

The South African Index of Multiple Deprivation for Children 2001 at Datazone Level

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and Andrew Dawes

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for Children 2001 at Datazone Level**

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1 Introduction

This report presents the South African Index of Multiple Deprivation for Children 2001 (SAIMDC 2001) at datazone level. The SAIMDC is a composite index reflecting five dimensions of deprivation experienced by children aged 0-17 inclusive: income and material deprivation, employment deprivation, education deprivation, biological parent deprivation and living environment deprivation.

The SAIMDC and the component domains of deprivation are presented at datazone level. As will be elaborated below, datazones are small areas containing approximately the same number of people (average 2 000). The datazone level SAIMDC therefore provides a fine-grained profile of deprivation affecting children across South Africa and enables pockets of deprivation to be identified.

1.1 Background

This project builds on a recent study about child deprivation in South Africa that was undertaken by a team from the University of Oxford's Centre for the Analysis of South African Social Policy (CASASP) in collaboration with the Human Sciences Research Council (HSRC) and was funded by Save the Children Sweden. A South African Index of Multiple Deprivation for Children 2001 (SAIMDC 2001) was produced at municipality level for the whole of South Africa using data from the publicly available ten percent sample of the 2001 Census (Barnes *et al.*, 2007; Barnes *et al.*, 2009).

Whilst the municipality level SAIMDC 2001 provides a sub-provincial profile of deprivation experienced by children, the results are nevertheless still at a fairly aggregate level and do not reveal the sub-municipality variations in levels of child deprivation across the country.

Prior to the construction of the municipality level SAIMDC 2001, a team comprising members of CASASP, HSRC and Statistics South Africa (StatsSA) developed a sub-municipality level measure of multiple deprivation called the Provincial Indices of Multiple Deprivation (PIMD) (Noble *et al.*, 2006, 2009 forthcoming). The PIMD refers to deprivation experienced by the total population (of all ages) and has been used in various ways to target deprivation across the country (Noble *et al.*, 2009 forthcoming). The PIMD was also built from the 2001 Census but, as it was constructed from the 100% Census, it was possible to produce it at electoral ward level for each of the nine provinces. However, due to the variation in size of wards across the country this geography was less than ideal and indeed was the reason why an index of multiple deprivation was separately created for each province rather than an overall index of multiple deprivation for the whole country. As was stated in Chapter 6 of the original PIMD report:

“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.” (Noble *et al.*, 2006a, p 53)

The recommendation in the original PIMD report to deal with this problem was:

“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. 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.” (Noble *et al.*, 2006a, p 54)

The National Department of Social Development (DSD), recognising the importance of creating a national index at the new geography, supported a project to develop a new statistical geography (datazones) in order to enable a South African Index of Multiple Deprivation 2001 (SAIMD 2001) at datazone level to be created (see Noble *et al.*, 2009) and the South African Index of Multiple Deprivation for Children 2001 (SAIMDC 2001) at datazone level which is presented in this report. This project was funded by DSD as part of Department for International Development Southern Africa’s SACED¹ programme.

The datazones nest within municipality boundaries and have a mean population of around 2 000 with most datazones having populations between 1 000 and 3 000. Once the datazones had been created, StatsSA agreed that the code that had been used to produce the SAIMDC at municipality level could be run on the 100% Census. This enabled the project team to produce the SAIMDC indicators at datazone level and thus the overall SAIMDC 2001 at datazone level could be constructed.

¹ Strengthening Analytical Capacity for Evidence-based Decision-making.

It is important to stress that the rationale and model of deprivation derive from the PIMD and the municipality level SAIMDC. The domains and their component indicators and the techniques used are, by design, identical to those used in the municipality level SAIMDC. As this is the case some sections of this report are drawn from the original PIMD and SAIMDC reports².

1.2 Child deprivation

The original SAIMDC report contains introductory sections about child poverty and child rights, the conceptual framework of the SAIMDC and a review of previous research measuring child poverty in South Africa, and presents a child-focused multidimensional child poverty model (Barnes *et al.*, 2007: 1-9). These sections are not repeated here.

The model of child deprivation that was used is of a series of uni-dimensional domains of deprivation which may be combined, with appropriate weighting, into a single measure of multiple deprivation. Operating within the constraints of the data available in the 2001 Census, the SAIMDC is an attempt to operationalise the model of child poverty developed by Noble *et al.* (2006).

The Government of South Africa remains committed to reducing the levels of child poverty and deprivation. The SAIMDC 2001 at datazone level is intended to be a useful tool with which to identify areas with the highest levels of child poverty and deprivation, so that policy makers can prioritise these areas when providing support for children.

1.3 Structure of the report

Section 2 presents the domains and indicators for the SAIMDC. **Section 3** describes the new datazone geography used in the SAIMDC. **Section 4** explains the methodological approach used. **Section 5** presents an overview of the SAIMDC at datazone level.

² This allows this document to be read as a stand alone report without constant reference back to the original PIMD or SAIMDC reports. Original copyright is duly acknowledged and material drawn from the original PIMD report is enclosed in double quotation marks and material drawn from the original municipality level SAIMDC report (Barnes *et al.*, 2007) is referenced in the usual way.

2 Domains and Indicators

The datazone level South African Index of Multiple Deprivation (SAIMDC) was constructed using the model of multiple deprivation briefly described in Section 1.3 above. The SAIMDC comprises indicators which were first combined to form domains of deprivation. The domains and constituent indicators were identical to those used for the SAIMDC at Municipality level (Barnes *et al.*, 2007). As with the SAIMDC a score for each of the domains was produced – referred to as a domain index - and these domain indices were ranked to give a relative picture of each dimension of deprivation across the whole of South Africa. The domain indices were then combined to form the overall SAIMDC.

The following section is a reproduction of the greater part of Chapter 2 of the report about the municipality level SAIMDC 2001 (Barnes *et al.*, 2007 pp 10-12) as it succinctly describes both the domains and indicators³.

2.1 The domains

As seen [...], the conceptual model is based on the idea of distinct domains of deprivation which can be recognised and measured separately. These are experienced by children living in an area (e.g. a municipality). Children 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 index of multiple deprivation is conceptualised as a weighted area level aggregation of these specific domains of deprivation.

For this report, five domains of deprivation were produced using the Census to form an index of multiple deprivation:

- *Income and Material Deprivation*
- *Employment Deprivation*
- *Education Deprivation*
- *Biological Parent Deprivation*
- *Living Environment Deprivation.*

The indicators in the Income and Material Deprivation and Living Environment Deprivation domains are the same as those used in the PIMD, except that they only take into account children aged 0-17 years. The indicators used in the Employment Deprivation and Education Deprivation domains are different from

³ References within the original chapter to other chapters in that report have been altered accordingly. Omitted sections are referenced in the usual way [...] and the 'Adequate Care Deprivation Domain' has been re-named 'Biological Parent Deprivation' to more accurately reflect what is being measured in that domain.

those used for the PIMD (see Barnes et al., 2007 Appendix 1 for details), while Biological Parent Deprivation is a new domain with specific relevance for children.

Each domain is presented as a separate domain index reflecting a particular aspect of deprivation. Thus 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, and enables clear decisions to be made about the contribution that each domain should make to the overall index.

While the domains represent distinct dimensions of deprivation, it is perfectly possible, indeed likely, that the same child could be captured in more than one domain. So, for example, if a child was in a low income household, not in school and in a household with no piped water, they would be captured in the Income and Material Deprivation, Education Deprivation and Living Environment Deprivation domains. This is entirely appropriate because one individual can experience more than one type of deprivation at any given time.

