Geography as Destiny: Considering the Spatial Dimensions of Poverty and Deprivation in South Africa

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GEOGRAPHY AS DESTINY:
Considering the spatial dimensions of poverty and deprivation in South Africa

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The persistence of geographical inequalities is an intriguing puzzle. Many explanations have been offered for why specific geographies flourish while other regions deteriorate. Some have highlighted the impact of natural constraints, like the limited availability of arable land, distance from the sea and the prevalence of disease. Others have stressed the importance of the impact of human capital spillover in neighbourhoods via local institutions, peer effects and the influence of role models. Recently many have focused on the need for spatial agglomeration to generate technological innovation and technology-driven growth.

Two things appear to be clear from the existing literature: we know that there are reasons why certain areas develop and other areas do not develop and we know that development often appears to induce more development. This self-reinforcing effect can result in widening gaps between regions, creating "pockets of poverty" that are so extreme that migration may ultimately appear to be one's best chance of escaping poverty.

In South Africa the link between geography and poverty has special significance due to apartheid era policies that restricted the movement of non-whites and reserved specific areas for black settlement. The areas selected for black settlement was less developed and often there was little potential or intention of further development. The physical marginalisation of blacks, coloureds and Indians is arguably the most lasting and visible legacy of apartheid.[2]

In theory migration could present a way to correct the geographic imbalance. However, in practice migration may well turn out to be a disappointing experience for many poor

[1] The authors would like to thank the Mellon Foundation for funding a research project on geography and inequality in South Africa, of which this paper constitutes a part.
[2] See Simkins (2000) for more on this topic

individuals and family. Research by Van der Berg et al (2004) on migration patterns in South Africa indicates that those migrating from rural areas to urban areas are likely to stand at the back of the job queue. According to their employment model, rural residents have low predicted employability in urban areas. Their marginal social status as newcomers is likely to further reduce their probability of finding employment.[3] Van der Berg et al thus conclude that rural-urban migration should not be viewed as an answer to rural poverty, but rather as an indication of the severity of it.

This paper's main contribution to the discussion about the geographical dimensions of poverty traps is a careful description of how the nature and depth of poverty and deprivation differ by geography. Conventionally, much of the analysis of poverty has focused on money-metric poverty lines. However, as Amartya Sen and others[4] have shown, welfare is a rich and complex concept that cannot be adequately captured by income and expenditure. To avoid the arbitrariness of a poverty line and the one-dimensionality of money-metric poverty measure, the paper opts for Totally Fuzzy and Relative indices of poverty – as pioneered by Cheli and Lemmi (1995). It provides a multi-dimensional account of poverty and deprivation without assigning arbitrary weights to the different poverty dimensions. Rather, the method weighs poverty dimensions according to the frequency of deprivation in this dimension among members of the population: the more common deprivation is in a specific dimension, the less weight the specific dimension will receive in the calculation of the index. Instead of a sharp line dividing the rich from the poor, the variable's bottom category is defined as marking extreme poverty and the top category as representing affluence, with everything in-between assigned a score to indicate the degree to which these individuals or households can be regarded as poor.

The analysis is based on the 1996 and 2001 Censuses. Unlike sample surveys, censuses do not suffer from the problems of representivity for smaller geographic areas, thus enabling analysis on a small scale. Census data allow the incorporation of a rich variety of welfare dimensions including the type of dwelling, the number of persons per room, the main source of energy used for cooking, water access, telephone access, type of refuse removal, sanitation and household income.

[3] Wittenberg (2001) and Dinkelman & Pirouz (2001) describe the role of labour market networks in the job search process
[4] See Sen (1985) and Ravallion (1996)

Detailed information on poverty and deprivation for small geographic units is extremely useful for poverty targeting, as demonstrated by Bigman & Fofack (2000) and Hentschel et al (2000). Due to the staggering amount of information generated by this analysis, the paper will focus its municipal and district level poverty analysis on the Eastern Cape and the Western Cape.

This paper will consist of four parts. The first section describes the methodology and the data. Secondly, we will calculate and compare Total Relative and Fuzzy Indices of poverty on the provincial and municipal level. In the third part of the paper, the two censuses will be used to analyse the nature and depth of deprivation over time. An analysis of changes in the quantity and quality of services delivered per municipality and district in the Eastern and Western Cape will enable the identification of areas of strength and weakness in the government's efforts to alleviate poverty. The fourth and last part of the paper investigates the merits of migration as a response to rural poverty, examining the Eastern-Cape-to-Western-Cape flow of migrants.

1. Methodology and Data

1.1 The Fuzzy Approach

Poverty is an umbrella concept referring to a conglomerate of interrelated deprivations including hunger, lack of shelter, illness, illiteracy, unemployment, powerlessness, lack of representation and lack of freedom.[5] Ravallion (1996) argues that the traditional approach, which relies on an analysis of income or expenditure as indicators of well-being, is insufficient insofar as these monetary indicators do not adequately capture deprivation of non-market goods.

Ravallion (1996: 9) however also cautions against the use of multi-dimensional poverty indices and specifically the arbitrary basis on which weights are often allocated to the dimensions of such an index. "Recognizing the limitations of conventional money metrics of welfare does not mean that one should aggregate the multiple indicators into a single metric when there is no obvious basis for setting the trade-offs. Being multi-dimensional just does not mean that one should somehow add up multiple indicators." The question is thus a practical one, asking how we can for example compare the poverty of a household without access to basic services, but

[5] This list of deprivations is loosely based on the poverty definition in World Bank (2002)

with sufficient food, to the poverty of a household with electricity and clean water, but insufficient cash and crops to feed their children?

Different methods provide different answers to this question about the allocation of index weights.[6] Weights can be assigned based on the a priori known or perceived relative importance of the dimensions, as is the case with the Human Development Index. Alternatively, the principal components method calculates weights for the index dimensions based on the proportion of the overall variation that the particular dimension captures. The Totally Fuzzy and Relative approach to poverty indices arguably offers the strongest defence against the accusation of arbitrariness. Weights are determined by the prevalence of the deprivation within the dimension, with rare dimensions of deprivation allocated a higher weight.

This method also avoids the artificial definiteness of a binary concept of poverty. Based on observation that poverty is an imprecise and amorphous concept, the "fuzziness" of Totally Fuzzy and Relative poverty indices is seen as an important virtue of this approach. Deaton (1997: 144) argues that it is difficult to defend the traditional approach of using a poverty line for identifying the poor.

> While it is possible – and in my view desirable – to give greater weight to the needs of the poorest, I see few advantages in trying to set a sharp line, below which people count and above which they do not. Poverty lines and poverty counts make good headlines and are an inevitable part of the policy debate, but they should not be used in policy evaluation. Perhaps the best poverty line is an infinite one; everyone is poor, but some a good deal more so than others, and the poorer they are the greater weight they should get in measuring welfare and in policy evaluation.

The fuzzy sets approach was developed by Zadeh (1965)[7] to describe "fuzzy" membership relations. The fuzzy approach has two critical levels instead of one: a minimum level, below which an individual or household is definitely a member of the group, and a maximum level,

[6] It is debate about the inherent problems with adding poverty dimensions to form an index is considered as falling outside the scope of this paper. Although it is not denied that there are problems with adding different dimensions of poverty and interpreting such a composite measure, the advantages of a single comparable measure incorporating all these dimensions deserves to be acknowledged, especially in decision making contexts where there is a need to assign a weight or a relative importance to the individual dimensions in some way or another.

[7] The method was later enhanced by Dubois and Prade (1980).

above which an individual or household is definitely not a member of the group. If an individual or household were to fall between these two levels, then the individual partially belongs to the group. The Totally Relative and Fuzzy approach set these critical levels to coincide with the minimum and maximum categories in each dimension to avoid arbitrary setting of critical levels, which will be open to the same criticism that the traditional approach to poverty measurement face.

The fuzzy sets approach is characterised by a membership function that determines the degree of membership to the fuzzy subset. If X is a set $x \in X$ and A is a fuzzy subset of X, it can be defined as:

$$A = \{x, \mu_A(x)\} \qquad \text{for all } x \in X$$

where $\mu_A(x)$ is the mapping of X to the interval [0, 1], indicating the degree of membership of x to A. $\mu_A(x)$ is the membership function such that if $\mu_A(x) = 0$, then x does not belong to A, but if $\mu_A(x) = 1$, then x completely belongs to A. If, however, $0 < \mu_A(x) < 1$, then x partially belongs to A, with the degree of membership to A increasing the closer $\mu_A(x)$ is to 1.

If this method is applied to poverty analysis, more dimensions can be introduced with X representing a set of k poverty dimensions so that $X = \{X_1, X_2, \ldots, X_k\}$ in a population of n individuals or households. If there are m categories of deprivation in dimension X_j, the categories can be arranged in increasing order with respect to the risk to poverty so that $x_j^{(1)}$ denotes the least risk of poverty and $x_j^{(m)}$ the maximum risk of poverty. Therefore, $X_j = \{x_j^{(1)}, x_j^{(2)}, ..., x_j^{(m)}\}$ where $x_j^{(1)} < x_J^{(2)} < ... < x_j^{(m)}$ with respect to the risk of poverty. If $\delta(x_{ij})$ represents the membership function for the i^{th} individual or household in dimension X_j, then according to Cheli and Lemmi (1995)'s Totally Fuzzy and Relative approach the membership function for discrete variables will look as follows:

$$\delta(x_{ij}) = \begin{cases} 0 & x_{ij} = x_j^{(1)} \\ \delta(x_j^{(\lambda-1)}) + \dfrac{F(x_j^{(\lambda)}) - F(x_j^{(\lambda-1)})}{1 - F(x_j^{(1)})} & \text{if } x_{ij} = x_j^{(\lambda)}, \lambda = 2, ..., m \end{cases}$$

where $F(x_j^{(\lambda)})$ is the cumulative distribution function of $x_j^{(\lambda)}$

The Cheli and Lemmi (1995) approach is a response to the method proposed by Cerioli and Zani (1990). Cheli and Lemmi contend that their approach presents an improvement on the methodology proposed Cerioli and Zani (1990) in at least two ways. Firstly, it does not require the setting of an arbitrary limit or line that defines the set of the poor and the set of the rich. Instead, the method lets the critical levels coincide with the minimum and maximum values or categories in each dimension. Secondly, Cheli and Lemmi claim that their proposed functional form is preferable because a linear membership function could give too much importance to rare categories, possibly resulting in an over- or underestimation of actual poverty. Their solution is a non-linear membership function where the poverty rating of each category in every dimension is determined by the number of individuals experiencing that level of deprivation relative to the size of the other categories. Miceli (1998) argues that this solution has the further advantage that it provides a closer match to a relative understanding of poverty.

For each individual or household, the composite poverty index value will be a weighted sum of their estimated degree of membership of each of the deprivation dimensions, calculated as shown below:

$$\delta_P(x_i) = \sum_{j=1}^{k} w_j \delta(x_{ij}) \quad \forall i = 1,...,n$$

with w_j denoting the weight of dimension X_j and $\sum_{j=1}^{k} w_j = 1$.

Cerioli and Zani (1990) proposed a weighting system where each dimension's weight is the inverse function of the number of individuals in the reference population that are deprived in terms of this dimension. Miceli (1998) defends this proposed weighting system, arguing that people tend to feel more deprived when they do not have access to the same goods or services that most others have access to. This line of thought coincides with a relative concept of poverty. It can be implemented as the following weighting function[8]:

[8] Filippone et al (2001) identify two advantages of choosing a logarithmic functional form in this case: it assigns a value of 0 to those dimensions where the whole population falls into the lowest category, i.e. everyone is deprived and avoids giving too much importance to extremely rare poverty indicators. Note that w_j is not defined when $\overline{\delta}(x_j) = 0$, i.e. when no person is deprived or poor in dimension X_j. If everybody is non-poor in dimension X_j, then dimension X_j makes no significant contribution to a study

$$w_j = \log\left(\frac{1}{\bar{\delta}(x_j)}\right) \qquad \text{where} \quad \bar{\delta}(x_j) = \frac{1}{n}\sum_{i=1}^{n}\delta(x_{ij})$$

with $\bar{\delta}(x_j)$ representing the average deprivation experienced in dimension X_j.

A subset mean can be calculated to provide an indication of the poverty of a subset of the population:

$$\frac{1}{n}\sum_{i=1}^{n}\delta_P(x_i)$$

where the subset contains *n* observations.

If *P* is defined to be the fuzzy subset of the poor these membership functions will capture the degree to which the individual or the household or the subset of the population belongs to *P* as outlined earlier, with a zero value denoting non-membership, a value of one indicating complete membership and all values in between zero and one suggesting some degree of membership, with the size of the index value representing the household or individual's degree of membership to the group of poor.

The fuzzy sets approach has previously been applied in the South African context by Ngwane et al (2001) and Qizilbash (2002). Ngwane et al (2001) employed the fuzzy set approach to construct a global poverty index for South Africa using the 1995 October Household Survey. Selecting and grouping nine dimensions of poverty into three groups or indicators: socio-economic, housing and services, and monetary, they found that poverty within provinces differs considerably depending on what indicator is used for analysis. They also found considerable differences in the resulting provincial ranking.

Qizilbash (2002) applied the fuzzy sets approach to the 1996 Census to assess vulnerability to poverty in South Africa. He treated "values between 0 and 1 as signalling a vulnerable group, with higher values signalling higher levels of vulnerability" (p. 761), i.e. those people at high risk of becoming absolutely poor. Core poverty was considered to be the lowest category in each dimension. His aim was to compare vulnerability and core poverty between the various provinces using a Borda ranking approach. He did not create a composite index of poverty,

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of poverty and should, therefore, not be included. See Filippone et al (2001) for alternative definitions of w_j.

because he argued that “reducing the number of indices to one or two composite indices, while helpful in some respects, may obscure the true situation” (p. 768). Where the Eastern Cape was ranked worst and the Western Cape best in terms of core poverty, these provinces ranked 4th and 7th, respectively, in terms of vulnerability.

1.2 1996 and 2000 Census

The 10% samples of the censuses of 1996 and of 2001 form the datasets for this paper. These censuses are believed not to capture the composition and size of the population fully accurately. Post-enumeration surveys revealed an undercount of just over 10% in 1996, and just over 20% in 2001, which have been adjusted for in the weights of the samples from the censuses. Even after these adjustments, however, demographers have noted some inconsistencies between the censuses, including a seeming undercount of whites in the 2001 census and perhaps too many teenagers, according to one assessment. (Van Aardt, 2003) However, for the purposes the censuses are used here, these inaccuracies should not greatly affect the results, and these biases in the overall numbers should have only a minor impact on the calculated indices. The census offers by far the best small area information, thus making it ideal as a tool for assessing service delivery. However, it is not very rich in variables, thus we are constrained in the variables we can use, and census income data needs to be handled with extreme care, due to known deficiencies. It is thus perhaps fortunate for this study that the further analysis employs a relatively small weight for income in the aggregate deprivation index, as discussed below.

Table 1 below displays the set of dimensions of poverty and their respective categories, ranked in increasing order with respect to risk to poverty[9] Following Cheli (1995), a crowding variable is included in the set to reflect deprivation of space and privacy. The nine other categories included in the index are the type of dwelling, the main source of energy for cooking, derived household income, water access, telephone access, refuse removal, sanitation, employment and education.

Table 2 reports the horizontal weights[10] for each of these dimensions for 1996 and 2001. In both years the dwelling dimension was estimated to be the most important contributor to deprivation while income was the least important. Note that the two indices are not

[9] This ranking is similar to the rankings used by Klasen (2000), Qizilbash (2001) and Ngwane et al (2001) apart from a slight adjustment to the energy variable: Klasen and Qizilbash adopted the same ranking for energy source for cooking: electricity, gas, paraffin/coal, dung and then wood. Here we propose a new ranking with wood ranked above animal dung as the source of energy for cooking.

[10] To distinguish the two sets of weights that the method calculates, the dimension weights are refered to as horizontal weights while the assigned values of the categories within each dimension are called vertical weights

comparable in the strictest sense due to adjustments of the 1996 income categories in the 2001 Census.

Table 2 shows that this poverty index is essentially a service delivery index. The nature of the index is to a large extent attributable to the variables that the Census had available. Eight of the ten dimensions of deprivation are linkable to service delivery outcomes and four of these service delivery variables are communal and can be considered as exogenous for the individual: water access, sanitation, refuse removal and the type of energy used for cooking. Although service delivery variables dominate in number, the index does include three crucial labour market variables and the low weight allocated to two of these variables indicates that deprivation in this dimension is relatively common and thus for the purposes of this analysis, less important.[11]

These weights match reasonably well with the "importance" weights reported by Clark and Qizilbash (2002). Their weights were based on a participatory survey where respondents were asked to rank their needs. Housing and shelter received the top rank, but health and energy related needs received a lower rank than here and water and income ranked higher.

