South African CitiesNetwork

LINKING POPULATION DYNAMICS TO MUNICIPAL REVENUE ALLOCATION IN BUFFALO CITY

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Joburg Metro Building, 16th floor, 158 Loveday Street, Braamfontein 2017

Tel: +27 (0)11-407-6471 | Fax: +27 (0)11-403-5230 | email: info@sacities.net |

www.sacities.net

DISCLAIMER:

This study is based on the StatsSA Census data of 2011. The results are not intended to provide an indication of actual future figures. Rather the intention is to provide for an understanding of how projections are arrived at in all their limitations. Projections can allow for an opportunity to interrogate assumptions made in future projections and act as a guide to thinking about how to manage and address future growth.

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EXECUTIVE SUMMARY

The relationship between population and development is recognised by various governments. In order to measure progress on socio-economic development, indicators are required. The traditional source of population figures at lower geographical levels is the census. However, census figures are outdated immediately as they are released since planners require population figures for the present and possibly, for future dates. In an attempt to meet the demand for current population figures, many organisations produce mid-year population estimates and projections. Statistics South Africa (Stats SA) produces mid-year estimates at national and provincial levels but these estimates often do not meet the needs of local administrators.

Some of South Africa's population are concentrated in cities or metros. Cities play a key role in the economic development of any country. Population dynamics in South African cities have financial implications. For efficient allocation of scarce resources, there is a need for revenue optimisation to meet the increasing demands and maintenance of public services and infrastructure driven by the growth of population in South African cities. In order to achieve this, accurate and reliable information about population dynamics is required to inform planning for city services and infrastructure demand as well as revenue assessment. In view of the above, the overall aim of this study is to develop indicators and provide population figures arising from population dynamics and characteristics as well as determine their municipal finance effects for Buffalo City. Thus, this study had two broad components – demographic analysis and financial analysis. Several data sets and methods were utilised in order to achieve the objectives of this study. The results for Buffalo City were compared with those for Eastern Cape Province (where Buffalo City is located) and South Africa as a whole to provide a wider context.

The results have many aspects. The levels of the indicators produced in this study indicate that there are some areas where Buffalo City shows higher levels of human development than Eastern Cape Province and the general population of South Africa. However, development plans needs to take into consideration some of the levels of the indicators.

These include population growth, age structure of the population, and growth in housing units, income poverty and vulnerability.

Regarding the population projections, the results indicate the population of Buffalo City could increase from about 786 108 million in 2016 to about 832 522 million 2021. The estimated ward populations in Buffalo City varied. This implies different levels of development challenges in the City's wards such as provision of health care, housing, electricity, water, sanitation, etc.

The results from the financial analysis suggests that relatively high levels of real municipal revenue growth during the period 2015 to 2021 will be realized with the demographic dividend of lower population growth providing the extra benefit of high real per capita revenue growth rates. The main reasons which were identified for such growth include, inter alia, the strong growth of the middle and upper income groups in Buffalo City, growth in the number of households and the incomes of households, increasing concentration of economic activity in Buffalo City; growing trade and investment, new manufacturing and service projects as well as the broadening of the industrial and tourism base in Buffalo City. However, it should be emphasised that municipal revenue growth in Buffalo City i would have been even higher in the presence of higher economic growth rates, employment and household income growth rates than the forecasts underlying the figures shown in this report.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND AND STATEMENT OF THE PROBLEM

Improvement of the welfare of people is at the centre of all socio-economic development planning. The purpose of all global development initiatives espoused in international conferences is to improve people's welfare. National and sub-national development plans place improvement of people's welfare as their core focus. Therefore, South Africa's development plans including Integrated Development Plans (IDPs) may be seen in this context.

The relationship between population and development has been emphasised in various international population conferences and is recognised by various governments. This is reflected in various governments' population policies. In this context, South Africa's population policy noted that: "The human development situation in South Africa reveals that there are a number of major population issues that need to be dealt with as part of the numerous development programmes and strategies in the country" (Department of Welfare, 1998) thus drawing a link between population and development. In order to measure progress on socio-economic development, indicators are required. Indicators provide a tool for understanding the characteristics and structure of the population.

