The Provincial Indices of Multiple Deprivation for South Africa 2001

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Acknowledgements

Chapter 1 Background

Section 1.1: Conceptual framework for the Provincial Indices of Multiple Deprivation 2001

Since the beginning of the post-apartheid era, a key objective of the South African government has been the improvement of the quality of life of all South Africans and the reduction of poverty and social inequality. The South African constitution requires the Parliament to ensure that financial resources are distributed equitably among provincial and sub-provincial governments, based partly on levels of poverty and disadvantage (Alderman *et al.*, 2003). It is therefore critical that robust measures are developed to quantify the nature and extent of social deprivation at sub-national level and thereby accurately identify the areas of greatest need (i.e. the most deprived areas).

Defining poverty and deprivation

Townsend defined people as poor if 'they lack the resources to obtain the types of diet, participate in the activities and have the living conditions and amenities which are customary, or at least widely encouraged or approved in the societies to which they belong' (Townsend, 1979: 31). Conversely he defined people as deprived if 'they lack the types of diet, clothing, housing, household facilities and fuel and environmental, educational, working and social conditions, activities and facilities which are customary' (Townsend, 1987: 131 and 140). Deprivation therefore refers to peoples' unmet needs, whereas poverty refers to the lack of resources required to meet those needs. This underpins our model of multiple deprivation. Townsend also lays down the foundation for articulating multiple deprivation as an accumulation of single deprivations (Townsend, 1987) - a concept which also underpins this project.

In South Africa this multi-dimensionality was asserted in the Reconstruction and Development Programme (RDP):

> *It is not merely the lack of income which determines poverty. An enormous proportion of very basic needs are presently unmet. In attacking poverty and deprivation, the RDP aims to set South Africa firmly on the road to eliminating hunger, providing land and housing to all our people, providing access to safe water and sanitation for all, ensuring the availability of affordable and sustainable energy sources, eliminating illiteracy, raising the quality of education and training for children and adults, protecting the environment, and improving our health services and making them accessible to all.* (African National Congress, 1994)

More recently it has been argued that poverty should be seen:

*… in a broader perspective than merely the extent of low income or low
expenditure in the country. It is seen here as the denial of opportunities
and choices most basic to human development to lead a long,
healthy, creative life and to enjoy a decent standard of living, freedom,
dignity, self-esteem and respect from others.* (Statistics South Africa, 2000: 54)

During the past three decades there have been significant developments in the way that
this multi-dimensional approach to poverty has been interpreted and measured
(Thorbecke, 2004).

Though Townsend's work mainly (though not entirely) referred to individuals
experiencing deprivations - single or multiple – the arguments can, in modified form,
extend to area based measures. At an area level it is difficult to measure the percentage of
the population experiencing one, two or more deprivations. It is possible, however, to
look at single deprivations at an area level and state that a certain proportion of the
population experiences that deprivation, a proportion experiences some other form of
deprivation etc., and at an area level describe the combination of single deprivations as
area level multiple deprivation.

The area itself can be characterised as deprived *relative to other areas*, in a particular
dimension of deprivation, on the basis of the proportion of people in the area
experiencing the type of deprivation in question. Having attributed the aggregate of
individual experience of deprivation to the area, it is possible to say that an area is
deprived in that particular dimension. Once the specific dimensions of deprivation have
been measured, these can be understood as elements of multiple deprivation.

Why is small area level deprivation important? First, geographical patterns of social
disadvantage (or advantage) are not random: the spatial distribution reflects the results of
dynamic social processes, economic change, migration, availability and costs of living
space, community preferences, and policies that may distribute particular groups to
certain areas or exclude them from others. Second, the spatial concentration of multi-
dimensional deprivation means that – when correctly measured – the most deprived areas
can effectively be targeted (Smith, 1999; Kleinman, 1999; Smith *et al*., 2001). Third, the
concentration of poor people in an area may mean that local services struggle to meet
high demand, or that areas lack resources to support certain services. Fourth, when a
range of deprivation measures is collected on an area basis, the exact mix of problems
will vary from area to area.

Dimensions of deprivation

This view of multiple deprivation allows the separate measurement of different
dimensions of deprivation, such as education deprivation and health deprivation. In the
case of low income, there is an argument that, following Townsend, within a multiple
deprivation measure only the deprivations resulting from a low income would be
included and low income itself would not be a component. However, the considerable

problems of measurement of material deprivations such as lack of adequate diet, clothing etc., mean that a measure of low income or consumption could be regarded as a useful proxy for material deprivation.

To summarise, the model which emerges from this theoretical framework is of a series of uni-dimensional domains of deprivation which may be combined, with appropriate weighting, into a single measure of multiple deprivation.

Measuring different aspects of deprivation and combining these into an overall multiple deprivation measure raises a number of questions (Noble *et al.,* 2005c). For example, how should the different dimensions of deprivation be weighted? To what extent should the same people or households be represented in more than one of the dimensions of deprivation? These and other issues are addressed in this report. First, previous research in this area is reviewed and compared to the above approach.

Section 1.2: Review of previous research measuring poverty at a small area level in South Africa

The majority of the literature on levels of poverty and inequality in post-apartheid South Africa is based on either national or sub-national population surveys. Key national datasets used, either alone or in combination, include the Income and Expenditure Surveys (1995 IES and 2000 IES), the October Household Surveys (OHS), the Labour Force Surveys (LFS), and the 1996 and 2001 Censuses. A number of sub-national surveys have also been undertaken for particular provinces or sub-provincial regions e.g. the KwaZulu-Natal Income Dynamics Study (KIDS) and the Cape Area Panel Study.

Alderman *et al*. (2000) combined the 1995 IES, 1995 OHS and 1996 Census to construct estimates of household expenditure. Households with expenditure below the threshold set by the Department of Local Government were deemed to be living in poverty. The results yielded estimates of the proportion of households living in poverty at various geographical levels, but with declining precision for small sub-units of major administrative divisions.

Hirschowitz *et al*. (2000) used the Alderman *et al*. (2000) methodology for imputing expected expenditures in their construction of provincial level 'development indices' for Statistics South Africa (Stats SA). Average monthly household expenditure was joined by ten indicators from the 1996 Census in a factor analysis. Two indices were identified: a 'Household Infrastructure Index' and a 'Household Circumstances Index'. The Infrastructure Index was based on eight variables relating to the state of housing, access to services, education and expenditure. The Circumstances Index was based on the remaining three variables relating to unemployment, household size and number of children.

Hirschowitz *et al*. state that their indices can be used '…to monitor change in the life circumstances of poor households over time, as funding becomes utilised, and

development programmes implemented…They can [also] be used to plan services within funding allocations, and to act as baseline information against which to monitor change, as and when new policies are introduced and put into operation' (Hirschowitz *et al.*, 2000: 81). Between them, the two Stats SA indices encompass a far wider range of indicators of social deprivation and inequality than those analyses restricted to measuring income, expenditure or consumption alone. However, the Stats SA indices are not an articulation of any explicit model of multiple deprivation; five of the eleven variables entered into the factor analysis relate to access to services, while the remaining six relate to housing, education, employment, expenditure and household demographics. This results in far greater weight being given to the issue of access to services than to the other aspects of social disadvantage.

McIntyre *et al.* (2000) produced four alternative deprivation indices at magisterial district level using data from the 1996 Census in order to look at the relationship between deprivation and health inequalities in South Africa. They produced a general index of deprivation using principal component analysis (PCA) of a number of variables relating to socio-economic, demographic and physical household characteristics. They also produced a policy-perspective index of deprivation, using 'groups identified by policy-makers as being particularly disadvantaged or as groups who should receive priority in social service delivery'. Their third index, called a single index of deprivation (SID), was a single variable: access to piped water. Their fourth index was a health-related index of deprivation, again using PCA. These indices, with the exception of the SID, could be regarded as indices of multiple deprivation since they each contain variables relating to different aspects of deprivation. However, they were not designed to conform to any particular model of multiple deprivation.

Klasen (2000), using data from the Project for Statistics on Living Standards and Development, constructed a deprivation index comprising of education, income, wealth, housing, water, sanitation, energy, employment, transport, financial services, nutrition, health care, safety and perceived well-being indicators. Though an important step forward, this index, based as it was on survey data at national level, did not allow the identification of small area multiple deprivation.

Using data from seven 1999-2000 Afrobarometer surveys in Southern Africa,[1] Mattes, Bratton and Davids (2003) developed a multi-faceted unidimensional Lived Poverty Index (LPI) that focuses on peoples' ability to obtain basic necessities. This index is intended to measure one specific aspect of overall well-being and was developed by combining responses to questions on how often the respondent or their family went without seven basic necessities in the year prior to interviewing. The necessities were as follows: a cash income, food, medical treatment, home fuel, water, electricity and home safety. In addition, five further indices were produced, namely an ill-health index, a development infrastructure index, an index of community services, an agricultural activity index, and an access to schools index. While the results produce cross-country estimates of the 'lived poverty' of households, the LPI (and indeed the other five

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[1] The seven included countries are Botswana, Lesotho, Malawi, Namibia, South Africa, Zambia and Zimbabwe.

complementary indices) is again constrained by its inability to identify deprivation at the small area level.

Bhorat *et al*. (2004), noting that South Africa does not have a recent data set on which poverty counts can be confidently based, 'provide a picture of asset and services deprivation, economic activity, and health and safety' and demonstrate, using Census data, changes that have taken place between 1996 and 2001. However, the data are presented only for discrete indicators rather than dimensions of deprivation or composite indices. Furthermore there is no presentation at sub-province level.

The South African Human Development Report 2003 (UNDP, 2003) constructed and calculated a Service Deprivation Index (SDI) 'to provide a more encompassing measure of the distribution of progress, and to measure the backlog of deprivation that still exists in seven dimensions of basic services… The seven basic services used for the calculation of SDI are: housing, energy for cooking, energy for heating, energy for lighting, water, toilet facilities and refuse removal' (UNDP 2003: 47). The SDI is calculated nationally and by province, race and gender.

The Social Research and Population Development Unit of the Department of Health and Social Services in the Western Cape created a Human Development Index (HDI) specifically for the Western Cape province (Department of Health and Social Services, 1999). Terming their index a Provincial Human Development Index the Unit combined four indicators with equal weight to form a composite index. These four indicators - income, employment status, literacy and water supply -were each formed from one or more variables from the 1996 Census. The four indicators were constructed independently and combined with equal weight. This work has been further developed (Western Cape Department of the Premier, 2005) using the 2001 Census to produce an HDI at municipality level. This combines variables relating to a long and healthy life (life expectancy) with variables relating to 'knowledge' (adult literacy and gross school enrolment) and a decent standard of living (using mean household income). The 2005 work also involved the generation of a set of indices which are combined to form a City Development Index (CDI), also largely based on the 2001 Census. The CDI is a combination of the following indices: education, infrastructure, health, income and waste removal. The CDI is presented at Census main place level. This approach has much in common with the Provincial Indices of Multiple Deprivation, presented and discussed in this report but is designed for a different purpose - to measure human development relevant to urban populations - rather than multiple deprivation at small area level.

Section 1.3: Structure of the report

The Provincial Indices of Multiple Deprivation 2001 for South Africa have been developed using the model described in **Section 1.1**. They build on work undertaken by CASASP's sister research centre, the Social Disadvantage Research Centre (SDRC) in constructing national indices of deprivation at small area level (e.g. for England see Noble *et al.*, 2000a; Noble *et al.*, 2004; for Wales see Noble *et al.*, 2000b; for Northern

Ireland see Noble *et al.*, 2001; Noble *et al.,* 2005a; for Scotland see Noble *et al.*, 2003; for Bangladesh see Smith *et al.*, 2005). Each Provincial Index of Multiple Deprivation (PIMD) was developed using the 10% sample of the 2001 Census and then produced using the full 100% Census.

Chapter 2 presents the domains and indicators for each PIMD and **Chapter 3** explains the methodological approach used. **Chapter 4** presents each PIMD at ward level. Recommendations on how to use a PIMD are made in **Chapter 5** and **Chapter 6** suggests areas for future work.

Though this document presents an Index of Multiple Deprivation for each province, it is intended that in due course a South African Index of Multiple Deprivation (SAIMD) will be produced for the whole of the country. As is explained in Chapter 6, a national index is contingent on further work on small area geographical units, which it is hoped will be completed during the first half of 2006.

It should therefore be stressed that each PIMD only provides information about relative levels of deprivation *within* the province in question. The PIMDs are *not* comparable across provinces. This means that neither the PIMD scores nor ranks can be compared *between* provinces. As the data point is 2001, changes will inevitably have occurred since that time. These measures do, however, provided a *starting point* from which to consider small area level deprivation, and can be used alongside local up-to-date information.

Chapter 2   Domains and indicators

Following on from the conceptualisation of multiple deprivation outlined in **Chapter 1** a Provincial Index of Multiple Deprivation (PIMD) was constructed for each of the nine provinces in South Africa. Each of these indices consists of indicators which were combined to form domains of deprivation for each province. A score for each of the domains was produced and these were ranked to give a relative picture of each dimension of deprivation in each province. The domain indices were then combined to form an overall Provincial Index of Multiple Deprivation.

Section 2.1: An introduction to the domains and indicators

The model of multiple deprivation

As indicated, the conceptual model is based on the idea of distinct domains of deprivation which can be recognised and measured separately. These are experienced by individuals living in an area. People may be counted as deprived in one or more of the domains, depending on the number of types of deprivation that they experience. The overall province index of multiple deprivation is conceptualised as a weighted area level aggregation of these specific domains of deprivation.

A review of previous and ongoing research into the areas of poverty and deprivation in South Africa was undertaken to identify the issues that have the greatest impact on people's quality of life in South Africa and which should therefore be included within a measure of multiple deprivation. Research based on the existing data sources mentioned above, such as sweeps of the IES, OHS, LFS and KIDS provided valuable information. CASASP's ongoing Indicators of Poverty and Social Exclusion Project in South Africa provided qualitative information on socially perceived necessities. [2]

Domains

Five domains of deprivation were identified that could be constructed using the Census to form an index of multiple deprivation for each province. These are as follows: Income and Material Deprivation, Employment Deprivation, Health Deprivation, Education Deprivation, and Living Environment Deprivation.

Each domain is presented as a separate domain index reflecting a particular aspect of deprivation. Thus the Employment Deprivation Domain captures exclusion from the world of work and conditions of work – not the low income that may flow from it. The

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[2] A project to examine which definitions of poverty and social exclusion are appropriate in contemporary, democratic South Africa and to determine how such definitions can be operationalised so as to create measures and indicators that will usefully inform policy-making.

Income Deprivation Domain can be used separately from a PIMD to examine low income alone. The Education Deprivation Domain represents educational disadvantage and does not include non education indicators which may contribute to education deprivation such as the lack of electric lighting to undertake homework. Such an indicator would be captured in the Living Environment Deprivation Domain. This approach avoids the need to make any judgments about the complex links between different types of deprivation (for example the links between poor health and unemployment), and enables clear decisions to be made about the contribution that each domain should make to the overall PIMD.

