

# Using election registration data to measure migration trends in South Africa

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## Abstract

Migration is critical for policy agendas and government planning as it changes the demographic composition of towns, cities and regions – this requires adjustments to service and infrastructure provision. To develop suitable policy responses, reliable, comparable and timely information is required. Obvious sources of migration data are the national census and household and labour surveys. Socio-economic data have not dealt well with migration. A recent CSIR research project, *Spatial and Temporal Evidence for Planning in South Africa*<sup>1</sup> (StepSA), explored the use of voter registration information as an alternative source of migration data. Anonymised voter registration data were provided by the Independent Electoral Commission of South Africa for several consecutive elections covering a 12-year period. The data, once spatialised (and related to a single set of voting districts), could then be processed to extract movement trends between different election periods. This article describes the process applied and the initial analyses conducted.

## DIE GEBRUIK VAN VERKIESINGSREGISTRASIE DATA OM MIGRASITENDENSE IN SUID-AFRIKA AAN TE DUI

Migrasie is krities belangrik vir beleidsformulering en ruimtelike beplanning gegewe die demografiese samestelling van dorpe en stede wat daardeur geraak word. Bykomend beïnvloed dit ook infrastruktuur- en diensteverskaffing. Die bekendste bron van sodanige inligting is Statistieke Suid-Afrika wat migrasiedata publiseer wat versamel is deur die tien-jaarlikse sensus asook deur die arbeid- en gesinsopnames. Sosio-ekonomiese data bevat in die algemeen nie veel migrasiedata nie. 'n Onlangse projek genaamd "*Spatial and Temporal Evidence for Planning in South Africa*"<sup>2</sup> (StepSA) het die moontlikheid verken om kiesersregistrasiedata as 'n alternatiewe bron van migrasiedata te benut. Geanonimiseerde kiesersdata is verskaf deur die Onafhanklike Verkiesingskommissie (OVK) van Suid-Afrika vir verskeie verkiesings wat oor 'n periode van 12 jaar gestrek het. Die data is ruimtelik verwerk en geprosesseer om die bewegings van persone tussen verskillende verkiesings te onttrek. Hierdie artikel beskryf die proses kortliks en ook die aanvanklike bevindings.

## HO SEBEDISA DINGODISO TSA DIKHETHO HO METHA KUTLOISISO YA DIPHETOHO TSA HO FALLA AFRIKA BORWA

Ho falla ke nthoe bohlokosa ha ho nahanoa ka maano le merero ya mmuso ka ha e le eona nthoe fetolang boemo ba dipalo tsa sechaba ka hara teropo tse nyane le tse kholo, hammoho le mahaeng- sena se hloka diphetoho ditshebeletsong tsa batho le phano ya dithulusi tsa ntlafatso ya teropo le mahaeng. Ho tswedisa pele maano a phethahetseng mme a tshepahalang, tsebo e bapisehang le e fihlang ka nako e ya hloka hloka. Mehlopi ya boitsebiso e tsebahalang ha ho buoa ka ho falla ke National Census le Household and Labour Surveys. Tsebo e hlahang dithutong tsa sechaba le meruo ya dibaka, ha e so ka e thetsana le ho falla. Pojeke ya dipatliso e qetang ho hlaha hautsoanyane e tsoang ho CSIR, e bitsoang 'Spatial and Temporal Evidence for Planning in South Africa' (stepSA) e shebene le tshebediso ya ditaba le tsebo e tsoang dingodiso tsa dikhethe ho shebisa taba ya ho falla ha batho ka hara naha. Independent Electoral Commission of South Africa, e ile ya fan aka tsebo eo e nang le eona ya dingodiso tsa dikhethe Afrika Borwa ho tloha dilemo tse leshome le metso e mebedi e fetileng ho fihlela joale. Hang hore tsebo eo e aroloe ka dibaka ( e beoue ka ditereke tseo e hloka ho ba ho tsona), e ile ya sebedisoa ho sheba mekhoha ya ho falla ha batho ho tloha diterekeng tse ding ho ya ho tse ding hara dinako tse fapaneng tsa dikhethe. Serapa sena se bontsha mokhoa o sebedisitsong ho etsa sena, hape se bontsha le dilta morao tse fumanoeng.

1 Previously known as the Integrated Planning Development and Modelling (IPDM) project.

2 Voorheen bekend as die Geïntegreerde Beplanning en Ontwikkeling Modelling (IPDM) projek.

## 1. INTRODUCTION

Demography is not static, and population figures, distribution and composition change over time and space (Waugh, 2000: 361). The world is also changing, and with globalisation, global economic integration and electronic communication, there is a greater awareness of opportunities to live and work (Usher, 2004: 3). This is especially prevalent in developing countries, including South Africa, where urbanisation through migration is still a strong current reality for the foreseeable future, which affects the South African settlement landscape (Kok & Collinson, 2006: 22). Over time, in addition to population growth or decline, migration changes the demographic composition of towns, cities and regions, which, in turn, requires adjustments to service and infrastructure provision. The development of suitable policy and planning responses requires reliable, comparable and timely information, which itself presents a problem as migration-specific surveys on a national scale are not carried out frequently in South Africa. Some official data (e.g. the 2007 Community Survey) do not reliably capture movements between and within provinces or within municipalities (Polzer, 2010: 2). Migration has many aspects and, therefore, cannot be properly analysed without taking into account spatial, economic and social factors, to name but a few.

As indicated by Kok (1999), census and other survey data are not always suitable for proper migration analyses, and it is often necessary to complement census and survey data on migration with other data sources. However, migration research worldwide is plagued by the absence of appropriate and reliable data from

alternative sources. Some countries in Europe and the Far East make their population registers, which include relatively updated migration data, available for research (see, for example, Shaw, 1975), but in most countries no such source of migration data exists. This was also the case in South Africa. The recent South African National Development Plan even indicated that data on migration into and within South Africa were poorly collected, weakly analysed and often deceptive. The plan noted that municipalities were often unable to respond effectively, because they did not have sufficient recent data or the necessary skills to make sense of the data they already had (Steyn, 2013: online).

Landau & Segatti (2009: 3) suggest that efforts to incorporate migration trends and data into long-term policy will require better data and better data integration into planning processes; therefore, in 2010, the Independent Electoral Commission (IEC) made available its first anonymous voters' registration data for all the election years during the period 1999-2009 to the IPDM<sup>3</sup> project, and again in 2012 for the election year 2011 to the StepSA project.<sup>4</sup>

This article focuses on using data from the IEC that was processed and mapped to support local migration and demographic research in South Africa.

## 2. MIGRATION

### 2.1 Migration theories

The data described and used in this article do not provide an opportunity to test any migration theories in this instance; this brief overview is, therefore, intended merely to orientate the reader to the theoretical issues involved in migration research. It is, nevertheless, important to note that migration theory originated in the late 19<sup>th</sup> century with Ernest-George Ravenstein's (1885; 1889) "laws" of migration, and has since

been improved over time with the contributions of scholars such as John Steward (1941) and George Zipf (1946) who could be regarded as the "fathers" of the gravity model of migration. Peter Rossi (1950) and Alden Speare (1974) dealt convincingly with the causes of intra-urban residential mobility, while Everett Lee (1966) is often (but incorrectly) labelled as the father of the "push-pull" theory of migration. Gordon de Jong (from the early 1980s – see, for example, De Jong & Gardner, 1981 – until the present) as well as Douglas Massey (starting in the early 1990s – see, for example, Massey, Arango, Hugo, Kouaouci, Pellegrino & Taylor, 1993; 1994 – and still continuing) have made very important contributions to a better understanding of the causes of migration in both developing and industrial countries.

One specific theoretical issue of particular relevance in town and regional planning is that of migration distance. As pointed out by Kok (1999), migration distance is inherently problematic and, therefore, the concept of a "migration-defining" area is more acceptable. However, this concept is not without serious flaws. According to Willis (1974: 5), "there is no fundamental reason for accepting the boundary definition of migration and the definition and statistical material would be closer to reality if we recorded all changes of residence". In his view, a typology of spatial mobility can best be developed if all residential moves are considered as migration (Willis, 1974: 6). Rather surprisingly, though, after criticising the use of 'boundary definitions' in migration, he proposes the use of 'migration-defining areas' (Kok, O'Donovan, Bouare & Van Zyl, 2003: 11-12). Kok *et al.* (2003: 12) then continue: "One can ascribe Willis's inconsistency to the difficulty of getting rid of the concept of 'migration-defining areas'". The solution may, therefore, lie in the use of adequately small and homogeneous spatial units. If the areas are kept as small as possible, they can, as the occasion requires, be consolidated into larger spatial units. It consequently makes sense,

theoretically speaking, to make maximum use of the small voting district and ward-level data on both migration origin and destination that are included in the IEC-derived migration data.