2.2 The indicators

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. 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 children or areas);
- They should be statistically robust.

[...] A total of 14 indicators were used in the SAIMDC and full details about these indicators are given in Barnes et al., 2007 Appendix 1.

All of the indicators [...] relate to 10 October 2001 (Census night). Unless stated otherwise, the indicators listed below take into account children aged 0-17 years inclusive. [...]

2.2.1 Income and Material Deprivation Domain

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

- **Number of children living in a household that has a household income (need-adjusted using the modified Organisation for Economic Co-operation and Development - OECD - equivalence scale) that is below 40% of the mean equivalent household income (approximately R850 per month in 2001 Rands); or**
- **Number of children living in a household without a refrigerator; or**
- **Number of children living in a household with neither a television nor a radio.**

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

2.2.2 Employment Deprivation Domain

This purpose of this domain is to measure the proportion of children living in workless households in an area.

- **Number of children living in households where no adults aged 18 or over are in employment.**

A simple proportion of children living in households experiencing this type of deprivation was calculated (i.e. the number of children living in a household with no employed adults divided by the total child population).⁴

2.2.3 Education Deprivation Domain

The purpose of this domain is to capture the extent of children's educational deprivation in an area.

- **Number of children (9-15 years inclusive) who are in the wrong grade for their age⁵; or**

⁴ Children over the age of 15 are legally allowed to be in certain forms of income generating employment. This means that there might be a very small overestimation of workless households (if any children in the household aged 16 or 17 are in paid employment). However, as a child is defined as aged 0-17 inclusive, the domain does capture children in households where there are no working adults.

- **Number of children (7-15 years inclusive) who are not in school.**

This domain was not created as a simple rate but the details are provided in Barnes et al., 2007 Appendix 1.

2.2.4 Living Environment Deprivation Domain

The purpose of this domain is to identify children living in poor quality environments.

- **Number of children living in a household without piped water inside their dwelling or yard or within 200 metres; or**
- **Number of children living in a household without a pit latrine with ventilation or flush toilet; or**
- **Number of children living in a household without use of electricity for lighting; or**
- **Number of children living in a household without access to a telephone; or**
- **Number of children living in a household that is a shack; or**
- **Number of children living in a household that is crowded.**

A simple proportion of children living in households experiencing one or more of the deprivations was calculated (i.e. the number of children 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 crowded divided by the total child population).

2.2.5 Biological Parent Deprivation Domain

The purpose of this domain is to capture children in an area who do not live with their biological parents, either because they are no longer alive or because they live elsewhere.

- **Number of children whose mother and father are no longer alive or not living in the household; or**
- **Number of children living in a child-headed household.**

A simple proportion of children experiencing either of the deprivations was calculated (i.e. the number of children whose mother and father are not present in the household or the number of children living in a child-headed household divided by the total population).

Barnes et al., 2007 pp 10-12

⁵ This indicator captures children who are below the appropriate grade for their age, not those who are ahead of their appropriate grade.

3 The Datazones

As referred to above the SAIMDC 2001 was made possible by the creation of a new statistical geography – the datazones. This section briefly describes the process of creating these datazones.

Datazones use Census Enumeration Areas (EAs) as the building blocks to create a standard geography. In simple terms a datazone comprises one or more contiguous EAs which share common characteristics. The creation of datazones involved complex geographical programming. The process of creating datazones from EAs involved several steps which were specified in terms of a series of rules. The process ensures that the datazones created are as appropriate a statistical geography as possible, and the datazones created share key common characteristics:

Geographical nesting: Datazones are based on the existing EA geography and nest within 2001 municipality boundaries.

Population size: Datazones were designed to have a common resident population size (within a fixed range). This allows comparability across the whole country.

Population density: EAs must be sufficiently similar to one another in terms of population density to be allowed to merge and form part of the same datazone. This ensures that urban areas, particularly those at the edge of towns, do not 'blur' into adjacent areas which are more rural and which have much lower population densities. Doing so helps to maximise the internal consistency of the datazones in terms of the population density.

Internal homogeneity: Datazones must be internally homogenous in terms of area type. This ensures that datazones are a 'meaningful' geography in the sense of capturing areas which are relatively similar to each other and that the datazones, therefore, represent 'an area' in a socio-economic as well as a statistical sense. The process of guaranteeing internal homogeneity of area type was achieved through cluster analyses which assigned EAs to cluster types. In the process of creating datazones, province-tailored rules were established which specified the types of areas which are sufficiently similar to merge with each other.

The resultant datazones were then checked in three ways:

1. Overlaying the datazones onto Google Earth Professional and examining the fit on the ground.
2. Checking with people who had detailed knowledge of the areas.
3. Occasionally, on site inspections.

A number of issues and problems emerged from this checking process and additional rules were therefore introduced and the whole process repeated. Examples of rules introduced included the need to control the overall shape of the resultant datazone (to promote circularity) and to deal with a number of special problems posed particularly by the EA geography in former homeland areas.

In order to improve the datazones a final process of optimisation was undertaken. EAs were iteratively swapped in order to test whether doing so improves the composition of each datazone in terms of the population density of its component EAs.

Some problems remain insoluble because of the underlying 'building block' geography, (i.e. problems with the EA geography). This results in some datazones remaining as irregular shapes, as 'islands' in 'seas', or with populations that are either too small or too large.

Datazones with small populations (often remote rural areas such as mountain tops) or forming part of District Management Areas were deleted. This left a base set of 22 251 datazones.

In addition, datazones where the non institutional population is less than 300 were dropped leaving 22 077 datazones for which domain indices were created.

The provincial breakdown is as follows:

Table 1: Number of datazones in each province for the SAIMDC 2001

Province	Number of datazones
Western Cape	2 172
Eastern Cape	3 172
Northern Cape	414
Free State	1 371
KwaZulu-Natal	4 650
North West	1 819
Gauteng	4 257
Mpumalanga	1 519
Limpopo	2 703
Total	22 077

On average, each datazone contains 773 children aged 0-17, and no datazone contains less than a hundred children.

4 Methodology

4.1 Use of the 2001 Census

The SAIMDC (like the PIMD) is based on the 2001 Census. Using the publicly available 10% sample of the 2001 Census, the team developed code in the statistical analysis package SAS to provide to StatsSA so that they could run the code on the 100% Census and aggregate the results to datazone level to create the SAIMDC data. CASASP was then able to process the data to produce the domain scores and overall SAIMDC.

4.2 Creating domain indices

4.2.1 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 [datazones] are the small area geography, the [datazone] level scores would be moved towards the average score for the municipality in which the [datazone] 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 [datazones] do move this may be in the direction of more deprivation if the ‘unreliable’ score shows less deprivation than the municipality mean”⁶. For the datazone level SAIMDC shrinkage was applied to all domains.

4.2.2 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). All the domains were created as simple rates. This avoided the key issue of weighting indicators which is necessary when combining indicators into a single measure.

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.”

⁶ For further information see Noble *et al.* (2006b) pp 17-21.

Five domain indices were created which were then combined into the overall SAIMDC 2001 at datazone level.

4.3 Combining domain indices into an index of multiple deprivation

4.3.1 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 [SAIMDC]. 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 [datazone's] population. Third, it effectively spreads out the part of the distribution in which there is most interest; that is the most deprived [datazones] in each domain.