While the domains represent distinct dimensions of deprivation, it is perfectly possible, indeed likely, that the same person could be captured in more than one domain. So, for example, if someone was unemployed, had no qualifications and no or very little other income they would be captured in the Employment Deprivation, Education Deprivation and Income Deprivation Domains. This is entirely appropriate because one individual can experience more than one type of deprivation at any given time.

Indicators

Each domain index contains a number of indicators, totalling thirteen overall (please see **Appendix 1** for full details). Given the exclusive use of Statistics South Africa's 2001 Census data for the construction of the index, all the indicators relate to 10 October 2001 (Census night). The aim for each domain was to include a parsimonious (i.e. economical in number) collection of indicators that comprehensively captured the deprivation for each domain, but within the constraints of the data available from the Census. Three further criteria were kept in mind when selecting indicators:
- They should be 'domain specific' and appropriate for the purpose (as direct as possible measures of that form of deprivation);
- They should measure major features of that deprivation (not conditions just experienced by a very small number of people or areas);
- They should be statistically robust.

The model is designed to be updated in three ways: first, to allow for the re-evaluation of the number and nature of the dimensions of deprivation; second, to allow for new and more direct measures of those dimensions to be incorporated; and third, to measure changing deprivation 'on the ground' as required.

Geographical units for each PIMD 2001

There was general consensus that each PIMD should be constructed at the smallest practicable spatial scale and that the ideal geography should possess relatively even sized populations. The domain indices and the overall PIMD are all presented at ward level, and wards are the main unit of analysis. Issues relating to geography including recommendations for further work are discussed in more detail in **Chapter 6.**

Population denominators

To enable the calculation of *rate* statistics, counts of deprived characteristics were divided by an appropriate population denominator. Since 2001 Census data were used, the denominators were also drawn from the Census. **Appendix 1** lists the denominators that were used to create each of the indicators.

Section 2.2: Income and Material Deprivation Domain

Purpose of domain

The purpose of this domain is to capture the proportion of the population experiencing income and/or material deprivation in an area.

Background

As indicated in the section outlining the conceptual framework for multiple deprivation, this domain sets out to capture material deprivation. However, there are few indicators of material deprivation contained within the Census or otherwise available at small area level. Income deprivation is a good proxy for general material deprivation and is included in this domain alongside two *direct* measures of material deprivation.

Despite advances in poverty measurement in South Africa over the past decade, and the emergence of a voluminous literature on the subject, the patterns and dynamics of poverty and inequality have become the subject of much debate. The key issue of contention relates to whether poverty has increased or decreased over the period. This situation has developed partly due to the wide range of definitions used. This is compounded by the absence of an official national poverty line, resulting in poverty estimates that fluctuate within quite a broad range, even when referring to a single dataset.[3]

Notwithstanding these debates, income deprivation is now often measured at national level as the proportion of households below a particular low income threshold. International comparisons frequently use the proportion of households living below various fractions (usually ranging from 40 to 60 %) of median or mean income. The availability of data in the Census on income distribution yields valuable insights into low income at very small spatial units.

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[3] For instance, Woolard and Leibbrandt (2001) use 1993 SALDRU data and different definitions of poverty to provide six estimates of the country's poverty incidence, which vary between 26 and 57 %.

Indicators

- Number of people living in a household that has a household income (need-adjusted using the modified OECD equivalence scale) that is below 40% of the mean equivalent household income; or
- Number of people living in a household without a refrigerator; or
- Number of people living in a household with neither a television nor a radio.

The income deprivation aspect of this domain is represented by the number of people in a ward living in households with an equivalent income of less than 40% of the national mean. Several household equivalent income thresholds and equivalence scales were investigated (see below) and the modified OECD equivalence scale was selected. This commonly used scale, which was initially suggested by Hagenaars *et al.* (1994), allocates a value of 1 to the household head, of 0.5 to each additional adult member or child aged 14 or over and of 0.3 to each child under 14. Mean equivalent income was calculated using the 2000 IES data and adjusted to 2001 levels using the Consumer Price Index. Having performed these calculations, a threshold of 40% of mean equivalised income in 2001 was adopted.

With regards to material deprivation, there are questions in the 2001 Census questionnaire about the possession of material goods (e.g. radio, television, computer, refrigerator, telephone, and cell-phone). These are widely used measures of variations in living standards. For the purpose of the provincial indices, three of the six household durables were included in the income deprivation domain - a refrigerator, radio and television. Ownership of a refrigerator represents a fundamental basic asset for safe storage of food, while ownership of a radio or television represents an important mode of communication with the outside world and a means of accessing information critical to one's life and livelihood. According to the 2001 Census, nearly three-quarters (73%) of households in the country had a radio, while slightly more than half had a television or refrigerator (54% and 51% respectively). For the other three excluded private goods, the levels of ownership were substantially lower. Cellular telephones were present in 32% of households, landline telephones in 24% of households and computers in a mere 9% of households. The current low levels of computer ownership in South Africa suggest that the lack of a computer is not a good indicator of deprivation at this stage of development. Telephone access has been included under the Living Environment Deprivation Domain and was thus not considered here.

Combining the indicators

A simple proportion of people living in households experiencing one or more of the deprivations was calculated (i.e. the number of people living in a household with low income and/or without a refrigerator and/or without a television and radio divided by the total population).

Other issues considered

Banded income
In the 2001 Census, all the income values are in 12 bands (or categories) and are reported at the individual level. This presents a simple technical problem of how to perform calculations at household level using banded income. To overcome this problem, income values (in most cases the logarithmic mean) were assigned to the bands.

Missing incomes
As Simkins (2004) observes, the sources of national income data in South Africa are relatively limited, and are confined largely to national accounts, the 1995 and 2000 Income and Expenditure Surveys and the 1996 and 2001 Censuses. Each of these sources has different limitations. With regard to the Census data, the key limitation is that a sizeable number of households either reported zero incomes or had missing income values. In the 2001 Census, this accounts for more than 3 million or 28% of households; 23% are zero-earning households and the remaining 5% are households with missing income (Leibbrandt *et al*., 2005). Stats SA has imputed values for missing cases using a variety of techniques (e.g. logical and 'hot deck'). Tests were conducted to examine the robustness of the income variable. For those households with either missing values or 'implausible' zero values, multiple imputation techniques were employed to validate Stats SA's imputations[4]. The results indicated that the Stats SA imputed data used in the income variable of the Census and incorporated into this domain are broadly reliable: missing and implausible zeros tend to be low income cases. This is reassuring in that it tells us that there are not large clusters of households in the upper end (or even in the middle) of the income distribution specifying zero incomes or refusing to report their income band.

The effects of different income thresholds
Sensitivity testing was conducted to determine whether relative ranking was changed by employing different income thresholds (20%, 30% and 40% of equivalised household mean income). This work had to be undertaken at the municipality level on the 10% sample of the Census as there was only limited access to the 100% Census. Changing the threshold had very little impact on the rank order of income deprived municipalities.[5]

The effects of different equivalence scales
Since households vary according to size and demographic composition, simply using total household income as an indicator would produce misleading results. Consequently, it has become customary to use some form of adjustment to take into account household size and structure. The simplest type of adjustment entails dividing total household income by household size to produce a per capita measure. However, while this takes into account household size, it does not adjust for structure, thus assigning equal values for adults and children alike. More complex equivalence scales assign values to each

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[4] A full **Technical Report** will be produced providing more detail.
[5] Correlation with 30% mean 0.994; with 20% 0.977 (Spearman's rho, p=0.01). See **Technical Report** for more details.

household in proportion to its needs, taking into account both size of the household and the age of its members (number of adults and children). Since there exist a wide variety of possible equivalence scales, the selection of a particular one is premised upon a set of assumptions about economies of scale and value judgements about the priority of the differential needs of individuals (children versus adults). Since such judgements may affect results, sensitivity tests were conducted to examine the potential effect of different scale parameters on the level of income deprivation and on the relative ranking of different small wards. The sensitivity analyses suggest that adopting different scales has very little impact on the rank order of the domain index[6].

Income versus expenditure as the principal living standard indicator
With regard to the choice of an indicator of living standards, the most commonly used in practice are based on household consumption expenditure and household income. In South Africa, expenditure tends to be the generally preferred of the two indicators, since it is perceived as being more reliably reported and more stable than income. Nonetheless, the 2001 Census does not include consumption and asks exclusively about gross income, so the domain focuses explicitly on income as the money-metric measure. It is also important to recognise that the measurement of expenditure is characterised by its own set of problems, in particular the difficulty of recording it correctly and potential recall error.

Section 2.3: Employment Deprivation Domain

Purpose of domain

This domain measures employment deprivation conceptualised as involuntary exclusion of the working age population from the world of work

Background

In determining what constitutes employment deprivation in the South African context, the intention was to move beyond a mere count of those who would be classified as officially unemployed. It was felt that elements of the 'hidden unemployed' should also be included, such as those who are involuntarily out of the labour force due to sickness or some form of disability.

Indicators

- Number of people who are unemployed (using official definition); plus
- Number of people who are not working because of illness or disability.

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[6] This work was undertaken at municipality level on the 10% sample of the Census. Original OECD and square root methods were tested, and the rank correlations with the modified OECD version of the domain were 0.999 and 0.995 respectively (Spearman's rho, p=0.01). See **Technical Report** for more details.

Stats SA uses two definitions of unemployment. According to the (international) official or strict definition, the unemployed are those people within the economically active population who (a) did not work in the seven days prior to Census night, (b) wanted to work and were available to start work within a week of Census night, and (c) had taken active steps to look for work or start some form of self-employment in the four weeks prior to Census night. Active steps to seek work can be registration at an employment exchange, applications to employers, checking at work sites or farms, placing or answering newspaper advertisements, seeking assistance of friends, etc. A person who fulfils the first two criteria above but did not take active steps to seek work is considered unemployed according to the expanded definition. This broad definition captures discouraged work seekers, and those without the resources to take active steps to seek work. In March 2005, these two alternate definitions made a difference between an unemployment rate of 26.5% and one of 40.5% (Stats SA, 2005).[7] This fairly sizable disparity between the two measures has been the source of an ongoing debate about the appropriate definition of unemployment (see below).

Combining the indicators

The domain was calculated as a proportion of the economically active population (15 to 65 year olds inclusive) plus people not working due to illness or disability that were unemployed or not working due to illness or disability (i.e. the number of people who are unemployed + the number of people not working due to illness or disability divided by the number of people who are economically active + the number of people not working due to illness or disability).

Other issues considered

Official versus expanded definitions of unemployment
The nature of unemployment in South Africa has been a focus of research for more than two decades and has produced a relatively sizeable body of literature. One debate that has permeated this literature has been whether unemployment in rural areas is voluntary or involuntary. The arguments have tended to polarise around whether rural-dwellers voluntarily choose to be unemployed because of the income available from household agriculture or if they are involuntarily unemployed due to a lack of productive activities available (Kingdon and Knight, 2004). As a consequence of this debate, and given its influence on the preferred definition of unemployment[8], it was deemed essential to test to see how robust the rankings produced by the Employment Deprivation Domain were to the choice of definition. Sensitivity tests revealed that the use of the expanded definition of unemployment did not affect the relative ranking of wards[9].

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[7] In the September 2001 round of Stats SA's Labour Force Survey, the closest to the Census reference night of 9-10 October 2001, the narrow and broad definitions of unemployment were 29.4% and 40.6% respectively (Stats SA, 2005).
[8] Stats SA's official definition of unemployment implicitly assumes that the non-searching unemployed have voluntarily withdrawn from the labour force (Kingdon and Knight, 2004).
[9] This work was undertaken at municipality level on the 10% sample of the Census. See **Technical Report** for details.

Quality of employment

Apart from access to employment, consideration was also given to indicators of the quality of employment for those people that have paid work. Unfortunately, the Census questionnaire is not especially strong in this regard. The only potential indicator that was identified was the number of hours worked in the week prior to Census night. However, this was eventually excluded due to concerns about its efficacy in actually measuring quality. For instance, business executives may have worked 50 or more hours during the reference week, but their quality of life would have otherwise been extremely high due to the remuneration they receive for their work. Conversely, certain unskilled labourers may be working fewer hours per week, but the nature of the employment may be physically taxing and poorly paid. Altman (2004) uses hourly earnings, the coverage of employees by written contracts, and the extent to which workers are covered by private pension plans as measures of quality in relation to working conditions. Unfortunately, while such indicators are present in Stats SA's household surveys, they are not included in the Census.

Section 2.4: Health Deprivation Domain

Purpose of domain

This domain identifies areas with relatively high rates of people who die prematurely.

Background

It is generally accepted that as a person ages they will have a greater risk of death in any given time period than those younger than them. This greater risk of death is not deemed by society to be unfair or unjust. Everyone will experience this deficit of health in his or her lifetime and it is therefore seen as an acceptable and unavoidable aspect of life. What is defined as unjust, and is therefore defined here as health deprivation, is unexpected deaths. The usual way of operationalising this principle in a measure is to age and gender standardise the data; that is to compare the number of deaths or level of morbidity in an area to what would be expected given the area's age and gender structure.

Indicator

- Years of Potential Life Lost

For the measure of premature deaths used in each of the PIMDs, Years of Potential Life Lost (YPLL), the level of unexpected mortality is weighted by the age of the individual who has died (see Blane and Drever, 1998). An area with a relatively high death rate in a young age group (including areas with high levels of infant mortality) will therefore have a higher overall YPLL score than an area with a similarly relatively high death rate for an older age group, all else being equal.

The YPLL indicator is a directly age and gender standardised measure of premature death (i.e. death under the age of 75). Because the direct method of standardisation makes use of individual age/gender death rates it is particularly prone to problems associated with small numbers. An empirical Bayes or 'shrinkage' technique is therefore used to smooth the individual age/gender death rates in order to reduce the impact of small number problems on the YPLL (see **Section 3.2**).

Other issues considered

Measures of physical morbidity

In the UK Indices of Deprivation (Noble *et al.*, 2000a, 2000b, 2001, 2003, 2004, 2005), the Health Deprivation Domain has also included measures of physical morbidity. Unfortunately the Census does not provide suitable information on this aspect of health deprivation. In future work it is hoped that a measure of physical morbidity could be included using administrative and survey data.

Section 2.5: Education Deprivation Domain

Purpose of domain

The purpose of this domain is to capture the extent of deprivation in education qualifications in a local area. The primary focus for this measure is adults aged 18 to 65 years.

Background

There is a close link between educational attainment, the type of work an individual is engaged in and the associated earnings potential. The level of education an individual has achieved determines both current income and savings potential and future opportunities for individuals and their dependents (Bhorat *et al.*, 2004).

Although the present South African government is intent on rectifying the disadvantages in education which stemmed from the apartheid system, there are still wide disparities, with the greatest challenges in the poorer, rural provinces (Chisholm, 2004; Reddy, 2005). This domain thus identifies areas where historical educational disadvantage is greatest by describing lack of educational qualification in the working age adult population.

