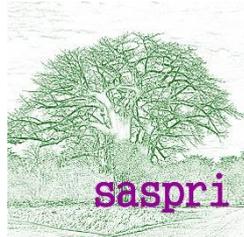




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Poverty and Deprivation in South
Africa: Small Area Change Over Time
2001 to 2011

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1. Introduction

This Working Paper has been produced as part of the ESRC/NRF-funded research programme: 'Changing Socio-Spatial Inequalities: Population change and the lived experience of inequality in urban South Africa'.

The research programme as a whole consists of a series of discrete yet interlinked strands of work, utilising both quantitative and qualitative methodologies to provide new insights into people's lived experiences of inequality in South Africa.

The purpose of this Working Paper is to highlight the change in deprivation levels over a 10-year period (2001-2011) in South Africa and the City of Cape Town specifically. In particular, the paper will highlight areas that have seen relative improvement between the two time points, those that have shown a relative decline and areas that have experienced little change over the decade. The report will begin by looking at changes in the levels of multiple deprivation, income poverty (based on the upper bound poverty line), and living environment deprivation at provincial, municipal and ward level. Changes in multiple deprivation as well as levels of income poverty and living environment deprivation for the City of Cape Town will be given particular prominence as this city was the study location for the qualitative component of the ESRC-NRF project on Changing Socio-spatial Inequalities in South Africa: population change and the lived experience of inequality in South Africa.

2. Background

The first small area level index of multiple deprivation produced for South Africa was the Provincial Indices of Multiple Deprivation 2001 (PIMD 2001). The PIMD 2001 was based on 2001 Census data and was constructed at ward level (Noble et al., 2006).

The conceptual model which underpinned the PIMD and later indices "is based on the idea of distinct domains of deprivation, which can be recognised and measured separately. These are experienced by individuals living in an area. People may be counted as deprived in one or more of the domains, depending on the number of types of deprivation that they experience. The overall [South African] index of multiple deprivation is conceptualised as a weighted area level aggregation of these specific domains of deprivation" (Noble et al., 2013).

The PIMD 2001 consisted of five component domains of deprivation measured at ward level using the 2001 Census data: income and material deprivation; employment deprivation; education deprivation; health deprivation; and living environment deprivation. The PIMD 2001 allowed a ranking of wards within each province on each of these five component domains. The five domains were then brought together to generate an overall Index of Multiple Deprivation for each ward, which was also ranked across wards within each province.

In a further piece of work, a new statistical geography for South Africa was developed by Avenell et al (2009), called Datazones. This new statistical geography, which consisted of areas of standardised population size across the whole of South Africa, facilitated the re-construction of an index of multiple deprivation for 2001 at datazone level - the South African Index of Multiple Deprivation 2001 (SAIMD 2001) (Noble et al., 2009).

In addition to the PIMD 2001 and the SAIMD 2001, a series of child focused indices followed, again utilising the 2001 Census data (Barnes et al. 2007; Barnes et al. 2009; Wright et al., 2009). Thereafter, the indices were updated to a 2007 time point at municipality level (Wright and Noble, 2009; Wright et al., 2009b) using the 2007 Community Survey. The Community Survey 2007 was (with other data) also used to produce a modelled SAIMD at datazone level for 2007 (Noble et al., 2010).

More recently, a ward level index has been produced using published 2011 Census data: the SAIMD 2011. The SAIMD 2011 is therefore the latest in the series of indices of multiple deprivation for South and Southern Africa that have been developed using census data to describe multiple deprivation at sub municipality level (Noble et al., 2013).

This analysis builds on the indices of deprivation described above. The aim in this piece of research was to construct a comparable ward level SAIMD for both 2001 and 2011 timepoints to facilitate the analysis of change over time. This was made possible by the release of Census data by Statistics South Africa for 2001 and 2011 on common 2011 ward boundaries. However, due to the differences in data availability between 2001 and 2011, this new analysis involved the construction of harmonised domains of deprivation and a harmonised overall index of multiple deprivation. To avoid confusion with earlier indices we refer to these new ward level indices as the Harmonised South African Index of Multiple Deprivation 2001-2011 (HSAIMD 2001-2011).

It is important to emphasise the integrity of the domains of deprivation. So, for example, the employment domain reflects exclusion from the world of work and not the lack of income such exclusion generates. Clearly the dimensions of deprivation are related, and it is quite possible for the same person or household to be represented in more than one domain. So, for example, employment deprivation is usually associated with low income and low income can lead to high levels of income poverty. Similarly, education deprivation can result in employment deprivation. Nevertheless, the aggregate effects of different deprivations are also of interest and so an aggregate index of multiple deprivation is also generated.

It should also be emphasised that each of the domains measures the proportion of people or households experiencing that deprivation in an area, meaning that the ward domain score is easy to interpret as a deprivation rate. This allows analysis of both absolute and relative change over time in deprivation rates.

3. Purpose

South Africa has made significant progress since 1994 in reducing overall poverty and deprivation levels in the country. The increase in public spending on social grants and the provision of basic goods and services has led to a decrease in poverty and vulnerability in historically disadvantaged areas of the country (Van der Berg et. al, 2008). However, high and persistent inequalities, including spatial inequalities, are still among the main challenges that need to be addressed in order to create an inclusive society (National Planning Commission, 2012).

Understanding the extent of inequalities at local levels is important for poverty reduction and other social policies. International research has found that high levels of inequality can be associated with a range of social ills including, higher crime rates (Demombynes & Özler, 2006), lower income growth of the poor (Van der Weide & Milanovic, 2018), and lower intergenerational mobility (Chetty et al.,2014). This Working Paper and the data underpinning it can be used as a basis to identify

clusters of poverty and deprivation at local levels and changes in these over time, and so can be useful to policymakers in their anti-poverty reduction strategies.

4. Domains and Component Indicators

There are four domains in the HSAIMD 2001-2011: income poverty; employment deprivation; education deprivation; and living environment deprivation. The indicators that comprise the four domains are detailed below.

Income Poverty Domain

Purpose of domain

The purpose of this domain is to capture the proportion of the population in a ward living in income poverty.

Background

There are a range of poverty lines which could have been used in this domain. The one adopted is based on work undertaken by Hoogeveen and Ozler (2006). They proposed two poverty lines - a “lower bound” poverty line and an “upper bound” poverty line. The upper bound poverty line was used here for both 2001 and 2011, with appropriate adjustments made using the CPI. The resultant poverty lines used here were as follows:

	October 2001 Per capita per month	October 2011 Per capita per month
Adjusted Upper Bound Poverty Line	R624	R1117

Indicators

- Number of people (adults and children) in a ward living below the higher bound poverty line

Combining the indicators

A simple proportion of the population living below the higher bound poverty line.

Employment Deprivation Domain

Purpose of domain

This domain measures employment deprivation in terms of the expanded definition of unemployment for people of working age.

Background

In addition to the 'official' definition of the unemployed (which accords with the definition promulgated by the International Labour Organisation) we also consider those who are 'discouraged workers' as it is recommended that they should be included (e.g. Lloyd and Leibbrandt, 2013). This generates a measure that is sometimes regarded as the 'expanded' definition of unemployment.

Indicators

- Number of people aged 15 to 64 inclusive who are unemployed (using official definition);
plus
- Number of people aged 15 to 64 inclusive who are discouraged workers.

Statistics South Africa (StatsSA) gives the official definition of the unemployed as 'those people aged 15–65¹ years who: did not work during the 7 days prior to 10 October; and, want to work and are available to start work within a week of the interview; and, have taken active steps to look for work or to start some form of self-employment in the 7 days prior to 10 October. (Statistics South Africa, 2012: 78). 'Active steps to seek work' are defined by StatsSA as: 'Steps such as registration at unemployment exchange, applications to employers, checking at work sites or farms, placing or answering newspaper advertisements, seeking assistance of friends, etc.' (Statistics South Africa, 2012: 6).

Discouraged workers are those who: did not work during the 7 days prior to 10 October; and, want to work and are available to start work within a week of the interview; and, have not taken 'active steps to seek work', and, gave the reason for not working as 'no jobs available'

Combining the indicators

By combining the numbers of 'officially' unemployed with the 'discouraged workers' we obtain the numerator for this domain which accords with the expanded definition of unemployment.

The denominator is the labour force (sometimes referred to as the economically active population). This comprises the employed, the official unemployed, and the discouraged workers aged 15 – 64 inclusive.

¹ Although StatsSA used the definition 15-65 in the metadata, the actual data only has values for ages 15 to 64 inclusive and this latter age range is therefore used in the index.

Education Deprivation Domain

Purpose of domain

The purpose of this domain is to capture the extent of deprivation in terms of educational qualifications in a local area for adults aged 18 to 64 years inclusive.