Each transformed domain has a range of 0 to 100, with a score of 100 for the most deprived [datazone]. The exponential transformation that was selected for standardising the domains in the [datazone] level [SAIMDC] stretches out the most deprived 25% of [datazones] in [the country]. The chosen exponential distribution is one of an infinite number of possible distributions.”⁷

4.3.2 Weighting

For the SAIMDC, equal weights were assigned to the exponentially transformed domains in the absence of evidence suggesting differential weights should be used⁸.

⁷ See Noble *et al.* (2006b) for further information.

⁸ See Barnes *et al.* (2007) for a discussion about why equal weights were chosen.

5 The Geography of Deprivation

5.1 How to interpret the datazone level results

There are six datazone level measures: five domain measures (which were combined to make the overall SAIMDC) and one overall SAIMDC. These six measures are each assigned a rank. The most deprived datazone for each measure is given a rank of 1. The ranks show how a datazone compares to all the other datazones in South Africa.

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.

The SAIMDC describes a datazone by combining information from all five domains: Income and Material Deprivation, Employment Deprivation, Biological Parent Deprivation, Education Deprivation and Living Environment Deprivation. The SAIMDC score is the weighted sum of the exponentially transformed domain rank of the domain scores. The bigger the SAIMDC score, the more deprived the datazone. However, because of the transformations applied, it is not possible to say, for example, that a datazone with a score of 44 is twice as deprived as a datazone with a score of 22. In order to make comparisons between datazones ranks should be used. The SAIMDC is ranked in the same way as the domain measures, i.e. a rank of 1 is assigned to the most deprived datazone in South Africa.

5.2 SAIMDC 2001 results at datazone level

Table 2 lists the 50 most deprived datazones in South Africa using the SAIMDC 2001. These are the areas with the highest levels of child deprivation, as defined by the SAIMDC. Of these 47 are in the Eastern Cape while the remaining 3, including the most deprived datazone in the country, are in KwaZulu-Natal. They are all located in former homeland areas.

Table 2: SAIMDC 2001 - the fifty most deprived datazones in South Africa

Rank	Datazone code	Municipality name	Province	Rank	Datazone code	Municipality name	Province
1	540_41	uMlalazi	KwaZulu-Natal	26	230_259	Mbizana	Eastern Cape
2	211_49	Mnquma	Eastern Cape	27	230_205	Mbizana	Eastern Cape
3	223_134	Emalahleni	Eastern Cape	28	222_532	Intsika Yethu	Eastern Cape
4	233_343	Port St Johns	Eastern Cape	29	222_19	Intsika Yethu	Eastern Cape
5	234_555	Nyandeni	Eastern Cape	30	223_60	Emalahleni	Eastern Cape
6	233_273	Port St Johns	Eastern Cape	31	236_1030	King Sabata Dalindyebo	Eastern Cape
7	226_79	Elundini	Eastern Cape	32	236_10	King Sabata Dalindyebo	Eastern Cape
8	232_416	Qaukeni	Eastern Cape	33	224_524	Engcobo	Eastern Cape
9	211_1002	Mnquma	Eastern Cape	34	234_160	Nyandeni	Eastern Cape
10	233_220	Port St Johns	Eastern Cape	35	236_81	King Sabata Dalindyebo	Eastern Cape
11	233_362	Port St Johns	Eastern Cape	36	232_235	Qaukeni	Eastern Cape
12	230_134	Mbizana	Eastern Cape	37	230_50	Mbizana	Eastern Cape
13	211_989	Mnquma	Eastern Cape	38	235_18	Mhlontlo	Eastern Cape
14	236_463	King Sabata Dalindyebo	Eastern Cape	39	224_595	Engcobo	Eastern Cape
15	211_887	Mnquma	Eastern Cape	40	232_585	Qaukeni	Eastern Cape
16	542_179	Nkandla	KwaZulu-Natal	41	230_397	Mbizana	Eastern Cape
17	233_347	Port St Johns	Eastern Cape	42	232_171	Qaukeni	Eastern Cape
18	235_859	Mhlontlo	Eastern Cape	43	222_324	Intsika Yethu	Eastern Cape
19	211_988	Mnquma	Eastern Cape	44	223_98	Emalahleni	Eastern Cape
20	235_96	Mhlontlo	Eastern Cape	45	522_89	Msinga	KwaZulu-Natal
21	210_1031	Mbhashe	Eastern Cape	46	224_631	Engcobo	Eastern Cape
22	211_914	Mnquma	Eastern Cape	47	224_364	Engcobo	Eastern Cape
23	210_1060	Mbhashe	Eastern Cape	48	236_596	King Sabata Dalindyebo	Eastern Cape
24	234_631	Nyandeni	Eastern Cape	49	234_709	Nyandeni	Eastern Cape
25	230_340	Mbizana	Eastern Cape	50	233_277	Port St Johns	Eastern Cape

If we take the 10% most deprived datazones in South Africa we find that they are shared between the nine provinces as follows (see Table 3). The overwhelming majority are in the Eastern Cape (57.2%) followed by KwaZulu-Natal (31.9%).

Table 3: SAIMDC 2001 – the provincial share of the most deprived national decile of datazones

Province	Share of most deprived 10% of datazones
Western Cape	0.0
Eastern Cape	57.2
Northern Cape	0.1
Free State	0.3
KwaZulu-Natal	31.9
North West	4.9
Gauteng	0.0
Mpumalanga	0.9
Limpopo	4.8

Another way of looking at the picture is to see what proportion of a province's datazones are in the most deprived 10% or 20% of datazones nationally. Table 4 shows the numbers of datazone per province, the number of these in the most deprived 10% nationally and the number in the most deprived 20% nationally. The final two columns show the percentage of the province's datazones which are in the most deprived 10% and the most deprived 20% nationally.

Table 4: The proportions of each province's datazones in the most deprived decile and the most deprived quintile of the SAIMDC 2001

Province	N datazones	N in 10% most deprived	N in 20% most deprived	% in 10% most deprived	% in 20% most deprived
Western Cape	2172	0	12	0.0	0.6
Eastern Cape	3172	1262	1741	39.8	54.9
Northern Cape	414	2	10	0.5	2.4
Free State	1371	7	95	0.5	6.9
KwaZulu-Natal	4650	703	1402	15.1	30.2
North West	1819	108	306	5.9	16.8
Gauteng	4257	0	31	0.0	0.7
Mpumalanga	1519	19	165	1.3	10.9
Limpopo	2703	106	653	3.9	24.2

Nearly 40% of the datazones in the Eastern Cape are in the most deprived 10% (decile) of deprivation nationally whilst just over 15% of KwaZulu-Natal's

datazones are similarly deprived. There are no datazones in the Western Cape or Gauteng in the most deprived decile and only 2 datazones in the Northern Cape and 7 in the Free State.

If we focus on the most deprived 20% we see that over half (54.9%) of the Eastern Cape's datazones are in the most deprived quintile whilst for KwaZulu-Natal the figure is just over 30%. These are followed by Limpopo (24.2%), North West (16.8%) and Mpumalanga (10.9%).

The geography of child deprivation across South Africa is now presented for the SAIMDC 2001. Because of the relatively small size of datazones, the results are presented in nine maps, one for each province. These maps (**Maps 1, 2, 3, 4, 5, 6, 7, 8 and 9**), are located at the end of this report. The datazones have been divided into *national* (i.e. South Africa wide) deciles of deprivation - ten equal groups. On the map, the thin dark grey lines depict the datazone boundaries, the thicker black lines are the municipality boundaries, and the thickest black lines are the province boundaries. The most deprived 10% of datazones *nationally* are shaded in dark blue and the least deprived 10% of datazones are shaded in bright yellow (areas left white are datazones that were excluded for the reasons given in Section 3).