Planning to improve the welfare of people often is done, not only at national level but also at lower geographical levels such as provinces, municipal/metro and wards levels (in the case of South Africa). The traditional source of population figures at lower geographical levels is the census. However, census figures are outdated immediately they are released since planners require population figures for the present and possibly, for future dates.

In an attempt to meet the demand for current population figures, many organisations produce mid-year population estimates and projections. However,

these estimates are usually at higher geographical levels. In the case of South Africa, Statistics South Africa (Stats SA) (the official agency providing official statistics) produces mid-year estimates for limited geographical levels – national and provincial levels (Stats SA 2014). Nevertheless, population estimates at higher geographical levels often do not meet the needs of local administrators such as city administrators.

Some of South Africa's population are concentrated in cities or metros. According to Udjo's (2014) estimates, the City of Johannesburg, City of Cape Town, eThekwini, Nelson Mandela Bay and Buffalo City respectively had the highest populations in South Africa in 2014 (ranging between 3.07 million to 4.67 million). Apart from fertility and mortality, migration is an important driver of population growth in South Africa's cities and metros as is the case elsewhere globally. Cities play a key role in the economic development of any country. For example, The City of Johannesburg is often referred to as the commercial hub of South Africa.

However, population dynamics (changes in population size due to the fertility, mortality and net migration) in South African cities have financial implications. For efficient allocation of scarce resources, there is a need for revenue optimisation to meet the increasing demands and maintenance of public services and infrastructure driven by the growth of population in South African cities. In order to achieve this, accurate and reliable information about population dynamics is required to inform planning for city services and infrastructure demand as well as revenue assessment.

1.2 OVERALL AIM OF STUDY

In view of the above, the overall objective of the study was to provide indicators and population figures arising from population dynamics and characteristics and determine their municipal revenue effects for Buffalo City.

1.3 SPECIFIC OBJECTIVES

Arising from the above overall aim, the specific objectives of the study are to:

1. select and develop inter-censal trends (2001 and 2011) in basic demographic/population indicators influencing development focusing on municipal services and infrastructure in Buffalo City.
2. provide projections of the population of Buffalo City from 2011 to 2021.
3. provide mid-2016 ward level population estimates within Buffalo City.
4. undertake a literature review on the impact of demographic change on metropolitan finances.
5. analyse and estimate current and future relationship between demographic change metropolitan finances (both revenue and expenditure side) with relevant financial indicators in Buffalo City.

Although the focus in this study is on Buffalo City, to provide a context, the results are compared with the national figures as well as Eastern Cape, the province in which Buffalo City is located.

CHAPTER 2

DATA AND METHODS

2.1 INTRODUCTION

Several data sets and methods were utilised in this study. There were two analytical aspects, namely; demographic and financial analysis. We describe the data sets and methods according to these two aspects.

2.2 DATA

2.2.1 Demographic analysis

The sources of data for the studies are Stats SA. The data include the 1996, 2001 and 2011 Censuses. Census (and survey) data have weaknesses in varying degrees from one country to the other. Despite the weaknesses the Stats SA's data may contain, they provide uniform sources for comparison of estimates between and within cities. The purpose of the study was not to establish "exact" magnitudes (whatever those may be) but to provide indications of magnitudes of differences between and within South Africa's cities within the context of the objectives of the study.

The overall undercount in the 1996 census was 11%. It increased to 18% in the 2001 Census and decreased to 14.6% in the 2011 Census (Statistics South Africa 2003, 2012). The tabulations on which the computations in the demographic aspect of this study were based were on the 2011 provincial boundaries. The adjustment of the 2001 provincial boundaries to the 2011 provincial boundaries was carried out by Stats SA. At the time of this study, the 1996, 2001 and 2011 Censuses' data adjusted to the new 2016 municipal boundaries were not available. South Africa's post-apartheid censuses are considered as controversial (Dorrington 1999; Sadie 1999; Shell 1999; Phillips, Anderson & Tsebe, 1999; Udjo 1999; 2004a; 2004b). Some of the controversies pertain to the reported age-sex distributions (especially the 0-4-year age group) and the overall adjusted census figures. A number of the limitations in

the data relevant to the present study were addressed in Udjo's (2005a; 2005b; 2008) studies and subsequently incorporated in this study.