### 2.2 Defining migration

There is no single definition of (human) migration: topological approaches are often used to supplement definitions (Kok *et al.*, 2003: 9). Often when the term 'migration' is used, those people who move between countries (international migrants) are thought of first; however, most migration takes place within national borders (Skeldon, 2008: 4). In order to conduct comparative and trend analyses, it is crucial to define migration clearly. Some concepts frequently emerge in migration studies, which are related to the following:

- Origins and destinations of migration;
- Duration of migration, and
- Spatial extent.

There are various forms of migration (see, for example, Waugh, 2000), but of these forms only circular migration will be discussed in this article because of its relevance for the subject at hand.

As implied earlier, moving a distance of a few street blocks is usually not considered migration as the socio-economic, social and cultural milieu might remain mainly unchanged. Some definitions also refer particularly to a change or establishment of a residence (Anon, 2008). According to Kok & Collinson (2006: 6), at its most basic, migration should be defined as "the crossing of the boundary of a predefined spatial unit by persons involved in a change of residence". The definition of migration must also fit the local context – temporary circular migration is a particular form of migration that occurs in South Africa. The apartheid system created areas of 'forced' settlement in the former homeland territories and associated with that the migrant labour system, which accompanied legislation inhibiting and controlling

3 Forerunner of the StepSA project sponsored by the Department of Science and Technology (DST) and undertaken by the Council for Scientific and Industrial Research (CSIR) and the Human Sciences Research Council (HSRC).

4 Undertaken by the CSIR and the HSRC.

the urban-ward migration of the black African people until the mid-1980s, which still continues at present (see, for example, Todes, Kok, Wentzel & Van Zyl, 2010: 340-341). Those seeking employment or education opportunities still relocate temporarily to urban areas while remaining connected to the sending household, often sending home remittances (Rwelamira & Kirsten, 2003: 2), because land in rural areas continues to represent “a sense of security, identity and history and a preferred place for settlement” (Posel, quoted in Todes *et al.*, 2010: 341).

While many commentators assumed that migrant labour would disappear in the aftermath of apartheid, because people would be able to settle permanently near the places where they work, it is not at all clear that this has been happening (see, for example, Collinson, Kok & Garenne, 2006; Todes *et al.*, 2010). Conceivably, it would, therefore, be important to analyse this form of migration more closely and over a wider spatial spectrum than has so far been done. As mentioned earlier, census data, which are limited in their coverage of migration histories, are not suitable for this purpose. The IEC-derived migration data, on the other hand, could potentially be appropriate for this purpose, because they cover individuals’ life-course migration since adulthood.

For the purpose of this article, migration is described as the process that results in an individual or household relocating to establish or re-establish residence in a different spatial area (defined, in this instance, as a voting district) than the prior residence.

### 2.3 Geographical unit used

When considering population movements, the spatial extent becomes important as this, in combination with the definition of migration, determines where migration occurs. As mentioned earlier, migration should perhaps be measured only if an administrative or geographical unit for the person or household changes. Often administrative units, defined mostly by bureaucrats or politicians,

are used to record migration, although they are not always the most suitable units. Then analysts attempt to rationalise such units for demographic analysis (Standing, 1984). Information is sometimes also not made available at the more disaggregate level at which it was recorded, but at a more aggregate level using larger spatial units. Some analysts such as Standing (1984: 39) have in the past reported on the practical problems associated with migration analysis when working at more aggregate levels and with zone types not always suitable for such analyses. There is also the danger that such limitations can miss out on some migration occurring or even distort observations. When the analysis units used vary significantly in size, this can also lead to the distortion of geo-statistical indicators and comparisons (Presidency, 2006: Annexure A: 7). This makes portraying and ‘reading’ information challenging and can even lead to a misinterpretation of the geo-spatial information. A further problem occurs when the spatial unit used in different time periods changes, requiring that a process be applied to align information to allow for a time series comparison without distorting the information used.

### 3. THE SOUTH AFRICAN CASE

In the past, one of the main sources of migration data was Statistics South Africa (Stats SA). Such data were collected at the enumerator area (EA)<sup>5</sup> level and made available at different aggregate spatial levels. Figure 1 provides a diagrammatic layout of the spatial units used for statistical and election-registration data analysis locally. The 1996 census provided migration-destination data at an EA level (and migration-origin data aggregated to magisterial districts), but the 2001 census migration-destination data were provided only at aggregated

levels. Comparison of data over time also becomes problematic when changes occur in the census questions related to migration (Kok & Collinson, 2006: 25). Apart from the Stats SA census data, there are also other data that contain migration information. These include purpose-made migration surveys, such as the migration surveys conducted for the HSRC, which include the HSRC Migration Survey 2001-02 (see, for example, Kok, Gelderblom, Oucho & Van Zyl, 2006); the recent Integrated Planning, Development and Modelling (IPDM) survey (see Cross, Kok, Venter, Turok, Olivier, Mafukidze & Badenhorst, 2012), and the World Bank’s Africa Migration Project survey in South Africa (World Bank, 2013: online). Some municipalities and metros also collect information on people’s past migration and local residential mobility.

In South Africa, the national census is now conducted only once every ten years. This is a long time period, considering that the time period for local municipal planning is much shorter – Integrated Development Plans (IDPs) are five-year plans (Mukwevho, 2013: 5). Municipalities indicated a need for inter-census data, given the extent of settlement change they observed within their areas within the past decade. During 2008, the DST commissioned the CSIR and the HSRC to develop an information and modelling platform, now known as the Spatial and Temporal Evidence for Planning in South Africa platform (STEPSA), to support integrated planning, development and service delivery in South Africa (STEPSA, 2013). For the component of the project that focused on developing ‘regional spatial profiles’, a number of living-lab sessions were initiated with three district municipalities and one local municipality. The purpose was to determine through engagement what information municipalities require support with for their analysis and planning. Migration information was identified by all these municipalities as a key data layer, given that by 2008, the 2001-based information was already outdated. After an initial search for suitable alternative

5 An EA is the smallest geographical unit (piece of land) into which the country is divided for census enumeration purposes. It is of a size that can be enumerated by one census fieldworker (enumerator) in the allocated period for the census. EAs typically contain between 100 and 250 households (Statistics South Africa, 2001: 5).

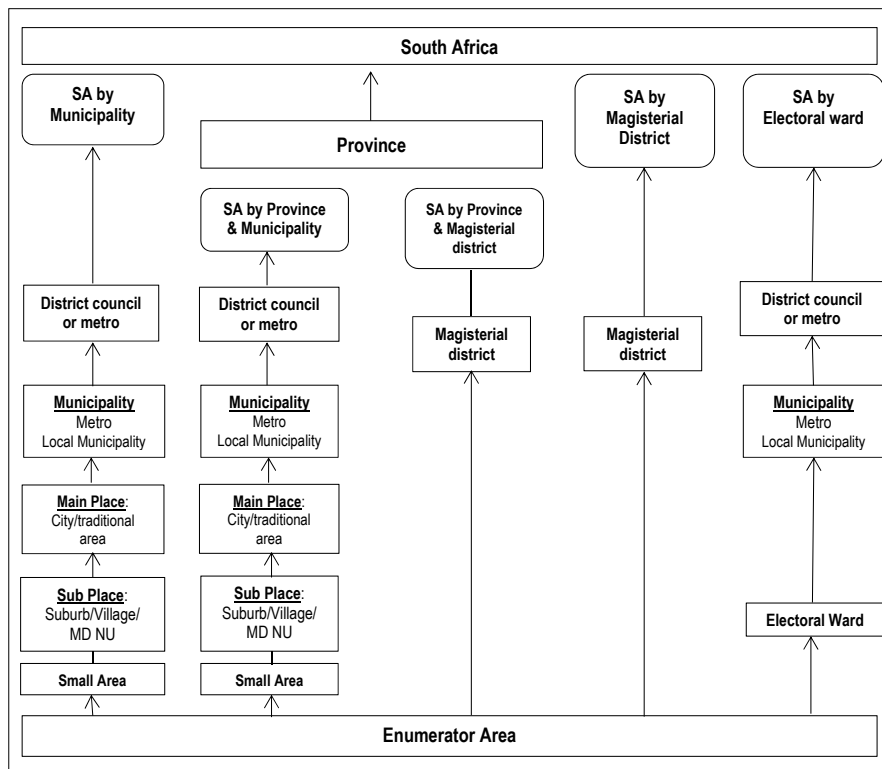


Figure 1: Spatial units used in South Africa

Source: Grobbelaar, 2005: 2

migration data sources, it was decided to approach the IEC to explore voter registration data as a migration data option.