Indicator

- Number of 18-65 year olds (inclusive) with no schooling at secondary level or above

Other issues considered

Qualifications attained by children

This domain gauges education deprivation by measuring the lack of advanced schooling in the working age adult population – a 'stock' measure. Ideally the domain would also have had a component which reflected all the qualifications attained by children – a 'flow' measure. The Census question on final level of education which is the basis of the 'stock' measure is also asked of children. However, it is not the same as a true 'flow' measure and is in many circumstances very difficult to interpret. The only child specific education indicator in the Census was in respect of current school attendance. This might be regarded a proxy for qualification. Examination of the distributions of this indicator at the small area level and the lack of correlation at the small area level with predictors of school attendance such as income suggested a possible lack of robustness in the indicator and it was felt that it would be inadvisable to include it.

Section 2.6: Living Environment Deprivation Domain

Purpose of Domain

The purpose of this domain is to identify deprivation relating to the poor quality of the living environment.

Background

This domain considers different aspects of the immediate environment in which people live that impact on the quality of their day-to-day life. There are indicators measuring the quality of housing, the amenities within the dwelling, and access to adequate living space.

Over the last decade, a number of targets have been established by the Government in relation to the provision of services to those who are currently without basic utilities. The most recent articulation of these national goals and targets is found in the Programme of Action, which has its origins in President Mbeki's State of the Nation address in May 2004. These targets include the achievement of Free Basic Service policy, ensuring universal household access to clean running water by 2009 and electricity by 2012, speeding up the provision of basic sanitation to those who are not yet connected, and addressing the housing backlog by scaling up social spending to improve access to basic shelter. Many of the indicators in this domain reflect on these issues.

Indicators

- Number of people living in a household without piped water inside their dwelling or yard or within 200 metres; or
- Number of people living in a household without a pit latrine with ventilation or flush toilet; or
- Number of people living in a household without use of electricity for lighting; or

- Number of people living in a household without access to a telephone; or
- Number of people living in a household that is a shack; or
- Number of people living in a household with two or more people per room.

Access to clean drinking water and sanitation facilities is essential for the good health of the population and thus is an important indicator to include in this domain.

There was a great deal of discussion about which toilet facilities should be classed as adequate. Initially, the indicator looked at the number of people living in households without a flush toilet. However, it was pointed out that some RDP housing is being constructed with pit latrines with ventilation, and so it was decided to classify them as not deprived. Thus, anyone living in a household with either a chemical toilet, pit latrine without ventilation, bucket latrine or no toilet facility was defined as deprived. This is consistent with the international definition of improved sanitation facilities that is used for reporting on progress towards the Millennium Development Goals (UN Millennium Project, 2005).

The Census asks questions on the type of energy/fuel that the household mainly uses for cooking, heating and lighting. It is felt that the choice of fuel for cooking may depend to a large extent on cultural preferences rather than whether or not electricity is available, although cost, availability and effectiveness are all factors (Bhorat et al., 2004). Paraffin may for example be selected over electricity for cooking purposes, and wood may be widely used in the more rural areas. However, it is argued that electricity would be the generally preferred choice for lighting - Bhorat et al. (2004: 9) conclude that 'the post-apartheid period reflects a process of a rapid expansion in the use of electricity as the preferred energy source for lighting' - and therefore a lack of electricity for lighting should be considered a deprivation.

Although the number of households with a cell-phone has increased dramatically in recent years, and often takes preference over a landline, there are households where there is neither a landline nor a cell-phone. For some households, there is not even a phone nearby and so communication with other people and services not in the immediate locality becomes very difficult. It is therefore important to include a measure of lack of access to a telephone.

Indicators of dwelling quality are a useful indication of both housing deprivation and vulnerability to shocks such as adverse weather conditions (Bhorat et al., 2004). Unfortunately the Census does not ask questions on the condition of dwellings, but a shack is an adequate proxy for poor quality dwellings, and is more suitable than using traditional dwellings either instead of or in addition to shacks (see below).

An indicator of quality of life within the home is the level of crowding. This is calculated by dividing household size by the number of rooms (includes kitchens, but excludes bathrooms and toilets). Three different versions of a crowding indicator were considered: one or more people per room, two or more people per room and three or more people per room. At municipality level (on the 10% Census), version 1 captured 59%, version 2

captured 31% and version 3 captured 13% (when the crowding indicator is considered in isolation from the other indicators in the domain). Research has been conducted in South Africa where both two or more people (Bhorat *et al*., 2004) and three or more people per room (Stats SA, 2004) were used as a measure of crowding. However, two or more people per room seemed to be the most common measure and so this was adopted as the crowding indicator for the PIMDs.

Combining the indicators

A simple proportion of people living in households experiencing one or more of the deprivations was calculated (i.e. the number of people living in a household without piped water and/or without adequate toilet and/or without electricity for lighting and/or without access to a telephone and/or that is a shack and/or that is overcrowded divided by the total population).

Other issues considered

Type of dwelling
There was some discussion as to whether people living in a traditional dwelling should be classed as deprived as well as people living in a shack. It is argued that people are not necessarily deprived if they live in a traditional dwelling for a number of reasons:

1. Traditional dwellings are often well-built and stable structures that offer protection from the elements. Shacks on the other hand are invariably of poor quality.
2. Traditional dwellings are often attached to a plot of land to which residents can lay claim. People who live in shacks rarely have access or rights to the land on which their dwelling is built.
3. In any event people living in traditional dwellings which lack basic services will be captured in the domain by the other indicators.

Refuse collection
An indicator looking at the number of people living in a household without refuse collection by the local authority was considered. However, it was eventually decided to drop the indicator because tests revealed that the indicator did not capture many extra people as deprived. As mentioned above, the aim for this and other domains was to include a parsimonious set of indicators that comprehensively captured the deprivation in question. This was achieved without the refuse collection indicator. It is further felt that this indicator in particular would bias against urban areas as refuse collection would generally occur in urban areas rather than rural areas. Thus people in rural areas would be classified as deprived in most instances and the indicator would not be very discriminatory.[10]

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[10] See **Technical Report** for details.

Section 2.7: Other domains considered

Crime and social order

Crime and social order are important elements in measuring deprivation at the small area level. In recent years, nationally representative attitudinal surveys have demonstrated that crime is consistently reported as a key challenge facing the country (HSRC 2001, 2003, 2004). Therefore, given that crime reduction and social order represent salient national priorities, they should ideally be included in an index of multiple deprivation to help to inform policy and local initiatives. Ideally, any domain focusing on crime and disorder would need to consider issues relating to the occurrence of crimes and incidents (i.e. where, when and what type), the offender (who and where) and the victim (who and where). Another valuable input would be data relating to fear of crime and the perception of community disorder. However, the Census does not include information on perceptions of crime, and so a domain measuring crime or social order could not be included in the PIMDs.

As the emphasis shifts to administrative data in subsequent rounds of research, a number of crime-focused data sets and methodologies will need to be explored. An important concern in this regard will be the reliability of reporting and the levels of standardisation of crime recording practices, though it is recognised that substantive progress is being made in these areas. It is hoped that these ongoing advances will enable future updates of the Indices to incorporate crime and social order indicators. Although police data is clearly an important indicator of levels and trends in crime and disorder, other partner agencies also collect a great deal of data relevant to this domain. Examples include the cross-sectional national victims of crime surveys that were undertaken in 1998 and 2003 by Stats SA and the Institute for Security Studies respectively.

Proximity to services

Proximity to services is another aspect of deprivation that was considered for inclusion as part of the PIMD. A Proximity to Services Deprivation Domain would measure the extent to which people have poor geographical access to certain key services, measured in terms of road distance to the nearest services. This is important since the welfare of individuals is affected by their access to opportunities, for instance, in labour markets, credit, education, and health and family planning services (Frankenberg, 2000). The types of services that are commonly used as indicators include health personnel and facilities, schools, credit sources, as well as other miscellaneous services such as post offices and daily markets. Additional factors that affect the time taken to travel to the service should be taken into account, including availability of public transportation and the quality of roads.

Questions pertaining to service availability in South Africa have been included in some household surveys. These include Living Standards Measurement Survey based instruments, such as the 1993/94 Project for Statistics on Living Standards and Development and the 1998 and 2003 rounds of KIDS, as well as the 1998 and 2003

Demographic and Health Surveys. There are however no specific questions on proximity to services in the 2001 Census. However, some of these services have been independently mapped using GIS, so there is the potential for subsequent rounds of research to make use of such data sources.

Chapter 3   Methodology

Section 3.1: Use of the 2001 Census

As indicated, each PIMD is based on the 2001 Census. The Census contains a wealth of valuable information on personal and household circumstances and many direct measures of deprivation.

Every person present in South Africa on Census night 9-10 October 2001 should have been enumerated in the 2001 Census. Thus the Census provides useful information on the whole population in one dataset. Imputation was carried out on the full Census by Stats SA to allocate values for unavailable, unknown, incorrect or inconsistent responses. A combination of 'logical' imputation and 'hot deck' imputation was used when inconsistencies were found in the data[11].

Stats SA has made available a 10% sample of the 2001 Census. The 10% sample is a useful and easy to use dataset for testing different indicators and combinations of indicators to be used in the Provincial Indices of Multiple Deprivation. Using the 10% sample it was only possible to produce an index at municipality level as the data is only robust to this level and ward codes are not supplied. However, once the final set of indicators, domains and combination techniques had been decided on, it was possible to run the entire code (with appropriate amendments) on the full dataset to produce each PIMD at ward level.

Section 3.2: Creating domain indices

Dealing with small numbers

To improve the reliability of a score which is based on small numbers, the shrinkage estimation technique can be applied. The effect of shrinkage is to move the score for a small area towards the average score of a larger area for a particular indicator. For example, where wards are the small area geography, the ward level scores would be moved towards the average score for the municipality in which the ward is located. The extent of movement depends on both the reliability of the indicator and the heterogeneity of the larger area. If scores are robust, the movement is negligible as the amount of shrinkage is related to the standard error. The shrinkage technique does not mean that the score necessarily becomes smaller (i.e. less deprived). Where wards do move this may be in the direction of more deprivation if the 'unreliable' score shows less deprivation than the municipality mean. For further details about the shrinkage technique, see the **Technical Report**.

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[11] Further details on the imputation techniques used, and also the Census in general, are available from Stats SA.

The impact of shrinkage was tested on all domains[12], but it was found that there was very little movement in the scores, and so for transparency of method, the 'unshrunk' scores were used for all indicators, other than the Years of Potential Life Lost indicator in the Health Deprivation Domain where the 'shrunk' score was used.

Combining indicators into domain indices

For each domain of deprivation (Income, Employment, etc) the aim is to obtain a single summary measure whose interpretation is straightforward in that it is, if possible, expressed in meaningful units (e.g. proportions of people or of households experiencing that form of deprivation). Apart from the Health Deprivation Domain, all of the other domains were created as simple rates. This avoided the key issue of weighting indicators which is necessary when combining indicators into a single measure. Because the domain scores are rates they are easy to interpret (i.e. X% of people in the ward of the relevant age are experiencing this type of deprivation). As discussed in **Section 2.4**, the Health Deprivation Domain is more complex as it had to be age standardised and the technique of shrinkage estimation was applied to ensure robustness.

There is no double counting of individuals within a domain. An individual may be captured in more than one domain but this is not double counting: it is simply identifying that they are deprived in more than one way.

After combining the indicators, District Management Areas[13] (DMAs), and fragments of split wards where the population was less than 100, were omitted from each PIMD, leaving the following number of wards in each province:

Western Cape   332
Eastern Cape   604
Northern Cape   153
Free State   291
KwaZulu-Natal   750
North West Province   375
Gauteng   420
Mpumalanga   361
Limpopo   487

Five domain indices were created for each province which were then combined into an overall PIMD.

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[12] This testing was undertaken at ward level for the whole country. See the **Technical Report**

[13] District Management Areas are areas such as game reserves and mining complexes with small populations with special characteristics. They produce anomalous results and are customarily excluded by Stats SA from small area analyses.

Section 3.3: Combining domain indices into an index of multiple deprivation

Standardisation and transformation

Domains are conceived as independent domains of deprivation, each with their own contribution to multiple deprivation. The strength of this contribution should vary between domains depending on their relative importance. Once the domains had been constructed, it was necessary to combine them into an overall index for each province. In order to do this the domain indices were standardised by ranking. They were then transformed to an exponential distribution.

The exponential distribution was selected for the following reasons. First, it transforms each domain so that they each have a common distribution, the same range and identical maximum/minimum value, so that when the domains are combined into a single index of multiple deprivation the (equal) weighting is explicit; that is there is no implicit weighting as a result of the underlying distributions of the data. Second, it is not affected by the size of the ward's population. Third, it effectively spreads out the part of the distribution in which there is most interest; that is the most deprived wards in each domain.

Each transformed domain has a range of 0 to 100, with a score of 100 for the most deprived ward. The exponential transformation that was selected for standardising the domains in the ward level PIMD stretches out the most deprived 25% of wards in each province. The chosen exponential distribution is one of an infinite number of possible distributions. Two other exponentials were explored: stretching out the most deprived 10% of wards (used in UK Indices) and stretching out the most deprived 30% of wards. When transformed scores from different domains are combined by averaging them, the skewness of the distribution reduces the extent to which deprivation on one domain can be cancelled by lack of deprivation on another. For example, if the transformed scores on two domains are averaged with equal weights, a (hypothetical) ward that scored 100 on one domain and 0 on the other would have a combined score of 50 and would thus be ranked at the 75th percentile. (Averaging the untransformed ranks, or after transformation to a normal distribution, would result in such a ward being ranked instead at the 50th percentile: the high deprivation in one domain would have been fully cancelled by the low deprivation in the other). Thus the extent to which deprivation in some domains can be cancelled by lack of deprivation in others is, by design, reduced. The exponential transformation procedure is set out in more detail in the **Technical Report**.

There are a number of other ways in which domain scores could have been standardised/transformed prior to combination. Examples include 'z' scores and the 'signed chi square' technique. However each has major drawbacks. The former leads to unpredictable *implicit* weighting where there are significant outliers at either end of the distribution; the latter introduces size of population into the equation in an unpredictable way (for a discussion see Noble *et al*., 2000a: 53-56). In the case of the UK work, ranking and then transforming the ranks to an exponential transformation distribution proved

most satisfactory (Noble *et al.*, 2000a). For this reason the technique was used with modification in the South African situation. In UK work the most deprived 10% of the distribution was 'spread out', whereas in South Africa with much higher levels of deprivation it was thought that it was appropriate to spread out the most deprived quarter of the distribution. Some sensitivity testing on different standardisation/transformation techniques and different exponential distributions was, however, undertaken and the analysis appears in the **Technical Report**.

As work in this area develops it is recommended that further work be undertaken on methods of combination of the domain indices to construct the overall Indices of Multiple Deprivation.

Weighting

An important issue in constructing an overall index of multiple deprivation is the question of what 'explicit weight' should be attached to the various components. The weight is the measure of importance that is attached to each component in the overall composite measure. How can one attach weights to the various aspects of deprivation? That is, how can one determine which aspects are more important than others?

There are at least five possible approaches to weighting:

    a) driven by theoretical considerations;
    b) empirically driven;
    c) determined by policy relevance;
    d) determined by consensus; and
    e) entirely arbitrary.

In the theoretical approach, account is taken of the available research evidence which informs the theoretical model of multiple deprivation and weights are selected which reflect this theory.