Background

It is well documented that the level of education an individual has achieved determines both current income and savings potential and future opportunities for individuals and their dependents (e.g. Borat *et al.*, 2004).

Unfortunately, there are no Census questions on educational attainment *per se*, but there is information on the highest level of education reached and this will be a good proxy for educational attainment. Many of the disparities in educational achievement throughout the adult population are direct legacies of the apartheid education system and, in particular the Bantu Education Act 1953. Thus, it is to be expected that these disparities in education will be spatially contoured.

Indicator

- Number of 18-64 year olds (inclusive) with no schooling at secondary level or above.

The denominator is the total number of 18-64 year olds (inclusive).

Living Environment Deprivation Domain

Purpose of domain

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

Background

This domain considers different aspects of the immediate environment in which people live that impact on the quality of their day-to-day life. This covers issues which might be regarded as service delivery deprivations. This domain is measured at the individual level.

Indicators

Number of households:

- without an adequate water supply; or

- without access to an adequate toilet; or
- without use of electricity for lighting; or
- living in a house that is a shack.

Adequate water supply is defined as ‘piped water inside dwelling’, ‘piped water inside the yard’, or ‘piped water on community stand within 200 metres’. We define adequate toilet here as ‘flush toilet connected to the sewerage’, ‘flush toilet connected to septic tank’, or ‘ventilated pit latrine’².

Combining the indicators

A simple proportion of households experiencing one or more of the deprivations was calculated (i.e. the number of households without an adequate water supply and/or without adequate toilet facilities and/or without electricity for lighting and/or a house that is a shack, divided by the total households).

Table 1: Domains and Indicators of the Harmonised South African Index of Multiple Deprivation 2001-2011

Income Poverty Domain	Employment Deprivation Domain	Education Deprivation Domain	Living Environment Deprivation Domain
% of individuals living below the Hogeveen and Ozler upper bound poverty line adjusted for inflation	% of working age people who are: <ul style="list-style-type: none"> • unemployed (using the expanded definition) 	% of 18-64 year olds who: <ul style="list-style-type: none"> • have no schooling at secondary level or higher 	% of households who: <ul style="list-style-type: none"> • have inadequate water supply, or • have inadequate sanitation, or • do not use electricity as main source for lighting, or • live in a shack.

NOTE: Each domain score was standardised and transformed to a common distribution and then combined with equal weights (i.e. 25% per domain). For more details about the SAIMD 2011 components and construction see Noble *et al.* (2013).

5. The Harmonised SAIMD

Each domain or dimension of deprivation has a score which is the proportion of the population (or households) experiencing that deprivation. These domain measures (which can be referred to as domain indices) are then ranked and can be used separately to describe patterns of each type of deprivation across the country. Within a domain, the higher the score, the more deprived the ward. However, the scores should not be compared between domains as they have different ranges. To compare between domains, the ranks should be used. A rank of 1 is assigned to the most deprived ward.

² These were selected as standards commonly used by government.

The overall HSAIMD for 2001 and 2011 describes a ward by combining information from all four domains: Income Poverty Deprivation, Employment Deprivation, Education Deprivation and Living Environment Deprivation. These are combined in three stages; first each domain is standardised by ranking; the ranks are then transformed to a standard distribution – the exponential distribution (Noble *et al.* 2013). Finally, the domains are combined using equal weights. The final ward level HSAIMD 2001 and HSAIMD 2011 are then ranked with the most deprived ward given a rank of 1 and the least deprived ward a rank of 4,277.

The HSAIMD for both 2001 and 2011 at ward level can be described as the combined sum of the weighted and exponentially transformed rank of the component domain scores. The larger the HSAIMD score, the more deprived the ward. However, because of the way that the component domains scores have been transformed, the scores are not linear. Thus, a ward with a score of 60 can be said to be more deprived than a ward with a score of 30 but cannot be regarded as twice as deprived.

In the remainder of this document analysis is presented at different spatial levels. The analysis begins at the national level then proceeds to analysis at the provincial level followed by analysis the municipality level and finally analysis of ward level. Analysis is for the overall HSAIMD 2001–2011 with some additional analyses focusing on two of the domains: income poverty and living environment deprivation - both of which feature prominently in the qualitative theme of this ESRC/NRF-funded research study.

6. National level analysis

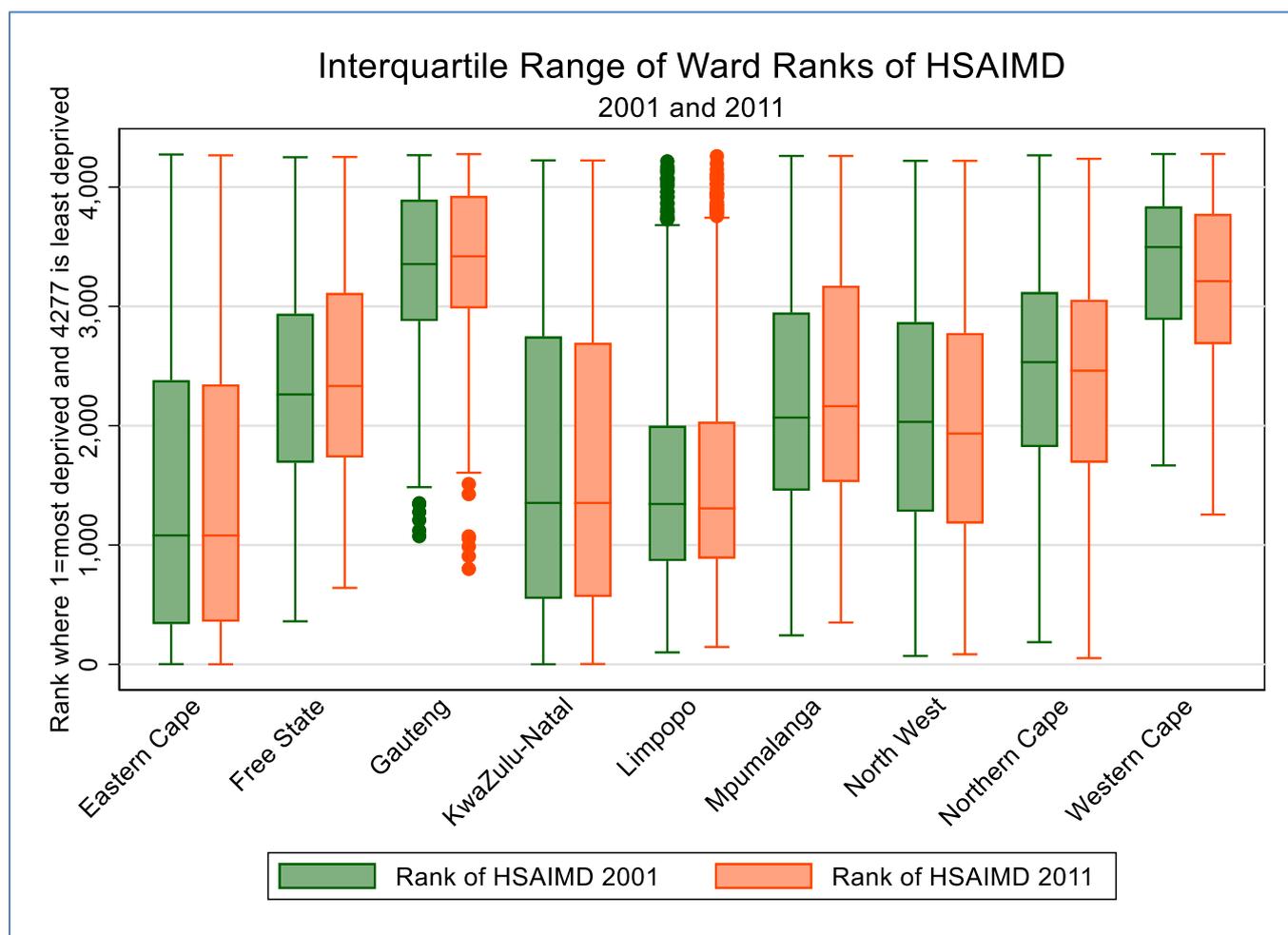
Looking at the national picture of the change in deprivation levels between 2001 and 2011 indicates that South Africa has seen improvement for all four domains of deprivation. **Figure 1** below depicts the interquartile range of all ward ranks for the overall HSAIMD for both 2001 and 2011.

These box plots and those that follow should be interpreted as follows. The range of deprivation is illustrated by the vertical line (with outliers shown as dots). So, if we take the Eastern Cape in 2011 as an example, the most deprived ward is located in Port St Johns local municipality and is ranked 1 in the country (where 1 = most deprived nationally) – it is both the most deprived ward in the country and in the Eastern Cape. The Eastern Cape’s least deprived ward is located in Buffalo City municipality and is ranked 4266 (where 4277 = least deprived nationally). So, the range of deprivation in wards in the Eastern Cape is very large.