2.2.2 Financial analysis

A total of 10 Stats SA Financial Censuses of municipality data sheets in Excel format were downloaded from the Stats SA website (www.statssa.gov.za) for analytical purposes (Statistics South Africa, 2006 to 2016), namely Eastern Cape Census of municipality data sheets for 2005 to 2014 (10 data sheets). In addition to the 10 data sheets referred to above, two other data sheets were used for the purposes of the financial analyses conducted for the purposes of this report, namely:

- The demographic data generated by Prof Udjo with respect to the municipal population of Buffalo City and
- Household consumption expenditure in nominal and real terms required to calculate the expenditure deflator, used to derive real municipal revenue growth totals with respect to Buffalo City (South African Reserve Bank (SARB), 2016).

The 12 data sheets obtained from Stats SA and the SARB as indicated above were scrutinized for potential missing data and were checked for possible anomalies such as volatility in the data sets and definitional changes in the metadata. Having completed suitable analyses for such missing data and volatilities the data were found to be in good order for inclusion in municipal revenue time-series for the purposes of this project.

Although it would have been ideal to be able to disaggregate the municipal revenue data into sub-categories such as residential, commercial/business, state and other, it was not part of the brief of this project to conduct such breakdowns. Furthermore, the necessary data for such breakdowns are not readily available due to definitional problems and it will require many hours of analyses and modelling to derive reliable and valid time-series at such a level of disaggregation.

2.3 METHODS

2.3.1 Demographic analysis

2.3.1.1 *Basic demographic and population indicators*

The indicators that were considered relevant are listed in Appendix 1. The definition of each indicator is also shown in Appendix 1. The statistical computation of the indicators is incorporated in the definitions of some of the indicators while a few of the indicators utilised indirect or direct demographic methods. These include annual growth rates and singulate mean age at marriage

- Annual growth rates

Annual growth rates were computed for some indicators. The computation utilised the geometric method of the exponential form expressed as

$$P_t = P_0 e^{rt}$$

P_0 is the base population at the base period, P_t is the estimated population at time t, t is the number of years between the base period and time t, r is the growth rate and e the base of the natural logarithm.

- Singulate Mean Age at Marriage

The singulate mean age at first marriage is an estimate of the mean number of years lived by a cohort before their first marriage (Hajnal, 1953). It is an indirect estimate of the mean age at first marriage and was estimated from the responses to the current marital status question. Assuming all first marriages took place by age 49, the singulate mean age at first marriage (SMAM) is expressed as:

$$SMAM = \sum_{x=0}^{49} \{P_x - (50P_{45-54})\} / (1 - P_{45-54})$$

where P_x is the proportion single at age x (Udjo, 2014a).

2.3.1.2 *The population projections*

The population projections utilised a top-down approach; that is, the population projections at a higher hierarchy were first conducted. The rationale for this is that

the quantity of data is usually richer at higher geographical levels and hence the estimates at the higher geographical levels provide control for the projections at lower geographical levels. Therefore, the projections of the population of Buffalo City entailed two stages. Firstly, a cohort component projection of the population of Eastern Cape (the province in which Buffalo City is located) from 2011 to 2021 was undertaken. Secondly, the projected population of Eastern Cape Province was then used as part of the inputs for projecting the population of Buffalo City.

The Cohort Component Method Projections of the Provincial Population

The cohort component method is an age-sex decomposition of the Basic Demographic Equation:

$$P_{(t+n)} = P_t + B_{(t,\ t+n)} - D_{(t,t+n)} + I_{(t,t+n)} - O_{(t,t+n)}$$

Where:

P_t is the base population at time t,

$B_{(t,\ t+n)}$ is the number of births in the population during the period t, $t+n$,

$D_{(t,t+n)}$ is the number of deaths in the population during the period t, $t+n$,

$I_{(t,t+n)}$ is the number of in-migrants into the population during the period t, $t+n$,

$O_{(t,t+n)}$ is the number of out-migrants from the population during the period t, $t+n$.