### 3.1 Data from the Independent Electoral Commission (IEC)

The Independent Electoral Commission (IEC) is South Africa's independent election management body, and one of its obligations is to maintain a voters' roll. To be able to vote in South Africa, an eligible person must register his/her details in the voters' roll of the voting district where s/he resides. If a voter has not moved since the previous election, his/her registration remains valid in that voting district. If, however, a voter has moved into a new voting district and wants to vote in the new voting district, s/he first has to re-register. Voting districts are geographical areas principally determined on the basis of geographical size and number of eligible voters. Urban voting districts generally contain approximately 3 000 voters located within a radius of approximately 7.5 kilometres from the voting station. Rural voting districts

accommodate approximately 1 200 voters located within a radius of up to 10 kilometres of the voting station (IEC, 2012: online). The importance given to elections since the end of the apartheid era and the extent to which results are scrutinised, has resulted in a well-maintained and accurate voters' roll. It is viewed as a suitable and trustworthy data set to track the movement of people (represented here by registered voters) over different time periods. However, it is generally assumed that, when people relocate, they will re-register in the voting district (VD) where they reside.

### 3.2 Methodology to prepare the IEC information

The IEC agreed to provide the unit record voter register in an anonymised format (national identification numbers (ID) were replaced with alternate numbers while still retaining age and gender features in the data). The data received from the IEC included the following variables:

- Anonymised person identifier, which is a unique number for every person in the data set;

- Gender;
- Age;
- Four-digit birth year, as obtained from the Department of Home Affairs (where available) to be used as a check, and
- The VD where the person was registered in 1999, 2000, 2004, 2006, 2009 and 2011 (if registered).

Three data sets containing voter registration data for each of the six elections between 1999 and 2011 were provided along with the number of registered voters in every VD for each of the five elections. For the 2011 national local government (municipal) election, 23 655 046 individual voters were registered, which makes it a good data set, considering that the 2011 total population estimates for South Africa was 51 770 560 (Statistics South Africa, 2012: 14), and the country's population aged 18 years and older was 33 702 589 (Statistics South Africa, 2013).

### 3.3 Processing the IEC information

The information was supplied for each of the preceding elections as indicated in Table 1. In addition to the tabular data, the voting districts were also supplied in geospatial file format for each election.

Table 1: List of elections, type and number of registered voters

Election year	Election type	Number of registered voters
1999	National/Provincial	18 168 072
2000	Municipal	18 476 516
2004	National/Provincial	20 674 926
2006	Municipal	21 054 957
2009	National/Provincial	23 181 997
2011	Municipal	23 655 046

Source: IEC, 2012: online

Within the IEC, the Delimitation Directorate is responsible for delimiting the geographic area of South Africa into voting districts. Drawing the outer municipal boundaries is the responsibility of the Municipal Demarcation Board.<sup>6</sup> The IEC's voting districts do not

<sup>6</sup> The Municipal Demarcation Board is an independent authority responsible for the determination of municipal boundaries (Municipal Demarcation Board, 2013: online).

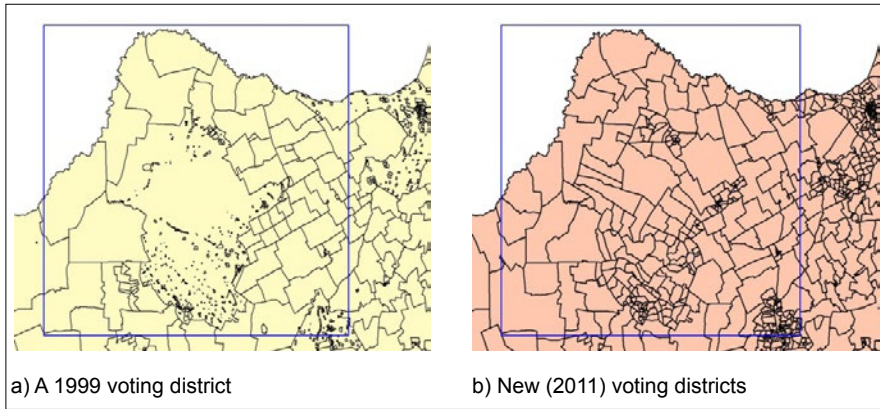


Figure 2: Comparison of two election-year spatial units – voting districts  
Source: Maritz, 2012: 11

have political significance (as wards do), but have been created for electoral efficiency and planning purposes. Before each election, the geospatial extent of voting districts in municipalities is inspected by municipal IEC representatives with a view to aligning the geography of voting districts in accordance with settlement, demographic and political changes that may have occurred since the previous election (EISA, 2002 online). This means, however, that voting districts between consecutive elections differ. Depending on the extent of settlement change, the voting districts could have changed significantly or not at all.

In this process, the spatial units of the last election – 2011 – were selected as the base and all prior election data needed to be related to it. The 2011 voting district spatial layer consequently became the (spatial) target layer for all prior election periods. Using ArcMap GIS, the proportional change needed to be calculated between the VD areas for the election periods 1999, 2000, 2004, 2006 and 2009 and related to the 2011 VD areas. This calculated value would be used later in the process to determine proportion of a voting district now part of another (new) district to be used in the 'allocation' of voters.

Figure 2 illustrates an example of the differences between the voting districts of two election periods – the 1999 and 2011 VD areas. Crucially,

the former homeland territories<sup>7</sup> differed significantly from the rest of South Africa – only settlements were demarcated in 1999 as voting districts with large areas in-between excluded. These in-between spaces were also not freestanding, but grouped into a single geospatial feature group.

The second problem was that the boundaries of the older voting district data sets for 1999 and 2000 differed from the 2011 spatial data (Figure 3), resulting in overlaps and slivers. This can be attributed to less accurate, old boundary data for South Africa which had been captured at different scales from old topographic maps. Subsequently, the South African coastline has been captured using more recent technologies such as high-resolution satellite imagery and aerial photography.

All voting districts for elections prior to 2011 were combined individually with the 2011 voting districts by applying a union-analysis function to calculate a geometric intersection of all features. Using an area-based approach, the proportional change of voting districts from the prior election (now part of the 2011 voting districts) could be calculated. The end results would indicate how much (percentage-wise) of a prior voting district would 'shift' to a new voting district, and thus also how many of the registered voters also

7 'Former homelands' refers to self-governing territories for Black African ethnic groups established under the apartheid policy (Cahoon, 2013: online).

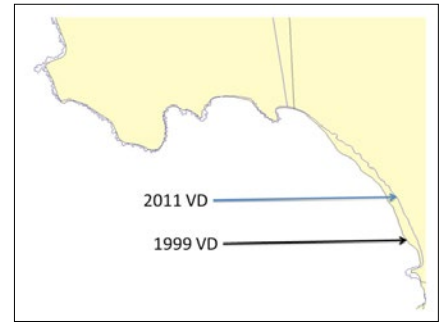


Figure 3: Comparison of the same spatial features from 1999 with those of 2011 indicating difference in data quality  
Source: Maritz, 2012: 13

needed to be shifted. Assuming an even population spread, this can then be translated to the allocation of registered voters between the two election periods. Using an area-proportioning approach, the 1999/2000/2004/2006/2009 areas were apportioned to the 2011 VDs.

The next step was to determine the most likely 2011 VD for each person on the voters' roll at the time of the 1999, 2000, 2004, 2006 and 2009 elections. This required a randomisation of the various eligible 2011 VDs. The spatial extent that each 2011 VD overlapped with the 1999/2000/2004/2006/2009 VD concerned was treated as a selection probability. The randomisation procedure was adopted to determine the most appropriate 2011 VD for each person registered as a voter for the 1999 election. The randomised selection was based on the so-called tabled distribution. Where there was a one-to-one overlap, no randomisation needed to take place. The same procedure was repeated for 2000, 2004, 2006 and 2009 to determine the most likely 2011 VD for the person concerned at the time of each election. In election years for which the person was not registered to vote, no allocation of 2011 VDs was made (Kok, 2010: 6). These allocations provided the basis for the subsequent migration analyses.

