This limitation of NZiDep is inherent in its design, and applies also to its area-based counterpart, NZDep. Furthermore, a measure of deprivation is only one measure of socioeconomic position: no such single measure can entirely capture an individual's socioeconomic position.

Glossary

Descriptions of variable names, technical terms, and acronyms

Note about *variable*s

For each *variable* in the list below, the first column gives the base acronym for variables obtained directly from the questionnaire. These variables may also have additional letters (R, M, or MM) which indicate re-coded, modified, or doubly-modified questionnaire variables. *Variable(d)* refers to other variables derived from the questionnaire, for example from several questions. Variables are related to their single source question by the addition of the questionnaire page and question number in parentheses after the explanation.

ADVICE	*variable*	could not get advice if needed (p.7, q.36)
BADSHOES	*variable*	wearing worn-out shoes (p.6, q.30)
BENEFIT	*variable*	on means-tested benefit (p.3, q.13)
BRWMPRB	*variable*	borrowing money problem (p.5, q 22)
CARS	*variable*	no car access (p.9, q.43)
CHPFOOD	*variable*	buying cheap food (p.6, q.31)
COMMHLP	*variable*	obtaining community help (p.5, q.24)
Cronbach's Coefficient Alpha	*technical*	statistic that measures the internal consistency of multiple items measuring an underlying construct latent variable)
CROWDED	*variable(d)*	in 'crowded' accommodation
Eigenvalue	*technical*	indicates the proportion of the overall variance explained by the relevant eigenvector
Eigenvector(s)	*technical*	used as here, describes structure in a correlation matrix
ELECPRB	*variable*	problems paying electricity bills (p.4, q.16)
ELSI	*acronym*	(NZ) Economic Living Standards Index
Equivalisation	*technical*	method used to control for varying household sizes and compositions
Factor Analysis	*technical*	searches for underlying factors in a set of variables
FEELCOLD	*variable*	feeling cold to save heating costs (p.7, q.34)
First Principal Component	*analytic*	the weighted combination of a set of variables that explains the most of their overall variance
FOODHLP	*variable*	obtaining food help (p.5, q.26)
HHINCOME	*variable*	low household income (p.11, q.51)
HUNGER	*variable*	going hungry (p.6, q.28)

INSURE	*variable*:	uninsured (p.9, q.41)
Item-total correlation	*technical*	the correlation between a variable and the total (sum) of the remaining variables in a group
MORTPRB	*variable*	mortgage problems (p.4, q.18)
Multiple correlation	*technical*	the correlation that summarises the association between one variable and a group of other variables
NOFRVEG	*variable*	going without fresh fruit or vegetables (p.7, q.33)
NOHOLS	*variable*	no holidays (p.7, q.35)
NOQUAL	*variable(d)*	no qualifications at all
NZDep	*acronym*	New Zealand Deprivation indexes for small areas
NZDep96	*acronym*	New Zealand Deprivation index using 1996 census data
NZDep2001	*acronym*	New Zealand Deprivation index using 2001 census data
NZiDep	*acronym*	**New Zealand index of socioeconomic deprivation for individuals**
NZSEI	*acronym*	New Zealand Socioeconomic Index for occupations
PARK	*variable*	no garden, or open space or park nearby (p.10, q.47)
PAY4OTHR	*variable*	problems paying for other items (p.10, q.46)
PHONE	*variable*	no access to a phone (p.8, q.39)
PHONPRB	*variable*	problems paying phone bill (p.4, q.20)
Principal Component	*technical*	transformation of a set of correlated variables to a set of uncorrelated variables; used here to produce the best single composite variable (*see* First Principal Component)
RENT	*variable*	in rented accommodation (p.9, q.45)
RENTPRB	*variable*	problems paying rent (p.3, q.14)
SCHQUAL	*variable*	no school qualification (p.1, q.4)
SINGLEPAR	*variable(d)*	in single parent family
STRANDED	*variable*	could not get help if stranded (p.8, q.37)
UNEMPLOY	*variable(d)*	unemployed (at any time in last 12 months)
VANDAL	*variable*	vandals nearby (p.10, q.48)
WRKLOOK	*variable*	looking for work (in last four weeks) (p.2, q.9)

Appendix: Recruitment and survey instruments

The recruitment strategy began with selection of house-level start-points (*see* Section 2; The survey). The walk-pattern which was prescribed for identification of eligible participants from each start-point is described in the first item in this Appendix, the fieldwork instructions.