There are two sorts of empirical approaches that might be applicable. First a commissioned survey or re-analysis of an existing survey might generate weights. Second one might apply a technique such as factor analysis to extract some latent 'factor' called 'multiple deprivation', assuming that is, that the analysis permitted a single factor solution (see Senior, 2002).

Alternatively, the individual domain scores could be released and weighted for combination in accordance with and proportional to the focus of particular policy initiatives or weighted in accordance with public expenditure on particular areas of policy.

Another approach would be for policy makers and other 'customers' or experts to simply be consulted for their views and the results examined for consensus.

Finally, simply choosing weights without reference to the above or even selecting equal weights in the absence of empirical evidence would come into the category of 'entirely arbitrary'. Weighting always takes place when elements are combined together. Thus if the domains are summed together to create an index of multiple deprivation this means they are given equal weight. It would be incorrect to assume that items can be combined without weighting.

For each PIMD, equal weights were assigned to the exponentially transformed domains in the absence of evidence suggesting differential weights should be used.

Appendix 2 summarises the components of each PIMD in diagrammatic form.

Chapter 4   The geography of deprivation

Section 4.1: How to interpret the ward level results

There are six ward level measures for each province: five domain measures (which were combined to make the overall PIMD) and one overall PIMD. These six measures are each assigned a rank within the province in question. The most deprived ward for each measure is given a rank of 1. The ranks show how a ward compares to all the other wards *within* the province and are easily interpretable.

Though this chapter presents an Index of Multiple Deprivation for each province, it is intended that in due course a South African Index of Multiple Deprivation (SAIMD) will be produced for the whole of the country. As is explained in Chapter 6, a national index is contingent on further work on small area geographical units, which it is hoped will be completed during the first half of 2006.

It should therefore be stressed that each PIMD only provides information about relative levels of deprivation *within* the province in question. The PIMDs are *not* comparable across provinces. This means that neither the PIMD scores nor ranks can be compared *between* provinces. As the data point is 2001, changes will inevitably have occurred since that time. These measures do, however, provided a *starting point* from which to consider small area level deprivation, and can be used alongside local up-to-date information.

The five domain measures and ranks

Each domain measure consists of a score which is then ranked. These domain measures can be used to describe each type of deprivation in an area. This is important as it allows users to focus on particular types of deprivation and to compare this across wards within the province.

The scores for all domains except the Health Deprivation Domain are straightforward rates. So, for example, if a ward scores 38.6 in the Income Deprivation Domain, this means that 38.6% of the ward's population are income deprived. The score for the Health Deprivation Domain is an age adjusted rate of years of potential life lost per 1000 population, so, for example, a score of 200 means that there are 200 years of potential life lost per 1000 of the population of the ward in question. Within a domain, the higher the score, the more deprived a ward is. However, the scores should not be compared between domains as they have different minimum and maximum values and ranges (before exponential transformation has been applied and the domains combined). To compare between domains within a province, the ranks should be used. A rank of 1 is assigned to the most deprived ward.

The Provincial Indices of Multiple Deprivation 2001

Each overall PIMD describes a ward by combining information from all five domains: Income and Material Deprivation, Employment Deprivation, Health Deprivation, Education Deprivation and Living Environment Deprivation. These were combined in two stages; first each domain was transformed to a standard distribution – the exponential distribution described above. Then the domains were combined using equal weights. Each overall ward level PIMD was then ranked in the same way as the domain measures.

Each PIMD score is the combined sum of the weighted, exponentially transformed domain rank of the domain scores. Again, the bigger the PIMD score, the more deprived the ward. However, because of the exponential distribution, it is not possible to say, for example, that a ward with a score of 40 is twice as deprived as a ward with a score of 20. In order to make comparisons between wards within a province, it is recommended that ranks should be used. The PIMDs are ranked in the same way as the domain measures, that is, a rank of 1 is assigned to the most deprived ward within the province.

The PIMDs provide many useful tools for examining the geographical distribution of deprivation within each province in South Africa. However, it should be remembered that even the least deprived wards may contain deprived people within them and the most deprived wards may contain affluent people. Identifying wards as being among the least deprived does not necessarily mean that these wards contain large numbers of very rich people.

In the rest of this chapter, the overall PIMD 2001 is presented for each province. **Maps 1, 2, 3, 4, 5, 6, 7, 8** and **9,** included at the end of this chapter[14]**,** show the ward level PIMD 2001 for each province in South Africa. The wards have been divided into provincial deciles of deprivation - ten equal groups. On the map, the thin black lines depict the ward boundaries and the thicker black lines are the municipality boundaries. The most deprived 10% of wards are shaded in dark blue and the least deprived 10% of wards are shaded in bright yellow (areas left white are wards that were excluded as they were either DMAs or fragments of split wards).

Section 4.2: Ward level results

Western Cape

The most deprived wards for each domain and the Western Cape PIMD are assigned a rank of 1 and the least deprived wards are assigned a rank of 332.

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[14] If this report has been obtained from the internet, the maps are instead available as separate files for downloading.

The most highly deprived wards score as deprived on several of the domains. In fact, if one takes wards that are ranked overall in the most deprived 25% of the PIMD, the following pattern emerges:

- 100% of these wards are in the most deprived 25% on one or more domains;
- 96.4% of these wards are in the most deprived 25% on two or more domains;
- 86.7% of these wards are in the most deprived 25% on three or more domains;
- 50.6% of these wards are in the most deprived 25% on four or more domains;
- 7.2% of these wards are in the most deprived 25% on all five domains.

Map 1 presents the PIMD 2001 at ward level for the Western Cape. The Western Cape has 332 wards in total. The largest concentrations of more deprived wards are within the City of Cape Town municipality (see map inset, where the townships on the Cape Flats – alongside the N2 – can be clearly seen). It should be noted that the wards in the Little Karoo, though highly deprived and large in geographical area, have relatively small populations.

The following table presents the most deprived 50 wards in the Western Cape, as well as the population size of each of these wards.

	Ward Code	Municipality Name	Region	Population in 2001 to nearest 1000	PIMD Score
1	19100090	City of Cape Town	CAPE_TOWN_5	32 000	420.40
2	10202001	Witzenberg	WORCESTER	7 000	413.69
3	10404014	George	KNYSNA	4 000	409.00
4	10404015	George	KNYSNA	6 000	398.70
5	10503006	Beaufort West	OUDTSHOORN	6 000	389.62
6	19100039	City of Cape Town	CAPE_TOWN_2	18 000	382.54
7	10205018	Breede Valley	WORCESTER	7 000	381.64
8	19100034	City of Cape Town	CAPE_TOWN_3	28 000	376.50
9	19100037	City of Cape Town	CAPE_TOWN_2	16 000	376.28
10	19100091	City of Cape Town	CAPE_TOWN_5	27 000	373.65
11	10205002	Breede Valley	WORCESTER	8 000	372.75
12	10203023	Drakenstein	WORCESTER	5 000	372.56
13	19100093	City of Cape Town	CAPE_TOWN_5	27 000	369.95
14	10404003	George	KNYSNA	6 000	367.35
15	10405003	Oudtshoorn	OUDTSHOORN	9 000	363.22
16	10503007	Beaufort West	OUDTSHOORN	5 000	357.44
17	10502000	Prince Albert	OUDTSHOORN	10 000	352.96
18	19100035	City of Cape Town	CAPE_TOWN_3	26 000	352.75
19	19100036	City of Cape Town	CAPE_TOWN_2	26 000	352.69
20	19100098	City of Cape Town	CAPE_TOWN_5	25 000	345.37
21	19100089	City of Cape Town	CAPE_TOWN_5	19 000	345.25

22	19100087	City of Cape Town	CAPE_TOWN_7	22 000	344.85
23	19100092	City of Cape Town	CAPE_TOWN_5	20 000	344.83
24	19100010	City of Cape Town	CAPE_TOWN_7	33 000	342.17
25	19100096	City of Cape Town	CAPE_TOWN_5	34 000	341.02
26	19100052	City of Cape Town	CAPE_TOWN_1	20 000	336.37
27	10501000	Laingsburg	OUDTSHOORN	6 000	333.31
28	19100097	City of Cape Town	CAPE_TOWN_5	27 000	331.41
29	10404018	George	GEORGE	4 000	330.76
30	10408007	Knysna	KNYSNA	5 000	330.69
31	19100040	City of Cape Town	CAPE_TOWN_3	23 000	329.52
32	19100088	City of Cape Town	CAPE_TOWN_5	30 000	324.51
33	10408006	Knysna	KNYSNA	5 000	323.52
34	10203025	Drakenstein	WORCESTER	7 000	321.55
35	10405010	Oudtshoorn	OUDTSHOORN	7 000	317.11
36	10401003	Kannaland	OUDTSHOORN	4 000	314.50
37	19100033	City of Cape Town	CAPE_TOWN_3	60 000	311.03
38	10408004	Knysna	KNYSNA	5 000	305.12
39	10503002	Beaufort West	OUDTSHOORN	4 000	303.77
40	10405004	Oudtshoorn	OUDTSHOORN	7 000	302.33
41	10403007	Mossel Bay	GEORGE	5 000	301.23
42	10404013	George	GEORGE	18 000	296.83
43	10503005	Beaufort West	OUDTSHOORN	7 000	295.89
44	10407003	Plettenberg Bay	KNYSNA	7 000	291.01
45	10302006	Overstrand	CALEDON	10 000	290.49
46	10405002	Oudtshoorn	OUDTSHOORN	6 000	289.36
47	10202002	Witzenberg	WORCESTER	7 000	289.27
48	10101001	Matzikama	CLANWILLIAM	8 000	288.74
49	10203024	Drakenstein	WORCESTER	4 000	287.99
50	10205008	Breede Valley	WORCESTER	8 000	285.95

Eastern Cape

The most deprived wards for each domain and the Eastern Cape PIMD are assigned a rank of 1 and the least deprived wards are assigned a rank of 604.

The most highly deprived wards score as deprived on several of the domains. In fact, if one takes wards that are ranked overall in the most deprived 25% of the PIMD, the following pattern emerges:
- 100% of these wards are in the most deprived 25% on two or more domains;
- 91.4% of these wards are in the most deprived 25% on three or more domains;
- 62.3% of these wards are in the most deprived 25% on four or more domains;
- 27.2% of these wards are in the most deprived 25% on all five domains.

Map 2 presents the PIMD 2001 at ward level for the Eastern Cape. The deprived wards of the Eastern Cape are mainly concentrated within the former Transkei homeland area in the municipalities of Mbizana, Qaukeni, Ntabankulu and Port St Johns.

The following table presents the most deprived 50 wards in the Eastern Cape, as well as the population size of each of these wards.

	Ward Code	Municipality Name	Region	Population in 2001 to nearest 1000	PIMD Score
1	21503002	Qaukeni	UMZIMKHULU	5 000	459.48
2	21503001	Qaukeni	UMZIMKHULU	6 000	442.52
3	21503017	Qaukeni	UMZIMKHULU	14 000	439.45
4	21503021	Qaukeni	UMZIMKHULU	15 000	431.04
5	21503022	Qaukeni	UMZIMKHULU	7 000	430.68
6	21503003	Qaukeni	UMZIMKHULU	10 000	429.59
7	21504001	Port St Johns	UMTATA	10 000	429.30
8	21502007	Ntabankulu	MOUNT_FRERE	15 000	423.60
9	21502001	Ntabankulu	MOUNT_FRERE	10 000	415.75
10	21504012	Port St Johns	UMTATA	15 000	415.67
11	21502003	Ntabankulu	MOUNT_FRERE	12 000	413.99
12	21501001	Mbizana	UMZIMKHULU	1 000	412.93
13	21501019	Mbizana	UMZIMKHULU	16 000	411.81
14	21201023	Mbhashe	BUTTERWORTH	12 000	403.85
15	21503023	Qaukeni	UMZIMKHULU	12 000	403.31
16	21506016	Mhlontlo	UMTATA	9 000	400.84
17	21506008	Mhlontlo	UMTATA	8 000	400.56
18	21501006	Mbizana	UMZIMKHULU	13 000	398.42
19	21501007	Mbizana	UMZIMKHULU	16 000	396.32
20	21504008	Port St Johns	UMTATA	13 000	394.95
21	21307010	Engcobo	CALA	12 000	386.59
22	21501008	Mbizana	UMZIMKHULU	9 000	380.50
23	21505003	Nyandeni	UMTATA	14 000	378.05
24	21507019	King Sabata Dalindyebo	UMTATA	14 000	376.17
25	24402018	Umzimvubu	MOUNT_FRERE	13 000	374.46
26	21502008	Ntabankulu	MOUNT_FRERE	13 000	368.65
27	21501010	Mbizana	UMZIMKHULU	10 000	360.94
28	21505020	Nyandeni	UMTATA	17 000	359.95
29	21501005	Mbizana	UMZIMKHULU	26 000	355.05
30	21503020	Qaukeni	UMZIMKHULU	12 000	354.18
31	21305013	Intsika Yethu	CALA	7 000	352.34
32	21501014	Mbizana	UMZIMKHULU	7 000	351.78
33	21201022	Mbhashe	BUTTERWORTH	8 000	350.69

34	21201011	Mbhashe	BUTTERWORTH	8 000	350.67
35	21503006	Qaukeni	UMZIMKHULU	10 000	349.55
36	21505006	Nyandeni	UMTATA	15 000	349.23
37	21305005	Intsika Yethu	CALA	9 000	348.59
38	24401009	Umzimkhulu	UMZIMKHULU	11 000	348.20
39	24401006	Umzimkhulu	UMZIMKHULU	11 000	346.92
40	21503005	Qaukeni	UMZIMKHULU	9 000	346.82
41	21504006	Port St Johns	UMTATA	13 000	346.42
42	21505021	Nyandeni	UMTATA	11 000	345.33
43	21501011	Mbizana	UMZIMKHULU	6 000	344.90
44	21201020	Mbhashe	BUTTERWORTH	9 000	344.29
45	21201015	Mbhashe	BUTTERWORTH	8 000	343.52
46	21202002	Mnquma	BUTTERWORTH	12 000	340.40
47	21201004	Mbhashe	BUTTERWORTH	11 000	340.07
48	21307011	Engcobo	CALA	11 000	340.06
49	24401001	Umzimkhulu	UMZIMKHULU	8 000	336.18
50	21305006	Intsika Yethu	CALA	11 000	335.58

Northern Cape

The most deprived wards for each domain and the Northern Cape PIMD are assigned a rank of 1 and the least deprived wards are assigned a rank of 153.

The most highly deprived wards score as deprived on several of the domains. In fact, if one takes wards that are ranked overall in the most deprived 25% of the PIMD, the following pattern emerges:

- 100% of these wards are in the most deprived 25% on two or more domains;
- 73.7% of these wards are in the most deprived 25% on three or more domains;
- 21.1% of these wards are in the most deprived 25% on four or more domains;
- 5.3% of these wards are in the most deprived 25% on all five domains.

Map 3 presents the PIMD 2001 at ward level for the Northern Cape. The deprived wards in the province are located around Kimberley, and in the area between Carnarvon, De Aar and Colesberg.