TABLE 1: Categories per deprivation dimension, 2001

Dimension	Description	Rank	Categories
Dwelling	Type of dwelling	1	Formal house/flat
		2	Single room or flatlet
		3	Traditional hut
		4	Shack
		5	Homeless
Crowding	Number of persons per room	1	<= 0.25
		2	0.25-0.5
		3	0.5-0.75
		4	0.75-1
		5	1-1.5
		6	1.5-2
		7	2-2.5
		8	2.5-3
		9	3-4
		10	>4
Energy	Energy source of cooking	1	Electricity/Solar
		2	Gas
		3	Paraffin/Coal
		4	Wood
		5	Dung
Income	Monthly	1	R204801 or more

[11] An analysis of the sensitivity of findings for the specification of dimension categories is planned for the next revision of this paper

	Household Income	2	R102401 - R204800
		3	R51201 - R102400
		4	R25601 - R51200
		5	R12801 - R25600
		6	R6401 - R12800
		7	R3201 - R6400
		8	R1601 - R3200
		9	R801 - R1600
		10	R401 - R800
		11	R1 – R400
		12	No Income
Water	Type of water access	1	Tap in dwelling
		2	Tap on premises
		3	Public tap/tanker/water vendor
		4	Rainwater tank/Borehole/Well
		5	Dam/River/Tanker/others
Telephone	Type of telephone access	1	In dwelling or cellular
		2	Nearby neighbour or work
		3	Public telephone/Another location nearby
		4	Another place not nearby
		5	No Access
Refuse	Refuse Removal	1	Municipality - at least once a week
		2	Municipality - less often
		3	Communal refuse dump
		4	Own refuse dump
		5	No rubbish disposal
Sanitation	Toilet facilities	1	Flush or chemical
		2	Pit latrine
		3	Bucket latrine
		4	No sanitation facilities
Employment	Employment Status - Strict	1	Employed
		2	15-65, but still not economically active
		3	Unemployed
Education	Education Level	1	Above Matric
		2	Matric
		3	Incomplete Secondary
		4	Complete Primary
		5	Incomplete Primary
		6	No Schooling

Source: Census 2001

TABLE 2: Horizontal weights for 1996 and 2001		
	1996	**2001**
Dwelling	0.141	0.156
Sanitation	0.112	0.122
Energy	0.111	0.119
Refuse	0.115	0.117
Employment	0.110	0.111
Telephone	0.083	0.094
Water	0.116	0.087
Crowding	0.069	0.066
Education	0.075	0.064
Income	0.067	0.062

Source: Census 1996 and 2001

2. Mapping Poverty and Deprivation

2.1 Poverty and deprivation by province in 2001

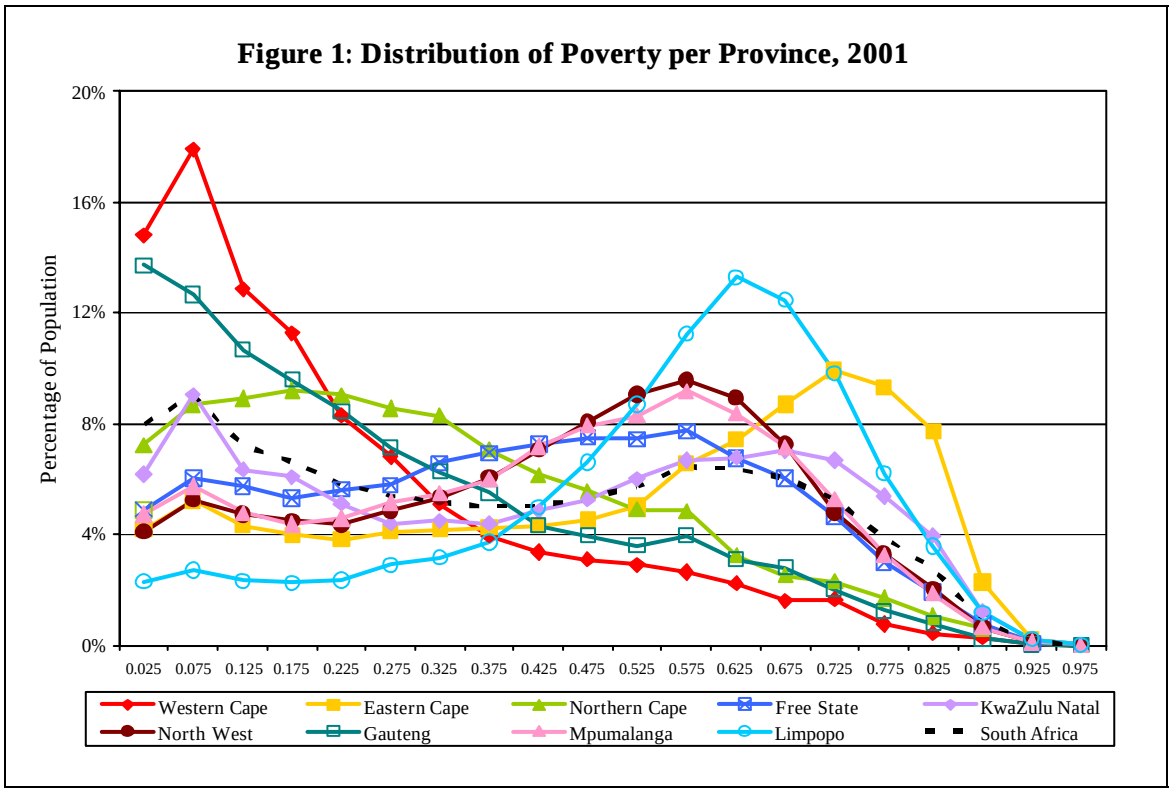
As reported earlier, it is a well-established result that poverty is associated with geography. In South Africa, the likelihood of being poor is considerably higher for households living in the Eastern Cape and Limpopo and significantly lower for households in Gauteng and the Western Cape (Woolard & Leibbrandt, 1999). The fuzzy sets approach gives answers that are in agreement with these previous results. According to Table 3 below the Western Cape and Gauteng are the two least deprived provinces while Limpopo and the Eastern Cape are the two most deprived regions. Based on household survey consumption estimates for 2000, Hoogeveen and Özler (2003) obtain an identical top three and also have Eastern Cape and Limpopo in the bottom two positions, but with the Eastern Cape ranking below Limpopo. Western Cape, Gauteng and the Northern Cape are the only three provinces that inherited no or negligible shares of the old homelands.

TABLE 3: Average Poverty by province, 2001

Western Cape	0.230
Gauteng	0.272
Northern Cape	0.321
Free State	0.411
KwaZulu Natal	0.422
Mpumalanga	0.434
North West	0.441
Eastern Cape	0.505
Limpopo	0.538
Total	0.386

Source: Census 2001

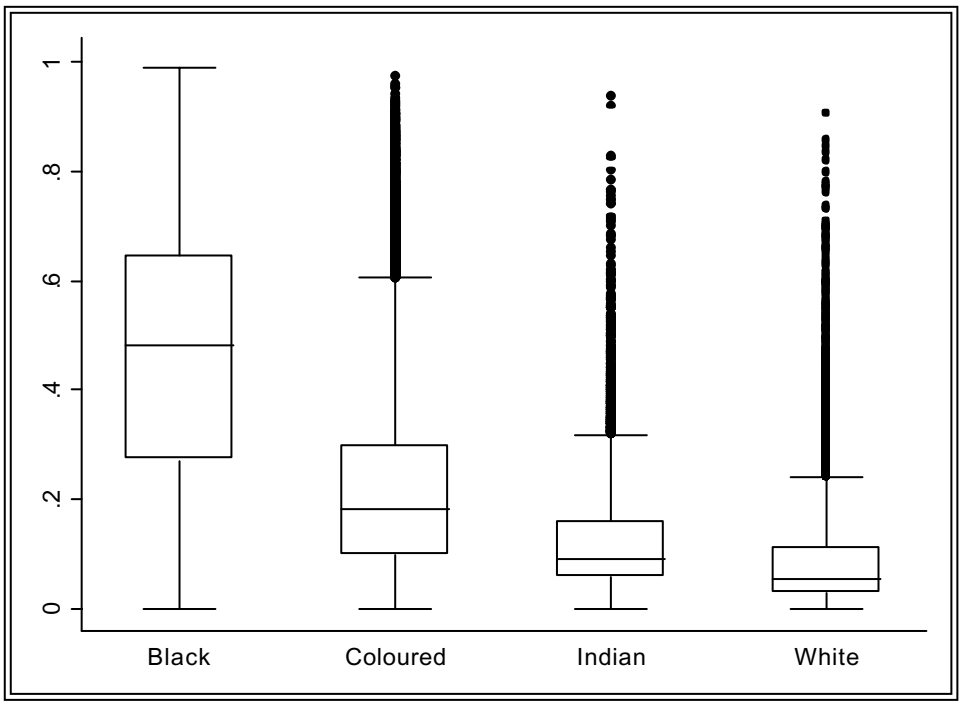
As expected the distribution curves in Figure 1 shows that the distribution of the Western Cape and Gauteng bulge towards non-deprivation whereas the humps in the distribution curves of the Eastern Cape and Limpopo are on the side of deprivation.



Source: Census 2001

Figure 2 illustrates the racial component of poverty and deprivation via a box-and-whiskers plot. The enduring impact of race and race-related characteristics is clear from this figure. There is little overlap in the poverty distributions of blacks and whites: the most deprived upper quartile of whites spans a similar range as the least deprived quartile of blacks.

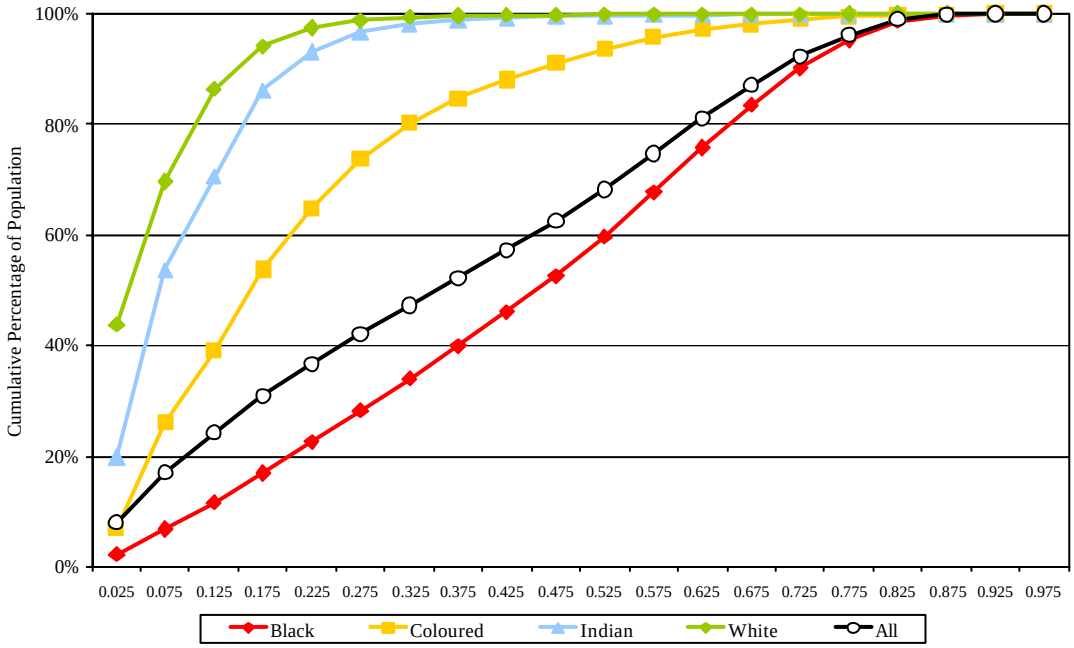
Figure 2: Distribution of poverty index by population group, 2001



Source: Census 2001

Figure 3 tells a similar story. The cumulative distribution curves for the different population groups reveal clear racial poverty dominance, confirming the results of analysis based on South African income and expenditure data. The black distribution curve is below the distribution curve for the whole population at every point. Due to the large black share of the population, the curve for the total population closely tracks that for blacks.

Figure 3: Cumulative Distribution of Deprivation by Population Group, 2001



Source: Census 2001

The table below summarises the average level of deprivation for each population group per province. The deprivation levels of the different races vary per province, but within broad bands, indicative of a strong association between race and poverty, but also one that varies considerably by province. It is for instance interesting to note that although the Western Cape has the lowest average levels of deprivation, blacks in this province are worse off than blacks in Gauteng and the Northern Cape.

TABLE 4: Average Poverty per Province by Population Group*, 2001

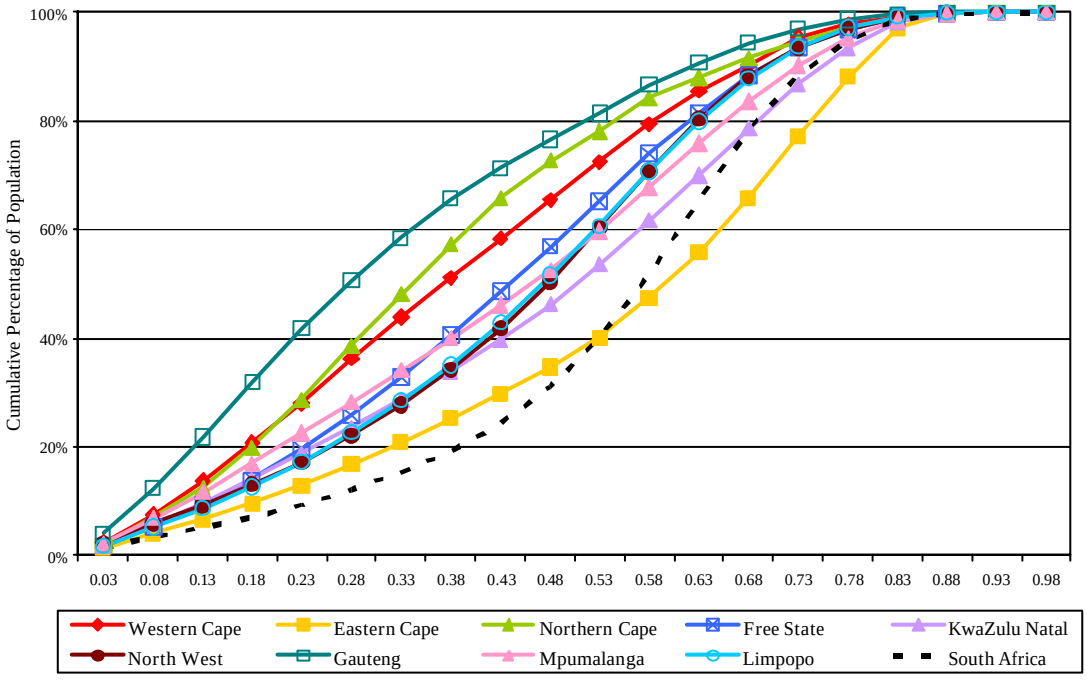
	Black	Coloured	White
Western Cape	0.401	0.204	0.072
Gauteng	0.334	0.177	0.073
Northern Cape	0.382	0.341	0.101
Free State	0.448	0.334	0.095
KwaZulu-Natal	0.493	0.162	0.079
Mpumalanga	0.467	0.264	0.089
North West	0.468	0.337	0.106
Eastern Cape	0.558	0.284	0.086
Limpopo	0.552	0.311	0.110
Total	0.459	0.229	0.079

* Note that the Indian share is not reported due to their low prevalence in specific provinces

Source: Census 2001

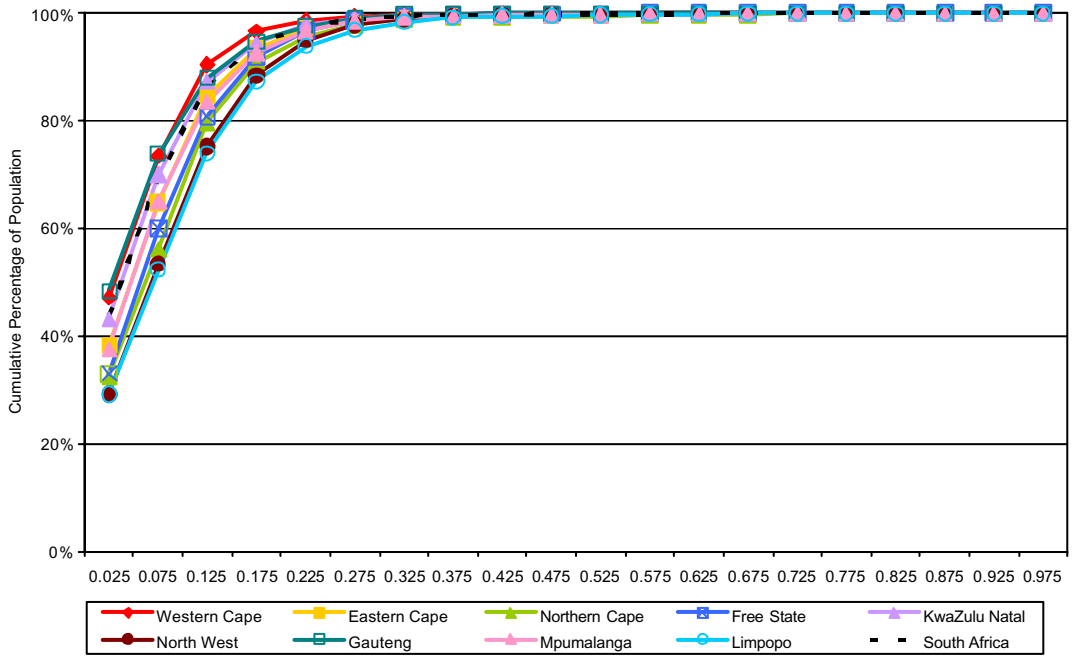
Further illustrating this point, a comparison of figures 4 and 5 show that there is a bigger provincial variation in the shape of the cumulative distribution curve for blacks than there is for whites, where the graph resembles a tight rainbow of provinces.