### 3.4 Constraints and benefits

One of the obvious limitations of using voter registration data is that it only represents registered voters. It

excludes those that are not eligible to vote such as foreigners and children (under 18 years of age). It also excludes those who simply do not vote and do not bother to register. The IEC migration data does not represent the entire population, and it, therefore, does not replace other migration data such as those recorded through the censuses. When voters move their residence, but fail to re-register in the voting district of their new place of residence, they are regarded as non-migrants. Although less likely, there is nothing to prevent voters from registering in another VD, even if they do not reside there. When working at a more aggregate scale than voting district, such issues are less important and the data become more reliable, since highly localised problems tend to be neutralised at higher spatial levels. It is a large data set that is suitable as a data set for migration analysis.

While it is important to acknowledge the constraints pertaining to the IEC data if errors in analysis are to be avoided, it is also important to recognise the important benefits of the IEC data. The IEC-derived migration data provide a number of advantages not available in any survey-based (including census) data. In censuses, the number of questions is severely restricted and it is, therefore, not possible to obtain information on successive migratory moves; however, the IEC data provide a longitudinal perspective of voters' migration histories, making it possible to identify trends over time. Secondly, in migration survey research, one is confronted with respondents' memory lapse. In the case of migration, it applies especially to migration dates; the IEC data do not rely on memory, but on registration to vote and are, therefore, free from recall errors. A related major advantage of the IEC data is the fact that one does not have to rely on either people's memory of the spatial entities previously lived in or on the correct classifications/descriptions and names of such places. Another related advantage of the IEC-derived migration data is the fact that coding errors, due to unclear

dates or place names, are virtually non-existent. Age reporting in survey and census data is also expected to be a more severe problem than in the IEC data, which has the benefit of being linkable with ID numbers depicting the registered date of birth.

#### 4. APPLICATION OF THE RESULTS

Although the IEC data in non-spatial form also contribute significantly to migration analysis, it is especially valuable for the authors to present the information spatially. In South Africa, decision-makers are often overloaded with documents and reports which they might not even read. Mechanisms to display or summarise information visually are preferred as a means to easily and quickly inform. This was one of the considerations when the STEPSA portal was developed. A number of relevant map themes, including migration, are provided through an online map viewer on the StepSA website to support local and regional planners.

##### 4.1 Correlation with 2011 census data

A key question when considering the use of the IEC data is to what extent it correlates with information drawn from the 2011 census. Should the trends be significantly different, it would raise doubt about the value of the information. During the initial processing of the latest (2011) IEC data, it was decided to compare it to the census information. At the time of conducting the comparison, Statistics SA had released only interprovincial migration results. The census data were processed to indicate the number of individuals who relocated between provinces in the periods 2001 and 2011. Similarly, the IEC data used the time periods 2000 and 2011. Figures 4 to 6 illustrate the trends between the census and the IEC interprovincial migration information for the provinces of the Western Cape, Free State, Mpumalanga, Eastern Cape, Northern Cape, KwaZulu-Natal, North West, Gauteng and Limpopo, respectively.

##### 4.2 Interprovincial migration

The data were also extracted at a more aggregate level, namely for province and local municipality. Using the flow-data model, flow lines were created indicating all flows. Using an origin-destination matrix generated from the flow data, flow lines can be created to illustrate the migration trends. Figure 7 illustrates the result – interprovincial migration flows for South Africa for the period 1999-2011.

Using the IEC data, the net flows of movement between provinces can be calculated – again the objective is not to list absolute numbers, but instead to identify major migration trends as this in itself is useful to understand trends over time. Observing net flows is favoured, as flows between the same origin/destination are cancelled out, leaving only the dominant movement trends. From the mapping, it can be observed that there are several net positive migration flows occurring, namely:

- From the Eastern Cape to the Western Cape;
- From Gauteng to the Western Cape;
- From Limpopo and Mpumalanga to Gauteng, and
- From the Free State to both Gauteng and the Western Cape.

When considering only net inflow or outflow, the IEC information indicates that the Western Cape and Gauteng (and, to a far lesser extent, North-West Province) are net receivers of migrants, while all other provinces are net providers of migrants, see Figure 8.<sup>8</sup> It must, however, be pointed out that this 'only indicated interprovincial movements' – more local inter-voting districts and inter-municipal movements are not taken into account. This is also a long interval and interim movements are not reflected in this instance.

<sup>8</sup> The Census only reflects the last movement that occurred during a 10-year period, while IEC data can be broken down further (2000, 2004, 2006, 2009, and 2011). This result reflects for IEC only the movement trend comparing movement from the data in 1999 and again 2011.