The green box indicates the range of the middle 50 per cent of wards in the province (the interquartile range³) while the horizontal line in the box is the median ward’s rank. The boxes for the Western Cape, Gauteng and Limpopo are relatively compressed (in both 2001 and 2011), indicating that these provinces’ wards are concentrated in a fairly narrow range. For Limpopo, the box sits towards the bottom of the chart, which shows that deprivation in the province is concentrated in the most deprived part of the national distribution. However, for the Western Cape and Gauteng the boxes sit towards the top of the chart, which shows that deprivation in these provinces is concentrated in the least deprived part of the national distribution.

³ The interquartile range (IQR) is ‘a measure of dispersion calculated by taking the difference between the first and third quartiles (that is, the 25th and 75th percentiles). In short, the IQR is the middle half of a distribution’ (Vogt, 1999: 143).

Figure 1 Interquartile range of Ward Ranks of the HSAIMD



Then turning now to each individual deprivation domain, the following table (**Table 2**) presents the percentages of each of the domains of deprivation across South Africa for the two time points. It is clear that, in absolute terms, poverty and deprivation have fallen between the two time points. With the largest percentage point fall relating to education deprivation. This is to be expected as the education domain is looking at those adults who did not have any secondary schooling. Since 1994 this is a declining phenomenon as school attendance has increased dramatically in the post-apartheid era. However, both income poverty and living environment deprivation have also seen large absolute reductions. This fall in absolute levels nationally does not of course speak to relative change over time and this will be picked up later in report. It should also be noted that despite the reductions in absolute levels of deprivation shown here, the rates of deprivation remain very high by many international standards.

Table 2: Rates of Deprivation at National level for each Domain in the HSAIMD 2001 and 2011

	2001	2011	Change
Income Poverty	76.32%	64.57%	-11.75%
Employment Deprivation	46.61%	39.98%	-6.63%
Education Deprivation	36.47%	21.44%	-15.03%
Living Environment Deprivation	56.58%	44.27%	-12.31%

7. Provincial Analysis

Overall deprivation: HSAIMD

Because the HSAIMD 2001 and 2011 are *ward level* measures, it is not possible to give direct national and provincial HSAIMD scores. However, it is possible to summarise the ward level HSAIMDs at provincial level (and at other spatial scales such as district municipality and local municipality). There are a number of possibilities but the most meaningful is to calculate the population weighted average rank of the wards for each higher-level geography (Noble et al., 2000; Noble et al., 2004).

At province level, we calculate the population weighted average rank for the wards in each province at both time periods. The lower the population weighted average rank of the wards in that province, the more overall multiple deprivation there is in the province. From **Table 3** below, we can see that the Eastern Cape has a population weighted average rank of 1506.24 in 2001 and is the most deprived province in South Africa on this measure in 2001. On the other hand, with a population weighted average rank of 3456.48, the Western Cape was the least deprived province in the country in 2001. In 2011, however, we see that Limpopo had a population weighted average rank of 1643.57 (just marginally ahead of the Eastern Cape) and is consequently the most deprived province in 2011, while Gauteng ranked as the least deprived country in 2011.

In **Table 3** below, the provinces shaded in green are provinces that have seen improvements in their rates of overall deprivation and have subsequently moved up a rank in their rank order in relation to other provinces. The province shaded in yellow is one which remained on the same rank order over the ten-year period even though average ward rank value in that province had improved slightly. It is important to emphasize that although a province may not have improved its overall rank order in the table, that does not mean that there has been no absolute improvement in wards in those provinces, as the rank order is affected by changes in the other provinces as well as the province in question.

Table 3: Overall HSAIMD rank changes

Province Name	Average Rank 2001	Rank Order 2001	Province Name	Average Rank 2011	Rank Order 2011
Eastern Cape	1506.24	1	Limpopo	1643.57	1
Limpopo	1548.59	2	Eastern Cape	1643.71	2
KwaZulu-Natal	1938.00	3	KwaZulu-Natal	2024.67	3
Mpumalanga	2044.58	4	North West	2097.64	4
North West	2060.53	5	Mpumalanga	2212.12	5
Free State	2292.35	6	Northern Cape	2333.82	6
Northern Cape	2400.18	7	Free State	2472.63	7
Gauteng	3273.19	8	Western Cape	3301.26	8
Western Cape	3456.48	9	Gauteng	3372.58	9

Domains of deprivation

Table 4 (below) provides the provincial rates of deprivation for the income poverty and living environment domains in 2001 and 2011. The Western Cape and Gauteng generally have the lowest rates of deprivation for each of the domains. There is a general trend of decreasing levels of deprivation in all provinces for each domain over the ten-year period. However, relative to Gauteng and the Western Cape, the other seven provinces still have higher rates of deprivation.

Limpopo had the highest level of Living Environment deprivation in 2001 with 85% of the population being deprived on this domain. This improved slightly in 2011 as the proportion of those experiencing Living Environment deprivation decreased to 75%. The Eastern Cape and the North West are the second and third most Living Environment deprived provinces for 2011 with figures of 60% and 59% respectively. It is worth noting that although overall levels of deprivation are decreasing, they are still very high in the provinces that contain the former homelands such as the Eastern Cape, KwaZulu-Natal, and Limpopo⁴.

⁴ The former homelands were areas of land designated by the Apartheid government specifically for Black Africans. These areas were located in the Eastern Cape, Kwa-Zulu Natal, Limpopo, Mpumalanga, North West and Free State provinces.

Table 4: Provincial rates of deprivation

Province Name	Higher bound poverty 2001	Higher bound poverty 2011	Living environment deprivation 2001	Living environment deprivation 2011
Eastern Cape	87%	77%	73%	60%
Free State	83%	69%	60%	34%
Gauteng	60%	49%	35%	25%
KwaZulu-Natal	81%	71%	64%	54%
Limpopo	89%	78%	85%	75%
Mpumalanga	84%	70%	70%	55%
North West	82%	68%	71%	59%
Northern Cape	80%	66%	50%	38%
Western Cape	57%	52%	26%	23%

8. Municipal level analysis

Overall HSAIMD

In order to illustrate the changes in the HSAIMD at municipality level, the population weighted average rank of the wards in each municipality was calculated for both time points following the approach utilised at provincial level and described above. Having created the population weighted average ranks the municipalities were then re-ranked and the rank of one was given to the most deprived municipality. This is undertaken for both time points. **Table 5** illustrates the 20 most deprived municipalities in South Africa at each of the two time points. **Table 6** repeats the exercise for the 20 least deprived municipalities. In each of the two tables, a rank of 1 represents the municipality that is most deprived and a rank of 234 represents a municipality that is least deprived at each time point. A line traces the trajectory of a municipality between the two time points. A municipality that improves (relative to other municipalities) between 2001 and 2011 is shaded green and one that gets worse (relative to other municipalities) is shaded red.

From **Table 5**, we can see that 17 of the most deprived municipalities in the country in 2001 were still among the top 20 most deprived group in 2011, though many had changed their relative position. Three municipalities, Nongoma, Umzimhulu and Ingwe local municipalities, (all highlighted in green), moved out of the group of the top 20 most deprived municipalities in 2011. On the other hand, Vulamehlo, Joe Morolong and Ntambanana local Municipalities (highlighted in red) are new entrants into the most deprived 20 municipalities in 2011.

From **Table 6**, we can see that 16 municipalities remained among the least deprived over the 10-year period. However, four from 2001, namely; George, Matzikama, Hessequa and Bergriver Local Municipalities (highlighted in red) moved out of the 20 least deprived municipalities over the decade and were replaced by new entrants in 2011 namely; Emfuleni, Mogale City, Richtersveld and Steve Tswhet Local Municipalities (highlighted in green).