At each house, a screening survey was used to recruit potential participants. This is the second item in this Appendix.

The survey questionnaire, which was administered by trained and ethnically-matched interviewers, is the third item in this Appendix.

The showcards used for the screening questionnaire, and the survey questionnaire, are the final items in this Appendix.

Fieldwork instructions

1. There are 50 separate start points for your target ethnic group.
2. Six interviews are to be conducted from each start point.
3. A total of 300 interviews are to be conducted with members of your target ethnic group.
4. Only people of your target ethnicity are to be interviewed by you.
5. From each start point, three interviews are to be with women, and three with men.
6. One man and one woman are to be in the 18 to 39 age group; one man and one woman are to be in the 40 to 59 age group; and one man and one woman are to be in the 60 or over age group.
7. Only one person from each of the six categories is to be interviewed from any start point.
8. Each start point is a street address.
9. Each start point has a map which shows the area to be worked first.
10. The start point is the first house to be visited.
11. After the first house, keep houses to your left, and visit every house until quota of six interviews has been completed for that start point.
12. Speak to an adult member of each house and use the screening questionnaire to find out:
    1. whether any members of the household are of your target ethnicity;
    2. if they are, find out their ages and genders; and
    3. if any are eligible to be interviewed.

    If more than one member of the household is eligible, select the one who will be the next to have their birthday.
13. Before conducting an interview, give the participant a copy of the information sheet, answer their questions, and obtain their consent on the consent form.
14. Do not interview more than one person from any house.
15. When it has not been possible to contact anyone in three houses, do not approach any more houses from that start point, until at least one of these houses has been contacted during a visit at a different time, and either an interview arranged or the house excluded due to ineligibility or refusal.

16. In other words, when the quota for a start point has been achieved, there should be no houses which have been approached less than three times without either contact having been made with a resident, or the house excluded.
17. When this happens, go to another start point and work that area.
18. Each house is to be visited up to three times to speak to someone and find out if anyone in the house is eligible to be interviewed.
19. Each visit is to be made at either a different time, or on a different day from the first visit.
20. If, after three visits, no contact has been made with anyone in the house, it can be excluded.
21. Further visits can be made to arrange or carry out an interview, if necessary.
22. When the complete block marked on the map has been worked without achieving the quota of six interviews, cross the street from the start point, visit the house opposite, and continue visiting houses from there while keeping houses to your left.
23. Continue until the quota of six interviews has been achieved for each start point.

Screening questionnaire

Interviewer name: _____ Interviewer no: | | |

Calls to obtain: | | |

Address: _____ Interview day and month: | | | | |

_____ Start point no: | | | | | | | |

Start-point identification: | | | |

[First three identification digits]

Hello, my name is _____ and I am carrying out a survey for the Wellington Medical School and the Lower Hutt Family Centre

We are surveying people from different ethnic groups who are at least 18 years old. At the moment, I am looking for people who are: *Say which one applies*

	Code
New Zealand European or other *If person eventually interviewed is "other", please specify below*	1
_____	
or NZ Maori	2
or Pacific (*Please specify for person eventually interviewed; eg. Samoan, Tongan, etc.*)	3
_____	

So could you please tell me if any members of your household are [Maori] [Pacific] [New Zealand European or other]? By household members I mean people who usually live in this house, rather than guests or visitors who usually live somewhere else.