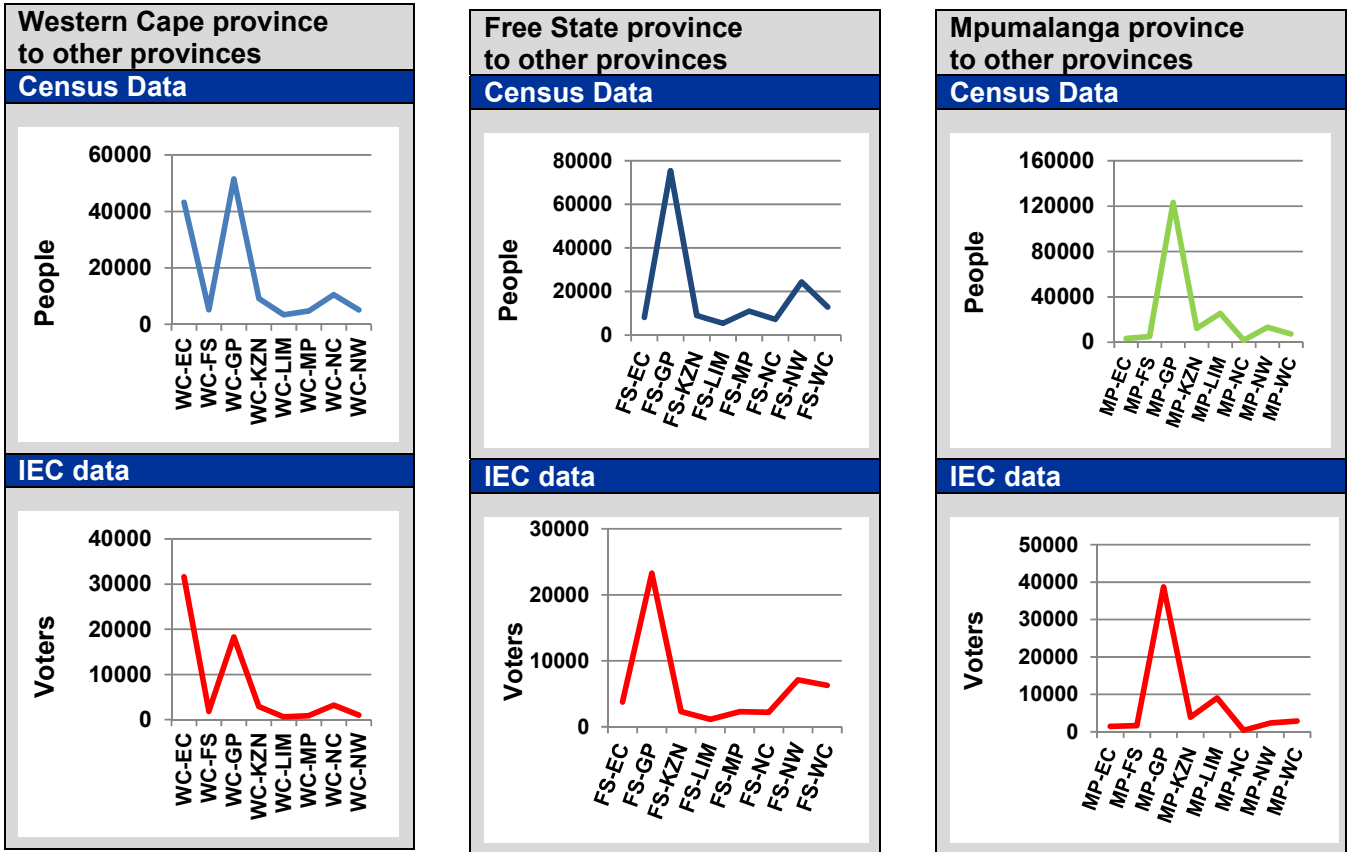


Figure 4: Comparison of census and IEC data for interprovincial flows

Source: Maritz & Kok, 2013: 4-6

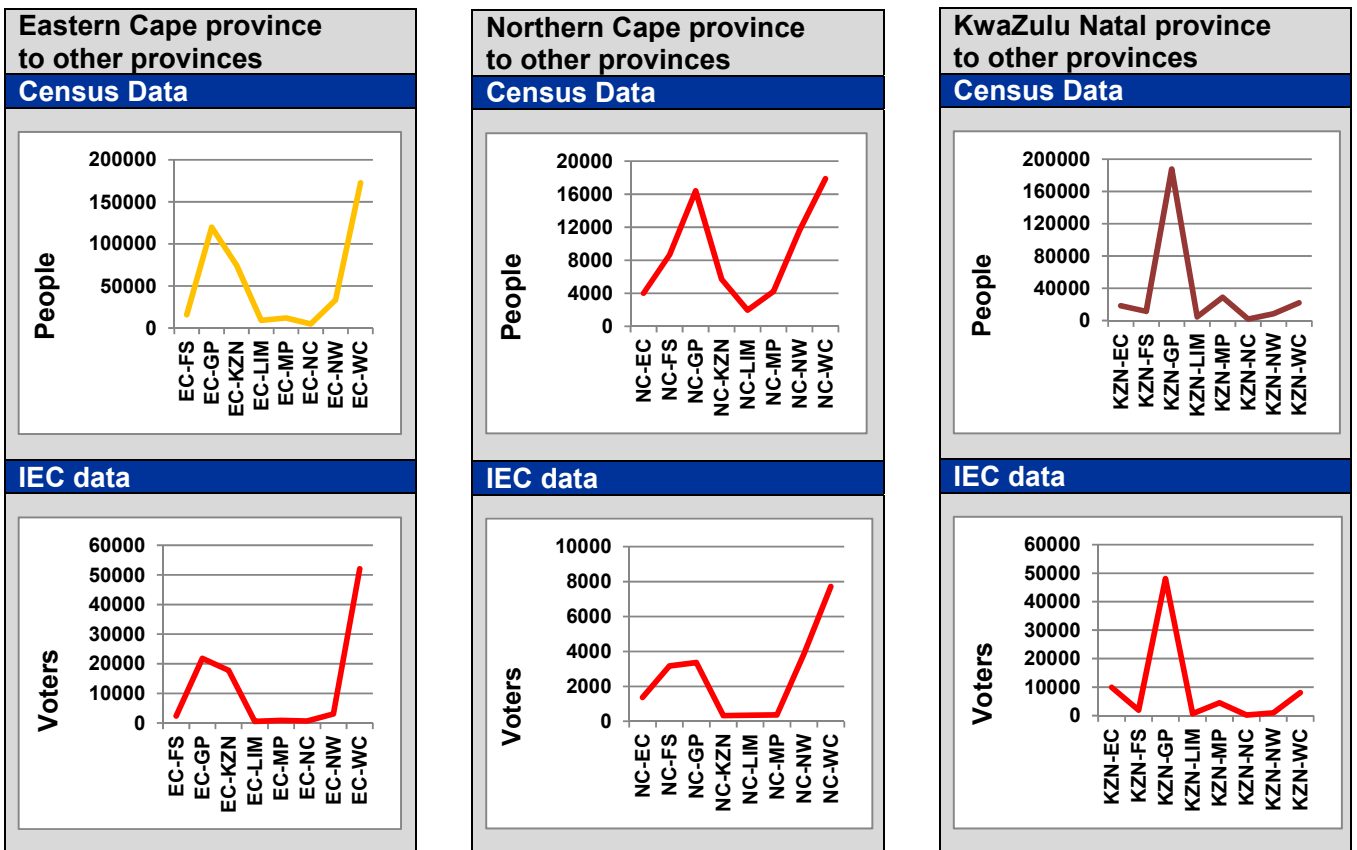


Figure 5: Comparison of census and IEC data for interprovincial flows

Source: Maritz & Kok, 2013: 4-6

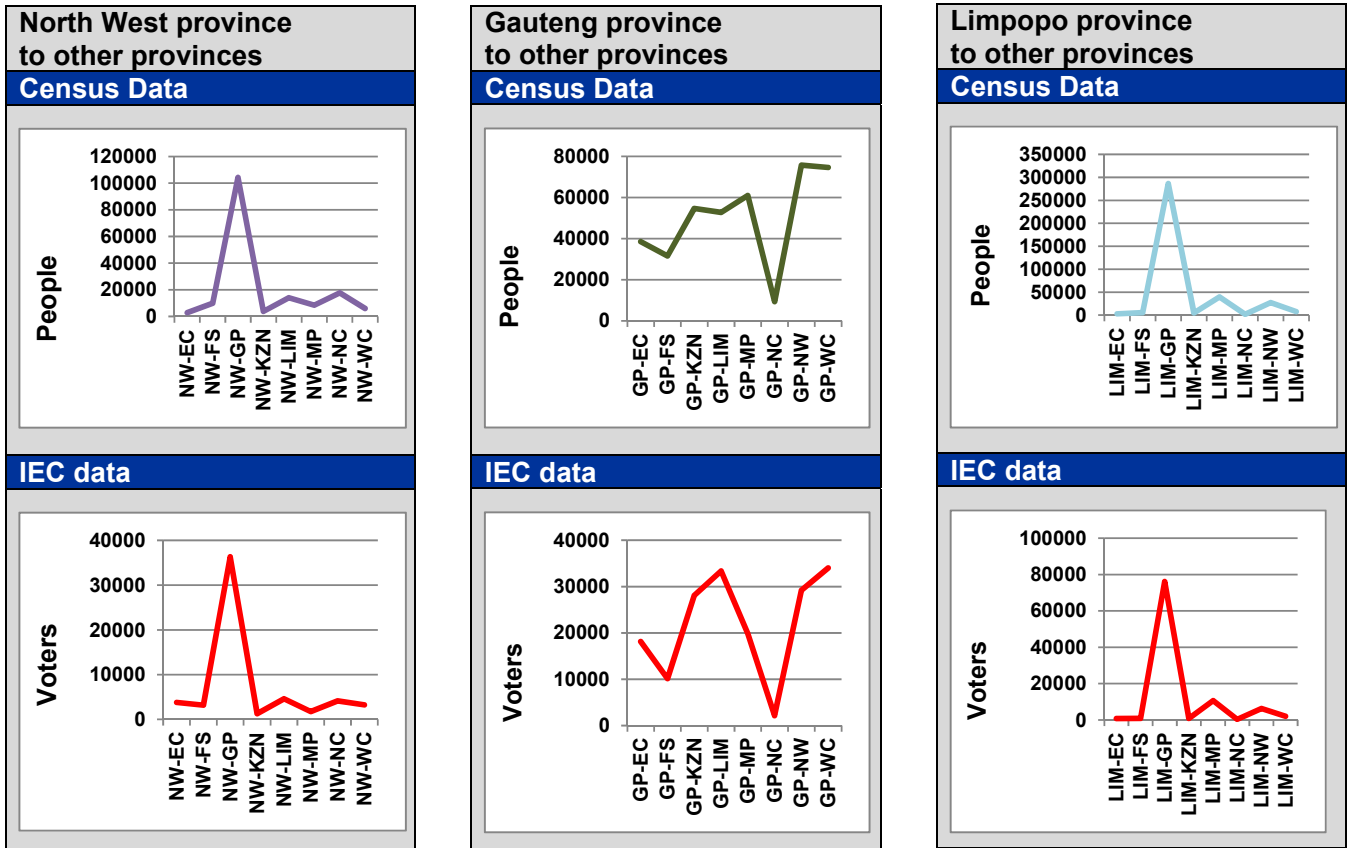


Figure 6: Comparison of census and IEC data for interprovincial flows  
 Source: Maritz & Kok, 2013: 4-6

**4.3 Inter-municipal migration trends**

To conduct inter-municipal migration analyses, the same information was extracted at municipal level. Similarly, origin and destination matrices were constructed and flow lines generated to indicate only major net migration trends. Summaries were also produced to indicate whether municipalities were net providers or net receivers of migrants. Figure 9 illustrates the results – the grey and blue areas indicate municipalities where a net outflow occurred, and the orange and red areas indicate municipalities that experienced a net gain through migration. The major movements indicated by flow lines generated are the following:

- There was significant movement from several municipalities in the Eastern Cape to the Western Cape.
- Migration from several municipalities in Limpopo province was to Gauteng.
- Migration also occurred between the metros, especially from

eThekwi to Gauteng and from Gauteng to Cape Town.