Thus, the cohort component method involves projecting mortality, fertility and net migration separately by age and sex. The technical details are given in Preston, *et al*. (2001). The application in the present study was as follows: Past levels of fertility and mortality in Eastern Cape were obtained partly from Udjo's (2005a; 2005b; 2008) studies. With regard to current levels of fertility, the Relational Gompertz model (see Brass 1981) was fitted to reported births in the previous 12 months and children ever born by reproductive age group of women in Eastern Cape in the 2011 Census to detect and adjust for errors in the data. This approach yielded fertility estimates for the Eastern Cape Province for the period 2011. Assumptions about future levels of fertility in the Eastern Cape Province were made by fitting a logarithm curve to the estimated historical and current levels of fertility in Eastern Cape.

Estimates of mortality in Eastern Cape were obtained from two sources, namely; (1) the 2008 and 2011 Causes of Death data, and (2) the age-sex distributions of household deaths in the preceding 12 months in Eastern Cape in the 2011 Census. The estimated life expectancies from these sources were not consistent. In particular, the trends comparing the levels estimated from the 2008 and 2011 Causes of Death data were highly improbable. The trend comparing the levels estimated from the 2008 Causes of Death data and the age-sex distributions of household deaths in the preceding 12 months in the 2011 Census seemed more probable given that life expectancy at birth does not increase sharply within a short time period (in this case, three years). In view of this, assumptions about future levels of life expectancy at birth in Eastern Cape were made by fitting a logistic curve to the life expectancies estimated from the 2008 Causes of Death data and the age-sex distributions of household deaths in Eastern Cape in the 2011 Census.

Net migration is the most problematic component of population change to estimate due to lack of data. This is a worldwide problem with the exception of the Scandinavian countries that operate efficient population registers where migration moves are registered. Net migration in South Africa is a challenge to estimate because of (1) outdated data on immigration and emigration. Even at provincial and city levels, one has to take into consideration immigration and emigration in population projections. Nevertheless, there has been no new processed information on immigration and emigration from Stats SA (due to lack of data from the Department of Home Affairs) since 2003. The second reason is that (2) although information on provincial in- and out-migration as well as immigration can be obtained from the censuses; censuses usually do not collect information on emigration though a few African countries (such as Botswana) have done so. The recent South African 2016 Community Survey by Stats SA included a module on migration. Although the results have been released, the raw data files were not yet available to the public at the time of this study. The third reason is that (3) undocumented migration further complicates migration estimates – even though the migration questions in South Africa's censuses theoretically capture both documented and undocumented migrants.

In view of the above, current trends in net migration in Eastern Cape, which includes foreign-born persons, was based on the 2011 Census questions on province of birth (foreign born coded as outside South Africa); living in this place since October 2001; and province of previous residence (foreign born coded as outside South Africa). Migration matrix tables were obtained from these questions and from which net migration was estimated for the provinces. Emigration was incorporated into the estimates based on projecting emigration from obsolete Home Affairs data (in the absence of any other authentic data that are nationally representative).

2.3.2 **Projecting Buffalo City's population**

The ratio method was used to project the population of Buffalo City. Firstly, population ratios of Buffalo City population to Eastern Cape population based on the 1996, 2001 and 2011 Censuses as well as on the 2011 provincial boundaries were first computed. Next, ratios of Buffalo City population to the district population in which it is located based on the 1996, 2001 and 2011 Censuses were computed. Secondly, linear interpolation was used to estimate the population ratios for each of the years 1996-2001 as well as the period 2001-2011. Thirdly, the population ratios for 2009, 2010 and 2011 were extrapolated to 2021 using least squares fitting on the assumption that the trend would be linear during the projection period (of 10 years). To obtain the population projections for Buffalo City, the extrapolated ratios were applied to the projected provincial population.