Table 5: Top 20 most deprived municipalities

Municipal overall deprivation levels for 2001/2011 (20 most deprived municipalities)				
Municipality name	2001		2011	Municipality name
Msinga	1		1	Msinga
Ntabankulu	2		2	Port St Johns
Port St Johns	3		3	Ntabankulu
Maphumulo	4		4	Maphumulo
Mbizana	5		5	Engcobo
Mbhashe	6		6	Ratlou
Engcobo	7		7	Ngquza Hill
Nqutu	8		8	Mbizana
Nyandeni	9		9	Vulamehlo
Nkandla	10		10	Mbhashe
Ngquza Hill	11		11	Nkandla
Umzumbe	12		12	Joe Morolong
Ndwedwe	13		13	Nqutu
Intsika Yethu	14		14	Indaka
Ratlou	15		15	Intsika Yethu
Indaka	16		16	Ntambanana
Nongoma	17		17	Nyandeni
Umhlabuyalingana	18		18	Ndwedwe
Umzimkhulu	19		19	Umhlabuyalingana
Ingwe	20		20	Umzumbe

Table 6: Top least deprived municipalities

Municipal overall deprivation levels for 2001/2011 (20 least deprived municipalities)				
Municipality name	2001		2011	Municipality name
Nama Khoi	215		215	Bitou
Ekurhuleni	216		216	Swartland
George	217		217	Emfuleni
Midvaal	218		218	Knysna
Randfontein	219		219	Cape Agulhas
Knysna	220		220	Emalaheni
Matzikama	221		221	Mogale City
Hessequa	222		222	Mossel Bay
Swartland	223		223	Drakenstein
City of Tshwane	224		224	Randfontein
Drakenstein	225		225	Richtersveld
Bergrivier	226		226	Stellenbosch
City of Johannesburg	227		227	Ekurhuleni
Bitou	228		228	Midvaal
Mossel Bay	229		229	Steve Tshwete
Cape Agulhas	230		230	City of Tshwane
City of Cape Town	231		231	Overstrand
Stellenbosch	232		232	Saldanha Bay
Saldanha Bay	233		233	City of Cape Town
Overstrand	234		234	City of Johannesburg

Domains of Deprivation

In this section, we first analyse Income Poverty and Living Environment Deprivation using box plots. These diagrams illustrate the distribution of municipality rates of Income Poverty and Living Environment Deprivation by province. Analysing the change in poverty and deprivation levels in this way provides a broad picture of the changes that have taken place in South African municipalities over the ten years.

The interpretation of the box plots is as described above. The only difference is that in these box plots the Y axis is not ranks of overall multiple deprivation but rather the *proportion* of the population living environment deprived or income poor. So, in these cases the boxes representing interquartile range sit towards the top of the chart where deprivation/income poverty is highest.

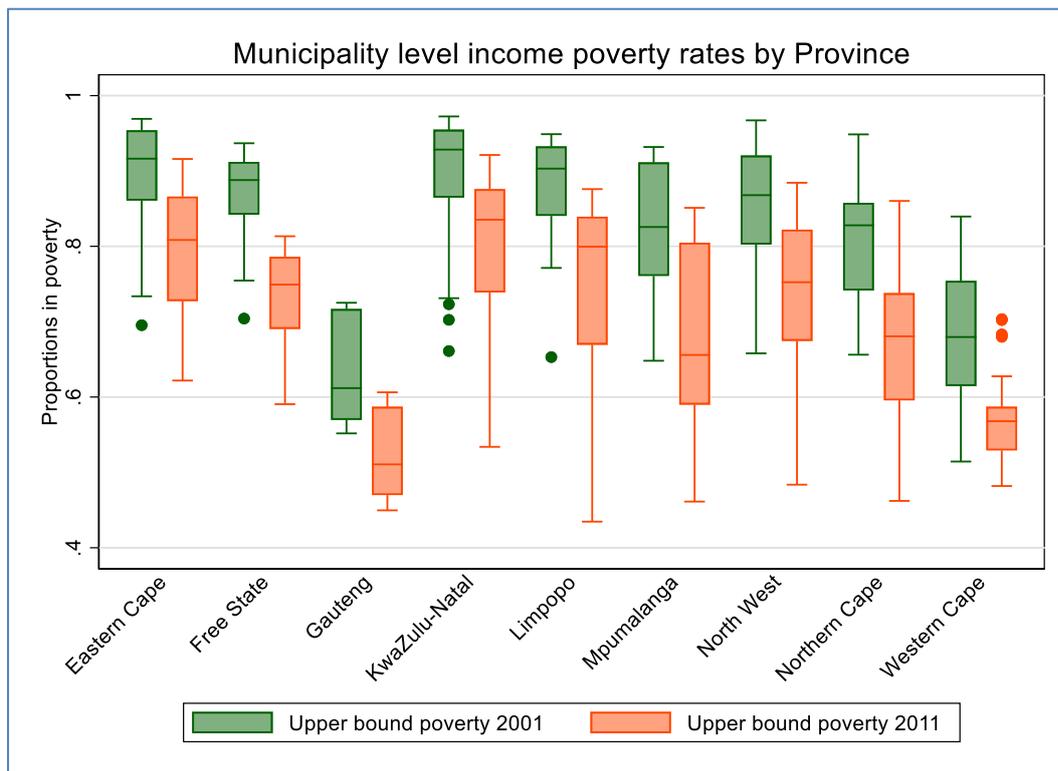
Income poverty

From **Figure 2**, we can see that in 2001 the interquartile range for municipalities in the Eastern Cape, the Free State, KwaZulu-Natal, Limpopo and North West all fell above 0.8. This basically means that three quarters or more of the municipalities in those provinces had poverty rates greater than 80%.

Municipalities in Gauteng and the Western Cape on the other hand had their interquartile range below 0.6. That is three quarters of the municipalities in those provinces had poverty rates below 60%.

By 2011, we can see that in absolute terms, there was an overall reduction in income poverty rates in municipalities across all provinces in the country. However, relatively speaking the Eastern Cape, KwaZulu-Natal and Limpopo have the highest poverty rates. It should be noted that the interquartile range is now more extended for all of these provinces reflecting a wider spread of poverty rates within the interquartile range. Conversely, Gauteng and the Western Cape have seen further reductions in their poverty rates and their interquartile range has become contracted. Indeed, almost all municipalities in Gauteng and Western Cape have income poverty rates of less than 60%.

Figure 2: Municipality level income poverty by Province



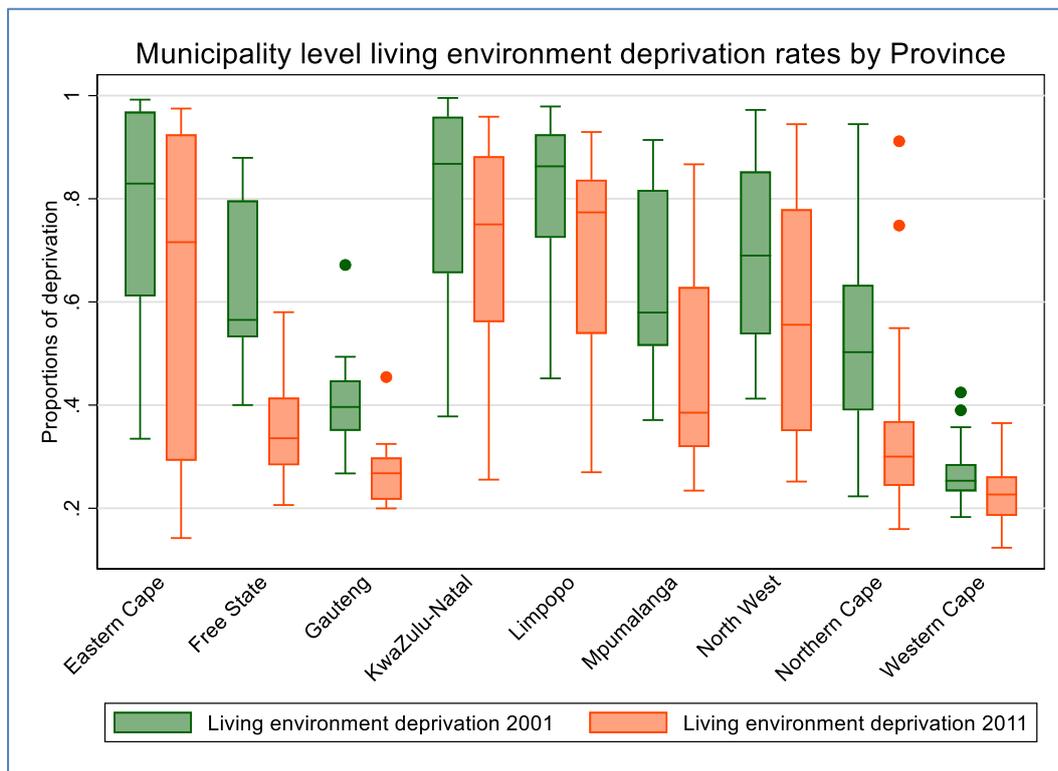
Living environment deprivation

The box plot in **Figure 3** below illustrate the range of living environment deprivation for municipalities within provinces in 2001 and 2011. The box plots in green represent the range of living environment deprivation in 2001 and the box plots in orange represent the range of living environment deprivation in 2011.

As with income poverty, we can see that overall municipalities within provinces saw improvements in their levels of living environment deprivation between 2001 and 2011. The most noticeable improvements can be seen in municipalities in the Free State and Northern Cape, where the distributions of living environment deprivation in 2011 are almost half of what they were in 2001.

While municipalities in Gauteng and the Western Cape are shown to be the least living environment deprived at both time points, municipalities in the Eastern Cape, KwaZulu-Natal and Limpopo remain the most living environment deprived in the country with each having median living environment deprivation figures of over 60%.