Figure 4: Cumulative Distribution of Poverty by Province for Blacks, 2001



Sources: Census 2001

Figure 5: Cumulative Distribution of Poverty per Province for Whites, 2001



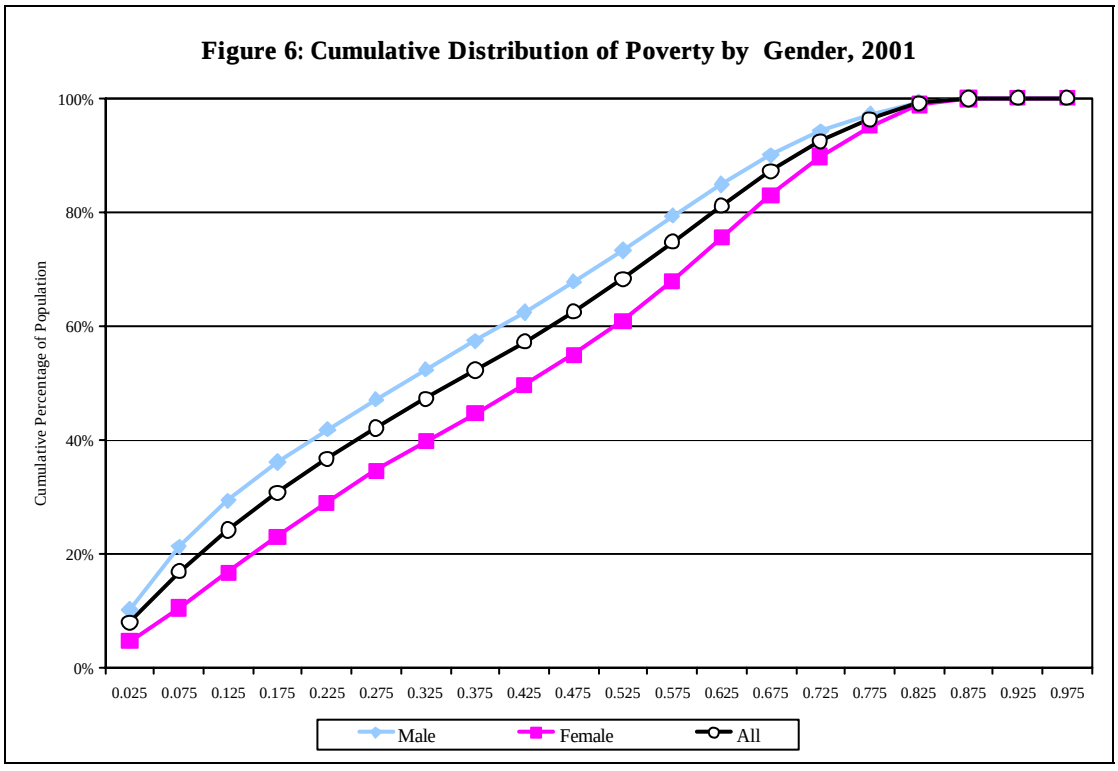
Sources: Census 2001

The two most deprived provinces, Limpopo and Eastern Cape, are also the only two provinces with female headed households constituting more than 50% of the total share of households. Differences between the average level of deprivation of households with male and female heads are the largest in Kwazulu-Natal, Mpumalanga and the Eastern Cape. Figure 6 shows poverty dominance: the cumulative distribution function for female headed households are below that of male headed households at every single point.

TABLE 5: Average Poverty by Gender of household head, 2001

	Male	Female
Western Cape	0.221	0.250
Eastern Cape	0.465	0.548
Northern Cape	0.317	0.332
Free State	0.396	0.437
KwaZulu-Natal	0.381	0.474
North West	0.425	0.467
Gauteng	0.264	0.288
Mpumalanga	0.401	0.483
Limpopo	0.502	0.571
Total	0.353	0.435

Source: Census 2001



Sources: Census 2001

According to Table 6, average poverty is always worse for households with an unemployed household head compared to the economically active. Poverty levels for the two groups are very close in the Eastern Cape, Limpopo and KwaZulu-Natal, while there are substantial gaps for the least deprived provinces Western Cape, Gauteng and Northern Cape, suggesting that the economically inactive could include a larger share of discouraged workers in the more deprived provinces.

TABLE 6: Average poverty among employed vs. unemployed per province, 2001

	Employed	Unemployed	Economically inactive*
Western Cape	0.176	0.458	0.249
Eastern Cape	0.303	0.611	0.609
Northern Cape	0.267	0.468	0.359
Free State	0.327	0.555	0.445
KwaZulu-Natal	0.267	0.567	0.536
North West	0.342	0.568	0.514
Gauteng	0.198	0.461	0.316
Mpumalanga	0.334	0.568	0.515
Limpopo	0.389	0.649	0.604
Total	0.259	0.546	0.496

* The economically active was defined as all persons between the age of 15 and 65 who are not part of the labour force

Note: Employed here refers to households with employed household heads

Source: Census 2001

Despite the known strong association between education and employability and hence also income, there is considerable geographical variation in average poverty within education groups – perhaps partly attributable to the strong service delivery component in the index.

TABLE 7: Average poverty among different education levels per province, 2001

	Tertiary	Secondary	Primary	No Schooling
Western Cape	0.062	0.209	0.329	0.395
Eastern Cape	0.179	0.410	0.585	0.678
Northern Cape	0.074	0.240	0.397	0.455
Free State	0.115	0.355	0.489	0.525
KwaZulu-Natal	0.115	0.313	0.511	0.623
North West	0.147	0.376	0.514	0.565
Gauteng	0.074	0.255	0.389	0.429
Mpumalanga	0.142	0.361	0.492	0.552
Limpopo	0.243	0.483	0.585	0.631
Total	0.111	0.315	0.481	0.580

Note: Education level refers to the education level of the household head

Source: Census 2001

Figure 7 displays the rural aspects of poverty as captured by this index. Rural poverty is substantially higher than urban poverty, demonstrating that poverty is essentially a rural problem. Rural poverty is deeper in Eastern Cape, KwaZulu-Natal and Limpopo. There is a remarkably small gap between rural and urban poverty in the Western Cape. Rural poverty levels are also lower in Gauteng and the Northern Cape.[12] There is a concern that the index may overrepresent rural poverty due to the urban bias because of the prominence of service delivery variables in the index. This could for instance influence the ranking of Limpopo (the most rural province with only 14% of its population living in urban areas) versus the Eastern Cape (where 57% of the population live in urban areas).

Figure 7: Average Poverty by Area of Residence, 2001

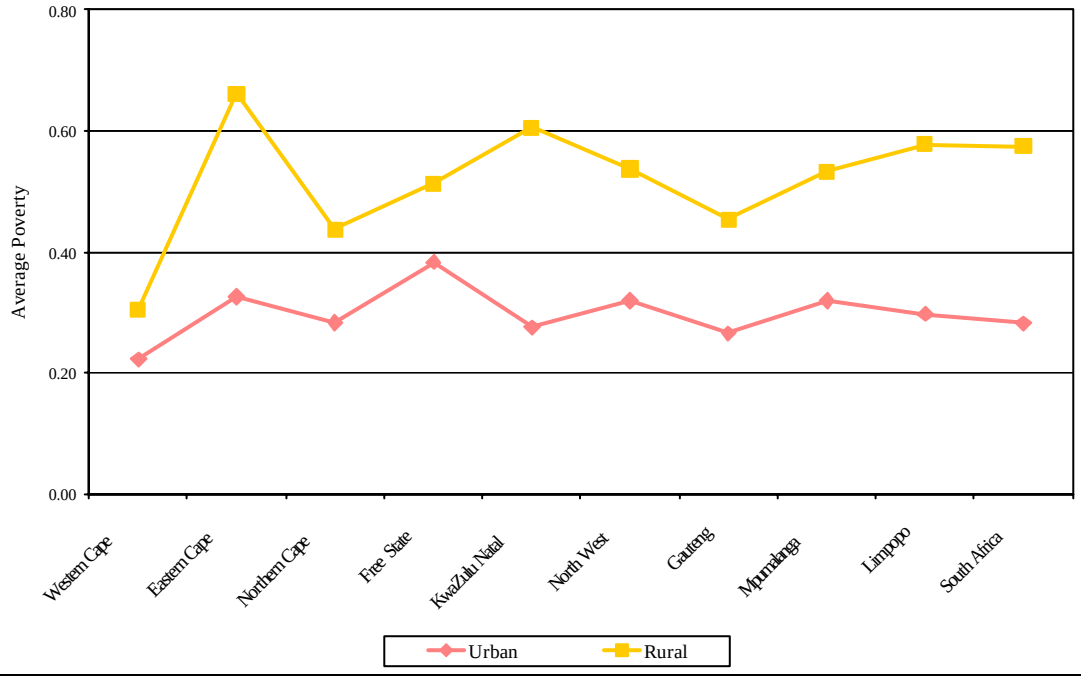


Table 8 illustrates that there are considerable differences in the variation of some poverty dimensions. For instance, we find dramatic variation across provinces in levels of deprivation with respect to sanitation, refuse removal and access to energy, but notable stability in the crowding variable and reasonable stability in education and income. For all the service delivery variables there is a sharp divide between the levels of deprivation in the Western Cape, Gauteng and the Northern Cape and the rest of the provinces. Infrastructure and the

[12] These observations make a strong argument for reporting geographical effects in 18 different groups, with separate categories for a province's rural and urban areas. However, this is often not possible as cell sizes become quite small in some cases.

level of service delivery were considerably poorer in the former homelands and these areas contain no or negligible shares of the former homelands. The table shows that the employment deprivation is severe in the Eastern Cape and Limpopo. The Eastern Cape, Limpopo and Mpumalanga have substantially more deprivation in access to energy than the rest of the provinces.[13]

TABLE 8: Average poverty by dimension for each province, 2001

	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu Natal	North West	Gauteng	Mpum alanga	Limpopo	Total
Dwelling	0.181	0.321	0.154	0.310	0.267	0.257	0.261	0.237	0.178	0.252
Crowding	0.512	0.586	0.537	0.548	0.558	0.522	0.513	0.541	0.585	0.544
Energy	0.113	0.549	0.257	0.313	0.382	0.366	0.142	0.425	0.654	0.342
Income	0.417	0.664	0.538	0.625	0.609	0.610	0.488	0.610	0.675	0.574
Water	0.201	0.649	0.334	0.450	0.526	0.541	0.297	0.510	0.643	0.458
Telephone	0.255	0.516	0.391	0.486	0.453	0.509	0.349	0.482	0.555	0.435
Refuse	0.078	0.519	0.221	0.308	0.412	0.502	0.104	0.488	0.703	0.351
Sanitation	0.116	0.522	0.254	0.376	0.383	0.425	0.119	0.409	0.588	0.335
Employment	0.256	0.475	0.286	0.374	0.400	0.368	0.297	0.351	0.442	0.363
Education	0.439	0.628	0.596	0.584	0.604	0.608	0.446	0.639	0.671	0.561
Average deprivation	0.230	0.505	0.321	0.411	0.422	0.441	0.272	0.434	0.538	0.386

Source: Census 2001

The cross-tabulations were supplemented with regression analysis not reported here, demonstrating the significance of geography when controlling for other determinants of household deprivation including the race, gender, age and education of the household head, access to employment and household size.

3. Charting Changes in Poverty and Deprivation

3.1 Changes in poverty and deprivation by province between 1996 and 2001

Table 9 below details the deprivation by poverty dimension for each province in 1996 and Table 10 shows the changes between 2001 and 1996. Except for income, Census variables are comparable with their 2001 Census equivalents. Encouragingly, this analysis indicates that there has been overall improvement in welfare and also improvement in six of the ten welfare dimensions. This result is in agreement with the general conclusion in the literature that, despite enduring problems with quality, government has made been remarkable progress in expanding the coverage of infrastructure and service delivery since 1994. In the overcrowding, income, water and education dimensions there has been an increase in deprivation.

[13] Appendix C gives a more detailed account of deprivation per province

According to the tables there has also been an increase in the average welfare for most provinces. The average deprivation level was higher in only three provinces: the Western Cape, Free State and Gauteng. For the Western Cape and Gauteng, the deterioration in average welfare could be a result of migration of the poor to these areas, placing strain on available resources.

TABLE 9: Average poverty by dimension for each province, 1996

	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu Natal	North West	Gauteng	Mpuma langa	Limpopo	Total
Dwelling	0.182	0.372	0.180	0.337	0.324	0.278	0.267	0.278	0.254	0.287
Crowding	0.470	0.597	0.544	0.545	0.560	0.544	0.486	0.530	0.580	0.537
Energy	0.120	0.588	0.291	0.343	0.408	0.429	0.138	0.451	0.703	0.373
Income	0.391	0.654	0.537	0.594	0.573	0.587	0.439	0.597	0.678	0.552
Water	0.110	0.606	0.227	0.298	0.462	0.410	0.154	0.353	0.535	0.357
Telephone	0.238	0.675	0.381	0.492	0.494	0.550	0.334	0.536	0.665	0.480
Refuse	0.088	0.542	0.206	0.263	0.450	0.494	0.090	0.474	0.712	0.360
Sanitation	0.113	0.559	0.317	0.411	0.434	0.473	0.120	0.439	0.639	0.369
Employment	0.249	0.523	0.308	0.346	0.411	0.391	0.262	0.356	0.528	0.377
Education	0.379	0.572	0.553	0.523	0.555	0.575	0.382	0.602	0.659	0.514
Average deprivation	0.209	0.562	0.326	0.396	0.454	0.455	0.249	0.446	0.584	0.407

Source: Census 1996

TABLE 10: Changes in Average poverty by dimension for each province, 1996 - 2001

	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu Natal	North West	Gauteng	Mpuma langa	Limpopo	Total
Dwelling	-0.001	-0.051	-0.026	-0.027	-0.057	-0.021	-0.006	-0.041	-0.076	-0.035
Crowding	0.042	-0.011	-0.007	0.003	-0.002	-0.022	0.027	0.011	0.005	0.007
Energy	-0.007	-0.039	-0.034	-0.030	-0.026	-0.063	0.004	-0.026	-0.049	-0.031
Income	0.026	0.010	0.001	0.031	0.036	0.023	0.049	0.013	-0.003	0.022
Water	0.091	0.043	0.107	0.152	0.064	0.131	0.143	0.157	0.108	0.101
Telephone	0.017	-0.159	0.010	-0.006	-0.041	-0.041	0.015	-0.054	-0.110	-0.045
Refuse	-0.010	-0.023	0.015	0.045	-0.038	0.008	0.014	0.014	-0.009	-0.009
Sanitation	0.003	-0.037	-0.063	-0.035	-0.051	-0.048	-0.001	-0.030	-0.051	-0.034
Employment	0.007	-0.048	-0.022	0.028	-0.011	-0.023	0.035	-0.005	-0.086	-0.014
Education	0.060	0.056	0.043	0.061	0.049	0.033	0.064	0.037	0.012	0.047
Average deprivation	0.021	-0.057	-0.005	0.015	-0.032	-0.014	0.023	-0.012	-0.046	-0.021

Census 1996 and 2001

Table 11 and 12 indicate that there have been increases in welfare in all three population groups.[14] The black population group has experienced the strongest rise in welfare over this period.

TABLE 11: Changes in Average Poverty by Population group per Province*, 1996 - 2001

	Black	Coloured	White
Western Cape	0.404	0.203	0.080
Eastern Cape	0.626	0.289	0.092
Northern Cape	0.401	0.363	0.100
Free State	0.454	0.305	0.097
KwaZulu-Natal	0.562	0.169	0.079
North West	0.494	0.323	0.107
Gauteng	0.326	0.169	0.076
Mpumalanga	0.495	0.279	0.093
Limpopo	0.599	0.354	0.121
Total	0.505	0.235	0.084

* Note that the Indian share is not reported due to their low prevalence in specific provinces
Source: Census 1996

TABLE 12: Changes in Average Poverty by Population group per Province*, 1996 - 2001

	Black	Coloured	White
Western Cape	-0.003	0.001	-0.008
Eastern Cape	-0.292	-0.112	-0.019
Northern Cape	-0.019	-0.022	0.001
Free State	-0.006	0.029	-0.002
KwaZulu-Natal	-0.069	-0.007	0.000
North West	-0.027	-0.059	-0.018
Gauteng	0.142	0.168	0.030
Mpumalanga	0.063	0.005	-0.007
Limpopo	-0.047	-0.043	-0.011
Total	-0.046	-0.006	-0.005

* Note that the Indian share is not reported due to their low prevalence in specific provinces
Source: Census 1996 and 2001

[14] The aggregate indices are not strictly comparable due to the discrepancy in the definition of the income categories. This section will be revised using an index without income. Due to the low weight of income in the index the broad trends are not expected to change significantly.