The following table presents the most deprived 50 wards in the Northern Cape, as well as the population size of each of these wards.

	Ward Code	Municipality Name	Region	Population in 2001 to nearest 1000	PIMD Score
1	38707008	Phokwane	KIMBERLEY	5 000	378.35
2	30705001	Renosterberg	DE_AAR	3 000	360.89
3	30702003	Umsombomvu	DE_AAR	4 000	359.21
4	38702004	Dikgatlong	KIMBERLEY	6 000	335.63
5	38703001	Magareng	KIMBERLEY	5 000	334.33
6	38702007	Dikgatlong	KIMBERLEY	4 000	333.92
7	38703002	Magareng	KIMBERLEY	4 000	333.70
8	30805002	Tsantsabane	KURUMAN	4 000	322.59
9	30703001	Emthanjeni	DE_AAR	6 000	320.11
10	38101001	Gamagara	KURUMAN	4 000	319.80
11	30702002	Umsombomvu	DE_AAR	5 000	318.26
12	30702005	Umsombomvu	DE_AAR	4 000	314.78
13	30708001	Siyancuma	KIMBERLEY	5 000	313.90
14	30704002	Kareeberg	CALVINIA	1 000	311.82
15	30708002	Siyancuma	KIMBERLEY	11 000	310.45
16	30604004	Kamiesberg	SPRINGBOK	2 000	303.70
17	30806001	Kgatelopele	KURUMAN	3 000	301.99
18	30704003	Kareeberg	CALVINIA	4 000	295.45
19	30604003	Kamiesberg	SPRINGBOK	3 000	288.34
20	30706003	Thembelihle	DE_AAR	4 000	285.10
21	30707001	Siyathemba	DE_AAR	4 000	279.19
22	38702005	Dikgatlong	KIMBERLEY	5 000	278.65
23	38702001	Dikgatlong	KIMBERLEY	4 000	271.46
24	30703006	Emthanjeni	DE_AAR	4 000	268.73
25	38701027	Sol Plaatje	KIMBERLEY	7 000	264.64
26	30801000	Mier	UPINGTON	6 000	259.46
27	30804004	!Kheis	UPINGTON	3 000	257.68
28	30803006	||Khara Hais	UPINGTON	5 000	256.09
29	30707002	Siyathemba	DE_AAR	4 000	254.67
30	38707009	Phokwane	KIMBERLEY	5 000	250.20
31	30805004	Tsantsabane	KURUMAN	5 000	247.91
32	38701026	Sol Plaatje	KIMBERLEY	7 000	246.96
33	30702004	Umsombomvu	DE_AAR	6 000	246.51
34	30804001	!Kheis	UPINGTON	4 000	245.95
35	30703002	Emthanjeni	DE_AAR	5 000	243.41
36	30706001	Thembelihle	DE_AAR	3 000	239.44
37	30804002	!Kheis	UPINGTON	2 000	238.52
38	30701004	Ubuntu	DE_AAR	4 000	236.79
39	30806003	Kgatelopele	KURUMAN	2 000	236.18
40	30704004	Kareeberg	CALVINIA	2 000	234.21
41	38701015	Sol Plaatje	KIMBERLEY	4 000	232.65
42	38703004	Magareng	KIMBERLEY	6 000	232.30

43	38701016	Sol Plaatje	KIMBERLEY	10 000	231.23
44	30705003	Renosterberg	DE_AAR	2 000	224.59
45	30805005	Tsantsabane	KURUMAN	5 000	222.64
46	30702001	Umsombomvu	DE_AAR	5 000	220.87
47	30606002	Karoo Hoogland	CALVINIA	2 000	217.71
48	30803007	‖Khara Hais	UPINGTON	7 000	217.07
49	30606003	Karoo Hoogland	CALVINIA	2 000	213.14
50	30705002	Renosterberg	DE_AAR	2 000	211.59

Free State

The most deprived wards for each domain and the Free State PIMD are assigned a rank of 1 and the least deprived wards are assigned a rank of 291.

The most highly deprived wards score as deprived on several of the domains. In fact, if one takes wards that are ranked overall in the most deprived 25% of the PIMD, the following pattern emerges:
- 100% of these wards are in the most deprived 25% on two or more domains;
- 84.7% of these wards are in the most deprived 25% on three or more domains;
- 25% of these wards are in the most deprived 25% on four or more domains;
- 5.6% of these wards are in the most deprived 25% on all five domains.

Map 4 presents the PIMD 2001 at ward level for the Free State. High levels of deprivation are found in the former homeland of Qwa Qwa in Maluti a Phofung municipality, as well as the municipalities of Tswelopele, Nala and Setsoto.

The following table presents the most deprived 50 wards in the Free State, as well as the population size of each of these wards.

	Ward Code	Municipality Name	Region	Population in 2001 to nearest 1000	PIMD Score
1	41803002	Tswelopele	WELKOM	7 000	424.41
2	41803006	Tswelopele	WELKOM	7 000	386.81
3	41805001	Nala	WELKOM	5 000	378.86
4	41805003	Nala	WELKOM	14 000	375.02
5	41803001	Tswelopele	WELKOM	7 000	372.02
6	41904034	Maluti a Phofung	PHUTHADITJABA	9 000	367.43
7	41904032	Maluti a Phofung	PHUTHADITJABA	7 000	348.41
8	41904015	Maluti a Phofung	PHUTHADITJABA	13 000	347.60
9	41901013	Setsoto	BETHLEHEM	5 000	346.19
10	41901005	Setsoto	BETHLEHEM	5 000	342.39
11	41904011	Maluti a Phofung	PHUTHADITJABA	8 000	342.32
12	42003004	Ngwathe	KROONSTAD	4 000	337.10

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13	41904020	Maluti a Phofung	PHUTHADITJABA	8 000	335.18
14	41702033	Mangaung	BLOEMFONTEIN	15 000	332.24
15	41801008	Masilonyana	WELKOM	5 000	327.52
16	41805011	Nala	WELKOM	6 000	327.18
17	41903002	Nketoana	BETHLEHEM	7 000	327.18
18	41904013	Maluti a Phofung	PHUTHADITJABA	12 000	324.72
19	41902012	Dihlabeng	BETHLEHEM	4 000	319.78
20	41805009	Nala	WELKOM	16 000	319.69
21	41904009	Maluti a Phofung	PHUTHADITJABA	12 000	319.42
22	41801001	Masilonyana	WELKOM	6 000	314.74
23	41701002	Naledi	BLOEMFONTEIN	3 000	314.14
24	41904008	Maluti a Phofung	PHUTHADITJABA	7 000	312.78
25	41803003	Tswelopele	WELKOM	5 000	307.63
26	41904021	Maluti a Phofung	PHUTHADITJABA	10 000	306.30
27	41904018	Maluti a Phofung	PHUTHADITJABA	12 000	305.97
28	41803005	Tswelopele	WELKOM	12 000	305.34
29	41902007	Dihlabeng	BETHLEHEM	9 000	304.55
30	41904007	Maluti a Phofung	PHUTHADITJABA	9 000	303.64
31	41801005	Masilonyana	WELKOM	5 000	302.27
32	41902014	Dihlabeng	BETHLEHEM	8 000	301.72
33	41904002	Maluti a Phofung	PHUTHADITJABA	10 000	298.85
34	41904017	Maluti a Phofung	PHUTHADITJABA	14 000	296.55
35	41804007	Matjhabeng	WELKOM	12 000	295.85
36	41805007	Nala	WELKOM	6 000	295.36
37	41804002	Matjhabeng	WELKOM	14 000	295.28
38	41804006	Matjhabeng	WELKOM	11 000	293.98
39	41904012	Maluti a Phofung	PHUTHADITJABA	13 000	291.73
40	41904014	Maluti a Phofung	PHUTHADITJABA	8 000	290.63
41	41904010	Maluti a Phofung	PHUTHADITJABA	10 000	286.51
42	41904031	Maluti a Phofung	PHUTHADITJABA	14 000	284.15
43	41901012	Setsoto	BETHLEHEM	6 000	283.63
44	42001020	Moqhaka	KROONSTAD	7 000	281.41
45	41804018	Matjhabeng	WELKOM	13 000	280.05
46	41901011	Setsoto	BETHLEHEM	6 000	277.94
47	41805002	Nala	WELKOM	6 000	275.44
48	42005003	Mafube	BETHLEHEM	12 000	271.03
49	41901009	Setsoto	BETHLEHEM	11 000	268.68
50	41904023	Maluti a Phofung	PHUTHADITJABA	12 000	266.72

KwaZulu-Natal

The most deprived wards for each domain and the KwaZulu-Natal PIMD are assigned a rank of 1 and the least deprived wards are assigned a rank of 750.

The most highly deprived wards score as deprived on several of the domains. In fact, if one takes wards that are ranked overall in the most deprived 25% of the PIMD, the following pattern emerges:

- 100% of these wards are in the most deprived 25% on one or more domains;
- 98.9% of these wards are in the most deprived 25% on two or more domains;
- 87.2% of these wards are in the most deprived 25% on three or more domains;
- 53.5% of these wards are in the most deprived 25% on four or more domains;
- 18.7% of these wards are in the most deprived 25% on all five domains.

Map 5 presents the PIMD 2001 at ward level for KwaZulu-Natal. Concentrations of wards showing deprivation in the most deprived decile are found in the municipalities of Nkandla, Ulundi, Msinga and Nqutu.

The following table presents the most deprived 50 wards in the KwaZulu-Natal, as well as the population size of each of these wards.

	Ward Code	Municipality Name	Region	Population in 2001 to nearest 1000	PIMD Score
1	52806007	Nkandla	EMPANGENI	10 000	445.72
2	52606024	Ulundi	VRYHEID	9 000	440.54
3	52402001	Nqutu	DUNDEE	14 000	431.64
4	52303010	Indaka	LADYSMITH	9 000	419.12
5	52606016	Ulundi	VRYHEID	3 000	414.99
6	52606006	Ulundi	VRYHEID	7 000	409.51
7	52404006	Msinga	DUNDEE	13 000	404.57
8	52804005	uMlalazi	EMPANGENI	9 000	402.37
9	54301001	Ingwe	KOKSTAD	11 000	401.34
10	52305003	Okhahlamba	LADYSMITH	10 000	400.59
11	52605001	Nongoma	VRYHEID	15 000	398.50
12	52903016	Ndwedwe	STANGER	11 000	398.27
13	52404008	Msinga	DUNDEE	10 000	396.90
14	52404014	Msinga	DUNDEE	11 000	396.67
15	52606005	Ulundi	VRYHEID	7 000	395.97
16	52804003	uMlalazi	EMPANGENI	9 000	395.46
17	52904011	Maphumulo	STANGER	8 000	395.24
18	52402010	Nqutu	DUNDEE	11 000	393.06
19	52606001	Ulundi	VRYHEID	10 000	391.83
20	52904006	Maphumulo	STANGER	11 000	389.45
21	52806009	Nkandla	EMPANGENI	9 000	387.33
22	52903010	Ndwedwe	STANGER	6 000	386.53
23	52103012	Umzumbe	PORT_SHEPSTONE	10 000	385.17
24	52303008	Indaka	LADYSMITH	12 000	384.81
25	52603003	Abaqulusi	VRYHEID	10 000	379.25

26	52303009	Indaka	LADYSMITH	13 000	377.72
27	52402002	Nqutu	DUNDEE	9 000	375.89
28	52404004	Msinga	DUNDEE	10 000	373.94
29	52704005	Hlabisa	PONGOLA	11 000	372.90
30	52306008	Imbabazane	LADYSMITH	10 000	371.92
31	52404005	Msinga	DUNDEE	8 000	371.46
32	52806014	Nkandla	EMPANGENI	9 000	371.46
33	52605003	Nongoma	VRYHEID	8 000	371.06
34	52903017	Ndwedwe	STANGER	10 000	370.08
35	52103006	Umzumbe	PORT_SHEPSTONE	7 000	369.45
36	52904008	Maphumulo	STANGER	11 000	366.55
37	52605014	Nongoma	VRYHEID	10 000	363.18
38	52206007	Mkhambathini	PIETERMARITZBURG	8 000	360.46
39	52404001	Msinga	DUNDEE	14 000	357.15
40	54301003	Ingwe	KOKSTAD	13 000	357.11
41	52806013	Nkandla	EMPANGENI	12 000	356.17
42	52402004	Nqutu	DUNDEE	10 000	354.91
43	52402005	Nqutu	DUNDEE	9 000	352.67
44	52806002	Nkandla	EMPANGENI	10 000	352.26
45	52606002	Ulundi	VRYHEID	11 000	351.36
46	52405006	Umvoti	DUNDEE	11 000	350.91
47	52103008	Umzumbe	PORT_SHEPSTONE	13 000	349.59
48	52904002	Maphumulo	STANGER	11 000	347.46
49	52404003	Msinga	DUNDEE	11 000	346.72
50	52701006	Umhlabuyalingana	PONGOLA	11 000	344.10

North West

The most deprived wards for each domain and the North West Province PIMD are assigned a rank of 1 and the least deprived wards are assigned a rank of 375.

The most highly deprived wards score as deprived on several of the domains. In fact, if one takes wards that are ranked overall in the most deprived 25% of the PIMD, the following pattern emerges:

- 100% of these wards are in the most deprived 25% on one or more domains;
- 95.7% of these wards are in the most deprived 25% on two or more domains;
- 71% of these wards are in the most deprived 25% on three or more domains;
- 50.5% of these wards are in the most deprived 25% on four or more domains;
- 24.7% of these wards are in the most deprived 25% on all five domains.

Map 6 presents the PIMD 2001 at ward level for North West Province. Areas in the former homeland of Bophuthatswana are among the most deprived areas in this province. The municipalities of Greater Taung and Setla-Kgobi have the largest concentration of most deprived wards in the province.

The following table presents the most deprived 50 wards in the North West, as well as the population size of each of these wards.

