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

[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.

[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

[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.

[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].

[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]

[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.