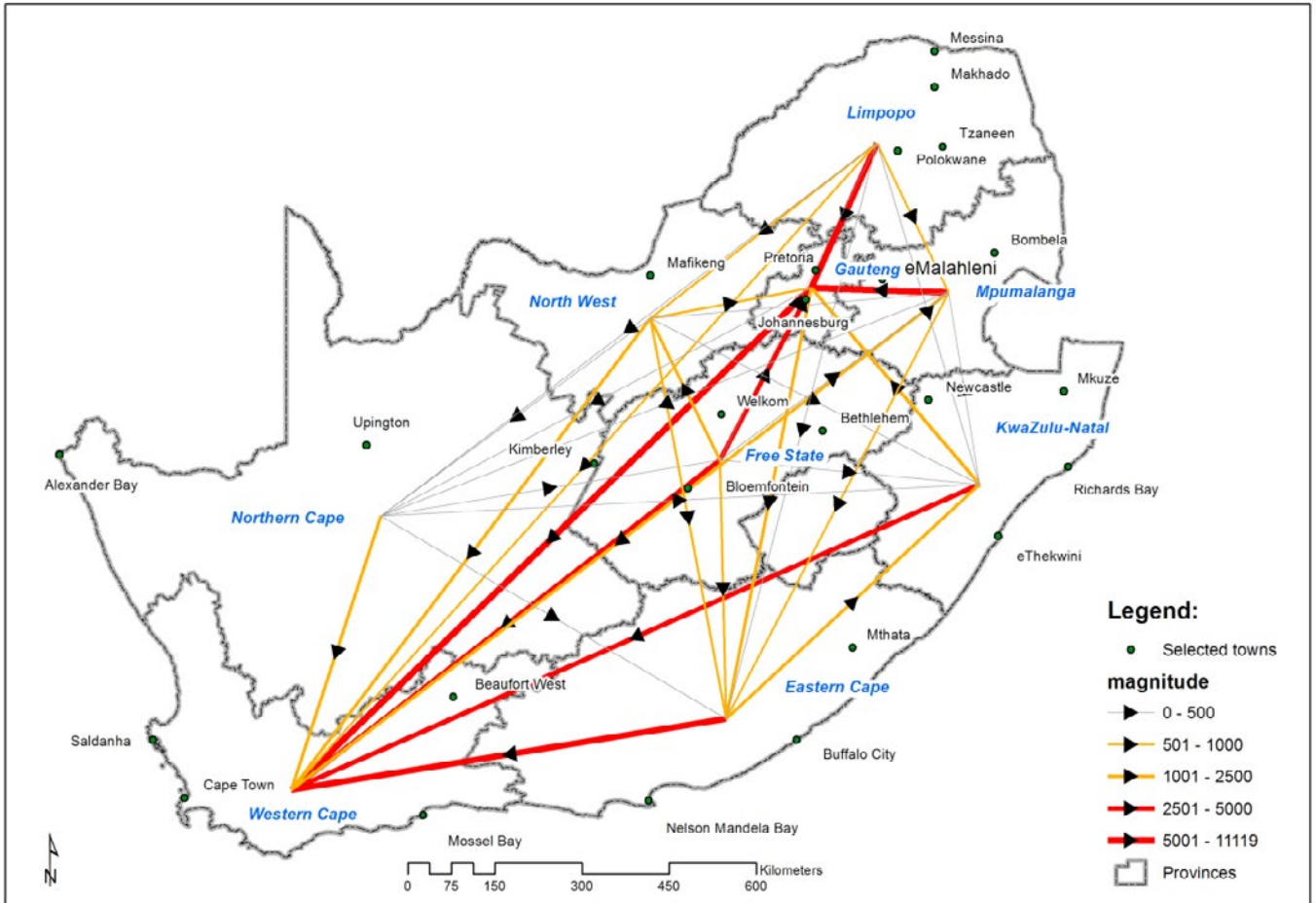
- Also observable are adjustments in distressed districts where migration occurred from more remote areas to municipalities with larger towns such as Kuruman and Mbombela.

Two trends can be observed in the areas currently described as distressed districts:<sup>9</sup> first there appear to be adjustments from more remote parts within these districts to larger service centres. Examples are Kuruman in North-West province and Mbombela in Mpumalanga province. The second trend is a movement from these distressed districts to the metropolitan areas of Gauteng, eThekwi and Cape Town. Significant movements can be observed from Vhembe to Gauteng, from OR Tambo and Amatole districts to Cape Town. When considering only net gain or loss due to migration, several municipalities

<sup>9</sup> At the time of writing this article, 23 districts were identified as priority rural districts, due to the large number of disadvantaged and poor communities within these areas.

stand out (see Figures 10 and 11): the City of Tshwane and Cape Town have experienced net gains, while Emfuleni and Matjhabeng have experienced net losses when considering the time period concerned (1999-2011). Naturally, it is important to note that movements within shorter time periods must also be considered, the results of which are not reflected in this example. These results should also be analysed beyond the spatial analysis, if the reason for them is to be understood. Some results might not reveal the full picture – for example, students in Stellenbosch (in 2000) who moved to major employment centres after completing their studies (in 2011) might be reflected as a major out-migration. However, in this instance, ‘shorter time periods’ need to be considered, as new students might have moved into the town, but this is not reflected when examining only this long period.





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Figure 7: Main interprovincial migration flows comparing the periods 1999 and 2011  
 Source: Maritz & Kok, 2013: 7

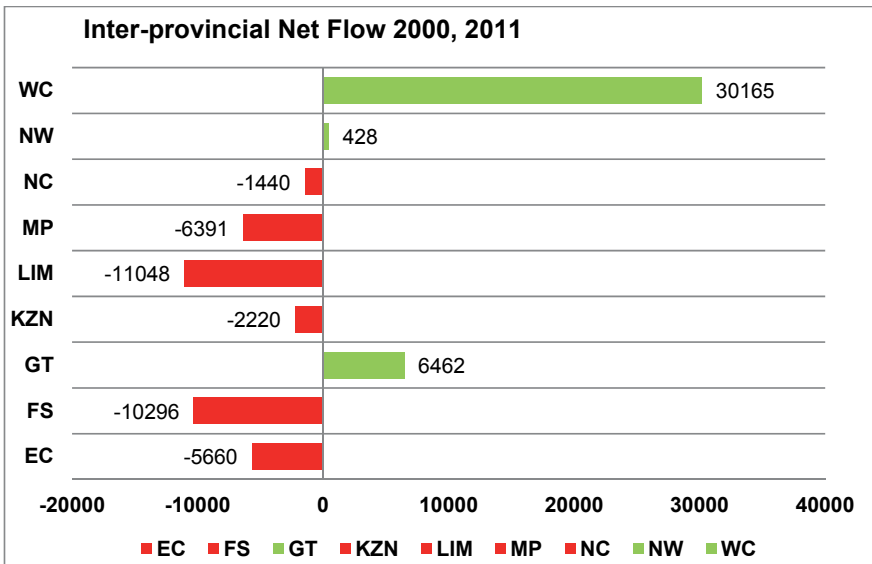


Figure 8: Interprovincial net migration flows comparing the periods 1999 and 2011  
 Source: Maritz & Kok, 2013: 8

### 5. CONCLUSIONS AND FUTURE RESEARCH

Although South Africa is in a better position than many other developing countries, it still requires more frequent and finer scale information, especially for local planning and policy development. Migration is one of the key issues identified by users (local and district municipalities). Given the low frequency of migration data collected nationally, the IEC’s voting district-based data has much potential as a migration data set. A key advantage is that the information is captured and related to voting districts, which in themselves are relatively small spatial units. Comparisons of IEC data with other migration information have shown that it is a viable complementary data source. The IEC data does have limitations and this is mainly due to human behaviour; however, the effects of this potential problem