	Ward Code	Municipality Name	Region	Population in 2001 to nearest 1000	PIMD Score
1	68102007	Moshaweng	MOTHIBISTAD	2 000	461.24
2	63904002	Greater Taung	VRYBURG	10 000	443.98
3	63801001	Setla-Kgobi	MMABATHO	10 000	442.93
4	63904014	Greater Taung	VRYBURG	9 000	416.63
5	63801009	Setla-Kgobi	MMABATHO	2 000	397.48
6	63904004	Greater Taung	VRYBURG	8 000	395.32
7	63904015	Greater Taung	VRYBURG	10 000	386.78
8	63903005	Mamusa	KLERKSDORP	10 000	385.46
9	63802003	Tswaing	MMABATHO	8 000	384.49
10	63904016	Greater Taung	VRYBURG	7 000	383.49
11	68102008	Moshaweng	MOTHIBISTAD	10 000	381.97
12	63802004	Tswaing	MMABATHO	7 000	379.91
13	63803026	Mafikeng	MMABATHO	11 000	376.83
14	63904006	Greater Taung	VRYBURG	9 000	375.55
15	63803001	Mafikeng	MMABATHO	10 000	374.06
16	68102009	Moshaweng	MOTHIBISTAD	8 000	359.74
17	63801003	Setla-Kgobi	MMABATHO	8 000	356.40
18	68707001	Phokwane	KIMBERLEY	6 000	354.10
19	63904013	Greater Taung	VRYBURG	9 000	352.55
20	63901001	Kagisano	VRYBURG	12 000	350.30
21	63801011	Setla-Kgobi	MMABATHO	16 000	349.69
22	63802005	Tswaing	MMABATHO	9 000	348.03
23	63801002	Setla-Kgobi	MMABATHO	7 000	345.39
24	63801010	Setla-Kgobi	MMABATHO	9 000	344.01
25	63801004	Setla-Kgobi	MMABATHO	23 000	343.53
26	63901009	Kagisano	VRYBURG	9 000	338.98
27	68102010	Moshaweng	MOTHIBISTAD	8 000	338.72
28	63801006	Setla-Kgobi	MMABATHO	9 000	336.02
29	63904005	Greater Taung	VRYBURG	9 000	334.46
30	63804019	Ditsobotla	MMABATHO	20 000	332.80
31	63904010	Greater Taung	VRYBURG	6 000	332.12
32	63904019	Greater Taung	VRYBURG	5 000	330.14
33	63801005	Setla-Kgobi	MMABATHO	7 000	328.50
34	63802006	Tswaing	MMABATHO	9 000	323.34
35	68102004	Moshaweng	MOTHIBISTAD	17 000	323.00
36	63903006	Mamusa	KLERKSDORP	9 000	321.40
37	68102002	Moshaweng	MOTHIBISTAD	8 000	320.62

38	68102006	Moshaweng	MOTHIBISTAD	6 000	319.54
39	68102003	Moshaweng	MOTHIBISTAD	8 000	319.34
40	63904017	Greater Taung	VRYBURG	4 000	316.52
41	63901005	Kagisano	VRYBURG	9 000	316.03
42	63802002	Tswaing	MMABATHO	9 000	316.00
43	63801008	Setla-Kgobi	MMABATHO	4 000	315.51
44	63901003	Kagisano	VRYBURG	11 000	309.66
45	64001001	Ventersdorp	KLERKSDORP	9 000	306.83
46	63804018	Ditsobotla	MMABATHO	6 000	298.84
47	63801007	Setla-Kgobi	MMABATHO	9 000	298.82
48	63805011	Zeerust	MMABATHO	10 000	297.62
49	63904020	Greater Taung	VRYBURG	8 000	297.47
50	63705004	Moses Kotane	RUSTENBURG	10 000	294.23

Gauteng

The most deprived wards for each domain and the Gauteng PIMD are assigned a rank of 1 and the least deprived wards are assigned a rank of 420.

The most highly deprived wards score as deprived on several of the domains. In fact, if one takes wards that are ranked overall in the most deprived 25% of the PIMD, the following pattern emerges:
- 100% of these wards are in the most deprived 25% on one or more domains;
- 99% of these wards are in the most deprived 25% on two or more domains;
- 83.8% of these wards are in the most deprived 25% on three or more domains;
- 50.5% of these wards are in the most deprived 25% on four or more domains;
- 20% of these wards are in the most deprived 25% on all five domains.

Map 7 presents the PIMD 2001 at ward level for Gauteng. The most deprived wards in the province are found in Westonaria municipality with some deprivation also evident in Merafong City and Emfuleni municipalities and in southern parts of Ekurhuleni.

The following table presents the most deprived 50 wards in the Gauteng, as well as the population size of each of these wards.

	Ward Code	Municipality Name	Region	Population in 2001 to nearest 1000	PIMD Score
1	78604011	Westonaria	RANDFONTEIN	5 000	459.19
2	78604014	Westonaria	RANDFONTEIN	7 000	453.26
3	78604009	Westonaria	RANDFONTEIN	5 000	446.61
4	78605004	Merafong City	CARLETONVILLE	6 000	444.79
5	78604015	Westonaria	RANDFONTEIN	7 000	438.74

6	78605003	Merafong City	CARLETONVILLE	6 000	426.21
7	74201028	Emfuleni	VEREENIGING	15 000	407.15
8	74201027	Emfuleni	VEREENIGING	22 000	404.74
9	78604010	Westonaria	RANDFONTEIN	4 000	397.62
10	79300025	Ekurhuleni Metro	GERMISTON	36 000	392.39
11	78605009	Merafong City	CARLETONVILLE	5 000	383.54
12	79300087	Ekurhuleni Metro	BENONI	10 000	380.30
13	78605008	Merafong City	CARLETONVILLE	7 000	369.46
14	79300039	Ekurhuleni Metro	SPRINGS	27 000	369.30
15	78605001	Merafong City	CARLETONVILLE	12 000	368.22
16	78601016	Mogale City	KRUGERSDORP	13 000	367.01
17	79300064	Ekurhuleni Metro	BENONI	29 000	366.22
18	74201029	Emfuleni	VEREENIGING	9 000	364.01
19	78602014	Randfontein	RANDFONTEIN	13 000	361.71
20	78601025	Mogale City	KRUGERSDORP	10 000	360.86
21	78601032	Mogale City	KRUGERSDORP	9 000	355.18
22	79400003	City of Johannesburg Metro	LENASIA	27 000	354.51
23	74203008	Lesedi	SPRINGS	6 000	345.79
24	74201038	Emfuleni	VEREENIGING	7 000	341.28
25	79400001	City of Johannesburg Metro	LENASIA	43 000	338.51
26	79300012	Ekurhuleni Metro	GERMISTON	21 000	335.08
27	79300023	Ekurhuleni Metro	GERMISTON	37 000	333.04
28	78605002	Merafong City	CARLETONVILLE	12 000	329.71
29	74203001	Lesedi	SPRINGS	6 000	329.16
30	74201006	Emfuleni	VEREENIGING	21 000	328.40
31	74201043	Emfuleni	VEREENIGING	12 000	326.60
32	79400006	City of Johannesburg Metro	LENASIA	34 000	326.02
33	78601019	Mogale City	KRUGERSDORP	12 000	325.26
34	79300026	Ekurhuleni Metro	GERMISTON	49 000	325.10
35	74201039	Emfuleni	VEREENIGING	22 000	324.58
36	79300062	Ekurhuleni Metro	BENONI	32 000	323.67
37	79300016	Ekurhuleni Metro	GERMISTON	22 000	323.21
38	74201026	Emfuleni	VEREENIGING	30 000	321.84
39	74201033	Emfuleni	VEREENIGING	11 000	321.14
40	79400004	City of Johannesburg Metro	LENASIA	43 000	320.92
41	78601022	Mogale City	KRUGERSDORP	10 000	320.82
42	79300065	Ekurhuleni Metro	BENONI	28 000	319.62

	Ward Code	Municipality Name	Region	Population in 2001 to nearest 1000	PIMD Score
43	74201003	Emfuleni	VEREENIGING	12 000	319.34
44	78605010	Merafong City	CARLETONVILLE	3 000	319.01
45	78602001	Randfontein	RANDFONTEIN	6 000	318.85
46	78605019	Merafong City	CARLETONVILLE	0	314.56
47	79300078	Ekurhuleni Metro	GERMISTON	23 000	312.41
48	78201006	Nokeng tsa Taemane	BRONKHORSTSPRUIT	5 000	312.13
49	78602015	Randfontein	RANDFONTEIN	7 000	311.96
50	74201018	Emfuleni	VEREENIGING	14 000	309.76

Mpumalanga

The most deprived wards for each domain and the Mpumalanga PIMD are assigned a rank of 1 and the least deprived wards are assigned a rank of 361.

The most highly deprived wards score as deprived on several of the domains. In fact, if one takes wards that are ranked overall in the most deprived 25% of the PIMD, the following pattern emerges:
- 100% of these wards are in the most deprived 25% on one or more domains;
- 92.2% of these wards are in the most deprived 25% on two or more domains;
- 77.8% of these wards are in the most deprived 25% on three or more domains;
- 40% of these wards are in the most deprived 25% on four or more domains;
- 17.8% of these wards are in the most deprived 25% on all five domains.

Map 8 presents the PIMD 2001 at ward level for Mpumalanga. The former homelands of KwaNdebele and KaNgwane contain high levels of deprivation. In particular, the municipalities of Albert Luthuli, Mkhondo and Seme are prominent, as well as Greater Groblersdal, Dr JS Moroka, and parts of Thembisile.

The following table presents the most deprived 50 wards in Mpumalanga, as well as the population size of each of these wards.

	Ward Code	Municipality Name	Region	Population in 2001 to nearest 1000	PIMD Score
1	83003002	Mkhondo	ERMELO	8 000	462.49
2	83001013	Albert Luthuli	ERMELO	1 000	450.93
3	83004009	Seme	ERMELO	10 000	436.16
4	83003001	Mkhondo	ERMELO	5 000	432.55
5	83001006	Albert Luthuli	ERMELO	9 000	414.78
6	83004004	Seme	ERMELO	3 000	408.12
7	83001008	Albert Luthuli	ERMELO	8 000	399.92
8	83004006	Seme	ERMELO	11 000	395.33

9	83204013	Nkomazi	KOMATIPOORT	10 000	386.46
10	83003003	Mkhondo	ERMELO	16 000	381.62
11	88305015	Greater Groblersdal	SIYABUSWA	8 000	380.71
12	83204005	Nkomazi	KOMATIPOORT	4 000	371.20
13	83003014	Mkhondo	ERMELO	11 000	370.11
14	83001019	Albert Luthuli	ERMELO	10 000	367.23
15	83001001	Albert Luthuli	ERMELO	8 000	367.19
16	88305010	Greater Groblersdal	SIYABUSWA	8 000	365.67
17	83003008	Mkhondo	ERMELO	12 000	359.45
18	83001009	Albert Luthuli	ERMELO	8 000	358.61
19	88305016	Greater Groblersdal	SIYABUSWA	7 000	354.17
20	83001003	Albert Luthuli	ERMELO	8 000	353.88
21	83204015	Nkomazi	KOMATIPOORT	11 000	352.29
22	83003015	Mkhondo	ERMELO	17 000	352.15
23	83001005	Albert Luthuli	ERMELO	7 000	351.83
24	83001002	Albert Luthuli	ERMELO	13 000	350.49
25	83105008	Thembisile	SIYABUSWA	10 000	346.30
26	83003009	Mkhondo	ERMELO	14 000	326.73
27	83001016	Albert Luthuli	ERMELO	9 000	324.84
28	83001011	Albert Luthuli	ERMELO	10 000	320.15
29	83105024	Thembisile	SIYABUSWA	8 000	320.12
30	83002006	Msukaligwa	ERMELO	4 000	312.62
31	83204008	Nkomazi	KOMATIPOORT	10 000	311.42
32	83003004	Mkhondo	ERMELO	10 000	311.38
33	83204012	Nkomazi	KOMATIPOORT	10 000	308.11
34	83003006	Mkhondo	ERMELO	9 000	308.07
35	83204001	Nkomazi	KOMATIPOORT	14 000	304.72
36	83106027	Dr JS Moroka	SIYABUSWA	6 000	301.75
37	88305005	Greater Groblersdal	SIYABUSWA	8 000	298.49
38	83007010	Highveld East	STANDERTON	4 000	298.22
39	83204022	Nkomazi	KOMATIPOORT	9 000	296.24
40	88305009	Greater Groblersdal	SIYABUSWA	10 000	296.09
41	83106026	Dr JS Moroka	SIYABUSWA	9 000	295.21
42	83103001	Middelburg	MIDDELBURG	8 000	295.13
43	88305017	Greater Groblersdal	SIYABUSWA	7 000	294.80
44	83006004	Dipaleseng	STANDERTON	4 000	292.97
45	88306005	Greater Tubatse	JANE_FURSE	2 000	292.62
46	83204016	Nkomazi	KOMATIPOORT	10 000	292.59
47	83204014	Nkomazi	KOMATIPOORT	11 000	292.39
48	83204002	Nkomazi	KOMATIPOORT	20 000	289.72
49	83002015	Msukaligwa	ERMELO	8 000	288.23
50	83106008	Dr JS Moroka	SIYABUSWA	5 000	287.79

Limpopo

The most deprived wards for each domain and the Limpopo PIMD are assigned a rank of 1 and the least deprived wards are assigned a rank of 487.

The most highly deprived wards score as deprived on several of the domains. In fact, if one takes wards that are ranked overall in the most deprived 25% of the PIMD, the following pattern emerges:

- 100% of these wards are in the most deprived 25% on one or more domains;
- 98.3% of these wards are in the most deprived 25% on two or more domains;
- 76.9% of these wards are in the most deprived 25% on three or more domains;
- 31.4% of these wards are in the most deprived 25% on four or more domains;
- 3.3% of these wards are in the most deprived 25% on all five domains.

Map 9 presents the PIMD 2001 at ward level for Limpopo. Again, the former homeland areas in this province feature as highly deprived. Limpopo's severely deprived wards are found in Makhuduthamaga, Fetakgomo, Blouberg, Greater Tubatse, Greater Giyani and Greater Letaba municipalities.

The following table presents the most deprived 50 wards in Limpopo, as well as the population size of each of these wards.

	Ward Code	Municipality Name	Region	Population in 2001 to nearest 1000	PIMD Score
1	98303002	Fetakgomo	JANE_FURSE	4 000	429.49
2	93501006	Blouberg	BOCHUM	11 000	418.24
3	98302029	Makhuduthamaga	JANE_FURSE	1 000	403.79
4	93402011	Mutale	THOHOYANDOU	0	394.57
5	98302010	Makhuduthamaga	JANE_FURSE	10 000	388.62
6	93607013	Mogalakwena	POTGIETERSRUS	8 000	376.93
7	98305023	Greater Groblersdal	SIYABUSWA	6 000	375.64
8	98401006	Maruleng	BUSHBUCKRIDGE	5 000	370.72
9	93501008	Blouberg	BOCHUM	12 000	369.22
10	98302024	Makhuduthamaga	JANE_FURSE	13 000	361.33
11	98306008	Greater Tubatse	JANE_FURSE	9 000	353.83
12	98302005	Makhuduthamaga	JANE_FURSE	11 000	353.82
13	98303001	Fetakgomo	JANE_FURSE	10 000	344.82
14	98305029	Greater Groblersdal	SIYABUSWA	7 000	342.71
15	98306007	Greater Tubatse	JANE_FURSE	8 000	340.64
16	98305027	Greater Groblersdal	SIYABUSWA	7 000	336.14
17	98302026	Makhuduthamaga	JANE_FURSE	8 000	328.29
18	98302028	Makhuduthamaga	JANE_FURSE	8 000	328.18

19	93501009	Blouberg	BOCHUM	7 000	328.10
20	98302020	Makhuduthamaga	JANE_FURSE	12 000	322.95
21	98306025	Greater Tubatse	JANE_FURSE	8 000	322.60
22	93501007	Blouberg	BOCHUM	11 000	321.74
23	98306029	Greater Tubatse	JANE_FURSE	13 000	321.49
24	88306022	Greater Tubatse	JANE_FURSE	1 000	321.30
25	98306023	Greater Tubatse	JANE_FURSE	7 000	319.93
26	93301013	Greater Giyani	GIYANI	9 000	319.53
27	93607008	Mogalakwena	POTGIETERSRUS	9 000	317.69
28	98306014	Greater Tubatse	JANE_FURSE	8 000	315.65
29	93607006	Mogalakwena	POTGIETERSRUS	10 000	311.18
30	93505018	Lepele-Nkumpi	LEBOWAKGOMO	11 000	309.46
31	93303030	Greater Tzaneen	TZANEEN	8 000	308.46
32	93302001	Greater Letaba	GIYANI	11 000	307.62
33	93501011	Blouberg	BOCHUM	11 000	306.65
34	93301023	Greater Giyani	GIYANI	7 000	305.44
35	93505005	Lepele-Nkumpi	LEBOWAKGOMO	8 000	304.70
36	98303003	Fetakgomo	JANE_FURSE	7 000	304.09
37	93502003	Aganang	PIETERSBURG	7 000	303.87
38	98306024	Greater Tubatse	JANE_FURSE	9 000	303.51
39	93505001	Lepele-Nkumpi	LEBOWAKGOMO	8 000	302.04
40	98302011	Makhuduthamaga	JANE_FURSE	11 000	300.98
41	93501004	Blouberg	BOCHUM	9 000	300.92
42	98304012	Greater Marble Hall	MIDDELBURG	8 000	300.33
43	98303004	Fetakgomo	JANE_FURSE	7 000	299.91
44	98306015	Greater Tubatse	JANE_FURSE	7 000	299.84
45	98402009	Bushbuckridge	BUSHBUCKRIDGE	3 000	298.87
46	93301024	Greater Giyani	GIYANI	7 000	298.84
47	98302006	Makhuduthamaga	JANE_FURSE	9 000	296.37
48	93301012	Greater Giyani	GIYANI	5 000	293.89
49	93501010	Blouberg	BOCHUM	9 000	291.72
50	98303011	Fetakgomo	JANE_FURSE	12 000	291.26

Chapter 5   How should the Provincial Indices of Multiple Deprivation be used?