Ethnicity code = 4th identification digit | |

If no members are of the target group, say:

Thank you for your time, but there is no-one in your house that I need to interview.

If any members are of the target group, ask the following:

Thank you. Could you tell me their first names, please?

Write the names down and then, for each named member, ask:

Is [Name] male or female and

SHOWCARD 1

which of these age groups does s/he belong to?

Name	Gender		Age Group			Next to have Birth-day
	1=male	2=fem	18-39	40-59	60+	
_____	1	2	1	2	3	
_____	1	2	1	2	3	
_____	1	2	1	2	3	
_____	1	2	1	2	3	
_____	1	2	1	2	3	
_____	1	2	1	2	3	
_____	1	2	1	2	3	
_____	1	2	1	2	3	
_____	1	2	1	2	3	

Gender ID = 5th identification digit

Age Group ID = 6th identification digit

If eligible, transfer the 6-digit identification to the first page of the full questionnaire

If no person is eligible due to someone of their gender and age group having been selected already in that start point, say:

Thank you for your help, but I will not need to interview any members of your household after all.

If one household member is eligible to be interviewed and their category has not already been selected from this startpoint, say:

[Name] is the person I will need to interview. Is [Name] home at the moment? Could I speak to her/him now?

If [Name] is available, explain the research and seek his/her consent to participate.

If s/he is not available now, find out when s/he is likely to be and arrange to return. If possible get a phone number.

Phone number: _____

UNTIL THIS PERSON HAS BEEN EXCLUDED, EITHER THROUGH THEIR REFUSAL TO PARTICIPATE, OR NOT HAVING BEEN CONTACTED DIRECTLY ON AT LEAST TWO RETURN VISITS, DO NOT RECRUIT ANOTHER PERSON OF THE SAME GENDER OR AGE GROUP FROM THE SAME START POINT.

If more than one person is eligible,say:

(Exclude anyone from a category that has already been recruited from this startpoint)

Who out of [Name 1], [Name 2] [etc.] will be the first to have their next birthday?

(If two people are identical in terms of age group, gender and birthdate, eg. twins, select the one whose first name begins with the lower letter of the alphabet. If their first names start with the same letter, use the second letter, and so on.)

When you know which of them will be the next one to have their birthday, say:

[Name] is the person I will need to interview. Is [Name] home at the moment? Could I speak to her/him now?

If [Name] is available, explain the research and seek his/her consent to participate.

If s/he is not available now, find out when s/he is likely to be and arrange to return. If possible get a phone number.

Phone number: _____

UNTIL THIS PERSON HAS BEEN EXCLUDED, EITHER THROUGH THEIR REFUSAL TO PARTICIPATE, OR NOT HAVING BEEN CONTACTED DIRECTLY ON AT LEAST TWO RETURN VISITS, DO NOT RECRUIT ANOTHER PERSON OF THE SAME GENDER OR AGE GROUP FROM THE SAME START POINT.

Survey questionnaire

Start time: | | | | |

Identification: | | | | | | |

First I'd like to ask you a few questions about yourself, like those in the Census.

Q1 ***Check screening questionnaire.***
Ask only if respondent is in age group 1 - 2 (under 60 years).
Otherwise skip to Q2.

Do you have any dependent children usually living here who are under 18 years old?

Yes 1

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Q2 Do you have a husband [wife], partner, or de facto living here with you?

Use YOU OR SOMEONE IN YOUR HOUSEHOLD in Questions 14-21

Yes 1

No . . . . . 2 *Skip to Q 4*

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Q3 Are the other people living here with you your flatmates?

Use YOU in Questions 4-13

Yes 1

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Q4 Do you have a secondary school qualification like a pass in school certificate, a sixth form certificate, or pass in a bursary examination?

Yes 1

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Q5 Apart from secondary school qualifications, have you completed any other qualification that took 3 months or more of full time study to get?

Yes 1

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Q6 In the last 7 days, did you work for pay, profit, or income for an hour or more?