If we consider the most deprived datazones (the blue areas) – as with the SAIMD 2001, these map onto the former homeland areas. In the Eastern Cape (**Map 2**) both the former Transkei and Ciskei are prominent. In KwaZulu-Natal (**Map 5**) deprivation is predominant in the areas forming part of the former KwaZulu homeland. In North West province (**Map 6**) deprivation is most prominent in the former Bhoputhaswana homeland. This concentration of poverty in the former homelands is also evident in Limpopo (**Map 9**), Mpumalanga (**Map 8**) and the Free State (**Map 4**). On the other hand relatively little of the most severe deprivation is present in Gauteng (**Map 7**) or the Western Cape (**Map 1**).

However, the strength of the datazone geography is that pockets of deprivation can be picked up in otherwise affluent areas. So for example, within the City of Cape Town (**Map 1**), pockets of deprivation are apparent in Langa, Nyanga Crossroads, Imizamo Yethu, Masiphumelele and Khayelitsha.

5.3 Comparison between the SAIMDC 2001 at municipality level and datazone level

As outlined above, the SAIMDC 2001 has already been produced at municipality level, using the 10% sample of the 2001 Census (Barnes *et al.*, 2007; Barnes *et al.*, 2009). How does the municipality level SAIMDC compare to the one that is presented here at datazone level?

Both versions of the SAIMDC relate to the same time point and both are derived from the 2001 Census. The fact that the municipality level version was constructed using the 10% sample of the Census should not impact greatly on the results as the 10% sample was weighted to represent the population as a whole. Indeed, when the datazone level SAIMDC's domain scores were aggregated up to municipality level and correlated with the municipality level SAIMDC's domain scores, the correlations between the domains were very high.⁹

As would also be expected, the percentage of children – at a national level – experiencing deprivation in each of the domains included in the SAIMDC is almost identical for the municipality level and datazone level versions of the SAIMDC:

Income Deprivation Domain: 81% (SAIMDC municipality level) *c.f.* 82% (SAIMDC datazone level)

Employment Deprivation Domain: 50% (both)

Education Deprivation Domain - Wrong grade: 24% (both)

Education Deprivation Domain - Not in school: 6% (both)

Living Environment Deprivation Domain: 77% (both)

Biological Parent Deprivation Domain: 25% (both)

The overall geographical profile of deprivation is also the same, with the highest levels of child deprivation occurring within the former homeland areas. However, unlike the municipality-level SAIMDC, an important contribution of the datazone level SAIMDC is its ability to reveal pockets of deprivation within more urban areas. This is particularly notable in the township areas around Johannesburg and Cape Town whose deprivation had been 'diluted' by the more affluent areas at municipality (metro) level.

An even more nuanced picture of deprivation *within* each province could be obtained by ranking the SAIMDC at datazone level for each province separately. This would enable greater discriminatory power within a province, but has not been done here as the primary intention was to provide a profile of child poverty and deprivation across the country as a whole.

5.4 Comparison between the SAIMDC 2001 at datazone level and the SAIMDC 2001 at datazone level

This section briefly compares the SAIMDC 2001 findings in this report with those of the SAIMDC 2001 at datazone level (Noble *et al.*, 2009).

⁹ The Income and Material Deprivation Domains, the Employment Domains and the Living Environment Domains each correlated 0.99; the Adequate Care Domains correlated 0.95 and the Education Domains correlated 0.91.

Both the SAIMD and SAIMDC were produced at datazone level using the 100% version of the 2001 Census. The SAIMDC, however, refers only to children aged 0-17 inclusive, whereas the SAIMD refers to the total population (of all ages).

Is the geographical profile of child deprivation the same as for the population as a whole? It would seem not. For the SAIMD, 47% of the country's most deprived 10% of datazones are located in the Eastern Cape; whereas for the SAIMDC, an even higher 57% of the country's most deprived 10% of datazones are located in this province. Similarly, whereas 33% of datazones in the Eastern Cape are in the most deprived 10% nationally on the SAIMD, a higher 40% of datazones in the province are in the most deprived 10% nationally on the SAIMDC. Child deprivation is therefore disproportionately located in the Eastern Cape province, compared with deprivation for the population as a whole. Further work is necessary to explore what factors are driving this discrepancy.

6 Concluding Remarks

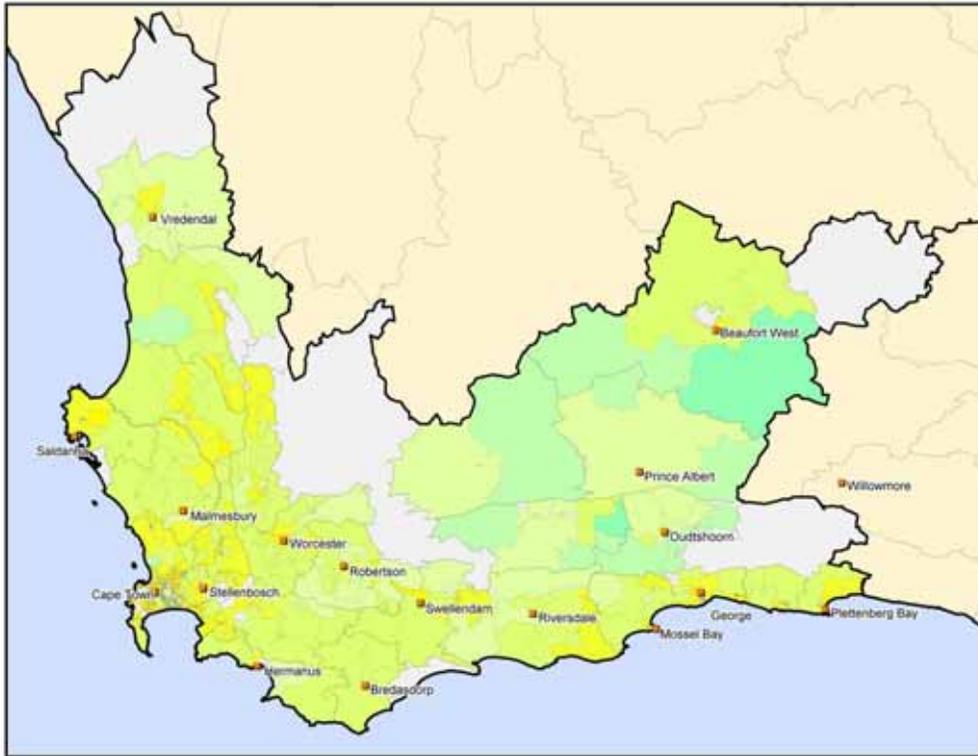
The SAIMDC 2001 at datazone level provides information about the geographical distribution of child poverty and deprivation across South Africa at a very small geographical level. The ability to map child deprivation below municipality level is a significant advance. In the previous version of the Index, deprivation for children was aggregated for each municipality. The datazone approach permits scrutiny of areas within municipalities, particularly the large metros such as the City of Cape Town or City of Johannesburg (as is evident from the maps provided in this report). The datazones provide a powerful tool for evidence-based policy-making. By providing descriptions of areas of deprivation both at Index level and also for each domain of deprivation, it is possible to enquire further into possible reasons for the types and levels of deprivation experienced by children in particular areas and then take steps to address the problems that are uncovered. It is also possible to take further steps to plot services (e.g. clinics; educational institutions; early childhood sites; municipal services) onto datazones in order to investigate the relationship between the levels of deprivation experienced by children and services available in the area.