Spatial targeting

The Provincial Indices of Multiple Deprivation provide a tool for people to identify the most deprived areas within each province. As the data point is 2001, changes will inevitably have occurred since that time. These measures do, however, provided a *starting point* from which to consider small area level deprivation, and can be used alongside local up-to-date information. There are a number of potential uses of a PIMD, but it is hoped that the major purpose will be to assist with spatial targeting. Spatial targeting is the directing of programmes and resources within programmes towards those in greatest social need, where the poorest should be identified objectively using measures of deprivation that are fairly and consistently applied. The intention is that each PIMD will be used by Government, aid agencies and non-governmental organisations to target the most deprived areas. It should be stressed that each PIMD only provides information about relative levels of deprivation *within* the province in question. The PIMDs are *not* comparable across provinces. This means that neither the PIMD scores nor ranks can be compared *between* provinces.

Not every person living in a disadvantaged area is deprived and conversely there are many disadvantaged people living outside the most deprived areas. Any spatial targeting should complement, and not be a substitute for, targeting of groups and people. It should also be remembered that each PIMD is a ward level summary and therefore does not provide information about variations in deprivation that may exist *within* any given ward.

If spatial targeting is used, it is necessary to decide where to draw a threshold. It is inevitable that there will be only marginal differences between some selected wards and some wards that are not selected. The choice of cut-off will be informed by the extent to which the programme or policy aims to concentrate resources on the most deprived areas, or spread resources more widely.

The domain measures

There are five domains within each PIMD, and their interpretation is described below using the Income Deprivation Domain as an example. The Health Deprivation Domain is described separately as it was constructed in a different way to the others.

The Income Deprivation Domain measures the number of people living in households with low incomes and lack of material goods. The count of people living in such households is expressed as a percentage of the total population of the area in question. The score for any ward is thus the percentage of the ward's population living in a household with a household equivalent income below 40% of mean income and/or no refrigerator and/or no TV and radio.

Because the number of people living in low income households or households lacking material goods are simply added, there is no explicit weighting given to the individual indicators. However, geographic patterns in the distribution of low income have the greatest influence on the domain measure as the low income indicator captures a greater proportion of the population than the other indicators.

For the other domains the denominator may be different, for example, for the Education Deprivation Domain, instead of a percentage of the whole population, the domain score is a percentage of 18-65 year olds (inclusive).

The Income Deprivation Domain scores can be placed in rank order, from the most deprived to the least deprived to inform spatial targeting. Because the Income Deprivation Domain scores are straightforward percentages, based on counts, they can be used to inform the distribution of resources across a number of wards.

Actual resources allocated will, however, need to take into account the number of deprived people in an area. While the domain *score* reflects the concentration of deprivation and may help identify the area to be targeted, the *number* of, say, income deprived may be better suited for determining the actual amount of resources provided.

The Health Deprivation Domain

The Health Deprivation Domain measures premature death. This is expressed as a rate: the number of years of life lost per 1000 population. The shrinkage technique was applied to this domain. Shrinkage involves moving 'unreliable' ward scores (i.e. those with a high standard error) towards another more robust score. This may be towards more deprivation or towards less deprivation. The resultant shrunk scores are on the same metric as the original raw scores.

Provincial Indices of Multiple Deprivation

The five domain scores are key outputs of the research, and it is recommended that the domain scores should be used when they are appropriate targeting tools for a specific project or programme. However many programmes will target deprivation in a wider or more general sense, and for this reason a multiple deprivation score has been calculated.

Each PIMD brings together the five domain scores into a single score. The use of the exponential transformation means that deprivation in each domain is aggregated, and relative non-deprivation in any domain essentially does not fully cancel out the deprivation observed in another domain. The exponential distribution emphasises differences between more deprived wards, and by extension makes less distinction between the remaining wards. A practical outcome of this is that small differences in ward rankings are more likely to represent real differences among deprived wards, while small differences in ward rankings among less deprived wards are less likely to represent real differences.

As with the domain indices, the actual resources allocated using each PIMD will also need to take into account the population of deprived areas. The PIMD rank for each ward indicates the concentration of multiple deprivation relative to other wards in the province and may help identify the area to be targeted, but the ward's population size will indicate the actual amount of resources provided to deprived areas that are selected.

Within any given province, wards with similar PIMD scores may have very different domain scores, and require different policy responses.

It is perhaps unsurprising that areas experiencing one form of deprivation frequently also experience other forms of deprivation. Correlations between the five domain scores and each of the PIMD scores were undertaken (results not shown here).

In each province, all domains correlate fairly highly with the overall PIMD for that province. In all cases, the Income Deprivation Domain has the highest correlation with the PIMD (0.914 to 0.974) and also correlates highly with the Living Environment Deprivation Domain. In nearly all provinces the Employment Deprivation, Education Deprivation and Living Environment Deprivation Domains all have a correlation of over 0.7 with their respective provincial index of multiple deprivation, but the intra-domain correlations are not always as high. In most provinces the Health Deprivation Domain has the lowest correlation with its PIMD and all other domains[15].

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[15] Please see **Technical Report** for full details

Chapter 6   Towards a national Index of Multiple Deprivation

The original intention was to produce a ward level South African Index of Multiple Deprivation (i.e. a single index for the whole country). However, the country's wards vary considerably in population size, especially by province. Though the national mean ward level population size is around 11 500, mean ward size by province ranges from around 5 000 in the Northern Cape to 20 000 in Gauteng. This raises two important issues: first, provinces with large wards will tend to be under-represented in national indices of deprivation; and second, pockets of deprivation in larger wards may be 'diluted' or hidden by relative non-deprivation in the vicinity.

The first issue is to some extent side-stepped by the creation of the PIMDs described in this report, although they do not address the second issue. However, both issues would be satisfactorily addressed by the creation of a new small area level statistical geography, the properties of which are described below.

A new statistical geography

Ideally, deprivation measures should be constructed at the smallest possible spatial scale that is consistent with robust measurement. The units should also be of more or less equal size in terms of population and should be relatively homogenous in terms of deprivation.

Electoral wards[16] were selected for each PIMD as the most robust small area option currently available. However, as indicated above, electoral wards vary greatly in size, with populations ranging from fewer than 150 people to more than 80 000 (Mean 11 416 Standard Deviation 7 973), across the country. The histogram below shows the population sizes for all wards in South Africa. Wards exist that have either very small populations or very large populations, and in general the large wards are found in the six metropolitan areas. Of the 482 wards with populations greater than 20 000, 88 (18.3%) are in Cape Town; 98 (20.3%) are in Johannesburg; 92 (19.1%) in Ethekwini; and 56 (11.6%) are in Tshwane.

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[16] Wards are clusters of voting district polygons obtained from the Independent Electoral Commission. The Municipal Demarcation Board created wards in 2000.

Distribution of population by ward (2001 ward boundaries)
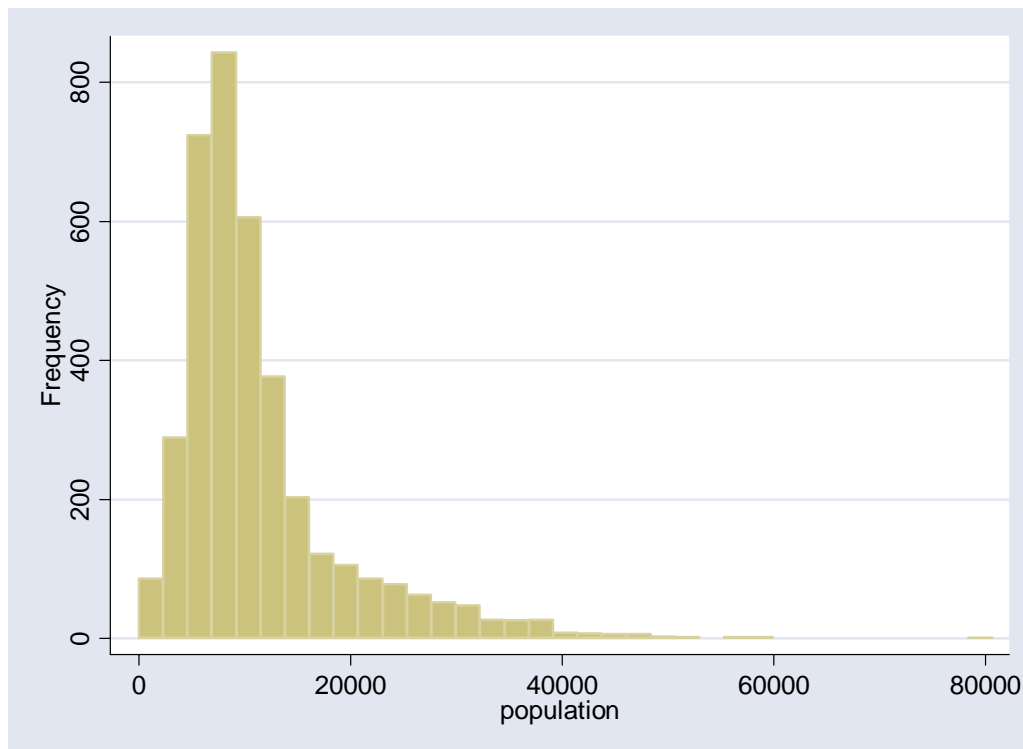
To address the issues raised above, it is recommended that a new small area unit be constructed that takes into account homogeneity and population size. The research team accordingly plans to develop Data Zones for South Africa which use Enumeration Areas as building blocks. This exercise will draw on work that has been carried out to create new small area geographies by the Office for National Statistics (England and Wales), the General Register Office for Scotland and the Northern Ireland Statistics and Research Agency. In these countries, similar problems with ward size and changing boundaries were encountered and it was therefore decided to develop a range of *statistical* areas that would be of consistent size and whose boundaries would not change.[17]

The key thing to note is that Data Zones would be analytical or statistical boundaries not political or administrative boundaries. They would be generated solely to ensure equity and consistency in the geographical measurement of deprivation.

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[17] For more information please visit the following websites:
England and Wales - http://www.statistics.gov.uk/geography/soa.asp
Northern Ireland - http://www.nisra.gov.uk/whatsnew/dep/super_output_areas.html
Scotland - http://www.sns.gov.uk/

Harnessing administrative data to create indices of multiple deprivation that are both up to date and updateable

The PIMDs 2001 and the proposed SAIMD 2001 draw exclusively from the 2001 Census. This represents the picture as at October 2001. Inevitably, change will have occurred since then and although for most areas the relative position will not have altered greatly, it is important to explore ways to bring the measurement of multiple deprivation up to date. Furthermore, some types of deprivation cannot be incorporated since census data have no or insufficient information on them, for example educational attainment for children still at school, the prevalence of crime in an area, and the extent of morbidity in an area.

It is therefore important to explore the availability of non-Census data sources. The main focus would be on the possibilities of using administrative data.[18] Such data would enable deprivation indicators to be produced at a small area level that could generate a small area index of multiple deprivation which is both up to date and which can be updated more frequently.

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[18] See Smith and Noble (2000) on the merits of using administrative data in the UK context.

Appendix 1 Indicators used in each PIMD 2001

This Appendix gives further details of the indicators that were used in each PIMD 2001. All indicators were derived from the 2001 Census. Information on the Census question used and the responses (codes) selected to define a person as deprived is provided below. All numerators and denominators exclude people living in institutions. For all domains apart from the Health Deprivation Domain, the score was calculated as a simple rate: i.e. the percentage of people experiencing deprivation on one or more of the indicators in that domain.

Income and Material Deprivation Domain

Numerator

1. **Number of people living in a household that has a household income (need-adjusted using the modified OECD equivalence scale) that is below 40% of the mean equivalent household income**

The Census question P-22 ("What is the income category that best describes the gross income of (this person) before tax?") was used to calculate a household income. A household equivalent income was calculated using this household income, a modified OECD equivalence scale, and Census question P-02 ("What is (the person's) date of birth and age in completed years?"). The cut-off used was 'below 40% mean household equivalent income derived from the IES 2000 and adjusted using the CPI. Further details of the equivalence scale used (and sensitivity testing of other equivalence scales) are given in the **Technical Report.**

2. **Number of people living in a household without a refrigerator**

This indicator used Census question H-29 ("Does the household have any of the following (in working condition): radio, television, computer, *refrigerator*, telephone in the dwelling, cell-phone?"). People were selected who lived in a household without a refrigerator (code 2).

3. **Number of people living in a household with neither a television nor a radio**

This indicator used Census question H-29 ("Does the household have any of the following (in working condition): *radio*, *television*, computer, refrigerator, telephone in the dwelling, cell-phone?"). People were selected who lived in a household with neither a radio nor a television (code 2 for both radio and television).

Denominator

This domain used the total population as a denominator.