Yes . . . . . 1 *Skip to Q10*

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Q7 In the last 7 days did you work in a family business or a family farm without pay?

Yes . . . . . 1 *Skip to Q10*

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Q8 In the last 7 days, were you employed in a job, business, or farm but did not work last week for some reason?

Yes . . . . . 1 *Skip to Q10*

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Q9 Did you look for paid work in the last 4 weeks?

Yes . . . . . 1 *Skip to Q12*

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Q10 In the last 12 months, have you been out of paid work at any time?

Yes 1

No . . . . . 2 *Skip to Q12*

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9 *Skip to Q12*

Q11 In the last 12 months how many months in total have you been out of work but looking for paid work?

Months out of work (maximum 12): | | |

Q12 Thinking about cigarettes - not pipes, cigars or cigarillos - do you smoke tobacco cigarettes regularly, that is, one or more per day?

Yes 1

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

SHOWCARD 2

Q13 Looking at showcard 2, did you yourself get income in the 12 months ending today from any of these sources?

Yes 1

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Now I'd like to ask you a few questions about any difficulties you or your household may have had recently with money.

Q14 Have there been times during the last 12 months when [you, or someone in this household, was] [you were] seriously behind in paying rent within the time allowed?

Yes 1

No . . . . . 2 *Go to Q16*

Don't know . . . . . 9 *Go to Q16*

Q15 **About how many times have you been seriously behind in the last 12 months?** *(use lowest number if range is given)*

Q16 **Have there been times during the <u>last 12 months</u> when [you, or someone in this household, was] [you were] seriously behind in paying for electricity within the time allowed?**

Yes 1

No . . . . . 2 *Go to Q18*

Don't know . . . . . 9 *Go to Q18*

Q17 **About how many times have you been seriously behind?**
(use lowest number if range is given)

Q18 **Have there been times during the <u>last 12 months</u> when [you, or someone in this household, was] [you were] seriously behind in mortgage re-payments within the time allowed?**

Yes 1

No . . . . . 2 *Go to Q20*

Don't know . . . . . 9 *Go to Q20*

Q19 **About how many times have you been seriously behind?**
(use lowest number if range is given)

Q20 **Have there been times during the <u>last 12 months</u> when [you, or someone in this household, was] [you were] seriously behind in paying for the telephone within the time allowed?**

Yes 1

No . . . . . 2 *Go to Q22*

Don't know . . . . . 9 *Go to Q22*

Q21 **About how many times have you been seriously behind?**
(use lowest number if range is given)

Now I'd like to ask you some questions about you personally

Q22 Have there been times during the last 12 months when you personally have had to borrow money from a money-lender or loan shark, excluding banks or building societies, or from friends and family in order to pay for your day-to-day needs?

Yes 1

No . . . . . 2 *Go to Q24*

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9 *Go to Q24*

Q23 About how many times have you personally had to do this in the last 12 months? *(use lowest number if range is given)*

Q24 In the last 12 months have you personally received help in the form of food, clothes or money from a community organisation like the Salvation Army?

Yes 1

No . . . . . 2 *Go to Q26*

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9 *Go to Q26*

Q25 About how many times have you personally received this sort of help in the last 12 months? *(use lowest number if range is given)*

Q26 In the last 12 months have you personally made use of special food grants or food banks because you did not have enough money for food?

Yes 1

No . . . . . 2 *Go to Q28*

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9 *Go to Q28*

Q27 About how many times have you personally done this in the last 12 months? *(use lowest number if range is given)*

Q28 Has there been any day in the last fortnight when you personally haven't had enough to eat?

Yes 1

No . . . . . 2 *Skip to Q30*

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9 *Skip to Q30*

Q29 What was the reason that you didn't have enough to eat - lack of money, ill health, your choice, or something else?

Lack of money 1

Ill health, choice, or something else 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Q30 In the last 12 months have you personally continued wearing shoes with holes because you could not afford replacement?