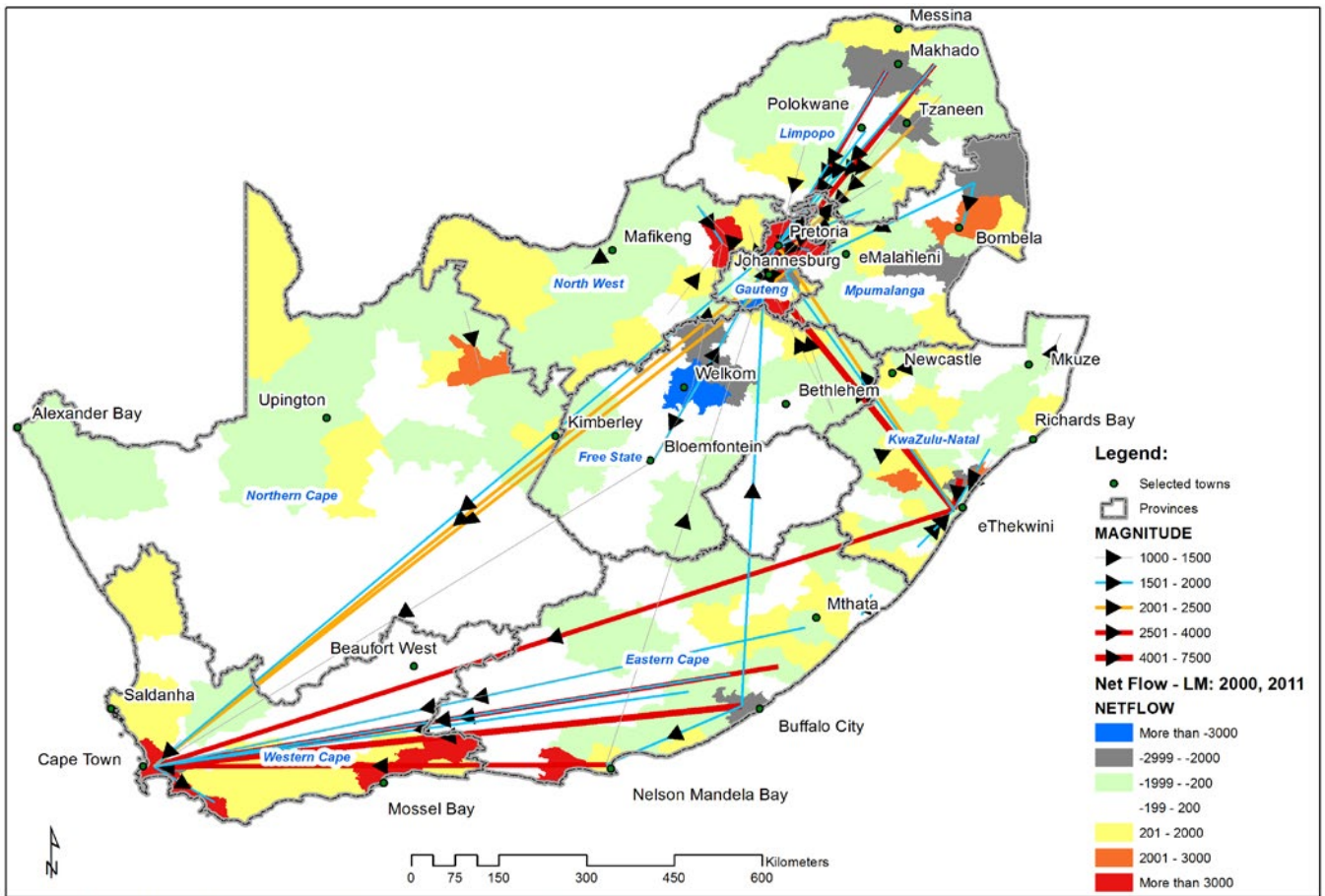


Figure 9: Net migration indicated by flow lines for inter-municipal movement for the period 1999-2011

Source: Maritz & Kok, 2013: 12

can for the most part be overcome by the aggregation of data and by combining the analysis with other socio-demographic information.

It was shown earlier that it is indeed possible to use the IEC data to determine migration trends.

In applying the data to the issue of the former homeland territories, the spatialised results gave a clear indication that the major migration streams indicated a move to the larger metropolitan centres and to regional centres such as Cape Town, Ekurhuleni, Johannesburg and Tshwane. At the time of writing this article, no analysis had been conducted on gender and age categories within the data set. Such analyses will also allow future analyses of population segments. The IEC migration data will, in future, be used more intensively to understand migration behaviour. It is hoped that this, in turn, will have a positive impact on national, regional and local planning and policy-making.

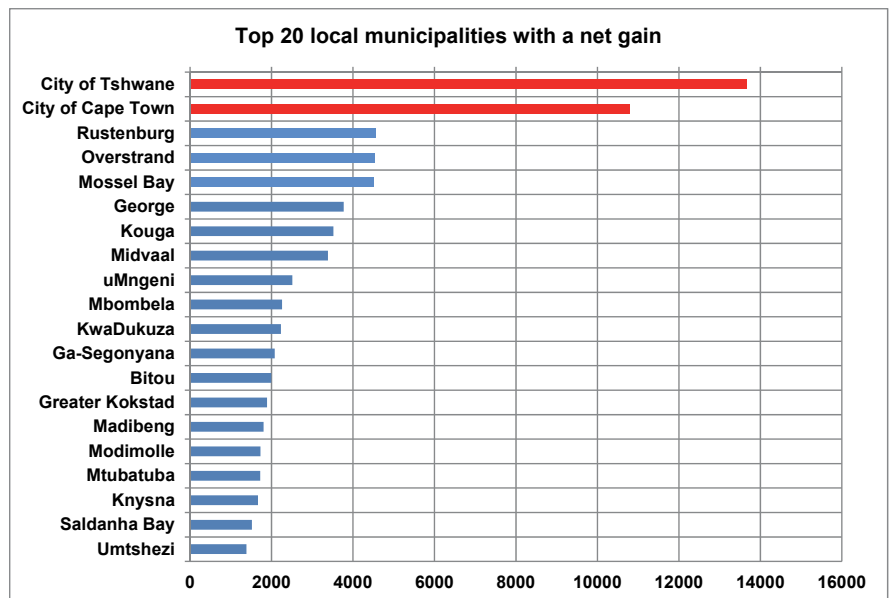


Figure 10: Graph indicating the top 20 local municipalities with a net gain for the period 1999 to 2011

Source: Maritz & Kok, 2013: 14

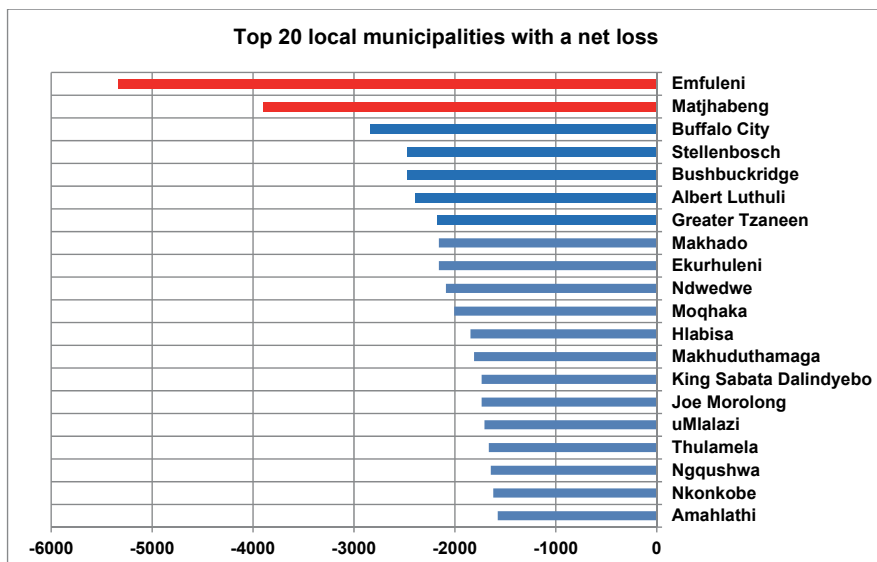


Figure 11: Graph indicating the top 20 local municipalities with a net loss for the period 1999 to 2011

Source: Maritz & Kok, 2013: 15

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**REFERENCES LIST**

ANON. 2008. INDEPTH resource kit for demographic surveillance systems. (Homepage of INDEPTH network). Available from: <<http://www.indepth-network.org>> [Accessed: 1 April 2013].