3.2 Changes in poverty and deprivation by magisterial district in the Western and Eastern Cape between 1996 and 2001

A more close-up examination of changes in poverty and deprivation in the Western Cape supports the hypothesis that the overall decline in welfare could be due to migration to the area. Table 13 below describes the changes in average poverty and poverty dimensions for the 10 magisterial districts that experienced the highest increase in average poverty. Only 13 of the 33 magisterial districts in the Western Cape have increases in poverty exceeding that for the total, thus suggesting that increase in average poverty was largely the result of higher deprivation levels in Cape Town and surrounding areas. The higher deprivation observed for the Western Cape appears to be mainly due to large migration flows to Cape Town and surrounding areas.

TABLE 13: Deprivation dimensions of 10 Western Cape magisterial districts with highest increase in average poverty, 1996 - 2001

	Dwelling	Crowding	Energy	Income	Water	Telephone	Refuse	Sanitation	Employment	Education	Average poverty
Wellington	-0.095	0.152	0.027	0.071	0.117	0.241	0.509	0.053	-0.129	0.222	0.098
Somerset West	0.131	0.100	0.070	0.112	0.173	0.101	-0.009	0.055	-0.023	0.101	0.091
Strand	0.010	0.059	0.020	0.057	0.128	0.010	0.086	0.086	0.028	0.073	0.070
Kuilsrivier	0.051	0.051	0.036	0.091	0.109	0.020	-0.022	0.028	0.106	0.077	0.053
Hermanus	-0.013	0.079	0.016	0.029	0.055	0.006	-0.061	-0.036	-0.024	0.053	0.034
Cape	0.035	0.074	0.034	0.014	0.101	0.034	0.013	0.022	-0.021	0.065	0.033
Montagu	-0.015	-0.011	-0.071	-0.049	0.088	0.081	0.072	-0.008	-0.137	0.050	0.023
Caledon	0.047	0.036	-0.019	0.018	0.073	0.022	-0.046	-0.008	0.047	0.042	0.023
Bellville	0.011	0.072	0.002	0.040	0.053	0.029	-0.005	0.009	0.008	0.124	0.023
Paarl	0.003	0.044	-0.025	0.015	0.096	-0.039	-0.009	0.000	0.007	0.036	0.019

Source: Census 1996 and 2001

Table 14 shows the ten magisterial districts with the highest decrease in average poverty between 1996 and 2001. Water provision appears to have deteriorated in the Western Cape and only five municipal districts report reductions in water deprivation, namely Ladismith, Van Rhynsdorp, Riverdal, Bredasdorp and Prince Albert.

TABLE 14: Deprivation dimensions of 10 Western Cape magisterial districts with highest decrease in average poverty, 1996 - 2001

	Dwelling	Crowding	Energy	Income	Water	Telephone	Refuse	Sanitation	Employment	Education	Average poverty
Prince Albert	-0.033	0.039	-0.140	-0.043	-0.001	-0.001	-0.046	-0.407	0.068	0.008	-0.070
Murraysburg	-0.023	-0.012	-0.161	0.003	0.085	-0.061	-0.058	-0.441	0.053	0.063	-0.064
Ladismith	-0.047	0.073	-0.150	-0.047	-0.066	0.113	-0.056	-0.096	-0.068	0.009	-0.050
Mitchellsplain	-0.223	0.027	-0.077	-0.011	0.051	-0.114	-0.079	-0.072	0.062	0.053	-0.049
Riversdal	-0.012	0.031	-0.109	-0.033	-0.029	-0.029	-0.056	-0.098	-0.075	0.014	-0.038
Heidelberg	-0.029	-0.009	-0.139	0.024	0.041	-0.011	-0.038	-0.082	-0.114	0.005	-0.037
Uniondale	-0.052	0.051	-0.123	-0.013	0.080	0.197	-0.105	-0.230	0.072	0.008	-0.033
Hopefield	-0.015	0.014	-0.039	-0.018	0.022	-0.035	-0.016	-0.046	-0.081	0.003	-0.031
Knysna	-0.052	0.040	-0.051	0.009	0.034	0.002	-0.152	-0.071	-0.001	0.043	-0.026
Van Rhynsdorp	-0.035	0.037	-0.013	-0.010	-0.033	0.082	-0.031	-0.125	-0.058	0.041	-0.023

Source: Census 1996 and 2001

The Western Cape also witnessed a marked rise in dwelling deprivation, concentrated in the areas surrounding Cape Town. Crowding was reported to be higher in all but four municipal districts.

Table 15 summarises the changes in deprivation for the ten magisterial districts with the strongest increase in deprivation. Overall, Eastern Cape experienced a decrease in deprivation levels and the change appeared to have been spread more evenly across geographies. 42 Of the 78 Eastern Cape magisterial districts had increases in welfare that were higher than that for the province. This decrease in overall deprivation occurred despite higher deprivation in the water dimension. Water deprivation was worse for 52 of the 78 magisterial districts.

Table 16 provides a list of the ten magisterial districts that had the highest decrease in average poverty.

TABLE 16: Deprivation dimensions of 10 Eastern Cape magisterial districts with highest increase in average poverty, 1996 - 2001											
	Dwelling	Crowding	Energy	Income	Water	Telephone	Refuse	Sanitation	Employ ment	Education	Average poverty
Willowvale	0.384	0.084	0.318	0.232	0.567	0.373	0.554	0.359	0.240	0.195	0.330
Umtata	-0.028	0.130	0.303	0.093	0.524	0.117	0.492	0.415	0.068	0.108	0.179
King William's Town	0.142	0.047	0.141	0.113	0.246	0.058	0.297	0.243	0.016	0.084	0.114
Victoria East	0.004	-0.093	0.053	0.151	0.386	0.088	0.358	-0.052	0.053	-0.115	0.108
Tsolo	0.050	0.021	0.199	0.062	0.259	-0.091	0.289	0.224	-0.009	0.134	0.100
Umzimkulu	0.063	-0.018	0.275	0.097	0.234	-0.143	0.239	0.037	0.111	0.156	0.098
Hofmeyer	-0.048	0.106	0.027	-0.018	0.177	0.176	0.036	0.019	-0.026	0.098	0.059
Aliwal North	0.070	0.017	-0.035	-0.013	0.243	0.008	0.109	0.132	-0.053	0.062	0.051
East London	-0.002	0.016	0.006	0.068	0.126	0.041	-0.004	0.017	0.051	0.037	0.022
Port Elizabeth	-0.063	0.023	-0.004	0.035	0.125	0.003	0.026	0.011	0.025	0.067	0.020

Source: Census 1996 and 2001

TABLE 16: Deprivation dimensions of 10 Eastern Cape magisterial districts with highest decrease in average poverty, 1996 - 2001											
	Dwelling	Crowding	Energy	Income	Water	Telephone	Refuse	Sanitation	Employ ment	Education	Average poverty
Uitenhage	-0.247	-0.056	-0.665	-0.231	-0.630	-0.629	-0.778	-0.709	-0.256	-0.041	-0.460
Wodehouse	-0.428	-0.014	-0.356	-0.100	-0.450	-0.472	-0.485	-0.306	-0.300	-0.002	-0.339
Venterstad	-0.351	-0.110	-0.517	-0.072	-0.562	-0.392	-0.613	-0.172	-0.215	0.074	-0.324
Willowmore	-0.242	-0.046	-0.127	-0.113	-0.446	-0.256	-0.461	-0.379	-0.231	0.074	-0.257
Barkly-East	-0.158	-0.100	-0.079	-0.089	-0.046	-0.180	-0.176	-0.114	-0.064	0.012	-0.122
Keiskamma-hoek	-0.155	-0.070	-0.181	0.035	-0.037	-0.311	-0.008	-0.107	-0.081	0.057	-0.116
Port St Johns	-0.095	-0.014	-0.017	-0.045	-0.050	-0.286	-0.022	-0.029	-0.137	0.030	-0.093
Mqanduli	-0.088	-0.006	-0.048	-0.023	-0.037	-0.256	-0.100	-0.054	-0.109	0.047	-0.089
Idutywa	-0.081	0.010	-0.058	0.010	-0.013	-0.321	-0.084	-0.051	-0.080	0.080	-0.088
Tabankulu	-0.073	-0.014	-0.025	0.089	-0.034	-0.314	-0.087	-0.047	-0.114	0.072	-0.082

Source: Census 1996 and 2001

The deprivation dimensions for 1996 and 2001 as well as changes in these dimensions are provided per magisterial district for the Eastern and Western Cape in six tables in Appendix D. The next section considers the merit of migration as a strategy to escape poverty and deprivation.

4. Tracking migration from the Western Cape to the Eastern Cape

4.1 Profile of migrants vs. non-migrants from the Eastern Cape and Western Cape

This section explores the impact of migration on poverty status. The question is ultimately whether the migrants from Eastern Cape to Western Cape, mostly black, experience an improvement in their living standards after their relocation. The diversity in aims and approaches associated with specific migration streams necessitates a focus on a single migration stream. This analysis will concentrate on the Eastern Cape-Western Cape migration stream.

To investigate the impact of migration on poverty status, four groups are defined: migrants who came to the Western Cape from the Eastern Cape before 1996 (old migrants), migrants who came to the Western Cape from the Eastern Cape after 1996 (new migrants), permanent residents in the Western Cape and permanent residents in Eastern Cape.

Table 17 below indicate that permanent residents in the Western Cape are better off than permanent residents in the Eastern Cape, and that migrants are better off than permanent residents in the Eastern Cape, but worse off than permanent residents in the Western Cape. Also, old migrants have lower average poverty levels than new migrants. All these results also hold for blacks. Table 18 shows that this ranking is also observed among households with unemployed household heads.

TABLE 17: Average poverty for blacks vs. total population by migrant status, 2001

	All	Blacks
Old Migrants from EC to WC	0.410	0.434
New Migrants from EC to WC	0.439	0.496
Permanent Residents in WC	0.187	0.292
Permanent Residents in EC	0.519	0.560

Source: Census 2001

TABLE 18: Average poverty employed vs. unemployed by migrant status, 2001

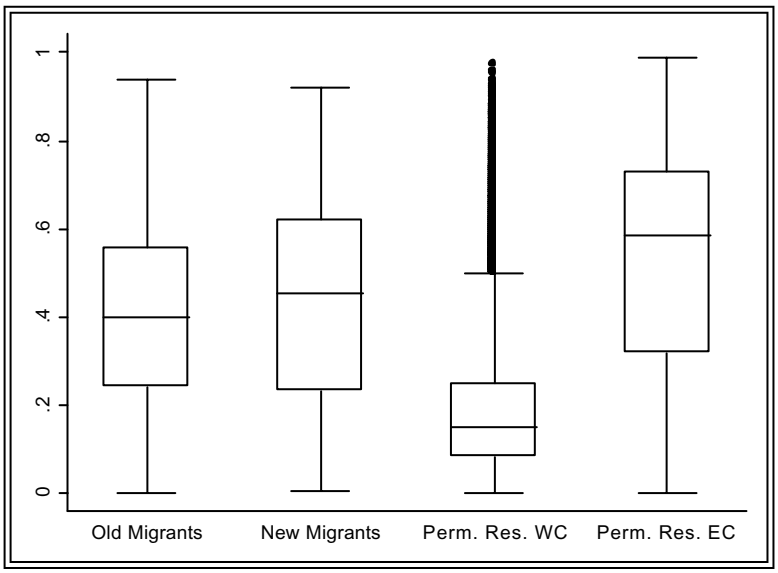
	Unemployed	Employed	Not Economically Active
Old Migrants from EC to WC	0.547	0.332	0.425
New Migrants from EC to WC	0.606	0.345	0.422
Permanent Residents in WC	0.349	0.150	0.226
Permanent Residents in EC	0.612	0.319	0.616

Source: Census 2001

Figure 8 and 9 provide information about the distributions of the four migration groups. Permanent residents in the Western Cape have a tight distribution around a low level of

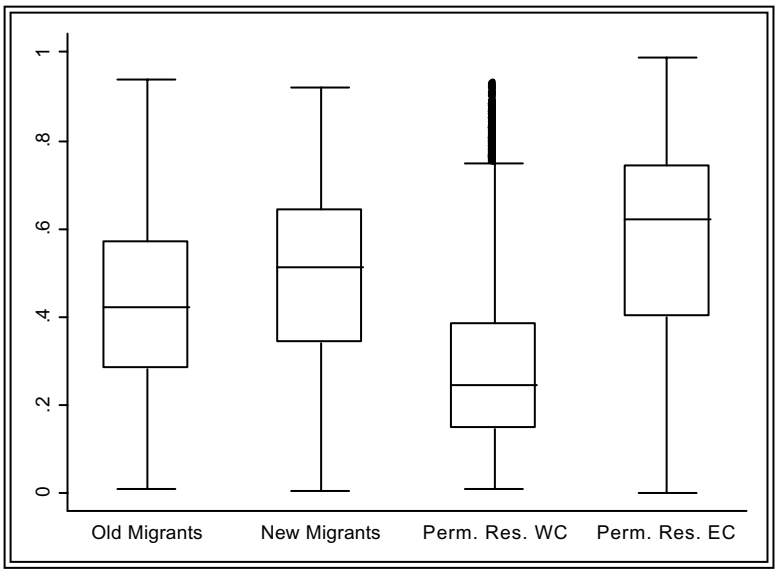
deprivation that is distinct from the other three groups. The Western Cape distribution for blacks is more similar to that of the other three groups.

Figure 8: Poverty by migrant status for Eastern Cape and Western Cape, 2001



Source: Census 2001

Figure 9: Poverty by migrant status for Eastern Cape and Western Cape for blacks, 2001



Source: Census 2001

4.2 The impact of migrant status on the propensity to be poor

The previous section's exploratory analysis did not control for differences in the profiles of the four groups. The position of migrants with respect to permanent residents in the Eastern and Western Cape could be attributable to marginalisation because of their newcomer status or to a systematic difference in their profile. For instance it is plausible that those who chose to migrate from the Eastern Cape to the Western Cape are more employable than the average Eastern Cape resident who might not have the funds to migrate or who might expect to have little to gain from migration, but less employable than the average labour market participant in the Western Cape due to for instance problems with accessing quality education in the Eastern Cape. A regression is thus required to determine whether the migrant status has a significant relationship to poverty when controlling for all other relevant influences. Table 19 below summarizes the results of a regression for all Western Cape households that have heads who are employed and between 18 and 64 years of age.

The regression analysis demonstrates that migrants have a higher expected level of deprivation when controlling for other determinants deprivation. Also, the regression shows that new migrants are worse off than old migrants on average. The effect of these variables appears to be stronger in the black population group.[15] This can be interpreted as evidence of marginalisation. According to this interpretation migrants are thus not only likely to be at the back of the job queue in terms of their profile as concluded by Van der Berg et al (2004), but a social capital deficit may further impede their chances of finding a well-paying job. The state of migrant settlements could offer an alternative or additional explanation for the significance of the term.

The race and geography variables are significant and have the appropriate sign. As expected, the age and education of the household head have a significant and negatively relation to deprivation. The household size variable's coefficient is significant and negative, indicating that at the average level additional household members tend to increase households' welfare. The female coefficient is significant, but not negative as expected. This is somewhat of a puzzle. Perhaps *employed* female head of households are better placed than their male counterparts, even though indications from other studies are that female headed households are usually worse off than male-headed households.

[15] The same phenomenon is observed when the sample is expanded to include households with unemployed or economically inactive household heads.

As is usually the case, the regression's fit is substantially lower when working with the more homogenous black group. The regression for the black population group is similar to the results for the all population groups in most respects. The sign reversals on the geographical variables could be an indication of an interaction between race and geography that warrants further investigation.

TABLE 19: Explaining deprivation in the Western Cape				
Dependent Variable: Deprivation				
	All		**Blacks**	
Variable	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**
Female	-0.0120	-9.47	-0.0278	-7.26
Rural	0.1060	50.57	-0.0235*	-3.15
Boland	0.0046*	2.71	0.0264	4.40
Central Karoo	0.0573	10.70	-0.0385**	-1.24
Eden	0.0345	18.43	-0.0187*	-3.18
Overberg	-0.0020**	-0.78	0.0217*	2.45
West Coast	0.0128	5.81	-0.0370	-3.99
Household Size	-0.0051	-18.38	-0.0107	-13.53
Age	-0.0022	-39.47	-0.0045	-24.85
Years of education	-0.0126	-73.06	-0.0140	-30.59
Coloured	-0.1090	-61.61		
Indian	-0.1341	-26.24		
White	-0.1505	-74.63		
Old Migrant	0.0781	39.28	0.0950	27.24
New Migrant	0.1101	33.00	0.1384	23.25
Constant	0.5001	139.36	0.6232	62.56
R-squared	0.517		0.243	
Sample: All household in the Western Cape with employed household heads aged between 18 and 64				

The regression also controlled for sector specific effects, but these were not reported
+Significant at the 0.01 level
** Significant at the 0.05 level.
All other statistics significant at 0.001 level

Conclusion

The paper presented evidence of the relationship between geography and poverty in South Africa using a fuzzy sets approach. The cross-tabulations and regression analysis reported proved that there is considerable role for geography in explaining patterns of deprivation. Infrastructure and service delivery clearly vary by geography, resulting in spatial differences in both the current welfare of households, via for instance housing and water, and the opportunities for enhancing welfare in the future, via for instance education and good health. The analysis also demonstrates that migration is unlikely to be a solution to this situation.