Yes 1

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Q31 In the last 12 months have you personally been forced to buy cheaper food so that you could pay for other things you needed?

Yes 1

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Q32 In the last 12 months have you personally gone without fresh fruit and vegetables so that you could pay for other things you needed?

Yes 1

No . . . . . 2 *Skip to Q34*

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9 *Skip to Q34*

Q33 In the last 12 months have you personally gone without fresh fruit and vegetables often or only occasionally?

Often 1

Occasionally 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Q34 In the last 12 months have you personally put up with feeling cold to save heating costs?

Yes 1

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Q35 Have you personally gone without a holiday in New Zealand, away from your home, in the last 12 months because of shortage of money?

Yes 1

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Now I am going to read you two statements and I would like you to tell me how true each of them is for you. If you are sure it is true about you, say that it is definitely true. If you think it is true, but are not absolutely sure, say that it is probably true. If you are sure that it is untrue about you, say that it is definitely untrue. If you think it is untrue, but are not absolutely sure, say that it is probably untrue.

Q36 The first statement is:

If a family crisis arose, such as a serious relationship problem, it would be difficult to find someone who could give me good advice about how to handle it.

Is this statement, for you, definitely true, probably true, probably untrue, or definitely untrue?

Definitely true 4

Probably true 3

Probably untrue 2

Definitely untrue 1

Q37 The second statement is:

If I was stranded 20 kilometres from home, there is someone I could call who would come and get me.

Is this statement, for you, definitely true, probably true, probably untrue, or definitely untrue?

Definitely true 4

Probably true 3

Probably untrue 2

Definitely untrue 1

Now I'd like to ask you some questions about this dwelling.

Q38 How many bedrooms are there in this dwelling, that is –

How many rooms used as bedrooms are there in this dwelling:		
How many sleepouts, furnished as bedrooms, are there:		
How many caravans are there <u>here</u> that this family uses as a bedroom:		
Total number of bedrooms:		

Q39 Is there a telephone in this dwelling, or a cell phone that is present all or most of the time? Don't count anything that is disconnected, unable to be used to make calls, or broken.

Yes . . . . . 1 *Skip to Q41*

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Q40 Is the reason your household does not have a telephone because you do not want one, or because you can't afford one, or for some other reason?

Don't want one 1

Can't afford one 2

Other reason 3

Q41 Do you, or someone else who lives here, have insurance for the contents of this dwelling?

Yes . . . . . 1 *Skip to Q43*

No 2

Don't know 9

Q42 Could you, or someone else who lives here, afford to pay for insurance for the contents of this dwelling?

Yes 1

No 2

Don't know 9

Q43 How many motor vehicles, apart from motor bikes or scooters, do the people who live here have available for their use? Don't count vehicles that belong to visitors, or vehicles that this household borrows occasionally from another household, or vehicles that can only be used for work, or motor bikes, or motor scooters.

No vehicle 1

One or more . . . . . 2 *Skip to Q45*

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9 *Skip to Q45*

Q44 Is the reason your household doesn't have a motor vehicle because your household does not want one, or because your household can't afford one, or for some other reason?

Household does not want one 1

Household can't afford one 2

Other reason 3

Q45 Do you, or anyone else who lives here, pay rent to the owner, or to their agent, for this dwelling?

Yes 1

No . . . . . 2 *Skip to Q47*

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9 *Skip to Q47*

Q46 After the rent has been paid, is there difficulty paying for your own essentials?

Yes 1

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Now I'd like to ask you a couple of questions about this area.

Q47 Is there an open space, like a garden or park, near enough for a dog to be walked or a small child to be taken?

Yes 1

No 2

If respondent does not answer, write
Don't know *or* Refused*, as appropriate* _____ 9

Q48 Is vandalism or deliberate damage to property common in this area?

Yes 1

No 2

Includes recently moved . . . . . Don't know 9

Finally, just some questions about the other members of this household.