The SAIMDC 2001 data is available in an EXCEL spreadsheet at datazone level for each domain and the overall SAIMDC.

Methodologically, it will be relevant to undertake further investigations on the impact of weighting on the final SAIMDC score as a result of (1) the severity of deprivation selected for each indicator threshold; (2) the type of exponential distribution assigned to the domain; and (3) the domain weights themselves.

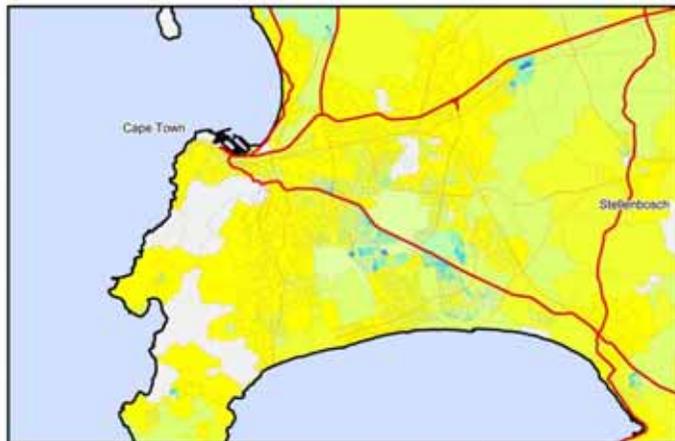
It will be important to monitor change in child poverty and deprivation over time. This can be undertaken both in terms of relative change (i.e. whether the relative profile of deprivation has altered, with some datazones ceasing to be within the 10% most deprived decile of datazones in the country, for example) and absolute change (i.e. whether the percentage of children experiencing each type of deprivation within a datazone has risen or fallen over time). This should be possible once the forthcoming 2011 Census has been undertaken.

**South African Index of Multiple Deprivation for Children 2001 at Datazone Level
Map 1 - Western Cape**



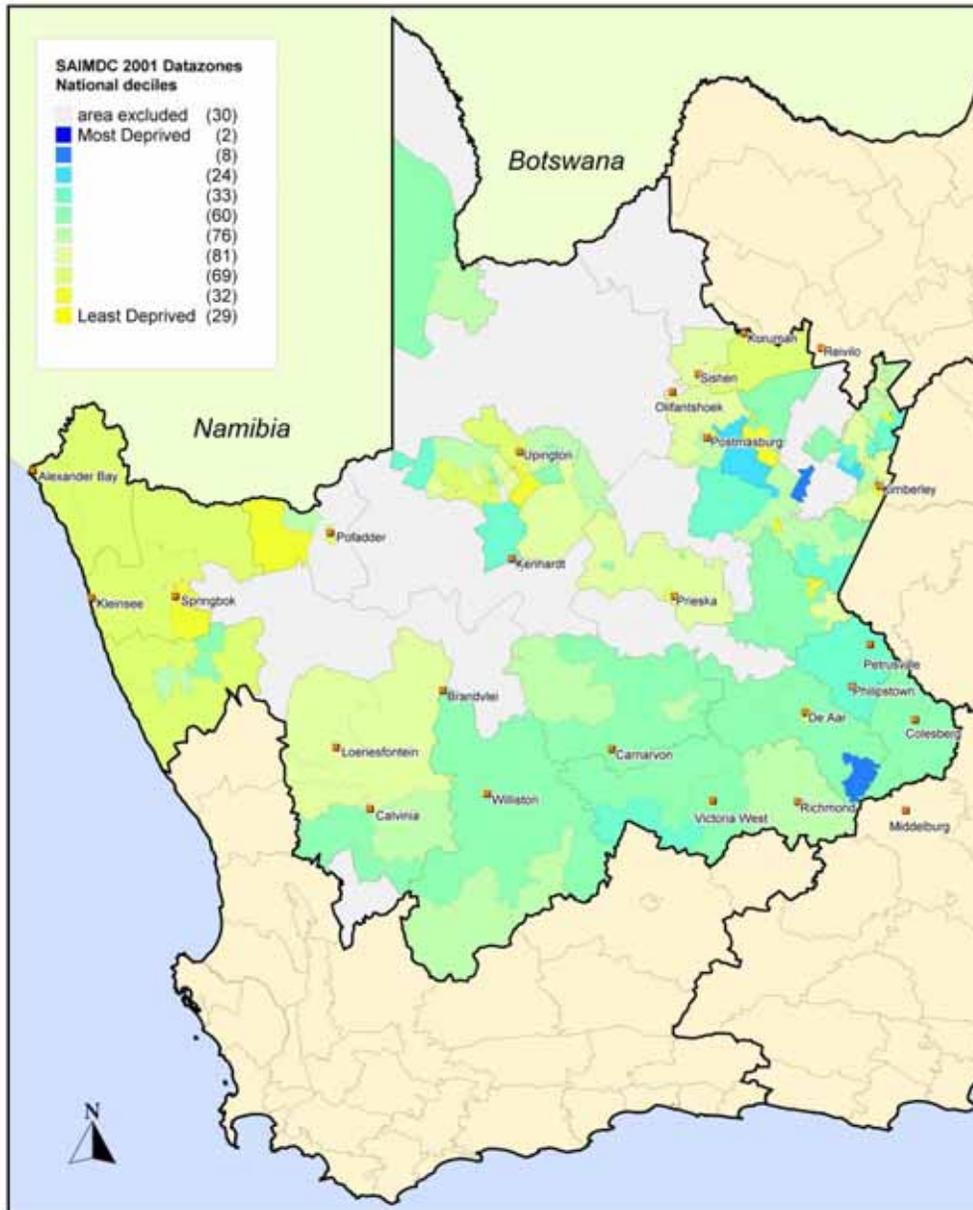
**SAIMDC 2001 Datazones
National deciles**

area excluded	(72)
Most Deprived	(0)
	(12)
	(43)
	(64)
	(89)
	(133)
	(221)
	(474)
	(614)
Least Deprived	(522)