More analysis is required to understand and explain the various vehicles through which these effects work. Although there are more avenues to explore with the two Censuses, in the end cross-tabulations and regressions of the variables available in the Census can only point at the significance of broad relationships. To understand the mechanisms of marginalisation at work in South Africa, this type of analysis will have to be complemented by experiments, case studies and the analysis of richer surveys.

The fuzzy sets approach provides an alternative to the traditional one-dimensional poverty line. The incorporation of several dimensions of deprivation is an advantage. However, the reliance on a relative notion of poverty for weighting the dimensions of deprivation limits the usefulness of the Cheli and Lemmi version of the approach employed here for evaluating government progress in alleviating poverty. Also it remains difficult to give meaning to changes in an index value. Understanding changes in the index requires the examination of the individual dimensions of the index.

The multidimensional fuzzy index approach to welfare presents a different view of post-apartheid welfare because it is able to capture non-market dimensions of welfare, like access to housing subsidies and access to electricity. The overall picture is more rosy than the conventional perspective focussing solely on changes in labour market conditions. It reports an improvement in average welfare with much of the improvement concentrated among the black population, thus showing that some progress has been made in the alleviation of poverty in the broader sense.

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APPENDIX A: Classification and Ranking of index variables

1. Dwelling Type

Census Classification	Ranking
1. House or brick structure on a separate stand or yard 3. Flat in a block of flats 4. Town/cluster/semi-detached house	(1) Formal House/Flat
5. House/flat/room, in backyard 8. Room/flatlet not in backyard but on a shared property	(2) Single room or flatlet
2. Traditional dwelling/hut/structure made of traditional materials. 9. Caravan or tent	(3) Traditional Hut
6. Informal dwelling/shack, in backyard 7. Informal dwelling/shack, not in backyard	(4) Shack
30. Refugee camp/shelter for the homeless 31. Homeless	(5) Homeless

2. Crowding (Number of persons per room)

Census Classification	Ranking
The variable was calculated by dividing household size by the number of rooms in the house (excluding the bathroom and kitchen)	(1) <= 0.25
	(2) 0.25-0.5
	(3) 0.5-0.75
	(4) 0.75-1
	(5) 1-1.5
	(6) 1.5-2
	(7) 2-2.5
	(8) 2.5-3
	(9) 3-4
	(10) >4

3. Energy for Cooking

Census Classification	Ranking
1. Electricity 8. Solar	(1) Electricity
2. Gas	(2) Gas
3. Paraffin 5. Coal	(3) Paraffin/Coal
4. Wood	(4) Wood
7. Animal Dung	(5) Dung

4. Monthly Household Income

Census Classification	Ranking
12. R204801 or more	(1) R204801 or more
11. R102401 - R204800	(2) R102401 - R204800
10. R51201 - R102400	(3) R51201 - R102400
9. R25601 - R51200	(4) R25601 - R51200
8. R12801 - R25600	(5) R12801 - R25600
7. R6401 - R12800	(6) R6401 - R12800
6. R3201 - R6400	(7) R3201 - R6400
5. R1601 - R3200	(8) R1601 - R3200
4. R801 - R1600	(9) R801 - R1600
3. R401 - R800	(10) R401 - R800
2. R1 - R400	(11) R1 - R400
1. No Income	(12) No Income

5. Water

Census Classification	Ranking
1. Piped water (tap) inside dwelling	(1) Tap in dwelling
2. Piped water (tap) inside yard	(2) Tap on premises
3. Piped water on community stands: distance less than 200m 4. Piped water on community stands: distance greater than 200m 10. Water vender 11. Others	(3) Public tap/tanker
5. Borehole 6. Spring 7. Rainwater tank	(4) Rainwater tank/borehole/well
8. Dam/pool/stagnant water 9. River/stream	(5) Dam/River/Tanker

6. Telephone

Census Classification	Ranking
1. Telephone in dwelling and cellphone 2. Telephone in dwelling only 3. Cellphone only	(1) In dwelling or cellular
4. At a neighbour nearby 6. At another location nearby	(2) At neighbour/work/another location nearby
5. At a public telephone nearby	(3) Public telephone
7. At another location, not nearby	(4) Another location not nearby
8. No access	(5) No access

7. Refuse Removal

Census Classification	Ranking
1. Removed by local authority at least once a week	(1) Municipality - at least once a week
2. Removed by local authority less often	(2) Municipality – less often
3. Communal refuse dump	(3) Communal refuse dump
4. Own refuse dump	(4) Own refuse dump
5. No rubbish disposal	(5) No rubbish disposal

8. Sanitation

Census Classification	Ranking
1. Flush toilet (connected to sewerage system) 2. Flush toilet (with septic tank) 3. Chemical toilet	(1) Flush or chemical
4. Pit latrine with ventilation 5. Pit latrine without ventilation	(2) Pit latrine
6. Bucket latrine	(3) Bucket latrine
7. None	(4) No sanitation facilities

9. Employment[16]

Census Classification	Ranking
1. Employed	(1) Employed
3. 15-65, but still not economically active	(2) 15-65, but not economically active
2. Unemployed	(3) Unemployed

10. Education

Census Classification	Ranking
15. Certificate with Grade 12 16. Diploma with Grade 12 17. Bachelor's Degree 18. Bachelor's Degree and Diploma 19. Honours Degree 20. Higher Degree (Master's, Doctorate)	(1) Above Matric
12. Grade 12	(2) Matric
8. Grade 8 9. Grade 9 10. Grade 10 11. Grade 11 13. Certificate with less than Grade 12 14. Diploma with less than Grade 12	(3) Incomplete Secondary
7. Grade 7	(4) Complete Primary
1. Grade 1 2. Grade 2 3. Grade 3 4. Grade 4 5. Grade 5 6. Grade 6	(5) Incomplete Primary
99. No schooling	(6) No schooling

[16] Here we use the strict definition of unemployment

APPENDIX B: Vertical weights

TABLE B1: Vertical weights per category of deprivation dimension, 2001

Dimension	Description	Rank	Categories	Share of total	Vertical Weight
Dwelling	Type of dwelling	1	Formal house/flat	63.76%	0.00
		2	Single room or flatlet	4.75%	0.13
		3	Traditional hut	14.98%	0.54
		4	Shack	16.51%	1.00
		5	Homeless	0.01%	1.00
Crowding	Number of persons per room	1	<= 0.25	6.61%	0.00
		2	0.25-0.5	17.09%	0.18
		3	0.5-0.75	11.81%	0.31
		4	0.75-1	23.89%	0.57
		5	1-1.5	13.81%	0.71
		6	1.5-2	13.43%	0.86
		7	2-2.5	3.64%	0.90
		8	2.5-3	4.67%	0.95
		9	3-4	2.92%	0.98
		10	>4	2.12%	1.00
Energy	Energy source of cooking	1	Electricity/Solar	52.42%	0.00
		2	Gas	2.64%	0.06
		3	Paraffin/Coal	23.80%	0.56
		4	Wood	20.18%	0.98
		5	Dung	0.96%	1.00
Income	Monthly Household Income	1	R204801 or more	0.14%	0.00
		2	R102401 - R204800	0.25%	0.00
		3	R51201 - R102400	0.38%	0.01
		4	R25601 - R51200	1.32%	0.02
		5	R12801 - R25600	3.69%	0.06
		6	R6401 - R12800	6.37%	0.12
		7	R3201 - R6400	8.99%	0.21
		8	R1601 - R3200	13.21%	0.34
		9	R801 - R1600	16.27%	0.51
		10	R401 - R800	17.87%	0.68
		11	R1 – R400	8.32%	0.77
		12	No Income	23.19%	1.00
Water	Type of water access	1	Tap in dwelling	32.32%	0.00
		2	Tap on premises	29.89%	0.44
		3	Public tap/tanker/water vendor	25.86%	0.82
		4	Rainwater tank/Borehole/Well	4.73%	0.89
		5	Dam/River/Tanker/others	7.20%	1.00
Telephone	Type of telephone access	1	In dwelling or cellular	41.87%	0.00
		2	Nearby neighbour or work	9.71%	0.17
		3	Public telephone/Another location nearby	39.01%	0.84
		4	Another place not nearby	3.37%	0.90
		5	No Access	6.02%	1.00
Refuse	Refuse Removal	1	Municipality - at least once a week	55.34%	0.00
		2	Municipality - less often	1.76%	0.04
		3	Communal refuse dump	1.81%	0.08
		4	Own refuse dump	32.59%	0.81
		5	No rubbish disposal	8.50%	1.00
Sanitation	Toilet facilities	1	Flush or chemical	54.74%	0.00
		2	Pit latrine	27.95%	0.62
		3	Bucket latrine	3.94%	0.70

		4	No sanitation facilities	13.37%	1.00
Employment	Employment Status - Strict	1	Employed	52.03%	0.00
		2	15-65, but still not economically active	27.22%	0.57
		3	Unemployed	20.75%	1.00
Education	Education Level	1	Above Matric	8.73%	0.00
		2	Matric	16.00%	0.18
		3	Incomplete Secondary	28.21%	0.48
		4	Complete Primary	6.92%	0.56
		5	Incomplete Primary	18.27%	0.76
		6	No Schooling	21.88%	1.00

Source: Census 2001

APPENDIX C: Examining poverty dimensions by category

TABLE C1: Proportion of total deprived of dwelling, space and energy by province, 2001

Dimension	Description	Rank	Categories	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu Natal	North West	Gauteng	Mpumalanga	Limpopo	Total
Dwelling	Type of dwelling	1	Formal house/flat	0.78	0.47	0.80	0.62	0.57	0.69	0.65	0.67	0.71	0.64
		2	Single room or flatlet	0.03	0.03	0.03	0.04	0.04	0.03	0.09	0.03	0.03	0.05
		3	Traditional hut	0.02	0.38	0.04	0.08	0.28	0.05	0.02	0.13	0.20	0.15
		4	Shack	0.16	0.11	0.13	0.26	0.11	0.22	0.24	0.16	0.07	0.17
		5	Homeless	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crowding	Number of persons per room	1	<= 0.25	0.07	0.06	0.07	0.06	0.06	0.08	0.07	0.06	0.05	0.07
		2	0.25-0.5	0.20	0.14	0.18	0.17	0.16	0.18	0.20	0.17	0.13	0.17
		3	0.5-0.75	0.14	0.10	0.12	0.12	0.11	0.12	0.13	0.13	0.11	0.12
		4	0.75-1	0.22	0.21	0.21	0.23	0.24	0.24	0.26	0.25	0.24	0.24
		5	1-1.5	0.14	0.15	0.15	0.15	0.15	0.14	0.10	0.16	0.16	0.14
		6	1.5-2	0.11	0.15	0.13	0.14	0.14	0.12	0.13	0.13	0.15	0.13
		7	2-2.5	0.03	0.05	0.04	0.04	0.04	0.04	0.02	0.04	0.05	0.04
		8	2.5-3	0.04	0.06	0.05	0.05	0.05	0.04	0.05	0.04	0.05	0.05
		9	3-4	0.02	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.03	0.03
		10	>4	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02
Energy	Energy source of cooking	1	Electricity/Solar	0.79	0.29	0.60	0.48	0.49	0.46	0.74	0.41	0.26	0.52
		2	Gas	0.03	0.03	0.06	0.03	0.03	0.03	0.02	0.02	0.02	0.03
		3	Paraffin/Coal	0.14	0.30	0.18	0.39	0.20	0.32	0.24	0.32	0.13	0.24
		4	Wood	0.03	0.36	0.15	0.08	0.26	0.18	0.01	0.24	0.59	0.20
		5	Dung	0.00	0.03	0.00	0.02	0.01	0.01	0.00	0.01	0.00	0.01

Source: Census 2001

TABLE C2: Proportion of total deprived of income, water and access to a telephone by province, 2001													
Dimension	**Description**	**Rank**	**Categories**	**Western Cape**	**Eastern Cape**	**Northern Cape**	**Free State**	**KwaZulu Natal**	**North West**	**Gauteng**	**Mpumalanga**	**Limpopo**	**Total**
		1	R204801 or more	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		2	R102401 – R204800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		3	R51201 – R102400	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
		4	R25601 – R51200	0.02	0.00	0.01	0.00	0.01	0.00	0.03	0.01	0.00	0.01
		5	R12801 – R25600	0.07	0.02	0.03	0.02	0.03	0.02	0.07	0.02	0.01	0.04
		6	R6401 – R12800	0.12	0.04	0.06	0.05	0.06	0.04	0.09	0.05	0.03	0.06
		7	R3201 – R6400	0.16	0.06	0.10	0.07	0.08	0.08	0.11	0.07	0.05	0.09
		8	R1601 – R3200	0.19	0.09	0.15	0.12	0.12	0.15	0.16	0.13	0.09	0.13
		9	R801 – R1600	0.16	0.15	0.19	0.17	0.15	0.18	0.17	0.18	0.14	0.16
	Monthly	10	R401 – R800	0.11	0.24	0.22	0.20	0.19	0.19	0.12	0.21	0.24	0.18
	Household	11	R1 – R400	0.03	0.09	0.09	0.12	0.09	0.09	0.05	0.11	0.15	0.08
Income	Income	12	No Income	0.12	0.31	0.14	0.24	0.26	0.24	0.19	0.23	0.28	0.23
		1	Tap in dwelling	0.67	0.18	0.41	0.23	0.30	0.18	0.47	0.21	0.10	0.32
		2	Tap on premises	0.18	0.19	0.41	0.47	0.21	0.36	0.37	0.39	0.31	0.30
		3	Public tap/tanker/water vendor	0.14	0.27	0.16	0.28	0.27	0.38	0.16	0.32	0.44	0.26
	Type of	4	Rainwater tank/Borehole/Well	0.00	0.11	0.01	0.01	0.08	0.06	0.00	0.05	0.08	0.05
Water	water access	5	Dam/River/Tanker/others	0.00	0.25	0.01	0.00	0.14	0.01	0.00	0.04	0.08	0.07
		1	In dwelling or cellular	0.63	0.29	0.41	0.35	0.38	0.34	0.55	0.37	0.28	0.42
		2	Nearby neighbour or work	0.09	0.15	0.18	0.11	0.12	0.09	0.05	0.08	0.09	0.10
	Type of	3	Public telephone	0.25	0.35	0.34	0.44	0.36	0.48	0.38	0.46	0.51	0.39
	telephone	4	Another place not nearby	0.01	0.07	0.02	0.03	0.05	0.03	0.01	0.03	0.05	0.03
Telephone	access	5	No Access	0.02	0.13	0.05	0.07	0.09	0.07	0.02	0.05	0.07	0.06

Source: Census 2001

TABLE C3: Proportion of total deprived of refuse removal, sanitation, employment and education by province, 2001													
Dimension	**Description**	**Rank**	**Categories**	**Western Cape**	**Eastern Cape**	**Northern Cape**	**Free State**	**KwaZulu Natal**	**North West**	**Gauteng**	**Mpumalanga**	**Limpopo**	**Total**
Refuse	Refuse Removal	1	Municipality – at least once a week	0.88	0.37	0.68	0.58	0.49	0.37	0.83	0.39	0.15	0.55
		2	Municipality – less often	0.01	0.01	0.03	0.03	0.01	0.01	0.03	0.02	0.01	0.02
		3	Communal refuse dump	0.02	0.01	0.03	0.04	0.01	0.02	0.02	0.02	0.01	0.02
		4	Own refuse dump	0.08	0.43	0.22	0.26	0.38	0.52	0.09	0.48	0.68	0.33
		5	No rubbish disposal	0.01	0.17	0.04	0.09	0.10	0.08	0.03	0.10	0.15	0.09
Sanitation	Toilet facilities	1	Flush or chemical	0.87	0.35	0.67	0.48	0.48	0.38	0.83	0.41	0.19	0.55
		2	Pit latrine	0.02	0.28	0.10	0.22	0.35	0.49	0.11	0.46	0.57	0.28
		3	Bucket latrine	0.04	0.06	0.11	0.20	0.01	0.04	0.02	0.03	0.01	0.04
		4	No sanitation facilities	0.08	0.31	0.11	0.10	0.16	0.09	0.04	0.10	0.23	0.13
Employment	Employment Status – Strict	1	Employed	0.65	0.34	0.60	0.52	0.47	0.51	0.64	0.54	0.39	0.52
		2	Not economically active	0.21	0.42	0.26	0.24	0.31	0.28	0.15	0.26	0.40	0.27
		3	Unemployed	0.14	0.23	0.14	0.23	0.22	0.21	0.21	0.20	0.21	0.21
Education	Education Level	1	Above Matric	0.13	0.06	0.06	0.06	0.07	0.06	0.13	0.06	0.06	0.09
		2	Matric	0.21	0.11	0.13	0.14	0.14	0.13	0.23	0.13	0.10	0.16
		3	Incomplete Secondary	0.35	0.26	0.28	0.28	0.26	0.27	0.33	0.23	0.22	0.28
		4	Complete Primary	0.08	0.08	0.08	0.09	0.06	0.08	0.06	0.06	0.06	0.07
		5	Incomplete Primary	0.16	0.21	0.23	0.24	0.20	0.23	0.14	0.18	0.16	0.18
		6	No Schooling	0.06	0.28	0.22	0.19	0.27	0.24	0.10	0.33	0.39	0.22