Figure 3: Municipality living environment deprivation rates by provinces



Municipality level analysis using transition matrices

In order to obtain further understanding of the trajectory of municipality level deprivation rates across provinces, we present analysis using transition matrices to look at change over the 10-year period. For each time point, municipalities are divided into five equal groups or quintiles according to the rates of deprivation in the municipality. A municipality with a quintile value of 1 has a deprivation level that places it within the 20% most deprived municipalities on the respective measure, whilst those municipalities located in quintile 5 have deprivation levels that place them in the 20% least deprived municipalities. The transition matrix is simply a cross tabulation of the quintile position of a municipality in 2001 with its corresponding quintile position in 2011.

The cells along the diagonal contain municipalities which have not changed quintiles between the two time points. Those cells above the diagonal represent municipalities that have improved their quintile position between the two time points whereas those below the diagonal represent those municipalities whose quintile position has deteriorated by one or more places. To aid interpretation, the tables have been shaded in different colours to indicate improvement, worsening or neutrality of the deprivation level in each municipality. Green indicates a municipality that has seen an improvement in its level of deprivation (relative to other municipalities) over the 10 years resulting in a change in quintiles, yellow represents municipalities that have remained in the same quintile, and red represents municipalities that have seen deterioration in levels of deprivation (relative to other municipalities) leading to a change in quintile.

Again, the analysis has been restricted to 2 domains: income poverty and living environment deprivation.

Table 7: Income poverty transition matrix

Municipality Income Poverty Quintile Distribution 2001/2011							
	2011					Total	
	1 Most deprived	2	3	4	5 Least deprived		
2001	1 Most deprived	43	3	1	0	0	47
	2	4	36	7	0	0	47
	3	0	8	30	9	0	47
	4	0	0	9	32	6	47
	5 Least deprived	0	0	0	6	40	46
	Total	47	47	47	47	46	234

From the transition matrix above (**Table 7**) we can see that of the 234 municipalities in South Africa (as of 2011), 181 (77%) were in the same quintile in 2001 [highlighted in yellow], 26 (11%) improved by one or more quintiles [highlighted in green] while 27 (12%) worsened by one or more quintiles [highlighted in red]. In interpreting the transition matrices, it is important to note that even if a municipality has not changed quintile over the 10 year period, that does not mean that the municipality has not seen any changes in the levels of deprivation, but rather that any improvements or deterioration in the levels of deprivation in that specific municipality did not result in a quintile change.

From **Table 7**, we can see that most of the municipalities that have changed quintile over the 10-year period did so by one quintile. This is the case for all of them except for one municipality that moved up two quintile positions i.e. moved from quintile 1 (2001) to quintile 3 (2011). The municipality in question is Greater Tubatse municipality in Limpopo province. It is interesting to note that of all the metropolitan municipalities in the country except one were the same quintile position at both time points. The exception was Nelson Mandela Bay, which dropped from quintile position 5 in 2001 to quintile position 4 in 2011 (became relatively poorer). While the relative change in poverty for Greater Tubatse Local Municipality was enough to move it from quintile 1 in 2001 to quintile 3 in 2011, it is important to note that as far as the absolute level of poverty is concerned, Greater Tubatse is still among the more impoverished municipalities in the country.

Table 8: Living environment transition matrix

Municipal Lived environment deprivation Quintile Distribution 2001/2011							
	2011					Total	
	1 Most deprived	2	3	4	5 Least deprived		
2001	1 Most deprived	42	5	0	0	0	47
	2	5	34	6	2	0	47
	3	0	8	26	7	6	47
	4	0	0	14	26	7	47
	5 Least deprived	0	0	1	12	33	46
	Total	47	47	47	47	46	234

Looking at the transition matrix for living environment deprivation (**Table 8**), we see that of the 234 municipalities in South Africa (as of 2011), 161 municipalities (69%) have remained in the same quintile [highlighted in yellow], 33 municipalities (14%) have improved [green highlight] and 40 municipalities (17%) worsened by one quintile position or more [red highlight]. Again, we see that most of the municipalities that have either improved or worsened over the 10-year period did so by only one quintile position. This is the case for all municipalities except for two municipalities that moved from quintile 2 in 2001 to quintile 4 in 2011 and a further six municipalities that moved from quintile position 3 in 2001 to quintile position 5 in 2011 (all improving their relative positions). On the other hand, as one municipality that worsened from quintile 5 in 2001 to quintile 3 in 2011.

The municipalities that improved from quintile position 3 in 2001 to quintile position 5 in 2011 were; Renosterberg and Kamiesburg in the Northern Cape, and Ikwezi, Inkwanca, Makana and Blue Crane Route which are all located in the Eastern Cape. The municipality that worsened from quintile 5 in 2001 to a quintile 3 in 2011 was Matzikama Local Municipality in the Western Cape.

9. Assessment of Inequality using 80:20 ratios

Introduction

In order to begin to assess the level of inequality between wards within their respective municipalities, we construct an 80:20 ratio of rates of ward level deprivation within each municipality. This measure is calculated by ranking the wards within their respective municipalities from least deprived to most deprived. Then, using the relevant population denominator, the wards that straddle the 20th and 80th percentiles of the cumulative population within the municipality are identified. The poverty rates for these two wards are then compared and expressed as a ratio, providing a measure of how similar or different the ward level poverty rates are at these two ends of the distribution. As this is performed separately for each municipality, the resulting 80:20 ratios

provide a means of comparing municipalities according to the level of inequality between wards within the municipalities. These 80:20 ratios have been calculated for both 2001 and 2011, which also enables assessment of the extent to which the ratios have increased over the period (i.e. the ward level poverty rates within a municipality have become more unequal over the period) or have decreased (i.e. the ward level poverty rates in the municipality have become more similar over the period).

To reflect the fact that this project is focusing on urban change, in this section we focus on the eight metropolitan municipalities. Moreover, as this measure needs rates of deprivation we cannot use it for the overall HSAIMD, but we can use it for the component domains. Again, we focus on income poverty and living environment deprivation. As compared to the more sophisticated analysis of changing inequalities presented in companion working papers, this 80:20 ratio may be regarded as a somewhat simplistic measure. It does, however, give an easy to interpret picture. It will only work well in the municipalities with a large number of wards. However, this is not an issue when restricting analysis to metropolitan municipalities.

Income Poverty

From **Table 9** below we can see that in 2001, The City of Cape Town had an 80:20 poverty ratio of 3.5, which means that the ward at the 80% percentile of wards within the City of Cape Town, was 3 and a half times more income deprived than the ward at the 20% percentile. The ratio for Cape Town decreased in 2011 to 2.9, indicating a reduction in inequality between wards in Cape Town. The metro with the highest 80:20 ratio in 2001 – City of Tshwane – still had the highest ratio in 2011 but inequality between wards had reduced. On the other hand, three of the municipalities with a relatively low 80:20 ratio in 2001 – Mangaung, Buffalo City and Nelson Mandela Bay - saw their inequality increase on this measure. In particular, in Mangaung the 80:20 ratio increased from 1.5 in 2001 to 2.2 in 2011.

Table 9: 80:20 ratios for income poverty

MUNICIPALITY	80% inc pov 2001	20% inc pov 2001	80:20 pov ratio 2001	80% inc pov 2011	20% inc pov 2011	80:20 pov ratio 2011
Mangaung	94.0%	64.1%	1.5	80.0%	36.8%	2.2
Buffalo City	91.5%	60.8%	1.5	78.1%	46.8%	1.7
Nelson Mandela Bay	91.4%	53.3%	1.7	80.8%	46.0%	1.8
eThekweni	87.9%	44.9%	2.0	75.1%	40.1%	1.9
Ekurhuleni	83.4%	36.3%	2.3	67.1%	28.2%	2.4
City of Cape Town	78.4%	22.6%	3.5	72.0%	25.0%	2.9
City of Johannesburg	80.8%	27.2%	3.0	66.1%	23.7%	2.8
City of Tshwane	81.9%	17.2%	4.8	66.6%	15.0%	4.4

Note: Ordered by ascending 80:20 ratios in 2001

Living Environment Deprivation

From **Table 10** below, we can see that over the ten year period, with the only exception being the City of Cape Town, all other Metropolitan municipalities saw a decrease in their living environment deprivation rates from 2001 to 2011, at both the upper and lower end of the distribution. The City of Cape Town was the only metropolitan municipality that saw an increase in its living environment deprivation rates at the lower end of the distribution. The changes in the City of Cape Town resulted in a reduction in its 80:20 ratio from 5.2 in 2001 to 3.2 in 2011. This is an indication that the ward level deprivation rates in this municipality have become more similar over the ten year period.