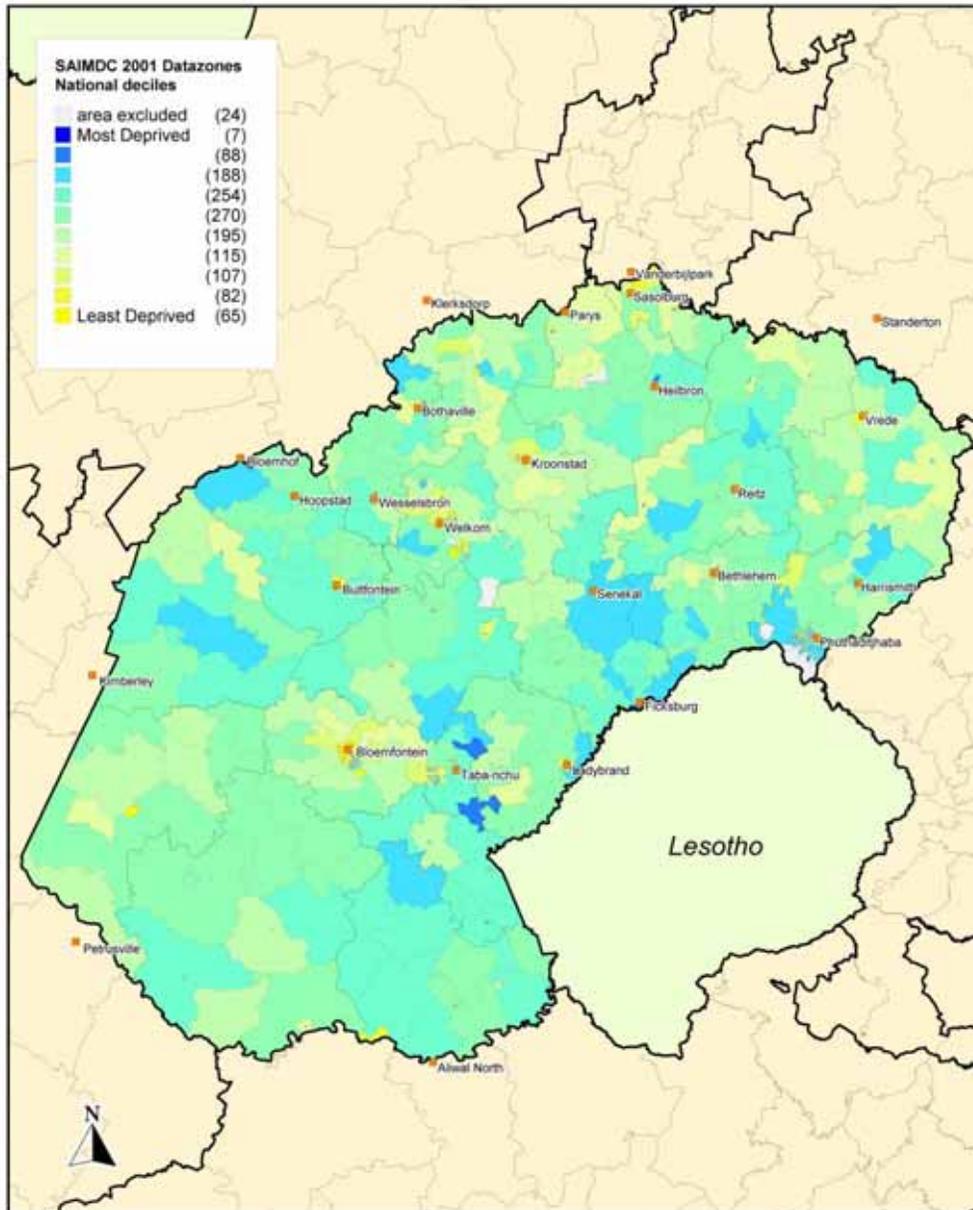
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**South African Index of Multiple Deprivation for Children 2001 at Datazone Level
Map 3 - Northern Cape**



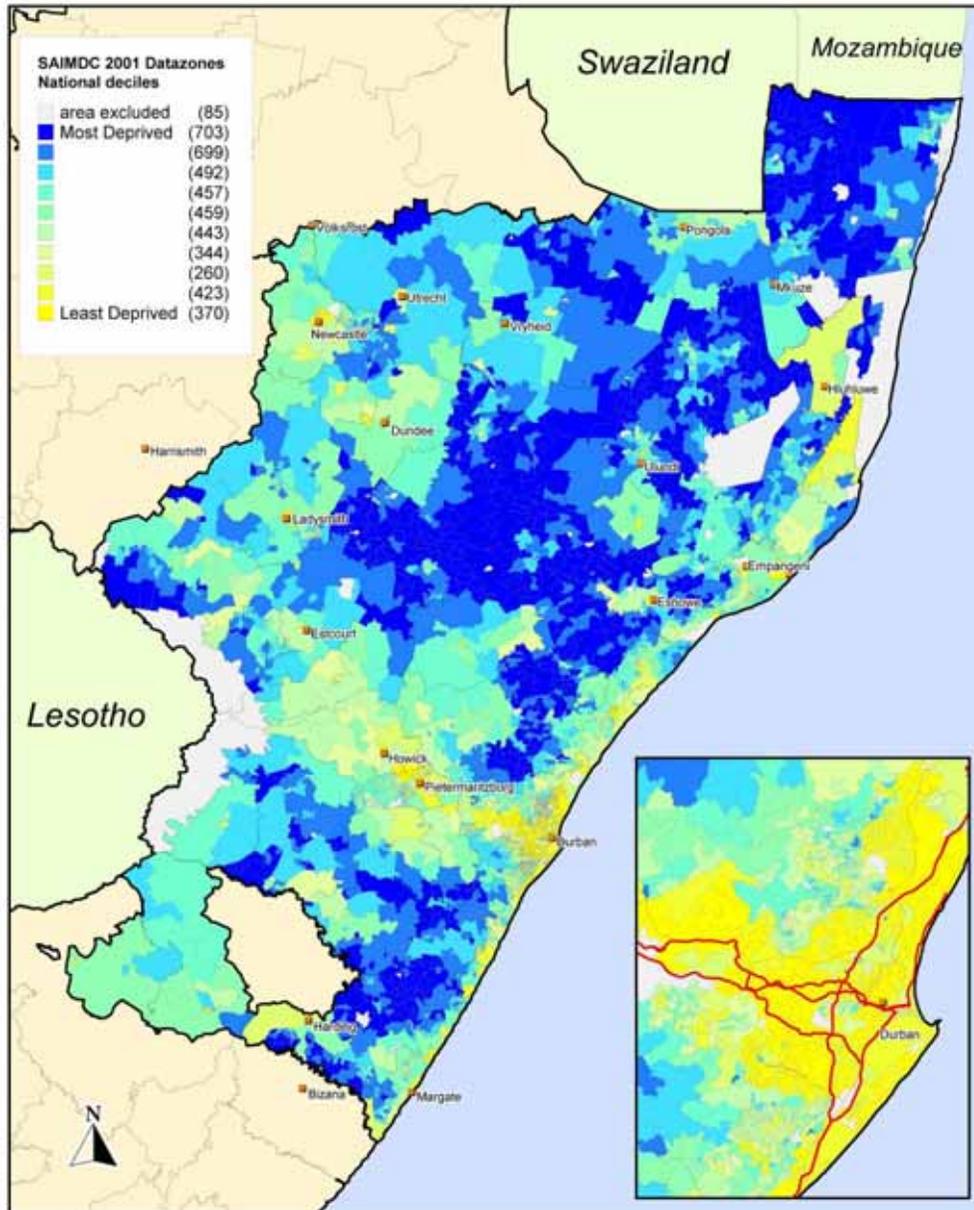
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**South African Index of Multiple Deprivation for Children 2001 at Datazone Level
Map 4 - Free State**