CAHOON, B. 2013. Former black homelands (bantustans.) Homepage of World Statesmen.org. Available from: <[http://www.worldstatesmen.org/South\\_African\\_homelands.html](http://www.worldstatesmen.org/South_African_homelands.html)> [Accessed: 18 April 2013].

COLLINSON, M., KOK, P. & GARENNE, M. 2006. *Migration and changing settlement patterns: Multilevel data for policy*. Report 03-04-01. Pretoria: Statistics South Africa.

COLLINSON, M., TOLLMAN, S.M. & KAHN, K. 2007. Migration, settlement change and health in post-apartheid South Africa: Triangulating health and demographic surveillance with national census data. *Scandinavian Journal of Public Health*, 35(Suppl. 60): 77-84.

CROSS, C., KOK, P., VENTER, C., TUROK, I., OLIVIER, J., MAFUKIDZE, J. & BADENHORST, W. 2012. The space economy and access to the city: HSRC’s draft final report for Phase 1(b), IPDM. Unpublished report to the Department of Science and Technology. Pretoria: HSRC.

DE JONG, G.F. & GARDNER, R.W. 1981. *Migration decision making: Multidisciplinary approaches to microlevel studies in developed and developing countries*. New York: Pergamon.

ELECTORAL INSTITUTE FOR SUSTAINABLE DEMOCRACY IN AFRICA (EISA). 2002. South Africa: Delimitation process and voting stations. Available from: <<http://www.eisa.org.za>> [Accessed: 12 April 2013].

GROBBELAAR, N. 2005. The development of a small area layer to serve as the most detailed geographical entity for the dissemination of census 2001 data. *AfricaGIS 2005: Beyond talk: Geo-information working for Africa*, 31 October to 4 November 2005.

INDEPENDENT ELECTORAL COMMISSION (IEC). 2012.

Independent electoral commission – about us. Available from: <<http://www.elections.org.za>> [Accessed: 12 April 2013].

KOK, P. 1999. The definition of migration and its application: Making sense of recent South African census and survey data. *Southern African Journal of Demography*, 7(1), pp. 19-30.

KOK, P. 2010. Preparing the IEC data for migration analyses: Approaches and methods adopted. Unpublished feedback to IEC. Pretoria: P. Kok.

KOK, P. & COLLINSON, M. 2006. *Migration and urbanization in South Africa. Report 03-04-02*. Pretoria: Statistics South Africa.

KOK, P., GELDERBLUM, D., OUCHO, J.O. & VAN ZYL, J. 2006. *Migration in South and southern Africa: Dynamics and determinants*. Cape Town: Human Sciences Research Council.

KOK, P., O’DONOVAN, M., BOUARE, O. & VAN ZYL, J., 2003. *Post apartheid patterns in internal migration in South Africa*. Cape Town: Human Sciences Research Council.

LANDAU, L.B. & SEGATTI, A. 2009. *Human Development Impacts of Migration: South Africa case study*. First ed. New York: United Nations Development Programme.

LEE, E.S. 1966. A theory of migration, *Demography*, 3(1), pp. 47-57.

MARITZ, J. & KOK, P. 2012. Feedback to the IEC on the voter registration data provided to the HSRC and CSIR. (Presentation provided to the IEC on 22 October 2012).

MARITZ, J. & KOK, P. 2013. Using election registration data to measure migration trends in South Africa. In: Buchroithner, M. (Ed.). *Proceedings of the 26th International Cartographic Conference, Dresden, Germany, 25-30 August 2013*. Dresden: Technische Universität Dresden: International Cartographic Association.

MARITZ, J. 2013. *Policy series presentation: Migration using IEC data at national scale*. CSIR: StepSA. Available from: <[stepsa.org](http://stepsa.org)> [Accessed: 3 March 2014]

MASSEY, D.S., ARANGO, J., HUGO, G., KOUAOUCCI, A., PELLEGRINO, A. & TAYLOR, J.E. 1993. Theories of international migration: A review. *Population and Development Review*, 19(3), pp. 431-466.

- MASSEY, D.S., ARANGO, J., HUGO, G., KOUAOUCCI, A., PELLEGRINO, A. & TAYLOR, J.E. 1994. An evaluation of international migration theory: The North American case. *Population and Development Review*, 20(4), pp. 699-751.
- MUNICIPAL DEMARCATION BOARD. 2013. About – history. Available from: <[www.demarcation.org.za](http://www.demarcation.org.za)> [Accessed: 12 April 2013].
- MUKWEVHO, H. 2013. Application of statistics in Emfuleni local municipality. Presented at the Gauteng Isibalo Symposium for Evidence-based Decision-making, Gallagher Estate, 16-17 September 2013.
- POLZER, T. 2010. *Population movements in and to South Africa: Migration factsheet*. Johannesburg: University of the Witwatersrand: Forced Migration Studies Programme.
- PRESIDENCY. 2006. *National Spatial Development Perspective 2006*. Pretoria: The Presidency, South Africa.
- RAVENSTEIN, E.G. 1885. The laws of migration. *Journal of the Royal Statistical Association*, 48(2), pp. 167-227.
- RAVENSTEIN, E.G. 1889. The laws of migration. *Journal of the Royal Statistical Association*, 52(June), pp. 241-301.
- ROSSI, P.H. 1980. *Why families move*. Beverly Hills, CA: Sage.
- RWELAMIRA, J.K. & KIRSTEN, J.F. 2003. The impact of migration and remittances to rural migration-sending households: The case of Limpopo Province, South Africa. Paper presented at annual conference of the 41<sup>st</sup> Agricultural Economic Association of South Africa (AEASA), 2-3 October 2003, Pretoria, South Africa.
- SHAW, R.P. 1975. *Migration theory and fact: A review and bibliography of current literature*. Philadelphia: Regional Science Association.
- SKELDON, R. 2008. *Migration and development*. UN/POP/EGM-MIG/2008/4. Bangkok, Thailand: United Nations Economic and Social Commission for Asia and the Pacific.
- SPEARE, A. 1974. Residential satisfaction as an intervening variable in residential mobility. *Demography*, 11(2), pp. 173-188.
- STANDING, G. 1984. Conceptualising territorial mobility. In: Bilsborrow, R.E., Oberai, A.S. & Standing, G. (Eds). *Migration surveys in low-income countries: Guidelines for survey and questionnaire design*. London: Croom Helm, pp. 31-59.
- STATISTICS SOUTH AFRICA. 2001. *Census 2001 – concepts and definitions*. 03-02-26 (2001). Pretoria.
- STATISTICS SOUTH AFRICA. 2012. *Statistical release (Revised) Census 2011*. P0301.4. Pretoria.
- STATISTICS SOUTH AFRICA, 2013. *Census 2011: Community Profile in SuperCross*. Pretoria.
- STEPSA. 2013. About Stepsa.org. Available from: <<http://stepsa.org>> [Accessed: 11 April 2013].
- STEWART, J.Q. 1941. An inverse distance variation for certain social influences. *Science*, 93(2404), pp. 89-90.
- STEYN, L. 2013. Measuring the waves of migration. *Mail and Guardian, Business*, 11 January 2013. Available from: <<http://mg.co.za/article/2013-01-11-measuring-the-waves-of-migration>> [Accessed: 6 March 2014].
- TODES, A., KOK, P., WENTZEL, M., VAN ZYL, J. & CROSS, C. 2010. Contemporary South African urbanization dynamics. *Urban Forum*, 21(3), pp. 331-348.
- USHER, E. (Ed.). 2004. *Essentials of migration management: A guide for policy makers and practitioners. Migration and Demography (section 2.2)*. Geneva: International Organisation for Migration.
- WAUGH, D. 2000. *Geography, an integrated approach*. 2<sup>nd</sup> edition. Cheltenham: Nelson Thornes.
- WILLIS, K.G. 1974. *Problems in migration analysis*. Westmead: Saxon House.
- WORLD BANK. 2011. African migration project survey in South Africa. Available from: <<http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTDECPROSPECTS/0,,contentMDK:21681739~pagePK:64165401~piPK:64165026~theSitePK:476883,00.html>> [Accessed: 12 November 2013].
- ZIPF, G.K. 1946. The  $P_1P_2/D$  hypothesis: On the inter-city movement of persons. *American Sociological Review*, 11(6), pp. 677-686.