The steps involved in projecting the provincial and city's population described above are summarised as follows:

1. Estimate historical levels of provincial fertility, mortality and net migration.
2. Estimate current (i.e. 2011) levels of provincial fertility, mortality and net migration.
3. Project 2011-2021 levels of provincial fertility, mortality and net migration based on historical and current levels.

4. Project Provincial population 2011-2021 using (3) above as inputs and 2011 census provincial population.
5. Compute observed ratio of Buffalo City's population to its provincial population in 1996, 2001 and 2011.
6. Project the ratios for the city in (5) above to 2021.
7. Compute the product of projected ratios in (6) above and projected provincial population 2011-2021 in (4) above to obtain the projected City's population 2011-2021.

2.3.3 **Base population for the projections**

The base population for the population projections were the population figures from the 2011 Census. Since the 2011 Census was undertaken in October 2011 and since population estimates are conventionally produced for mid-year time periods, the 2011 Census age-sex distributions were adjusted to mid-2011. This was done by age group using geometric interpolation of the exponential form on the 2001 and 2011 age-sex distributions.

2.3.4 **Assumptions in the population projections**

Fertility: It was assumed that the overall fertility trend follows more or less a logarithm curve (See table 2.1 for the fertility assumptions).

*Life Expectancy at birth***:** Though inconsistent results were obtained from the analysis of mortality from the 2008 and 2011 Causes of Death data as well as the distribution of household deaths in the preceding 12 months in the 2011 Census, a marginal improvement in life expectancy at birth was assumed and that the improvement would follow a logistic curve with an upper asymptote of 70 years for males and 75 years for females (See table 2.2 for the mortality assumptions).

Net migration: On the basis of the analysis carried out on the migration data described above, the net migration volumes shown in table 2.3 were assumed for the provinces.

TABLE 2.1

FERTILITY ASSUMPTIONS IN THE PROVINCIAL POPULATION PROJECTIONS

Province	Total fertility rate*	
	2011	2021
Eastern Cape	2.8	2.3

**Estimates were based on extrapolating historical and current levels.*

TABLE 2.2

MORTALITY ASSUMPTIONS IN THE PROVINCIAL PROJECTIONS

Province	Life expectancy at birth (years, both sexes)*	
	2011	2021
Eastern Cape	50.4	59.6

**Estimates were based on extrapolating historical and current levels.*

TABLE 2.3

NET MIGRATION (INTERNAL & INTERNATIONAL) ASSUMPTIONS IN THE PROVINCIAL PROJECTIONS

Province	Net migrants (both sexes)*	
	2011	2021
Eastern Cape	-9 278	24 060

**Estimates were based on extrapolating historical and current levels*.

2.3.4.1 *Incorporating HIV/AIDS*

HIV/AIDS was incorporated into the projections using INDEPTH (2004) life tables as a standard.

Mid-2016 Ward Level Population Projections within Buffalo City

To project the population of the electoral wards within the city, the projected share of the district municipality (in which the ward is located) to provincial population, and then projected share of local municipality (in which the ward is located) population to district municipality population were first projected using the ratio method. The principle is the same as outlined above in the projections of the city's population. The stages in the projections of the electoral ward population therefore entailed the following:

- Firstly, cohort component projections of provincial population as outlined above. The results were part of the inputs for projecting the population of the relevant district municipality;
- Secondly, projections of the relevant district municipality's population from 2011 to 2021 using the ratio method were made. The results were part of the inputs for projecting the populations of the relevant local municipalities;
- Thirdly, projections of the relevant local municipalities' populations from 2011 to 2021 were made using the ratio method. The results were part of the inputs for projecting the populations of electoral wards; and
- Finally, projections of the populations of the relevant electoral wards in the provinces from 2011 to 2021 were made.

The steps in projecting the ward level population size are summarised as follows:

- Compute observed ratio of each ward within the city to the city's population in 1996, 2001 and 2011;
- Project the ratios in (1) above to 2016 for each ward within the city; and

- Compute the product of the projected ratios in (2) above and projected city population to obtain the estimated mid-2016 ward population for the city.