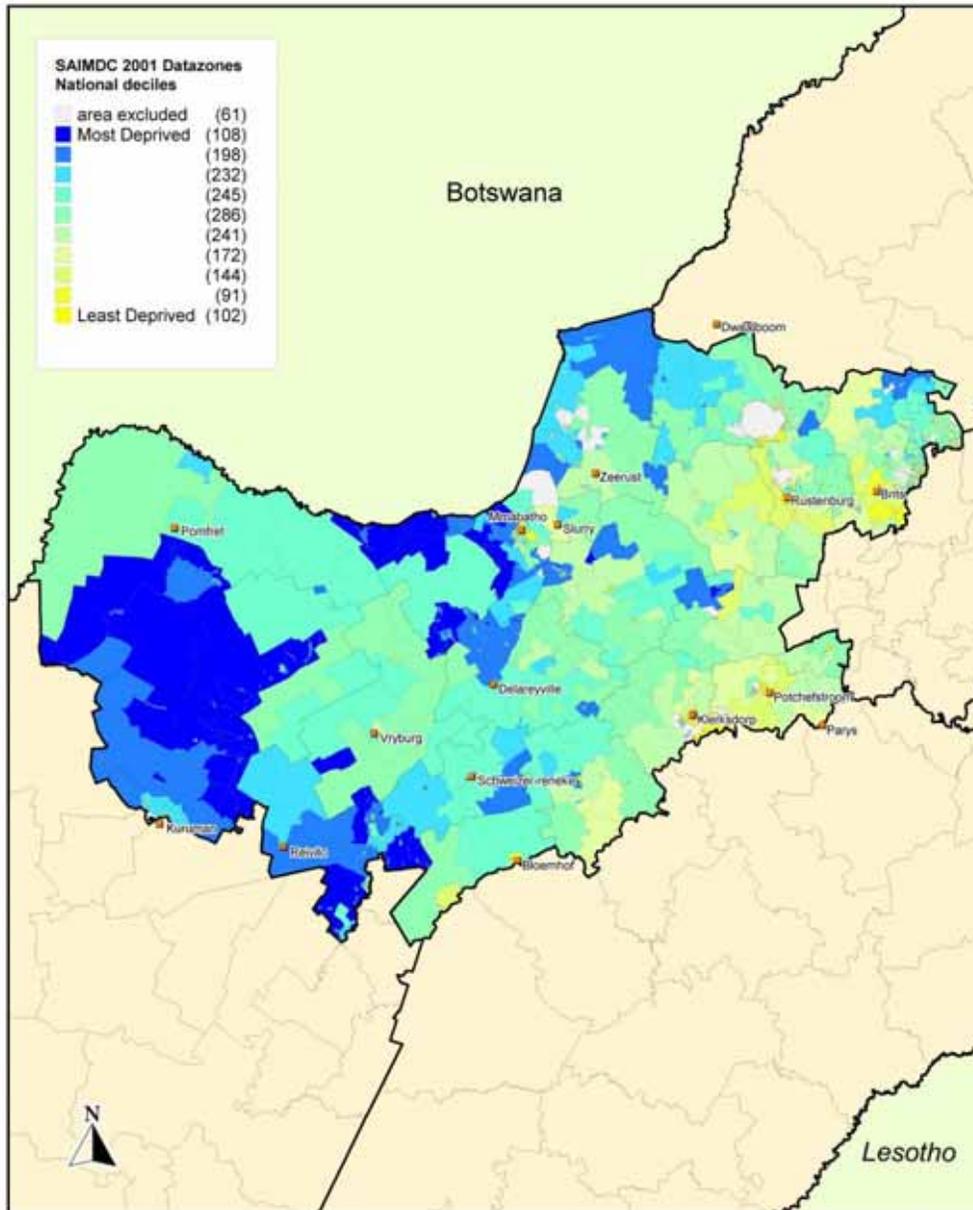
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**South African Index of Multiple Deprivation for Children 2001 at Datazone Level
Map 5 - KwaZulu-Natal**



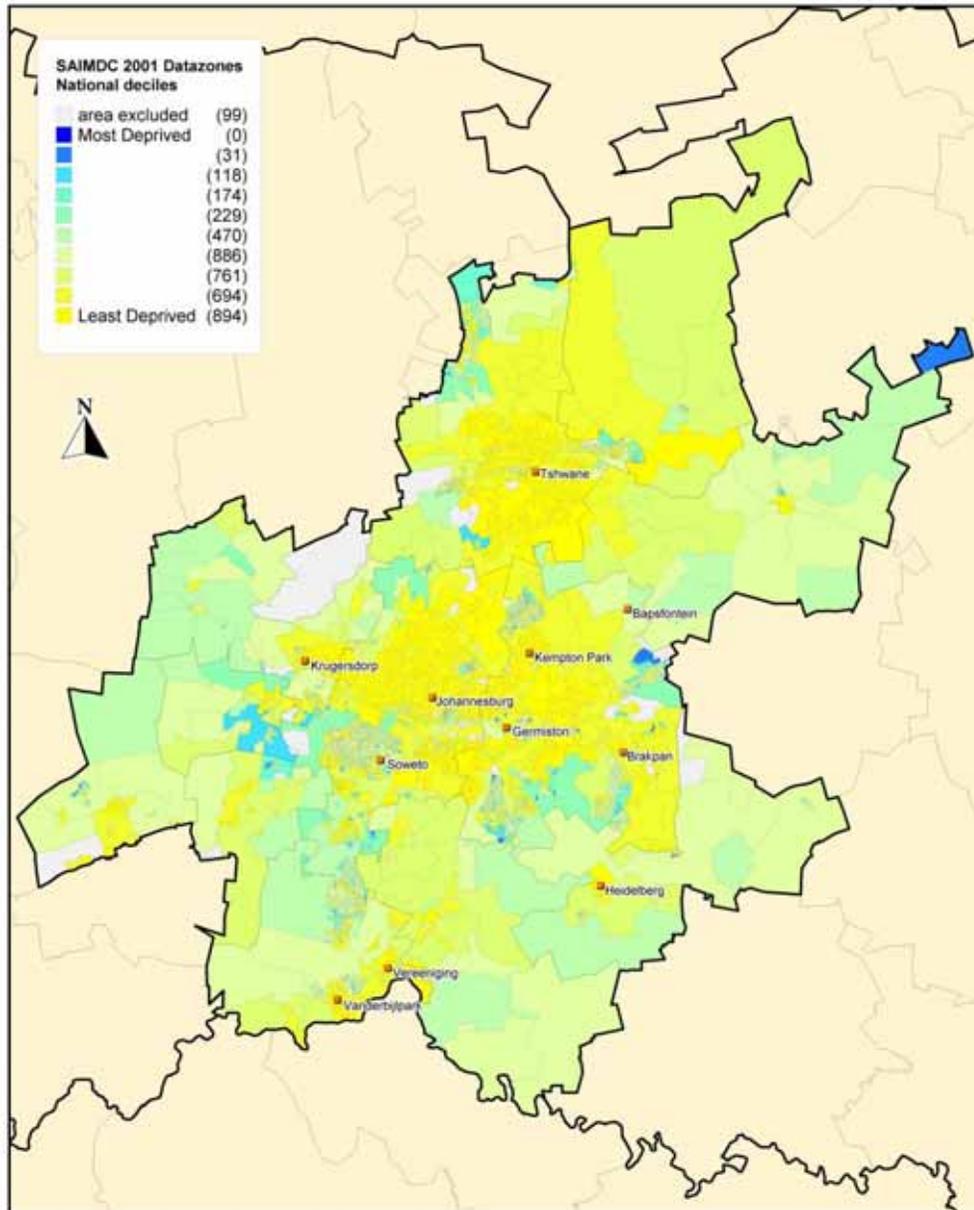
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South African Index of Multiple Deprivation for Children 2001 at Datazone Level
 Map 6 - North West Province