Table 10: 80:20 ratios for living environment deprivation

MUNICIPALITY	80% liv env dep 2001	20% liv env dep 2001	80:20 liv env dep 2001	80% liv env dep 2011	20% liv env dep 2011	80:20 liv env dep 2011
Mangaung	93.20%	52.90%	1.8	61.90%	32.30%	1.9
Nelson Mandela Bay	68.80%	36.00%	1.9	39.30%	15.90%	2.5
eThekweni	87.10%	42.90%	2	69.80%	36.80%	1.9
Buffalo City	97.10%	48.10%	2	90.30%	32.10%	2.8
City of Tshwane	98.10%	41.10%	2.4	79.70%	27.20%	2.9
Ekurhuleni	80.30%	32.70%	2.5	65.50%	24.30%	2.7
City of Johannesburg	87.10%	23.70%	3.7	59.90%	19.90%	3
City of Cape Town	80.90%	15.70%	5.2	66.50%	20.90%	3.2

Note: Ordered by ascending 80:20 ratios in 2001

From **Table 10**, we can see that the city of Cape Town had the highest 80:20 ratio in 2001 as regards living environment deprivation (5.2). Although it was still the most unequal in 2011 the ratio had reduced to 3.2 – similar to the city of Johannesburg (3.0 in 2011) but demonstrating a greater reduction in the magnitude of the ratio over the ten-year period. Five Metros became more unequal as regards living environment deprivation. Buffalo city showed the greatest increase in inequality with its 80:20 ratio moving from 2 in 2001 to 2.8 in 2011.

10. The City of Cape Town

As we indicated in the introduction, the focus of this study is on urban change using the city of Cape Town as a case study. Consequently, this section focuses on change between 2001 and 2011 at ward level within the city of Cape Town.

We begin by looking at the overall HSAIMD and then focus on the two domains of income property and the living environment domain in more detail.

Overall HSAIMD

Tables 11 and **12** below, illustrate the 20 most deprived and the 20 least deprived wards in the City of Cape Town on the overall HSAIMD at both time points. There were 111 wards in Cape Town in 2011 and these have been ranked from 1 to 111 at each of the two time points (where 1 is most deprived). The tables that follow map the trajectories of the wards over the ten-year period.

Considering first **Table 11**, we see that 17 of the most deprived wards within the City of Cape Town in 2001 were still among the top 20 most deprived group in 2011 even though some had changed their ranks over the period. Interestingly, in 2001, three wards namely; ward 19100334, ward 19100035 both located in Philippi and ward 19100098 in Khayelitsha (green highlight) improved their ranking and moved out and were no longer in the 20 most deprived wards in Cape Town in 2011. However, ward 191000106 in Matroosfontein, ward 19100095 in Macassar and ward 19100047 in Athlone (red highlight) which were not in the 20 most deprived wards in Cape Town in 2001 are seen in the 20 most deprived wards in 2011. The majority of the most deprived wards in the city can be found in the urban townships. This is a consequence of South Africa's Apartheid legacy which has resulted in poor Black African and Coloured South Africans being primarily concentrated spatially in the formerly racially segregated townships on the outskirts of the City (Dixon & Durrheim, 2003).

Table 11: 20 most deprived wards in City of Cape Town

Overall SAIMD deprivation levels 2001 - 2011 (20 most deprived wards in Cape Town)								
Ward number	Ward code	Main place name/Sub Place	SAIMD 2001		SAIMD 2011	Main place name/Sub place	Ward code	Ward number
101	19100101	Kraaifontein	1		1	Khayelitsha	19100089	89
87	19100087	Khayelitsha	2		2	Khayelitsha	19100087	87
89	19100089	Khayelitsha	3		3	Crossroads	19100036	36
39	19100039	Nyanga	4		4	Nyanga	19100037	37
37	19100037	Nyanga	5		5	Khayelitsha	19100090	90
80	19100080	Philippi	6		6	Nyanga	19100039	39
90	19100090	Khayelitsha	7		7	Gugulethu	19100040	40
91	19100091	Khayelitsha	8		8	Philippi	19100080	80
104	19100104	Cape Metro NU1	9		9	Khayelitsha	19100093	93
33	19100033	Philippi	10		10	Langa	19100052	52
93	19100093	Khayelitsha	11		11	Matroosfontein	19100106	106
36	19100036	Crossroads	12		12	Khayelitsha	19100091	91
52	19100052	Langa	13		13	Khayelitsha	19100018	18
108	19100108	Mfuleni	14		14	Khayelitsha	19100096	96
96	19100096	Khayelitsha	15		15	Philippi	19100033	33
34	19100034	Philippi	16		16	Macassar	19100095	95
40	19100040	Gugulethu	17		17	Kraaifontein	19100101	101
35	19100035	Philippi	18		18	Cape Metro NU1	19100104	104
98	19100098	Khayelitsha	19		19	Athlone	19100047	47
18	19100018	Khayelitsha	20		20	Mfuleni	19100108	108

Considering the 20 least deprived wards in Cape Town (**Table 12**) we see that 18 wards have remained among the 20 least deprived in Cape Town over the 10-year period. However, two wards from 2001, namely; ward 19100083 in Strand and ward 19100008 in Brackenfell (red highlight) moved out of the 20 least deprived wards in Cape Town by 2011. These wards were replaced by new entrants in 2011, namely ward 19100060 in Lansdowne and ward 19100077 in Oranjezicht. In contrast to the 20 most deprived wards, we see that a majority of the least deprived wards are located in areas that were historically reserved for the White population in the country.

Table 12: 20 least deprived wards in City of Cape Town

Overall SAIMD deprivation levels 2001 - 2011 (20 least deprived wards in Cape Town)								
Ward number	Ward code	Main place name/Sub place	SAIMD 2001		SAIMD 2011	Main place name/Sub place	Ward code	Ward number
64	19100064	Silvermine	92		92	Lansdowne	19100060	60
83	19100083	Strand	93		93	Somerset West	19100015	15
54	19100054	Sea Point	94		94	Goodwood	19100027	27
23	19100023	Cape Metro NU1	95		95	Brackenfell	19100102	102
8	19100008	Brackenfell	96		96	Cape Metro NU1	19100023	23
62	19100062	Constantia Heights	97		97	Constantia Heights	19100062	62
5	19100005	Milnerton	98		98	Plumstead	19100073	73
103	19100103	Kraaifontein	99		99	Milnerton	19100005	5
27	19100027	Goodwood	100		100	Oranjezicht	19100077	77
15	19100015	Somerset West	101		101	Bellville	19100003	3
73	19100073	Plumstead	102		102	Kraaifontein	19100103	103
107	19100107	Blouberg	103		103	Silvermine	19100064	64
70	19100070	Bellville	104		104	Parow	19100002	2
59	19100059	Newlands	105		105	Sea Point	19100054	54
3	19100003	Bellville	106		106	Blouberg	19100107	107
2	19100002	Parow	107		107	Newlands	19100059	59
58	19100058	Rondebosch	108		108	Bellville	19100070	70
1	19100001	Parow	109		109	Rondebosch	19100058	58
102	19100102	Brackenfell	110		110	Parow	19100001	1
21	19100021	Durbanville	111		111	Durbanville	19100021	21