2.3.5 **Financial analysis**

Having obtained the 12 data sheets as indicated above (see section 2.1.2), the 10 Stats SA Financial Censuses of municipality data sheets were individually analysed in order to derive totals with respect to two municipal revenue variables, namely:

- Revenue generated from rates and general services rendered: According to Stats SA (2016), such revenue consists of property rates, the receipt of grants and subsidies and other contributions.
- Revenue generated through housing and trading services rendered: According to Stats SA (2016), such revenue consists of revenue generated through all activities associated with the provision of housing as well as trading services which include waste management, wastewater management, road transport, water, electricity and other trading services.

The two revenue totals were then aggregated for the period 2005 to 2014 for which revenue results were obtained from Stats SA. The obtained results for Buffalo City Municipality's revenues were typed onto one spreadsheet covering the period 2005 to 2014. By doing this, the 2005 to 2014 municipal revenue time-series were created consisting of three sub-time-series for Buffalo City Municipality, namely; for (1) revenue generated from rates and general services rendered by Buffalo City Municipality; (2) revenue generated through housing and trading services rendered by Buffalo City Municipality; and (3) for total municipal revenue of Buffalo City Municipality. The 'total revenue' time-series was generated by adding together the revenue generated from rates and general services rendered time-series and revenue generated through housing and trading services rendered time-series. A total of 3 (three municipal revenue by one municipality) time-series covering the period 2005 to 2014 were tested for consistency and stability as a necessary condition for the ARIMA, population and economic forecast-based municipal

revenue projections conducted for this study. Thereafter, the SARB household consumption expenditure data in nominal and real terms time-series covering the period 2005 to 2014 were included in the same data sheet.

Having obtained the total municipal revenue time-series which is expressed in nominal terms, an expenditure deflator was required to arrive at a municipal revenue time series for 2005 to 2014 in real terms with respect to Buffalo City Municipality. By dividing the household expenditure variable at constant prices through the household expenditure variable at nominal prices, an expenditure deflator time-series for the period 2005 to 2014 was derived with 2010 as the base year (2010 constant prices). By dividing the municipal revenues in nominal terms time-series for 2005 to 2014 through the expenditure deflator time-series for the period 2005 to 2014, municipal revenue at 2010 constant prices time-series for the period 2005 to 2014 with respect to Buffalo City Municipality was obtained.

Having obtained 2005 to 2014 revenue estimates in nominal and real terms, autoregressive integrated moving averages (ARIMA) equations were applied to the 2005 to 2014 municipal revenue time-series in order to generate 2015 to 2021 municipal revenue estimates in nominal and real terms. ARIMA was used for projection purposes due to the stability of the 2005 to 2014 Buffalo City municipal revenue time-series. By using ARIMA, no assumptions had to be made regarding future revenue generation practices of the Buffalo City Municipality and long-term underlying trends in the data set could be used to inform future Buffalo City municipal revenue outcomes. Furthermore, it was apparent from analysing the 2005 to 2014 municipal revenue time-series for this study that annual nominal municipal revenue growth rates were fairly consistent, which lends further credibility for using ARIMA for projection purposes (see figures 6.1 to 6.6). The ARIMA-based result was augmented by means of an equation that was applied to both municipal revenues derived from rates and taxes as well as from municipal trading income to determine whether the ARIMA result provided estimates of greatest likelihood. This equation was as follows:

$$R_{t+1} = R_t \times (\frac{(P + H + C)}{3} + A)$$

where:

R_{t+1} : Municipal revenue at time plus 1.

R_t : Municipal revenue at time plus 0.

P : Population growth rate.

H : Household consumption expenditure growth rate.

C : Consumer price inflation.

A : Municipal accelerator.

Where the ARIMA and equation-based results were similar, the ARIMA-based result was used. In cases where the ARIMA-based result differed from the equation, the equation-based result was used.