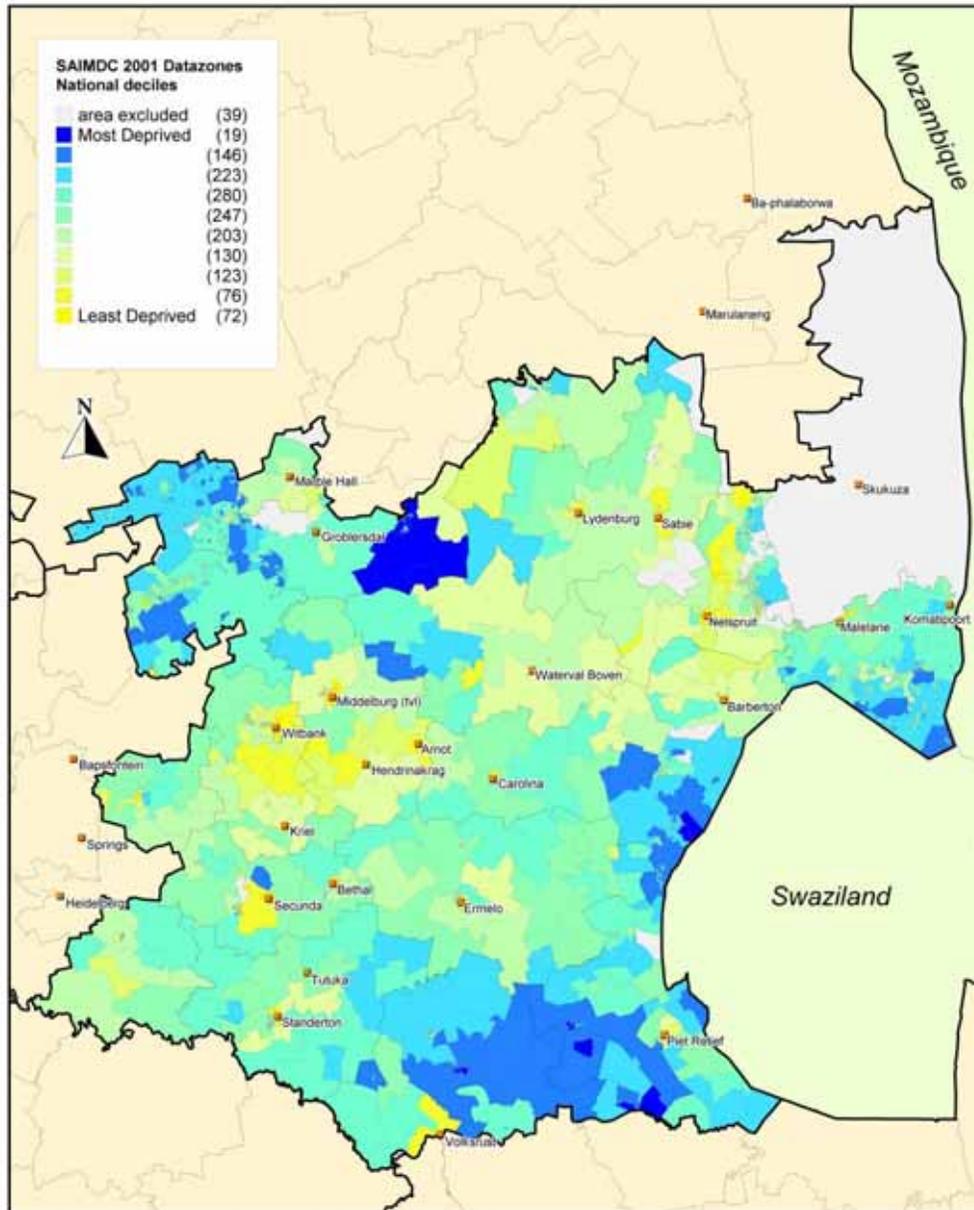
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**South African Index of Multiple Deprivation for Children 2001 at Datazone Level
Map 7 - Gauteng**



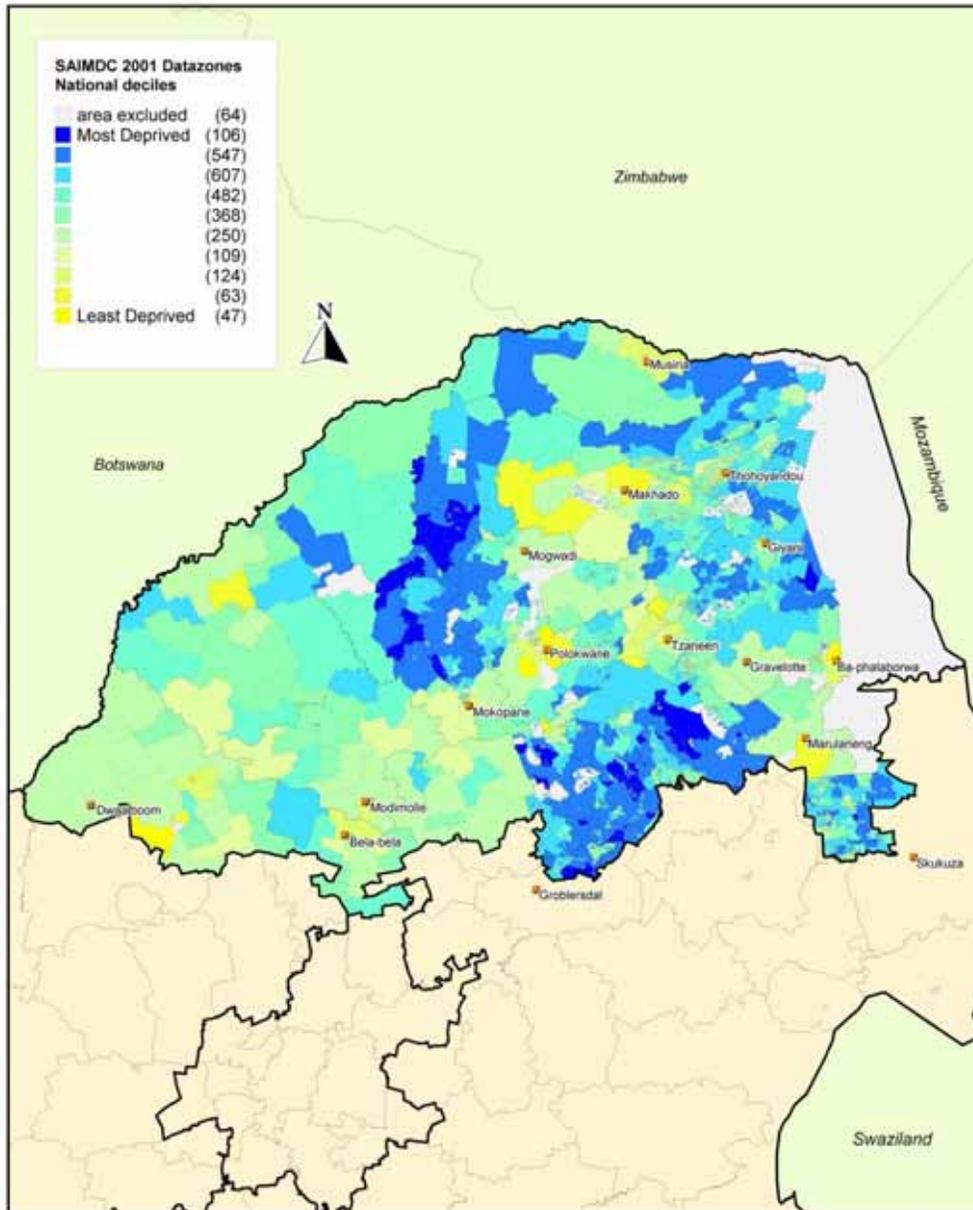
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**South African Index of Multiple Deprivation for Children 2001 at Datazone Level
Map 8 - Mpumalanga**



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**South African Index of Multiple Deprivation for Children 2001 at Datazone Level
Map 9 - Limpopo**



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