Source: Census 2001

APPENDIX D: Deprivation dimensions by magisterial district for Eastern Cape and Western Cape, 1996 and 2001

TABLE D1: Deprivation dimensions by magisterial district for the Western Cape, 1996

	Dwelling	Crowding	Energy	Income	Water	Telephone	Refuse	Sanitation	Employment	Education	Average poverty
Beaufort West	0.036	0.505	0.334	0.493	0.097	0.283	0.130	0.111	0.313	0.518	0.244
Bellville	0.038	0.376	0.009	0.261	0.019	0.099	0.015	0.013	0.210	0.253	0.106
Bredasdorp	0.090	0.433	0.165	0.434	0.164	0.206	0.157	0.184	0.233	0.430	0.227
Caledon	0.148	0.493	0.157	0.442	0.150	0.327	0.194	0.156	0.181	0.481	0.244
Calitzdorp	0.031	0.490	0.441	0.521	0.163	0.260	0.439	0.338	0.285	0.577	0.327
Cape	0.047	0.307	0.020	0.284	0.025	0.097	0.010	0.027	0.216	0.216	0.106
Ceres	0.120	0.540	0.275	0.419	0.103	0.308	0.166	0.168	0.159	0.542	0.241
Clanwilliam	0.055	0.486	0.196	0.471	0.120	0.218	0.300	0.219	0.200	0.514	0.257
George	0.230	0.469	0.137	0.402	0.153	0.288	0.102	0.150	0.265	0.406	0.238
Goodwood	0.118	0.494	0.072	0.378	0.053	0.184	0.027	0.033	0.301	0.379	0.172
Heidelberg	0.101	0.491	0.284	0.451	0.166	0.257	0.240	0.227	0.334	0.514	0.276
Hermanus	0.170	0.400	0.111	0.409	0.120	0.239	0.112	0.128	0.286	0.357	0.195
Hopefield	0.035	0.427	0.081	0.347	0.095	0.195	0.127	0.082	0.261	0.414	0.181
Knysna	0.289	0.456	0.243	0.447	0.280	0.307	0.217	0.246	0.279	0.406	0.305
Kuilsrivier	0.217	0.485	0.092	0.327	0.124	0.239	0.041	0.098	0.174	0.344	0.190
Ladismith	0.062	0.480	0.428	0.531	0.226	0.292	0.300	0.351	0.295	0.548	0.330
Laingsburg	0.027	0.547	0.469	0.560	0.187	0.292	0.344	0.255	0.241	0.611	0.310
Malmesbury	0.082	0.489	0.096	0.404	0.093	0.267	0.130	0.113	0.223	0.442	0.199
Mitchellsplain	0.528	0.593	0.244	0.521	0.232	0.440	0.133	0.228	0.291	0.462	0.345
Montagu	0.085	0.525	0.263	0.488	0.093	0.282	0.176	0.152	0.290	0.490	0.234
Moorreesburg	0.024	0.442	0.097	0.380	0.079	0.148	0.218	0.106	0.203	0.463	0.188
Mossel bay	0.179	0.466	0.133	0.464	0.119	0.284	0.086	0.074	0.346	0.391	0.230
Murraysburg	0.104	0.577	0.635	0.593	0.230	0.435	0.266	0.610	0.286	0.638	0.410
Oudtshoorn	0.121	0.532	0.210	0.452	0.133	0.265	0.124	0.196	0.310	0.460	0.258
Paarl	0.194	0.529	0.136	0.390	0.108	0.287	0.126	0.112	0.219	0.435	0.216

Source: Census 1996

TABLE D1: Deprivation dimensions by magisterial district for the Western Cape, 1996											
	Dwelling	**Crowding**	**Energy**	**Income**	**Water**	**Telephone**	**Refuse**	**Sanitation**	**Employment**	**Education**	**Average poverty**
Piketberg	0.069	0.480	0.209	0.423	0.142	0.224	0.221	0.187	0.199	0.473	0.233
Prince Albert	0.079	0.547	0.411	0.548	0.213	0.471	0.244	0.565	0.268	0.596	0.367
Riversdal	0.072	0.438	0.280	0.440	0.187	0.234	0.250	0.207	0.292	0.456	0.261
Robertson	0.093	0.478	0.185	0.483	0.157	0.277	0.261	0.189	0.239	0.546	0.254
Simonstown	0.127	0.359	0.051	0.302	0.066	0.135	0.022	0.054	0.259	0.256	0.144
Somerset West	0.077	0.382	0.030	0.278	0.068	0.129	0.061	0.073	0.268	0.274	0.144
Stellenbosch	0.152	0.432	0.068	0.369	0.124	0.203	0.074	0.099	0.209	0.328	0.182
Strand	0.218	0.424	0.066	0.343	0.096	0.219	0.026	0.061	0.254	0.304	0.179
Swellendam	0.088	0.497	0.254	0.459	0.194	0.308	0.279	0.220	0.235	0.506	0.271
Tulbagh	0.081	0.511	0.295	0.497	0.160	0.309	0.183	0.230	0.201	0.516	0.262
Uniondale	0.076	0.532	0.514	0.539	0.234	0.286	0.503	0.510	0.209	0.553	0.375
Van Rhynsdorp	0.086	0.499	0.141	0.495	0.220	0.253	0.322	0.318	0.284	0.525	0.284
Vredenburg	0.136	0.522	0.068	0.338	0.081	0.281	0.030	0.055	0.188	0.414	0.181
Vredendal	0.100	0.503	0.195	0.462	0.166	0.302	0.254	0.256	0.167	0.506	0.260
Wellington	0.140	0.512	0.115	0.373	0.119	0.199	0.122	0.131	0.179	0.410	0.201
Worcester	0.094	0.527	0.128	0.434	0.136	0.310	0.145	0.134	0.201	0.464	0.225
Wynberg	0.057	0.401	0.013	0.311	0.020	0.097	0.012	0.022	0.265	0.294	0.123
Total	0.182	0.470	0.120	0.391	0.110	0.238	0.088	0.113	0.249	0.379	0.209

Source: Census 1996

TABLE D2: Deprivation dimensions by magisterial district for the Eastern Cape, 1996											
	Dwelling	**Crowding**	**Energy**	**Income**	**Water**	**Telephone**	**Refuse**	**Sanitation**	**Employment**	**Education**	**Average poverty**
Aberdeen	0.064	0.494	0.543	0.613	0.259	0.305	0.275	0.451	0.338	0.610	0.377
Adelaide	0.174	0.522	0.480	0.663	0.336	0.348	0.262	0.584	0.427	0.591	0.418
Albany	0.245	0.541	0.315	0.543	0.294	0.373	0.135	0.490	0.339	0.501	0.358
Albert	0.151	0.596	0.427	0.599	0.342	0.395	0.241	0.603	0.335	0.633	0.400
Alexandria	0.362	0.534	0.405	0.643	0.396	0.401	0.335	0.430	0.386	0.631	0.432
Aliwal North	0.289	0.614	0.373	0.594	0.213	0.432	0.084	0.275	0.379	0.556	0.353
Barkley-East	0.323	0.698	0.615	0.726	0.519	0.626	0.498	0.720	0.360	0.636	0.559
Bathurst	0.379	0.500	0.371	0.609	0.470	0.392	0.270	0.454	0.408	0.565	0.430
Bedford	0.173	0.573	0.523	0.703	0.328	0.418	0.333	0.667	0.433	0.608	0.470
Bizana	0.429	0.657	0.834	0.768	0.958	0.924	0.832	0.781	0.666	0.674	0.747
Butterworth	0.377	0.605	0.573	0.653	0.587	0.811	0.479	0.556	0.503	0.448	0.546
Cala	0.370	0.677	0.805	0.738	0.774	0.839	0.770	0.697	0.669	0.594	0.683
Cathcart	0.196	0.567	0.549	0.649	0.352	0.473	0.431	0.347	0.337	0.632	0.439
Cofimvaba	0.461	0.698	0.821	0.756	0.862	0.866	0.858	0.806	0.635	0.694	0.740
Cradock	0.183	0.489	0.412	0.615	0.244	0.356	0.274	0.476	0.344	0.601	0.379
East-London	0.401	0.554	0.310	0.494	0.327	0.395	0.231	0.227	0.341	0.455	0.364
Elliot	0.294	0.647	0.582	0.645	0.422	0.488	0.290	0.407	0.381	0.644	0.453
Elliotdale	0.558	0.725	0.929	0.763	0.974	0.916	0.905	0.950	0.695	0.832	0.823
Engcobo	0.530	0.699	0.868	0.749	0.933	0.895	0.890	0.878	0.667	0.692	0.782
Flagstaff	0.515	0.649	0.904	0.800	0.970	0.957	0.820	0.755	0.701	0.709	0.774
Fort Beaufort	0.235	0.537	0.408	0.640	0.311	0.405	0.242	0.616	0.473	0.561	0.438
Graaff-Reinet	0.101	0.525	0.356	0.508	0.280	0.301	0.099	0.382	0.370	0.530	0.311
Hankey	0.291	0.554	0.295	0.586	0.352	0.461	0.372	0.500	0.311	0.574	0.414
Hewu	0.156	0.595	0.547	0.694	0.541	0.617	0.454	0.579	0.620	0.606	0.517
Hofmeyer	0.216	0.540	0.577	0.656	0.362	0.314	0.270	0.699	0.410	0.688	0.455

Source: Census 1996

TABLE D2: Deprivation dimensions by magisterial district for the Eastern Cape, 1996											
	Dwelling	**Crowding**	**Energy**	**Income**	**Water**	**Telephone**	**Refuse**	**Sanitation**	**Employment**	**Education**	**Average poverty**
Humansdorp	0.260	0.473	0.243	0.439	0.258	0.308	0.224	0.277	0.272	0.438	0.306
Idutywa	0.492	0.641	0.847	0.753	0.934	0.946	0.900	0.840	0.651	0.640	0.763
Indwe	0.093	0.639	0.549	0.712	0.459	0.571	0.279	0.723	0.517	0.659	0.486
Jansenville	0.044	0.484	0.524	0.625	0.308	0.330	0.255	0.601	0.373	0.651	0.385
Joubertina	0.065	0.517	0.448	0.519	0.241	0.365	0.431	0.386	0.186	0.552	0.369
Keiskammahoek	0.512	0.613	0.795	0.691	0.797	0.875	0.800	0.653	0.617	0.572	0.691
Kentani	0.451	0.696	0.930	0.739	0.969	0.931	0.891	0.922	0.692	0.755	0.795
King William's Town	0.104	0.494	0.151	0.391	0.132	0.297	0.098	0.133	0.231	0.359	0.222
Kirkwood	0.225	0.528	0.388	0.622	0.368	0.407	0.403	0.468	0.339	0.638	0.422
Komga	0.371	0.626	0.581	0.635	0.503	0.561	0.385	0.587	0.357	0.651	0.513
Lady Frere	0.291	0.659	0.696	0.706	0.692	0.859	0.757	0.698	0.619	0.655	0.642
Lady Grey	0.307	0.662	0.549	0.663	0.455	0.467	0.213	0.647	0.337	0.664	0.479
Libode	0.529	0.684	0.847	0.737	0.894	0.940	0.851	0.838	0.652	0.685	0.764
Lusikisiki	0.444	0.672	0.867	0.774	0.934	0.921	0.858	0.835	0.663	0.727	0.765
Maclear	0.227	0.648	0.636	0.733	0.518	0.613	0.353	0.732	0.428	0.658	0.538
Maluti	0.469	0.642	0.775	0.784	0.863	0.918	0.835	0.745	0.669	0.592	0.724
Mdantsane	0.270	0.591	0.343	0.591	0.263	0.528	0.262	0.259	0.442	0.503	0.367
Middelburg	0.036	0.523	0.318	0.546	0.123	0.346	0.124	0.208	0.291	0.574	0.271
Middeldrift	0.232	0.603	0.785	0.713	0.733	0.819	0.810	0.709	0.652	0.632	0.657
Molteno	0.136	0.653	0.440	0.627	0.391	0.346	0.162	0.551	0.447	0.683	0.416
Mount Ayliff	0.550	0.621	0.846	0.773	0.881	0.931	0.812	0.753	0.684	0.618	0.748
Mount Fletcher	0.434	0.665	0.840	0.761	0.885	0.939	0.855	0.837	0.672	0.618	0.745
Mount Frere	0.462	0.600	0.822	0.746	0.887	0.931	0.815	0.742	0.649	0.548	0.719
Mpofu	0.482	0.603	0.840	0.685	0.765	0.710	0.785	0.722	0.642	0.702	0.693
Mqanduli	0.531	0.678	0.911	0.763	0.969	0.953	0.932	0.920	0.685	0.760	0.810

Source: Census 1996

TABLE D2: Deprivation dimensions by magisterial district for the Eastern Cape, 1996											
	Dwelling	**Crowding**	**Energy**	**Income**	**Water**	**Telephone**	**Refuse**	**Sanitation**	**Employment**	**Education**	**Average poverty**
Ngqueleni	0.519	0.646	0.870	0.781	0.964	0.927	0.849	0.854	0.661	0.707	0.777
Nqamakwe	0.432	0.606	0.870	0.763	0.963	0.918	0.875	0.804	0.686	0.541	0.748
Ntabathemba	0.194	0.703	0.658	0.711	0.597	0.711	0.830	0.783	0.680	0.708	0.639
Pearston	0.018	0.452	0.634	0.688	0.359	0.382	0.228	0.676	0.453	0.656	0.415
Peddie	0.253	0.624	0.757	0.727	0.840	0.689	0.783	0.674	0.642	0.681	0.657
Port Elizabeth	0.278	0.470	0.177	0.481	0.166	0.325	0.041	0.124	0.354	0.383	0.257
Port St Johns	0.542	0.679	0.875	0.777	0.935	0.907	0.824	0.886	0.663	0.715	0.781
Queenstown	0.256	0.557	0.321	0.568	0.245	0.450	0.242	0.289	0.382	0.449	0.335
Qumbu	0.408	0.593	0.856	0.747	0.923	0.976	0.827	0.801	0.639	0.625	0.736
Somerset East	0.165	0.504	0.440	0.599	0.325	0.339	0.281	0.465	0.349	0.594	0.379
Sterkspruit	0.244	0.705	0.661	0.732	0.803	0.840	0.820	0.781	0.697	0.636	0.677
Sterkstroom	0.108	0.531	0.474	0.670	0.283	0.425	0.274	0.679	0.501	0.643	0.431
Steynsburg	0.097	0.545	0.473	0.704	0.244	0.266	0.249	0.598	0.432	0.663	0.407
Steytlerville	0.078	0.464	0.529	0.566	0.366	0.395	0.311	0.541	0.308	0.565	0.386
Stutterheim	0.384	0.596	0.524	0.641	0.547	0.455	0.498	0.511	0.443	0.611	0.515
Tabankulu	0.548	0.652	0.899	0.685	0.949	0.969	0.938	0.897	0.686	0.710	0.798
Tarka	0.113	0.517	0.535	0.633	0.348	0.288	0.276	0.659	0.369	0.627	0.412
Tsolo	0.412	0.647	0.817	0.737	0.868	0.858	0.824	0.816	0.630	0.640	0.720
Tsomo	0.509	0.554	0.873	0.773	0.951	0.984	0.868	0.853	0.654	0.559	0.762
Uitenhage	0.298	0.494	0.210	0.540	0.172	0.365	0.081	0.130	0.368	0.456	0.304
Umtata	0.377	0.609	0.554	0.652	0.629	0.759	0.554	0.569	0.452	0.521	0.553
Umzimkulu	0.523	0.637	0.880	0.725	0.902	0.837	0.798	0.669	0.624	0.605	0.722
Venterstad	0.193	0.566	0.362	0.577	0.279	0.348	0.221	0.532	0.494	0.654	0.392
Victoria East	0.274	0.549	0.587	0.660	0.734	0.669	0.741	0.609	0.563	0.552	0.590
Willowmore	0.081	0.550	0.567	0.549	0.375	0.303	0.310	0.526	0.326	0.570	0.398
Willowvale	0.506	0.662	0.900	0.773	0.953	0.969	0.934	0.899	0.671	0.662	0.793
Wodehouse	0.226	0.656	0.579	0.663	0.369	0.400	0.416	0.707	0.336	0.666	0.479
Zwelitsha	0.374	0.664	0.560	0.629	0.548	0.651	0.565	0.489	0.473	0.583	0.537
Total	0.372	0.597	0.588	0.654	0.606	0.675	0.542	0.559	0.523	0.572	0.562