Q49 **Could you tell me how many people there are living in this household, including you?**

total number _____ in the household

Q50 **Could you now tell me how many of these there are:**

boys under ten years old	
girls under ten years old	
boys older than nine but under 18 years old	
girls older than nine but under 18 years old	
male adults 18 years and over [including you]	
female adults 18 years and over [including you]	
TOTAL (*check total above*)	

Q51 **Could you tell me your own age, in years, please?**

Write age here | |

SHOWCARD 3

Q52 **Can you tell me whether the TOTAL income from all sources for all the adults in this household combined, after tax has been removed, is above or below the amount for your household size shown on showcard 3**

Below threshold 1

Above threshold 2

Don't know / won't say 9

Q53 *If the household does have a working phone (refer to Q39) ask:*
If you agree, I would like to record your phone number, in case my supervisor needs to contact you to check any of the details I have recorded.

Phone number: _____

Finish time: | | | | |

Thank and close

Showcards

Screening questionnaire

There was one showcard.

Showcard 1 - age groups

18 - 39 years 1
40 - 59 years 2
60+ years 3

Survey questionnare

There were two showcards, relevant to the time of the survey.

Showcard 2 - means tested benefit

Community Wage
Domestic Purposes Benefit
Transitional Retirement Benefit
Independent Youth Benefit
Invalids Benefit
Orphans and Unsupported Child Benefit

Notes: (1) This list deliberately excludes the unemployment benefit which is means-tested, but is captured in the unemployment question.

(2) The Sickness Benefit is not included on the list of benefits here. This is because, although it is means-tested, it is intended for short-term use only. People more permanently incapacitated and therefore unable to work are eligible to apply for the Invalids Benefit which is on the list of means-tested benefits.

Showcard 3 - equivalised household income thresholds

(bottom income quintile cut-offs for different household types)

Household			Household income before tax			Household income after tax		
Code	Adults	Children	Annual	Monthly	Weekly	Annual	Monthly	Weekly
A	1	nil	14,120	1,180	270	11,190	930	220
B	1	1	19,770	1,650	380	15,660	1,310	300
C	1	2	24,770	2,060	480	19,620	1,640	380
D	1	3	29,120	2,430	560	23,060	1,920	440
E	1	4	33,030	2,750	640	26,260	2,180	500
F	1	5	36,720	3,060	700	29,090	2,420	560
G	1	6 or more	40,200	3,350	770	31,840	2,650	610
H	2	nil	21,730	1,810	420	17,210	1,430	330
I	2	1	26,290	2,190	500	20,820	1,740	400
J	2	2	30,640	2,550	590	24,260	2,020	470
K	2	3	34,330	2,860	660	27,190	2,270	520
L	2	4	38,030	3,170	730	30,120	2,510	580
M	2	5	41,500	3,460	800	32,870	2,740	630
N	2	6 or more	44,760	3,730	860	35,450	2,950	680
O	3	nil	28,030	2,340	540	22,200	1,850	430
P	3	1	31,940	2,660	610	25,300	2,110	490
Q	3	2	35,850	2,990	690	28,390	2,370	550
R	3	3	39,330	3,280	760	31,150	2,600	600
S	3	4	42,590	3,549	819	33,730	2,810	650
T	3	5	45,850	3,821	882	36,310	3,030	700
U	3	6 or more	48,892	4,074	940	38,720	3,230	750
V	4 +	nil	33,464	2,789	644	26,500	2,210	510
W	4 +	1	37,158	3,096	715	29,430	2,450	570
X	4 +	2	40,635	3,386	781	32,180	2,680	620
Y	4 +	3	43,894	3,658	844	34,760	2,900	670
Z	4 +	4	46,936	3,911	903	37,170	3,100	720
AA	4 +	5	49,979	4,165	961	39,580	3,300	760
BB	4 +	6 or more	53,021	4,418	1,020	41,990	3,500	810

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