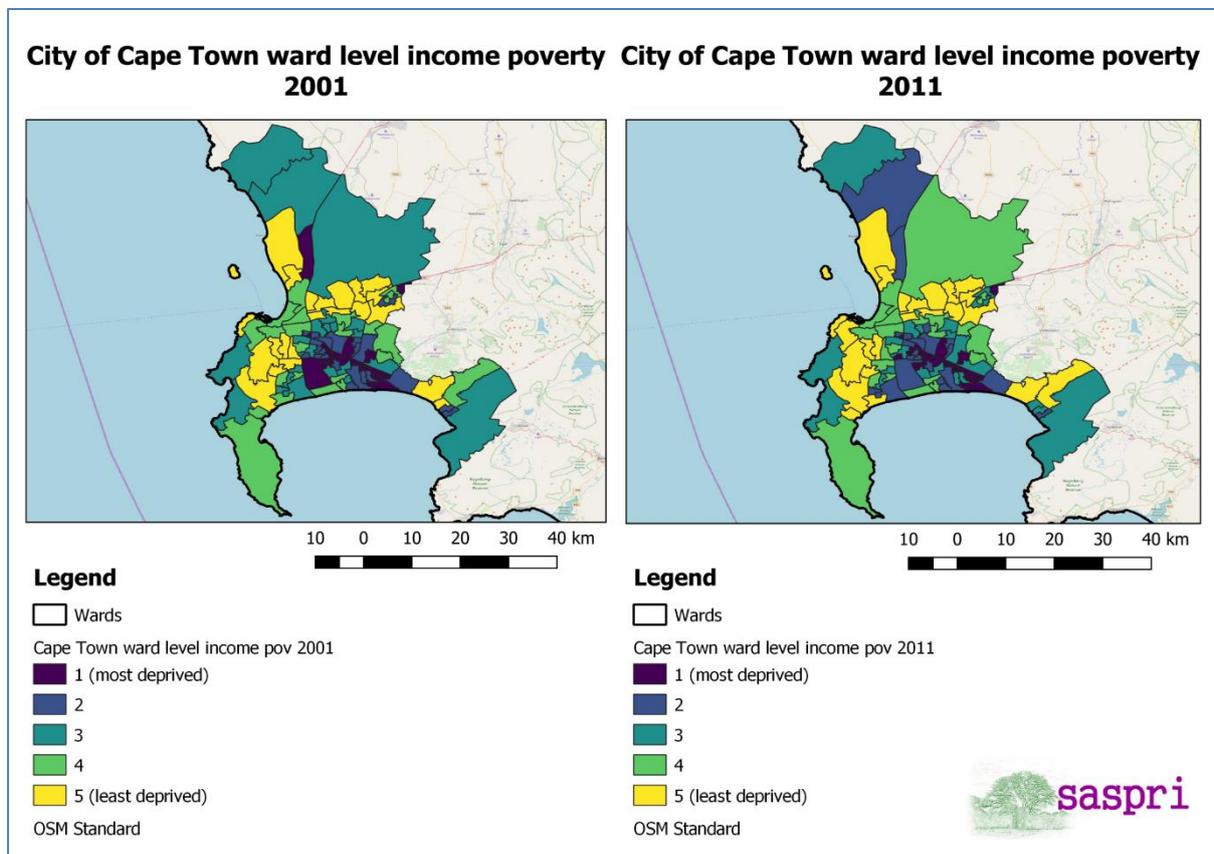
Changes in income poverty and living environment deprivation.

For each of these two domains, we present maps and scatter plots to illustrate change. As regards the maps, the wards of the city have been divided into five equal groups (quintiles) according to their rate of deprivation. As before quintile 1 represents the highest levels of deprivation whereas quintile 5 represents the lowest levels of deprivation. On the maps the legend conveys the gradation between most deprived (dark blue) through greens to least deprived (yellow). The maps show visually any quintile change.

The maps are followed by scatter plots where each dot on the chart represents one of the one 111 wards in Cape Town. The horizontal x-axis illustrates the rate of poverty or deprivation in 2001, while the vertical y-axis illustrates the rate of poverty or deprivation in 2011. The orange line ($y=x$) represents a point where the rate of poverty or deprivation with in 2001 would be identical to that found in 2011. The closer a ward is to the orange line ($y=x$) the less change that ward experienced in its rates of poverty or deprivation over the 10 years.

Overall, it is important to note that any ward that is on the right side of the line ($y=x$), experienced a reduction in its poverty or deprivation rates over the ten years, and the further away to the right the ward is, the greater the reduction in the ward's poverty or deprivation rate. Conversely, any ward to the left of the line ($y=x$) is a ward that has experienced an increase in its rate of poverty or deprivation, and the further away to the left the ward is, the greater the extent of increase in poverty or deprivation.

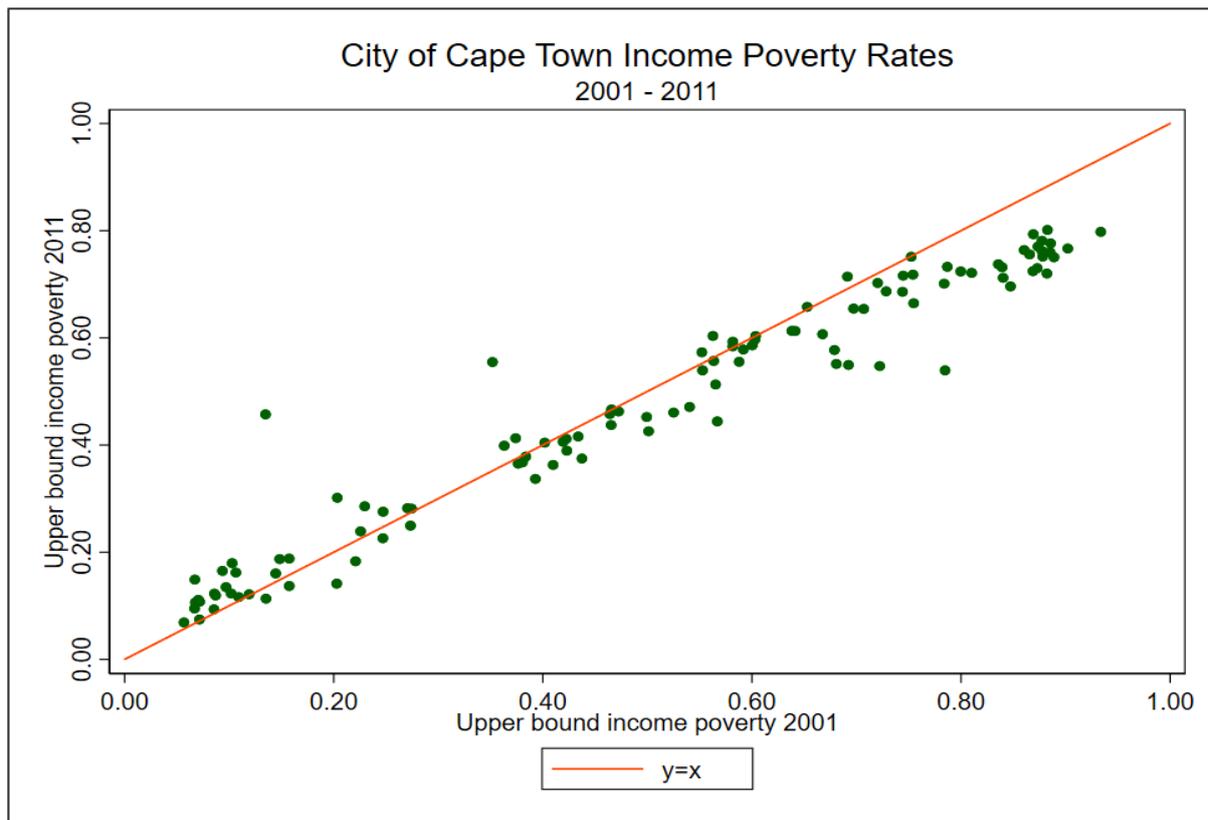
Map 1: Changes in ward level income poverty in the City of Cape Town



As regards income poverty, **Map 1** above shows that broadly the highest levels of income poverty are concentrated in the townships of the Cape Flats at both points in time. Similarly, in broad terms the least deprivation is concentrated in the southern suburbs, the northern suburbs and the Blouberg/Table View area of the West Coast.

Turning to the scatter plot (**Figure 4**), it is clear to see that most wards in the city experienced a decrease in their rates of income poverty over the ten years. Notable improvements were made by some of the wards which had an income poverty rate of more than 60% in 2001. Interestingly, many of the wards which had low levels of income poverty in 2001 i.e. wards with less than 20% income poverty within them, saw a slight increase in their rates of income poverty in 2011. Overall the city saw many of its less deprived wards from 2001 grow slightly more deprived in 2011, while the more deprived wards from 2001 grew less deprived by 2011.

Figure 4: Scatterplot of income poverty rates 2001 and 2011 in the City of Cape Town



Living Environment Deprivation

As with income poverty, **Map 2** below shows that the highest levels of living environment deprivation are to be found at both time points in the townships on the Cape Flats. In addition, strikingly, the ward in the peninsular which contains the Imizamo Yethu township has moved to the most deprived quintile in 2011.

Again, the lowest levels of living environment deprivation can be seen in the southern suburbs, the northern suburbs and the Blouberg/Table View area of the West Coast.