Source: Census 1996

TABLE D3: Deprivation dimensions by magisterial district for the Western Cape, 2001											
	Dwelling	**Crowding**	**Energy**	**Income**	**Water**	**Telephone**	**Refuse**	**Sanitation**	**Employment**	**Education**	**Average poverty**
Beaufort West	0.023	0.521	0.226	0.484	0.190	0.363	0.097	0.076	0.338	0.563	0.241
Bellville	0.049	0.448	0.011	0.301	0.072	0.129	0.010	0.023	0.218	0.377	0.129
Bredasdorp	0.077	0.448	0.087	0.427	0.152	0.227	0.150	0.112	0.201	0.466	0.207
Caledon	0.195	0.529	0.138	0.460	0.223	0.349	0.147	0.147	0.228	0.523	0.267
Calitzdorp	0.035	0.537	0.314	0.501	0.239	0.251	0.436	0.276	0.209	0.588	0.309
Cape	0.082	0.381	0.053	0.299	0.126	0.131	0.023	0.049	0.195	0.281	0.139
Ceres	0.093	0.569	0.200	0.449	0.148	0.431	0.175	0.112	0.168	0.572	0.245
Clanwilliam	0.062	0.528	0.185	0.469	0.162	0.367	0.299	0.146	0.172	0.571	0.252
George	0.181	0.532	0.108	0.448	0.241	0.309	0.108	0.143	0.275	0.457	0.254
Goodwood	0.155	0.444	0.068	0.360	0.149	0.151	0.007	0.077	0.237	0.340	0.175
Heidelberg	0.073	0.481	0.145	0.474	0.207	0.246	0.201	0.145	0.220	0.519	0.240
Hermanus	0.158	0.479	0.128	0.439	0.175	0.245	0.051	0.092	0.262	0.410	0.229
Hopefield	0.021	0.441	0.042	0.328	0.117	0.160	0.111	0.036	0.180	0.417	0.151
Knysna	0.237	0.496	0.192	0.455	0.314	0.308	0.065	0.175	0.277	0.448	0.279
Kuilsrivier	0.268	0.536	0.128	0.418	0.233	0.260	0.018	0.126	0.280	0.421	0.243
Ladismith	0.015	0.554	0.278	0.484	0.159	0.404	0.243	0.255	0.226	0.557	0.281
Laingsburg	0.015	0.549	0.311	0.512	0.251	0.346	0.272	0.200	0.283	0.603	0.305
Malmesbury	0.085	0.549	0.069	0.386	0.149	0.313	0.114	0.100	0.200	0.505	0.205
Mitchell's Plain	0.305	0.620	0.167	0.510	0.284	0.326	0.054	0.156	0.353	0.515	0.296
Montagu	0.070	0.514	0.192	0.438	0.181	0.362	0.248	0.145	0.152	0.540	0.257
Moorreesburg	0.065	0.493	0.037	0.431	0.096	0.349	0.207	0.062	0.117	0.503	0.194
Mossel Bay	0.138	0.483	0.132	0.406	0.205	0.263	0.061	0.068	0.263	0.445	0.217
Murraysburg	0.081	0.565	0.474	0.596	0.315	0.374	0.209	0.169	0.339	0.700	0.346
Oudtshoorn	0.110	0.556	0.160	0.446	0.234	0.324	0.126	0.132	0.304	0.532	0.254
Paarl	0.197	0.574	0.111	0.405	0.204	0.248	0.117	0.112	0.226	0.471	0.234

Source: Census 2001

TABLE D3: Deprivation dimensions by magisterial district for the Western Cape, 2001											
	Dwelling	**Crowding**	**Energy**	**Income**	**Water**	**Telephone**	**Refuse**	**Sanitation**	**Employment**	**Education**	**Average poverty**
Piketberg	0.043	0.537	0.107	0.443	0.156	0.328	0.310	0.107	0.134	0.522	0.225
Prince Albert	0.046	0.587	0.271	0.505	0.212	0.470	0.198	0.157	0.336	0.603	0.296
Riversdal	0.060	0.469	0.170	0.408	0.158	0.205	0.194	0.109	0.216	0.470	0.224
Robertson	0.073	0.578	0.114	0.492	0.214	0.386	0.165	0.130	0.220	0.565	0.252
Simonstown	0.123	0.410	0.042	0.309	0.106	0.128	0.017	0.034	0.221	0.319	0.151
Somerset West	0.208	0.482	0.100	0.390	0.242	0.230	0.052	0.127	0.245	0.375	0.235
Stellenbosch	0.162	0.461	0.050	0.472	0.171	0.164	0.098	0.054	0.257	0.339	0.192
Strand	0.228	0.483	0.086	0.400	0.223	0.229	0.112	0.147	0.281	0.377	0.249
Swellendam	0.076	0.497	0.145	0.453	0.213	0.359	0.264	0.168	0.168	0.524	0.259
Tulbagh	0.098	0.575	0.155	0.499	0.200	0.451	0.201	0.159	0.180	0.568	0.267
Uniondale	0.023	0.582	0.390	0.526	0.314	0.482	0.397	0.280	0.281	0.561	0.342
Vanrhynsdorp	0.051	0.536	0.128	0.484	0.187	0.335	0.290	0.193	0.226	0.566	0.261
Vredenburg	0.155	0.553	0.080	0.406	0.176	0.231	0.010	0.032	0.243	0.475	0.198
Vredendal	0.080	0.563	0.150	0.453	0.215	0.382	0.297	0.202	0.169	0.517	0.267
Wellington	0.045	0.664	0.142	0.444	0.236	0.440	0.631	0.184	0.049	0.632	0.299
Worcester	0.121	0.555	0.079	0.444	0.211	0.357	0.182	0.113	0.205	0.514	0.240
Wynberg	0.057	0.411	0.013	0.284	0.063	0.077	0.006	0.031	0.191	0.318	0.115
Total	0.172	0.516	0.106	0.411	0.192	0.248	0.071	0.106	0.255	0.437	0.223

Source: 2001 Census

TABLE D4: Deprivation dimensions by magisterial district for the Eastern Cape, 2001											
	Dwelling	**Crowding**	**Energy**	**Income**	**Water**	**Telephone**	**Refuse**	**Sanitation**	**Employment**	**Education**	**Average poverty**
Aberdeen	0.078	0.476	0.415	0.625	0.327	0.353	0.220	0.285	0.368	0.647	0.353
Adelaide	0.167	0.514	0.400	0.624	0.477	0.396	0.211	0.550	0.391	0.612	0.408
Albany	0.230	0.574	0.316	0.566	0.423	0.377	0.090	0.455	0.354	0.567	0.362
Albert	0.097	0.559	0.331	0.633	0.467	0.379	0.227	0.388	0.371	0.680	0.363
Alexandria	0.330	0.536	0.338	0.600	0.471	0.485	0.269	0.396	0.336	0.666	0.413
Aliwal North	0.360	0.632	0.338	0.581	0.457	0.440	0.193	0.407	0.326	0.618	0.404
Barkly-East	0.164	0.598	0.536	0.637	0.473	0.446	0.322	0.607	0.296	0.647	0.437
Bathurst	0.244	0.527	0.341	0.565	0.481	0.368	0.177	0.332	0.374	0.582	0.380
Bedford	0.183	0.549	0.435	0.670	0.496	0.392	0.395	0.492	0.408	0.626	0.432
Bizana	0.397	0.656	0.807	0.779	0.935	0.625	0.824	0.708	0.577	0.757	0.678
Butterworth	0.350	0.589	0.493	0.688	0.637	0.542	0.447	0.522	0.496	0.535	0.488
Cala	0.366	0.615	0.719	0.694	0.792	0.556	0.779	0.673	0.561	0.678	0.613
Cathcart	0.142	0.579	0.503	0.625	0.473	0.446	0.296	0.289	0.384	0.628	0.398
Cofimvaba	0.433	0.638	0.781	0.739	0.861	0.630	0.847	0.820	0.560	0.755	0.682
Cradock	0.018	0.516	0.288	0.571	0.319	0.414	0.179	0.254	0.343	0.593	0.306
East London	0.399	0.570	0.316	0.562	0.453	0.436	0.227	0.244	0.392	0.492	0.386
Elliot	0.209	0.614	0.581	0.665	0.535	0.420	0.271	0.380	0.407	0.660	0.433
Elliotdale	0.492	0.737	0.920	0.738	0.949	0.705	0.875	0.927	0.580	0.883	0.759
Engcobo	0.452	0.652	0.838	0.752	0.902	0.608	0.851	0.838	0.568	0.767	0.702
Flagstaff	0.428	0.637	0.893	0.774	0.927	0.617	0.829	0.751	0.583	0.764	0.692
Fort Beaufort	0.161	0.564	0.414	0.614	0.485	0.405	0.289	0.512	0.501	0.576	0.417
Graaff-Reinet	0.111	0.556	0.253	0.484	0.286	0.342	0.119	0.161	0.296	0.574	0.286
Hankey	0.254	0.556	0.241	0.569	0.481	0.523	0.325	0.495	0.287	0.659	0.403
Hewu	0.153	0.545	0.501	0.720	0.696	0.415	0.609	0.632	0.590	0.674	0.514
Hofmeyer	0.168	0.646	0.604	0.638	0.539	0.490	0.306	0.719	0.385	0.786	0.514

Source: Census 2001

TABLE D4: Deprivation dimensions by magisterial district for the Eastern Cape, 2001											
	Dwelling	**Crowding**	**Energy**	**Income**	**Water**	**Telephone**	**Refuse**	**Sanitation**	**Employment**	**Education**	**Average poverty**
Humansdorp	0.199	0.490	0.177	0.464	0.297	0.353	0.106	0.155	0.288	0.493	0.283
Idutywa	0.410	0.651	0.789	0.763	0.922	0.626	0.816	0.789	0.571	0.720	0.675
Indwe	0.050	0.631	0.550	0.673	0.587	0.508	0.303	0.698	0.428	0.680	0.461
Jansenville	0.039	0.474	0.396	0.612	0.353	0.364	0.222	0.541	0.379	0.646	0.361
Joubertina	0.077	0.558	0.357	0.507	0.263	0.495	0.302	0.346	0.165	0.587	0.331
Keiskammahoek	0.357	0.542	0.614	0.725	0.760	0.564	0.792	0.546	0.536	0.629	0.575
Kentani	0.426	0.689	0.901	0.759	0.958	0.609	0.874	0.906	0.592	0.790	0.729
King William's Town	0.246	0.541	0.292	0.504	0.379	0.355	0.396	0.376	0.246	0.443	0.336
Kirkwood	0.234	0.559	0.360	0.588	0.529	0.521	0.502	0.440	0.330	0.665	0.438
Komga	0.269	0.663	0.453	0.646	0.558	0.536	0.392	0.521	0.372	0.675	0.465
Lady Frere	0.296	0.632	0.738	0.728	0.841	0.557	0.876	0.806	0.582	0.793	0.652
Lady Grey	0.309	0.667	0.518	0.662	0.534	0.479	0.286	0.578	0.395	0.649	0.481
Libode	0.438	0.655	0.814	0.740	0.878	0.583	0.854	0.807	0.561	0.750	0.686
Lusikisiki	0.408	0.665	0.844	0.771	0.915	0.635	0.849	0.788	0.561	0.771	0.694
Maclear	0.138	0.647	0.577	0.680	0.636	0.516	0.266	0.633	0.344	0.710	0.465
Maluti	0.372	0.638	0.765	0.762	0.838	0.628	0.822	0.673	0.578	0.682	0.647
Mdantsane	0.260	0.555	0.366	0.669	0.420	0.454	0.143	0.236	0.517	0.536	0.373
Middelburg	0.020	0.515	0.269	0.603	0.189	0.407	0.101	0.113	0.351	0.588	0.270
Middledrift	0.186	0.525	0.637	0.727	0.809	0.458	0.823	0.678	0.601	0.691	0.581
Molteno	0.066	0.626	0.442	0.659	0.465	0.381	0.146	0.358	0.472	0.699	0.382
Mount Ayliff	0.440	0.626	0.790	0.763	0.848	0.644	0.810	0.727	0.582	0.683	0.669
Mount Fletcher	0.385	0.638	0.830	0.784	0.879	0.854	0.857	0.775	0.592	0.709	0.704
Mount Frere	0.414	0.569	0.783	0.747	0.874	0.714	0.787	0.695	0.532	0.658	0.652
Mpofu	0.342	0.550	0.777	0.685	0.865	0.586	0.748	0.687	0.540	0.693	0.622
Mqanduli	0.443	0.672	0.863	0.739	0.932	0.697	0.833	0.866	0.576	0.806	0.721

Source: Census 2001

TABLE D4: Deprivation dimensions by magisterial district for the Eastern Cape, 2001											
	Dwelling	**Crowding**	**Energy**	**Income**	**Water**	**Telephone**	**Refuse**	**Sanitation**	**Employment**	**Education**	**Average poverty**
Ngqueleni	0.450	0.667	0.829	0.737	0.953	0.647	0.828	0.844	0.568	0.756	0.707
Nqamakwe	0.405	0.569	0.836	0.768	0.906	0.602	0.844	0.780	0.542	0.666	0.673
Ntabethemba	0.164	0.649	0.554	0.712	0.771	0.557	0.836	0.697	0.551	0.757	0.585
Pearston	0.029	0.552	0.540	0.660	0.427	0.467	0.201	0.532	0.394	0.717	0.405
Peddie	0.235	0.525	0.717	0.747	0.827	0.617	0.790	0.606	0.615	0.715	0.608
Port Elizabeth	0.215	0.493	0.173	0.515	0.291	0.328	0.067	0.135	0.378	0.450	0.277
Port St Johns	0.446	0.665	0.858	0.732	0.884	0.621	0.802	0.858	0.526	0.745	0.688
Queenstown	0.147	0.595	0.310	0.597	0.322	0.419	0.213	0.217	0.417	0.525	0.333
Qumbu	0.428	0.600	0.815	0.733	0.903	0.631	0.813	0.749	0.558	0.709	0.670
Somerset East	0.113	0.540	0.410	0.602	0.418	0.453	0.195	0.294	0.351	0.649	0.364
Sterkspruit	0.175	0.631	0.601	0.722	0.805	0.691	0.831	0.708	0.547	0.692	0.601
Sterkstroom	0.083	0.529	0.464	0.680	0.392	0.421	0.166	0.519	0.485	0.655	0.396
Steynsburg	0.179	0.567	0.404	0.610	0.414	0.335	0.163	0.593	0.356	0.683	0.389
Steytlerville	0.043	0.465	0.411	0.533	0.335	0.314	0.265	0.539	0.335	0.626	0.367
Stutterheim	0.311	0.604	0.568	0.649	0.683	0.472	0.512	0.472	0.439	0.662	0.506
Tabankulu	0.475	0.637	0.874	0.774	0.915	0.654	0.851	0.850	0.573	0.783	0.716
Tarka	0.178	0.557	0.456	0.609	0.413	0.305	0.238	0.651	0.322	0.662	0.415
Tsolo	0.422	0.618	0.787	0.716	0.865	0.584	0.831	0.782	0.514	0.706	0.662
Tsomo	0.350	0.560	0.816	0.770	0.925	0.587	0.854	0.823	0.572	0.668	0.672
Uitenhage	0.262	0.499	0.208	0.542	0.321	0.354	0.090	0.144	0.398	0.518	0.302
Umtata	0.270	0.624	0.513	0.633	0.696	0.483	0.573	0.545	0.436	0.564	0.484
Umzimkulu	0.440	0.591	0.829	0.749	0.863	0.615	0.793	0.606	0.563	0.677	0.650
Venterstad	0.172	0.527	0.363	0.652	0.340	0.444	0.184	0.496	0.408	0.679	0.398
Victoria East	0.197	0.472	0.416	0.729	0.665	0.436	0.579	0.479	0.547	0.539	0.500
Willowmore	0.032	0.503	0.460	0.547	0.288	0.413	0.280	0.230	0.332	0.626	0.332
Willowvale	0.465	0.635	0.884	0.782	0.942	0.677	0.864	0.885	0.566	0.766	0.728
Wodehouse	0.078	0.648	0.544	0.673	0.502	0.498	0.449	0.594	0.371	0.660	0.454
Zwelitsha	0.246	0.586	0.418	0.662	0.609	0.451	0.504	0.404	0.487	0.596	0.450
Total	0.317	0.587	0.551	0.664	0.650	0.517	0.522	0.522	0.478	0.629	0.506