Employment Deprivation Domain

Numerator

4. **Number of people who are unemployed**
Unemployed people aged 15-65 inclusive were identified using the derived variable on employment status which has the following categories: not applicable, employed, unemployed, and not economically active. This derived variable is based on responses to five Census questions:
- P-02 ("What is (the person's) date of birth and age in completed years?") – the unemployed derived variable uses 15-65 inclusive;
- P-18 ("In the seven days before 10 October did (the person) do any work for pay (in cash or in kind) profit or family gain, for one hour or more?") – the unemployed derived variable selects people who said 'no' (code 5);
- P-18a ("What is the main reason why (the person) did not have work in the seven days before 10 October?") – the unemployed derived variable selects people who said 'could not find work' (code 7);
- P-18b ("In the past four weeks before 10 October has (the person) taken active steps to find employment") – the unemployed derived variable selects people who answer 'yes' (code 1);
- P-18c ("If offered work, how soon could (the person) start?") – the unemployed derived variable selects people who said 'within one week' (code 1).

5. **Number of people who are not working due to illness and disability**
This variable was created from Census question P-18a ("What is the main reason why (the person) did not have work in the seven days before 10 October?"), by selecting people aged 15-65 inclusive who said 'Unable to work due to illness and disability' (code 4).

Denominator

The denominator for this domain was constructed by adding the total economically active population to people not working because of illness or disability (15 to 65 year olds inclusive). The totally economically active population was taken from the Census derived variable on employment status (official/strict definition), codes 1 (employed) and 2 (unemployed). The number of people not working because of illness or disability was taken from Census question P-18a ("What is the main reason why (the person) did not have work in the seven days before 10 October?"), selecting people who said 'Unable to work due to illness and disability' (code 4).

Health Deprivation Domain

6. **Years of Potential Life Lost**
This directly age and sex standardised measure of premature deaths was calculated using Census questions:

- P-02 ("What is (the person's) date of birth and age in completed years?")
- P-03 ("Is (the person) male or female?")
- H-31a ("What was the age in years at death?")
- H-31a ("What is the sex of the deceased?")

Method: Blane and Drever (1998). In addition shrinkage was applied to age-sex rates and an upper age was set at 75.

Education Deprivation Domain

Numerator

7. **Number of 18 to 65 year olds (inclusive) who have no schooling at secondary level or above**
This indicator used Census question P-17 ("What is the highest level of education that (the person) has completed?"). People were selected who had no schooling (code 99) or answered Grade 6/Standard 4 or less (codes 1 to 6).

Denominator

This domain used 18-65 year olds (inclusive) for the denominator, taken from Census question P-02 ("What is (the person's) date of birth and age in completed years?").

Living Environment Deprivation Domain

Numerator

8. **Number of people living in a household that has no access to a telephone**
This indicator used Census question H-29a "Where do members of this household mainly use a telephone?", which was asked only to people in households that answered 'no' to having a telephone in the dwelling or a cell-phone (question H-29). People in households that responded 'at another location not nearby' (code 4), or 'no access to a telephone' (code 5) were selected.

9. **Number of people living in a household that has no piped water inside the dwelling or yard or nearby**

This indicator used Census question H-26 ("In which way does this household obtain piped water for domestic use?") and selected people in households that responded 'no access to piped (tap) water' (code 1), or 'piped (tap) water on community stand: distance greater than 200m from dwelling' (code 2).

10. **Number of people living in a household that has no use of electricity for lighting**

This indicator used Census question H-28 ("What type of energy/fuel does this household mainly use for cooking, for heating and *for lighting*?") and selected people in households that responded 'gas' (code 2), 'paraffin' (code 3), 'candles' (code 6), 'solar' (code 8), and 'other' (code 9).

11. **Number of people living in a household that is a shack**

This indicator used Census question H-23a ("Which type of dwelling or housing unit does this household occupy?") and selected people in households that responded 'informal dwelling/shack in back yard' (code 6), 'informal dwelling/shack not in back yard e.g. in an informal/squatter settlement' (code 7).

12. **Number of people living in a household that has neither a pit latrine with ventilation nor a flush toilet**

This indicator used Census question H-27 "What is the main type of toilet facility that is available for use by this household?" and selected people in households that responded 'chemical toilet' (code 3), 'pit latrine without ventilation' (code 5), 'bucket latrine' (code 6), and 'none' (code 7).

13. **Number of people living in a household that has two or more people per room**

The Census question H-24 ("How many rooms, including kitchens, are there for this household?") was used in conjunction with a count of number of people per household to calculate the number of households where there were two or more people per room.

Denominator

Total population was used as the denominator for this domain.

APPENDIX 2: COMPONENTS OF EACH PROVINCE INDEX OF MULTIPLE DEPRIVATION

INCOME AND MATERIAL DEPRIVATION DOMAIN	EMPLOYMENT DEPRIVATION DOMAIN	HEALTH DEPRIVATION DOMAIN	EDUCATION DEPRIVATION DOMAIN	LIVING ENVIRONMENT DEPRIVATION DOMAIN
People living in a household that has a household income below 40% of the mean equivalent household income (A) People in a household without a fridge (B) People in a household with neither a TV nor a radio (C)	People aged 15-65 who are unemployed (official definition) (A) People aged 15-65 who are not working because of illness or disability (B)	Years of potential life lost (A)	People aged 18-65 with no schooling at secondary level or above (A)	People in a household without piped water in their dwelling or yard or within 200 metres (A) People in a household without a pit latrine with ventilation or flush toilet (B) People in a household without use of electricity for lighting (C) People in a household without access to a telephone (D) People living in shack (E) People in a household with 2 or more people per room (F)
		APPLY 'SHRINKAGE' PROCEDURE TO A		
(People experiencing A or B or C) / Ward total population **INCOME AND MATERIAL DEPRIVATION**	(A+B) / ((Ward economically active population aged 15-65) + B) **EMPLOYMENT DEPRIVATION DOMAIN SCORE**	**HEALTH DEPRIVATION DOMAIN SCORE**	A / Ward population aged 18-65 **EDUCATION DEPRIVATION DOMAIN SCORE**	(People experiencing A or B or C or D or E or F) / Ward total population **LIVING ENVIRONMENT DOMAIN SCORE**
STANDARDISE DOMAIN AND TRANSFORM TO EXPONENTIAL DISTRIBUTION	**STANDARDISE DOMAIN AND TRANSFORM TO EXPONENTIAL DISTRIBUTION**	**STANDARDISE DOMAIN AND TRANSFORM TO EXPONENTIAL DISTRIBUTION**	**STANDARDISE DOMAIN AND TRANSFORM TO EXPONENTIAL DISTRIBUTION**	**STANDARDISE DOMAIN AND TRANSFORM TO EXPONENTIAL DISTRIBUTION**
20%	**20%**	**20%**	**20%**	**20%**

WEIGHT INDIVIDUAL DOMAIN EXPONENTIAL SCORES AS SHOWN AND COMBINE TO PRODUCE A PROVINCE INDEX OF MULTIPLE DEPRIVATION (PIMD)

Acronyms

The following abbreviations have been used in this report:

CASASP	Centre for the Analysis of South African Social Policy
CDI	City Development Index
DMA	District Management Area
GIS	Geographic Information System
HDI	Human Development Index
HSRC	Human Sciences Research Council
IES	Income and Expenditure Survey
IMD	Index of Multiple Deprivation
KIDS	KwaZulu-Natal Income Dynamics Study
LFS	Labour Force Survey
LPI	Lived Poverty Index
OA	Output Area
OECD	Organisation for Economic Co-operation and Development
OHS	October Household Survey
PCA	Principal Components Analysis
PIMD	Provincial Index of Multiple Deprivation
RDP	Reconstruction and Development Programme
SAIMD	South African Index of Multiple Deprivation
SALDRU	South African Labour and Development Research Unit, University of Cape Town
SDI	Service Deprivation Index
SDRC	Social Disadvantage Research Centre
SID	Single Index of Deprivation
SOA	Super Output Area
Stats SA	Statistics South Africa
YPLL	Years of Potential Life Lost

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The Research Team

Centre for the Analysis of South African Social Policy

CASASP has extensive experience through its sister research team, the Social Disadvantage Research Centre, of constructing national indices of deprivation at small area level. SDRC has recently undertaken a number of pioneering pieces of research into the conceptualisation and measurement of multiple deprivation in the United Kingdom, producing national indices for England (Noble *et al*., 2000a; Noble *et al*., 2004), Wales (Noble *et al*., 2000b), Northern Ireland (Noble *et al*., 2001; Noble *et al*., 2005) and Scotland (Noble *et al*., 2003).

CASASP is currently involved in a large collaborative research programme with the South African National Department for Social Development (DSD), funded by the UK Government Department for International Development Southern Africa (DFID-SA). This collaboration, termed the 'Programme for the development of the research infrastructure and the evidence base for pro-poor social policy in South Africa' is part of the wider DFID-SA sponsored programme 'Strengthening Analytical Capacity for Evidence-Based Decision-Making in South Africa'. Through its existing research activity and commitments in South Africa, CASASP is gaining an invaluable insight into the complexities of defining and measuring multiple deprivation in the South African context.

The members of the research team from CASASP are: Michael Noble, Helen Barnes, Chris Dibben, Wiseman Magasela, Stefan Noble, Phakama Ntshongwana, Gemma Wright and David Avenell (GIS consultant).

The Human Sciences Research Council

The HSRC of South Africa is a statutory research institution that supports development nationally, in the Southern African Development Community (SADC) and in Africa. The research portfolio of the HSRC focuses primarily on the conducting of large-scale, policy-relevant, social-scientific projects for public-sector users, non-governmental organisations and international development agencies. This research is shaped and managed in terms of flexible, interdisciplinary and problem-oriented research programmes that are aligned to national development challenges. It also maintains, updates, maps and disseminates vital national and topical databases.

The organisation was recently restructured to ensure that its research activities and programmes are more closely aligned to South Africa's national development priorities: notably poverty reduction through economic development, skills enhancement, job creation, the elimination of discrimination and inequalities, and effective service delivery. As such, poverty reduction is, directly or indirectly, addressed by much of the research and networking undertaken by the HSRC's six research programmes. Particular examples include: assessing social security provision for the Department of Social Development;

evaluating the impact of government programmes using administrative datasets for the Office of the President's Ten Year Review (2003); examining the social wage concept for the Department of Water Affairs and Forestry; the Science and Technology for Poverty Reduction project for the Department of Science and Technology; developing a food security and vulnerability information and mapping system for the Department of Agriculture; and evaluating the poverty relief programme for the Public Service Commission. The HSRC also seeks to contribute to the research and development strategy of its parent Department of Science and Technology, especially in its mission to 'improve poverty reduction impact through focused innovation and social learning, based on research and monitoring'.

Recognising this mandate and research focus, the HSRC therefore has an express interest in engaging in the development of an index of multiple deprivation for the country. Moreover, there is a strong commitment in relation to building up national capacity to conduct such research on an ongoing basis and facilitating the strengthening and coordination of administrative data systems to be able to inform such processes.
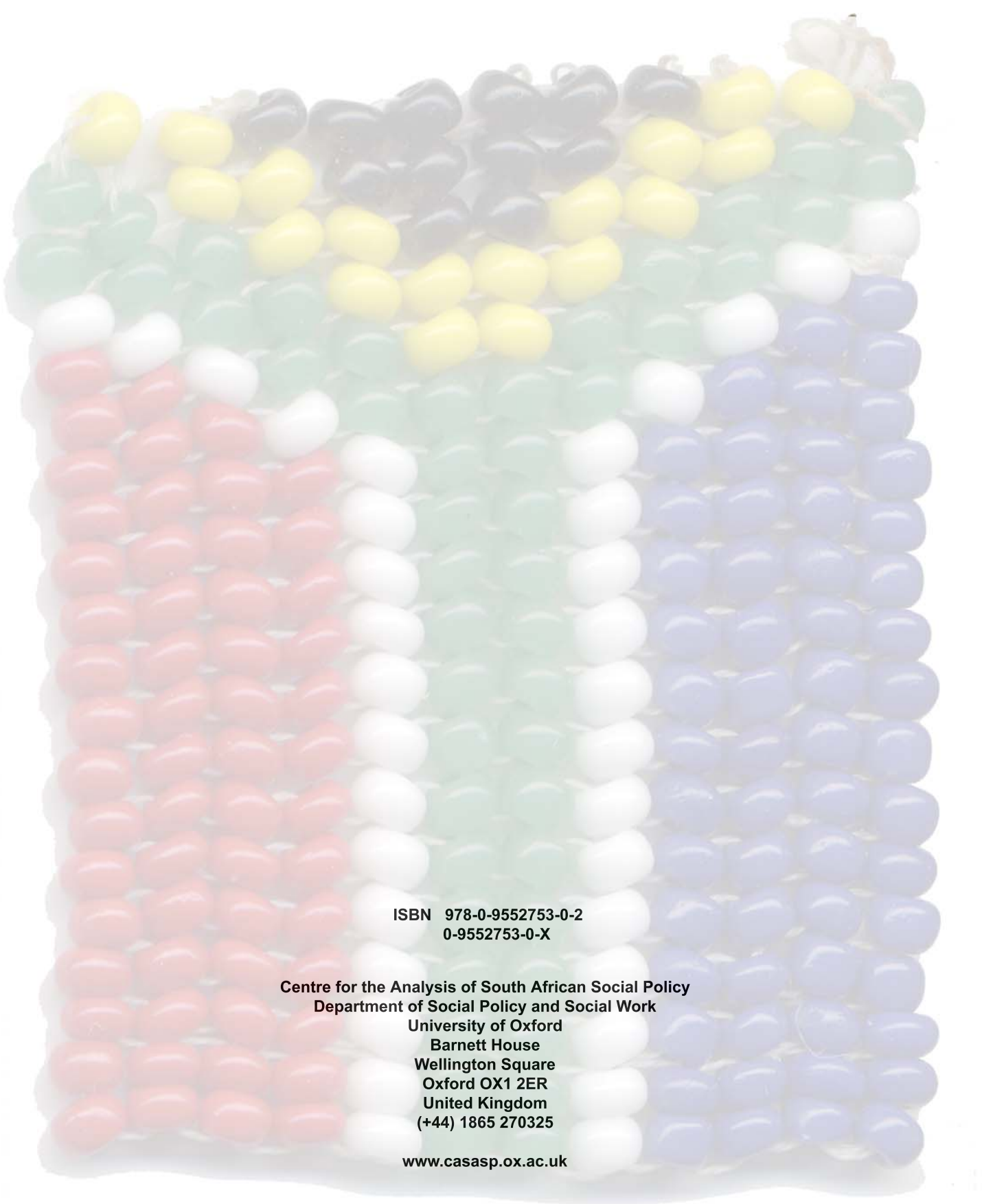
The members of the research team from the HSRC are: Benjamin Roberts and Sharmla Rama.

Statistics South Africa

As the national statistics agency in South Africa, Stats SA is mandated to collect data and produce official statistics. Stats SA's mission is to provide a relevant and accurate body of statistics to inform users on the dynamics in the economy and society through the application of internationally acclaimed practices. A full account of the organisation can be found at www.statssa.gov.za.

The Demography and Social Analysis Division generates information products on poverty and social trends at national and sub-national level. Since 2000, Stats SA has been working with various partners (e.g. the World Bank) to provide small area statistics on poverty. The development of a PIMD represents further progress in expanding the information base for development planning and evaluation. Members of the Demography and Social Analysis Division are partners in the Indices of Multiple Deprivation project.

The members of the research team from Stats SA are: Miriam Babita, Heston Phillips and Sibongile Zungu.