Map 2: Changes in ward level living environment deprivation in the City of Cape Town

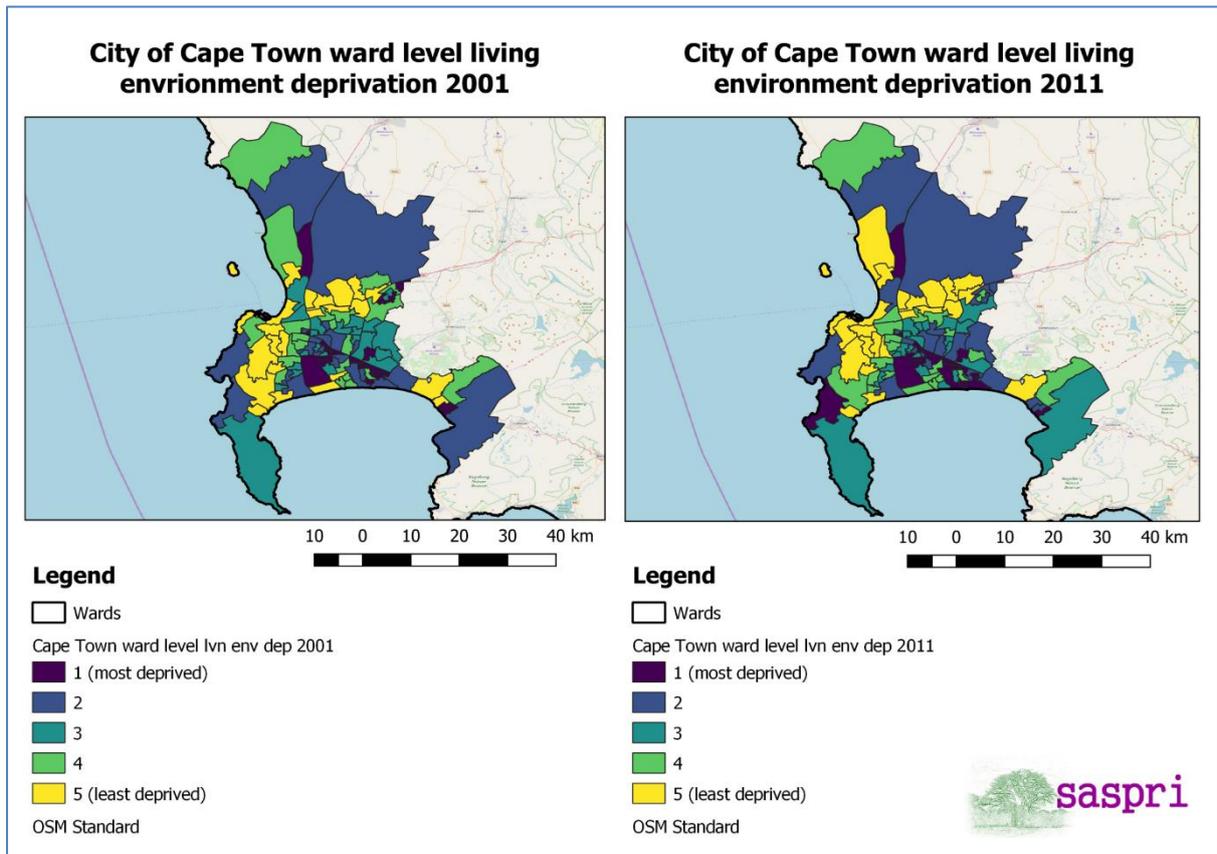
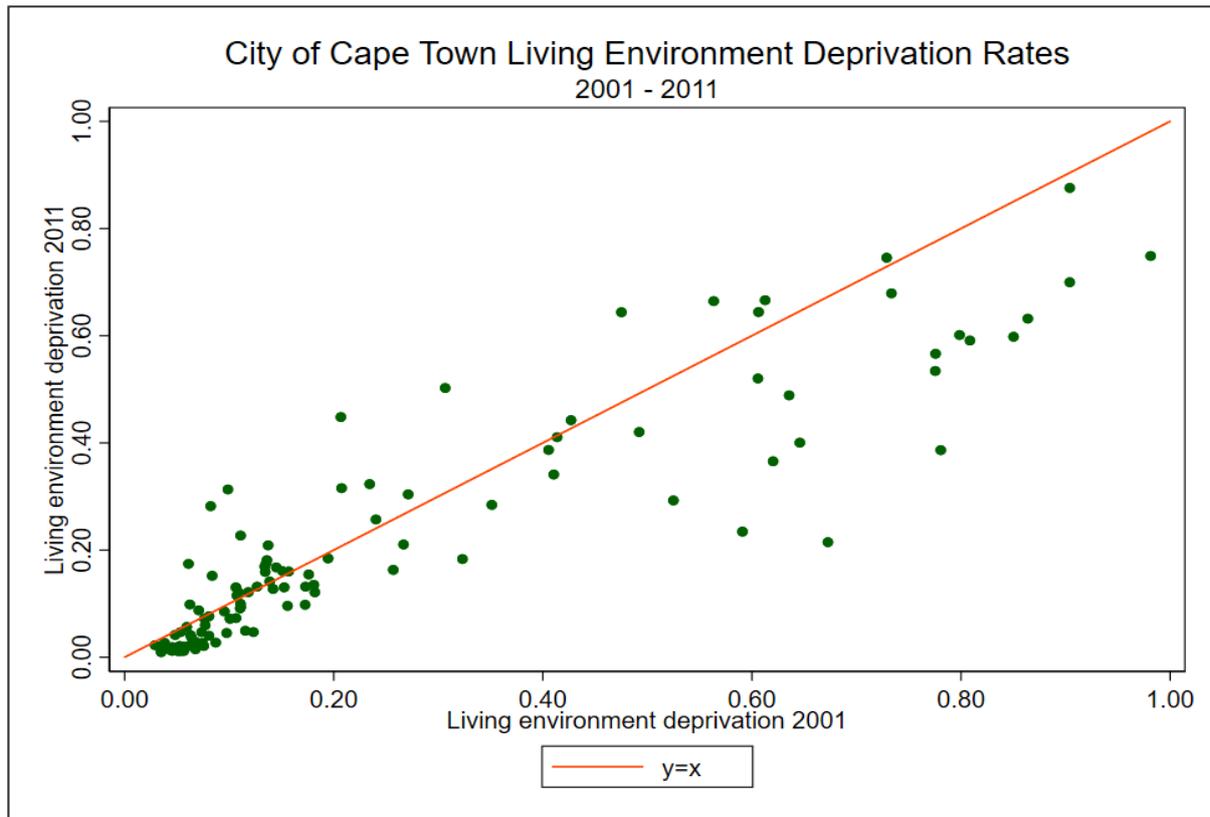


Figure 5: Scatterplot of living environment deprivation rates 2001 and 2011 in the City of Cape Town



From **Figure 5** we can see that the majority of wards which had living environment deprivation rates of 20% or less in 2001, exhibited more or less the same deprivation rate in 2011. A number of wards which had levels of living environment deprivation levels of greater than 40% in 2001 have seen a substantial reduction in their levels of deprivation in 2011.

The majority of wards in the City of Cape Town saw their levels of living environment deprivation decrease. Only a few wards saw increases in their levels of living environment deprivation over the ten years.

11. Conclusion

The purpose of this Working Paper is to highlight the change in poverty and deprivation levels over a 10-year period (2001-2011) generally in South Africa and in the City of Cape Town in particular. This was undertaken using a new harmonised index of multiple deprivation – the HSAIMD. The HSAIMD was made possible by the re-release by Statistics South Africa of the 2001 census data on 2011 ward boundaries, to complement the 2011 census data that was already available on 2011 ward boundaries. The analysis used both the overall HSAIMD and a subset of the component domains, namely income poverty and living environment deprivation. The paper highlighted areas that have seen relative improvement, those that have shown a relative decline and areas that have experienced little change over the decade.

South Africa made significant progress in reducing overall poverty and deprivation levels in the country between 2001 and 2011 in absolute terms. However, the relative positions of different parts of the country remain largely unchanged. The Western Cape and Gauteng generally have the lowest rates of deprivation for each of the domains at both time points, whilst provinces which contained former homelands, such as the Eastern Cape, Kwa-Zulu Natal and Limpopo were among the most deprived at both time points.

Focussing on metropolitan municipalities and using the 80:20 ratio measure, we looked at the levels of inequality between wards within their respective municipalities. We restricted this analysis to income poverty and living environment deprivation. The ratios were calculated for both 2001 and 2011, which enabled the assessment of the extent to which inter-ward inequality has increased or decreased over the ten-year period within the metros. The 80:20 ratio analysis indicated that four metros namely Mangaung, Buffalo City, Nelson Mandela Bay and Ekurhuleni became more unequal (inequality increased) over the ten years on both domains. On the other hand, eThekweni, City of Cape Town, City of Johannesburg and City of Tshwane became less unequal (inequality decreased). However, it is worth noting that the City of Cape Town, the City of Johannesburg and the City of Tshwane had much higher levels of inequality at both time points than the smaller metros where inequality increased.

Ward level analysis revealed that the City of Cape Town saw a reduction in its levels of income poverty and living environment deprivation over the ten-year period. This, however, did little to change the fact that many of the 20 most deprived wards within the City of Cape Town in 2001 remained in the most deprived group in 2011. The majority of the most deprived wards in the city can be found in the townships on the outskirts of the City. There were a few wards that were able to move out of top 20 most deprived wards by 2011. Similarly, we see that there have been relatively small changes to the composition of top 20 least deprived wards in city. In contrast to the 20 most deprived wards, the 20 least deprived wards are mostly located in the well-served and well-resourced areas of the city.

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