Source: Census 2001

TABLE D5: Changes in the dimensions of deprivation by magisterial district for the Western Cape, 1996 - 2001											
	Dwelling	**Crowding**	**Energy**	**Income**	**Water**	**Telephone**	**Refuse**	**Sanitation**	**Employment**	**Education**	**Average deprivation**
Beaufort West	-0.014	0.016	-0.107	-0.009	0.093	0.081	-0.034	-0.035	0.024	0.045	-0.003
Bellville	0.011	0.072	0.002	0.040	0.053	0.029	-0.005	0.009	0.008	0.124	0.023
Bredasdorp	-0.013	0.014	-0.078	-0.007	-0.011	0.022	-0.007	-0.072	-0.032	0.036	-0.020
Caledon	0.047	0.036	-0.019	0.018	0.073	0.022	-0.046	-0.008	0.047	0.042	0.023
Calitzdorp	0.004	0.047	-0.128	-0.019	0.076	-0.009	-0.003	-0.062	-0.076	0.011	-0.019
Cape	0.035	0.074	0.034	0.014	0.101	0.034	0.013	0.022	-0.021	0.065	0.033
Ceres	-0.027	0.029	-0.075	0.030	0.045	0.123	0.010	-0.056	0.009	0.030	0.004
Clanwilliam	0.007	0.042	-0.011	-0.002	0.042	0.149	-0.001	-0.073	-0.027	0.057	-0.004
George	-0.049	0.063	-0.029	0.046	0.088	0.021	0.006	-0.007	0.010	0.051	0.016
Goodwood	0.038	-0.051	-0.004	-0.018	0.096	-0.032	-0.021	0.043	-0.064	-0.038	0.003
Heidelberg	-0.029	-0.009	-0.139	0.024	0.041	-0.011	-0.038	-0.082	-0.114	0.005	-0.037
Hermanus	-0.013	0.079	0.016	0.029	0.055	0.006	-0.061	-0.036	-0.024	0.053	0.034
Hopefield	-0.015	0.014	-0.039	-0.018	0.022	-0.035	-0.016	-0.046	-0.081	0.003	-0.031
Knysna	-0.052	0.040	-0.051	0.009	0.034	0.002	-0.152	-0.071	-0.001	0.043	-0.026
Kuilsrivier	0.051	0.051	0.036	0.091	0.109	0.020	-0.022	0.028	0.106	0.077	0.053
Ladismith	-0.047	0.073	-0.150	-0.047	-0.066	0.113	-0.056	-0.096	-0.068	0.009	-0.050
Laingsburg	-0.012	0.001	-0.159	-0.047	0.065	0.054	-0.072	-0.055	0.043	-0.007	-0.005
Malmesbury	0.002	0.060	-0.027	-0.018	0.055	0.046	-0.016	-0.013	-0.022	0.063	0.006
Mitchellsplain	-0.223	0.027	-0.077	-0.011	0.051	-0.114	-0.079	-0.072	0.062	0.053	-0.049
Montagu	-0.015	-0.011	-0.071	-0.049	0.088	0.081	0.072	-0.008	-0.137	0.050	0.023
Moorreesburg	0.041	0.051	-0.060	0.051	0.017	0.202	-0.011	-0.045	-0.086	0.041	0.006
Mossel bay	-0.042	0.017	-0.001	-0.058	0.086	-0.021	-0.025	-0.006	-0.083	0.054	-0.013
Murraysburg	-0.023	-0.012	-0.161	0.003	0.085	-0.061	-0.058	-0.441	0.053	0.063	-0.064
Oudtshoorn	-0.011	0.025	-0.050	-0.007	0.100	0.059	0.003	-0.064	-0.006	0.072	-0.004
Paarl	0.003	0.044	-0.025	0.015	0.096	-0.039	-0.009	0.000	0.007	0.036	0.019

Source: Census 1996 and 2001

TABLE D5: Changes in the dimensions of deprivation by magisterial district for the Western Cape, 1996 - 2001											
	Dwelling	**Crowding**	**Energy**	**Income**	**Water**	**Telephone**	**Refuse**	**Sanitation**	**Employment**	**Education**	**Average deprivation**
Piketberg	-0.026	0.057	-0.102	0.020	0.014	0.104	0.090	-0.080	-0.065	0.049	-0.008
Prince Albert	-0.033	0.039	-0.140	-0.043	-0.001	-0.001	-0.046	-0.407	0.068	0.008	-0.070
Riversdal	-0.012	0.031	-0.109	-0.033	-0.029	-0.029	-0.056	-0.098	-0.075	0.014	-0.038
Robertson	-0.020	0.100	-0.071	0.010	0.057	0.109	-0.096	-0.059	-0.018	0.020	-0.002
Simonstown	-0.004	0.051	-0.009	0.007	0.040	-0.006	-0.004	-0.021	-0.038	0.063	0.006
Somerset West	0.131	0.100	0.070	0.112	0.173	0.101	-0.009	0.055	-0.023	0.101	0.091
Stellenbosch	0.010	0.029	-0.018	0.103	0.046	-0.039	0.024	-0.046	0.048	0.011	0.010
Strand	0.010	0.059	0.020	0.057	0.128	0.010	0.086	0.086	0.028	0.073	0.070
Swellendam	-0.012	0.000	-0.109	-0.006	0.018	0.052	-0.015	-0.052	-0.067	0.018	-0.012
Tulbagh	0.017	0.064	-0.140	0.002	0.039	0.142	0.018	-0.071	-0.020	0.052	0.005
Uniondale	-0.052	0.051	-0.123	-0.013	0.080	0.197	-0.105	-0.230	0.072	0.008	-0.033
Van Rhynsdorp	-0.035	0.037	-0.013	-0.010	-0.033	0.082	-0.031	-0.125	-0.058	0.041	-0.023
Vredenburg	0.019	0.031	0.012	0.067	0.095	-0.050	-0.020	-0.023	0.055	0.061	0.017
Vredendal	-0.020	0.059	-0.044	-0.009	0.049	0.080	0.043	-0.054	0.001	0.011	0.007
Wellington	-0.095	0.152	0.027	0.071	0.117	0.241	0.509	0.053	-0.129	0.222	0.098
Worcester	0.027	0.028	-0.049	0.009	0.074	0.046	0.037	-0.022	0.004	0.050	0.015
Wynberg	0.000	0.009	0.000	-0.027	0.043	-0.020	-0.007	0.009	-0.074	0.024	-0.008
Total	-0.010	0.046	-0.014	0.020	0.082	0.010	-0.018	-0.008	0.007	0.057	0.015

Source: Census 1996 and 2001

TABLE D6: Changes in the dimensions of deprivation by magisterial district for the Eastern Cape, 1996 – 2001											
	Dwelling	**Crowding**	**Energy**	**Income**	**Water**	**Telephone**	**Refuse**	**Sanitation**	**Employment**	**Education**	**Average poverty**
Aberdeen	0.014	-0.018	-0.128	0.012	0.068	0.049	-0.055	-0.166	0.030	0.037	-0.024
Adelaide	-0.007	-0.008	-0.081	-0.039	0.141	0.048	-0.050	-0.034	-0.036	0.021	-0.010
Albany	-0.015	0.033	0.001	0.023	0.129	0.005	-0.045	-0.035	0.015	0.066	0.004
Albert	-0.054	-0.037	-0.096	0.034	0.126	-0.017	-0.015	-0.214	0.036	0.047	-0.037
Alexandria	-0.032	0.003	-0.067	-0.042	0.074	0.084	-0.066	-0.034	-0.051	0.035	-0.020
Aliwal North	0.070	0.017	-0.035	-0.013	0.243	0.008	0.109	0.132	-0.053	0.062	0.051
Barkly-East	-0.158	-0.100	-0.079	-0.089	-0.046	-0.180	-0.176	-0.114	-0.064	0.012	-0.122
Bathurst	-0.135	0.028	-0.030	-0.044	0.012	-0.024	-0.093	-0.122	-0.034	0.017	-0.050
Bedford	0.010	-0.024	-0.088	-0.033	0.168	-0.026	0.062	-0.174	-0.025	0.018	-0.038
Bizana	-0.033	-0.001	-0.028	0.012	-0.023	-0.299	-0.008	-0.072	-0.090	0.083	-0.069
Butterworth	-0.026	-0.016	-0.080	0.036	0.051	-0.269	-0.032	-0.034	-0.008	0.087	-0.058
Cala	-0.005	-0.062	-0.087	-0.045	0.017	-0.284	0.008	-0.023	-0.108	0.084	-0.069
Cathcart	-0.054	0.012	-0.046	-0.024	0.120	-0.027	-0.135	-0.059	0.047	-0.004	-0.042
Cofimvaba	-0.028	-0.060	-0.040	-0.017	0.000	-0.237	-0.010	0.013	-0.076	0.062	-0.059
Cradock	-0.165	0.026	-0.124	-0.044	0.075	0.058	-0.095	-0.222	-0.001	-0.008	-0.072
East London	-0.002	0.016	0.006	0.068	0.126	0.041	-0.004	0.017	0.051	0.037	0.022
Elliot	-0.085	-0.033	-0.001	0.020	0.113	-0.069	-0.019	-0.027	0.026	0.016	-0.021
Elliotdale	-0.066	0.012	-0.009	-0.025	-0.025	-0.211	-0.030	-0.024	-0.115	0.051	-0.064
Engcobo	-0.078	-0.047	-0.030	0.003	-0.031	-0.287	-0.038	-0.040	-0.098	0.074	-0.080
Flagstaff	-0.087	-0.012	-0.011	-0.026	-0.044	-0.341	0.009	-0.004	-0.118	0.055	-0.082
Fort Beaufort	-0.074	0.027	0.006	-0.025	0.174	0.000	0.047	-0.104	0.027	0.014	-0.021
Graaff-Reinet	0.010	0.031	-0.103	-0.024	0.006	0.041	0.020	-0.221	-0.074	0.043	-0.025
Hankey	-0.037	0.002	-0.053	-0.017	0.130	0.062	-0.047	-0.005	-0.024	0.086	-0.010
Hewu	-0.003	-0.049	-0.046	0.026	0.155	-0.201	0.155	0.053	-0.030	0.067	-0.002
Hofmeyer	-0.048	0.106	0.027	-0.018	0.177	0.176	0.036	0.019	-0.026	0.098	0.059

Source: Census 1996 and 2001

TABLE D6: Changes in the dimensions of deprivation by magisterial district for the Eastern Cape, 1996– 2001											
	Dwelling	**Crowding**	**Energy**	**Income**	**Water**	**Telephone**	**Refuse**	**Sanitation**	**Employment**	**Education**	**Average poverty**
Humansdorp	-0.061	0.016	-0.067	0.026	0.040	0.045	-0.118	-0.121	0.016	0.055	-0.023
Idutywa	-0.081	0.010	-0.058	0.010	-0.013	-0.321	-0.084	-0.051	-0.080	0.080	-0.088
Indwe	-0.043	-0.008	0.001	-0.039	0.128	-0.063	0.024	-0.025	-0.089	0.021	-0.024
Jansenville	-0.005	-0.009	-0.128	-0.013	0.044	0.033	-0.034	-0.060	0.006	-0.005	-0.025
Joubertina	0.012	0.040	-0.091	-0.012	0.022	0.129	-0.129	-0.040	-0.021	0.034	-0.037
Keiskammahoek	-0.155	-0.070	-0.181	0.035	-0.037	-0.311	-0.008	-0.107	-0.081	0.057	-0.116
Kentani	-0.025	-0.007	-0.029	0.020	-0.011	-0.323	-0.017	-0.015	-0.100	0.035	-0.065
King William's Town	0.142	0.047	0.141	0.113	0.246	0.058	0.297	0.243	0.016	0.084	0.114
Kirkwood	0.009	0.032	-0.028	-0.035	0.162	0.114	0.099	-0.028	-0.009	0.028	0.016
Komga	-0.102	0.037	-0.129	0.011	0.054	-0.025	0.007	-0.066	0.015	0.024	-0.048
Lady Frere	0.005	-0.027	0.042	0.022	0.149	-0.302	0.119	0.108	-0.037	0.138	0.010
Lady Grey	0.002	0.005	-0.031	-0.001	0.079	0.012	0.073	-0.069	0.058	-0.015	0.002
Libode	-0.092	-0.029	-0.032	0.003	-0.016	-0.356	0.003	-0.030	-0.091	0.064	-0.078
Lusikisiki	-0.035	-0.006	-0.023	-0.003	-0.018	-0.286	-0.009	-0.048	-0.102	0.043	-0.071
Maclear	-0.090	-0.001	-0.059	-0.054	0.118	-0.097	-0.087	-0.099	-0.084	0.052	-0.073
Maluti	-0.096	-0.005	-0.010	-0.022	-0.025	-0.290	-0.012	-0.072	-0.091	0.091	-0.077
Mdantsane	-0.010	-0.036	0.022	0.078	0.157	-0.074	-0.119	-0.023	0.075	0.034	0.006
Middelburg	-0.016	-0.009	-0.049	0.058	0.066	0.061	-0.023	-0.095	0.060	0.015	-0.002
Middledrift	-0.046	-0.078	-0.149	0.014	0.076	-0.360	0.013	-0.030	-0.051	0.060	-0.076
Molteno	-0.070	-0.027	0.003	0.032	0.074	0.034	-0.016	-0.192	0.025	0.016	-0.034
Mount Ayliff	-0.111	0.005	-0.056	-0.011	-0.033	-0.287	-0.002	-0.026	-0.102	0.065	-0.079
Mount Fletcher	-0.049	-0.027	-0.009	0.023	-0.006	-0.085	0.003	-0.062	-0.081	0.091	-0.041
Mount Frere	-0.048	-0.031	-0.039	0.001	-0.013	-0.217	-0.028	-0.048	-0.117	0.110	-0.067
Mpofu	-0.141	-0.053	-0.062	0.000	0.100	-0.124	-0.037	-0.035	-0.103	-0.009	-0.071
Mqanduli	-0.088	-0.006	-0.048	-0.023	-0.037	-0.256	-0.100	-0.054	-0.109	0.047	-0.089

Source: Census 1996 and 2001

TABLE D6: Changes in the dimensions of deprivation by magisterial district for the Eastern Cape, 1996– 2001											
	Dwelling	**Crowding**	**Energy**	**Income**	**Water**	**Telephone**	**Refuse**	**Sanitation**	**Employment**	**Education**	**Average poverty**
Ngqueleni	-0.070	0.021	-0.042	-0.045	-0.010	-0.280	-0.021	-0.011	-0.093	0.050	-0.070
Nqamakwe	-0.027	-0.037	-0.033	0.005	-0.057	-0.316	-0.031	-0.024	-0.144	0.125	-0.075
Ntabethemba	-0.030	-0.054	-0.104	0.001	0.174	-0.154	0.006	-0.086	-0.129	0.049	-0.055
Pearston	0.010	0.100	-0.094	-0.028	0.068	0.084	-0.027	-0.144	-0.059	0.060	-0.010
Peddie	-0.018	-0.098	-0.040	0.019	-0.013	-0.072	0.007	-0.068	-0.027	0.033	-0.049
Port Elizabeth	-0.063	0.023	-0.004	0.035	0.125	0.003	0.026	0.011	0.025	0.067	0.020
Port St Johns	-0.095	-0.014	-0.017	-0.045	-0.050	-0.286	-0.022	-0.029	-0.137	0.030	-0.093
Queenstown	-0.108	0.038	-0.011	0.029	0.077	-0.031	-0.029	-0.072	0.035	0.076	-0.003
Qumbu	0.020	0.007	-0.041	-0.014	-0.020	-0.344	-0.014	-0.053	-0.081	0.085	-0.066
Somerset East	-0.053	0.036	-0.031	0.003	0.093	0.114	-0.086	-0.171	0.002	0.055	-0.014
Sterkspruit	-0.069	-0.073	-0.061	-0.010	0.001	-0.149	0.010	-0.074	-0.150	0.055	-0.076
Sterkstroom	-0.025	-0.003	-0.011	0.010	0.109	-0.004	-0.108	-0.160	-0.017	0.012	-0.035
Steynsburg	0.082	0.022	-0.069	-0.094	0.170	0.069	-0.085	-0.005	-0.076	0.019	-0.018
Steytlerville	-0.035	0.001	-0.118	-0.033	-0.031	-0.080	-0.046	-0.002	0.027	0.061	-0.019
Stutterheim	-0.074	0.009	0.044	0.008	0.135	0.017	0.014	-0.039	-0.004	0.051	-0.010
Tabankulu	-0.073	-0.014	-0.025	0.089	-0.034	-0.314	-0.087	-0.047	-0.114	0.072	-0.082
Tarka	0.065	0.040	-0.079	-0.024	0.065	0.018	-0.037	-0.008	-0.047	0.036	0.003
Tsolo	0.050	0.021	0.199	0.062	0.259	-0.091	0.289	0.224	-0.009	0.134	0.100
Tsomo	-0.062	-0.087	-0.001	0.033	0.057	-0.271	0.029	0.006	-0.058	0.028	-0.048
Uitenhage	-0.247	-0.056	-0.665	-0.231	-0.630	-0.629	-0.778	-0.709	-0.256	-0.041	-0.460
Umtata	-0.028	0.130	0.303	0.093	0.524	0.117	0.492	0.415	0.068	0.108	0.179
Umzimkulu	0.063	-0.018	0.275	0.097	0.234	-0.143	0.239	0.037	0.111	0.156	0.098
Venterstad	-0.351	-0.110	-0.517	-0.072	-0.562	-0.392	-0.613	-0.172	-0.215	0.074	-0.324
Victoria East	0.004	-0.093	0.053	0.151	0.386	0.088	0.358	-0.052	0.053	-0.115	0.108
Willowmore	-0.242	-0.046	-0.127	-0.113	-0.446	-0.256	-0.461	-0.379	-0.231	0.074	-0.257
Willowvale	0.384	0.084	0.318	0.232	0.567	0.373	0.554	0.359	0.240	0.195	0.330
Wodehouse	-0.428	-0.014	-0.356	-0.100	-0.450	-0.472	-0.485	-0.306	-0.300	-0.002	-0.339
Zwelitsha	0.020	-0.070	-0.160	-0.001	0.240	0.050	0.088	-0.304	0.151	-0.070	-0.029
Total	-0.057	-0.077	-0.009	0.035	0.102	-0.135	-0.044	0.032	0.006	0.046	-0.031

Source: Census 1996 and 2001