The obtained municipal revenue estimates in nominal and real terms were then divided by the 2015 to 2021 municipal population estimates in order to derive per capita Buffalo City municipal revenue estimates in nominal and real terms. Having obtained such estimates, diagnostic tests were conducted to determine the stability and likelihood of such estimates. Such diagnostic tests included stability and volatility tests to determine the integrity of the various time-series over the period 2005 to 2021.

CHAPTER 3

RESULTS PART 1: BASIC DEMOGRAPHIC AND POPULATION INDICATORS, 2001 AND 2011

3.1 INTRODUCTION

Indicators provide a tool for understanding the characteristics and structure of the population on which development programmes are directed, that is, understanding the development context. Linked to this, is the monitoring of different dimensions of development progress. According to Brizius and Campbell (1991) cited in Horsch (1997), indicators provide evidence that a certain condition exists or certain results have or have not been achieved. Horsch (1997) further notes that indicators enable decision-makers to assess progress towards the achievement of intended outputs, outcomes, goals, and objectives. As such, according to Horsh (1997), indicators are an integral part of a results-based accountability system. This chapter provides some basic demographic and population indicators for Buffalo City Municipality. To contextualise the magnitudes of the indicators, they are compared with the national and provincial (the province in which Buffalo City is located) values.

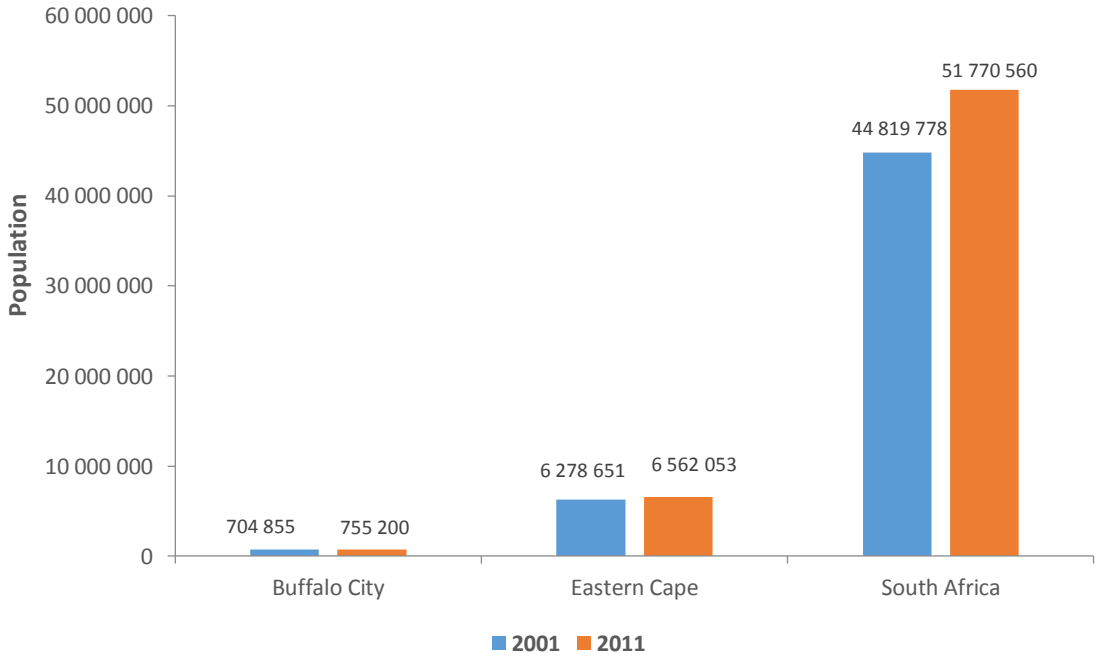
3.2 DEMOGRAPHIC PROFILE

3.2. Population size

The population sizes of Buffalo City Municipality are compared with those of Eastern Cape Province and South Africa as a whole in 2001 and 2011 in figure 3.1. In absolute terms, the population of Buffalo City increased from 704,855 in 2001 to 755,200 in 2011 during the period 2001 and 2011. The city's population accounted for about 11.2% and 11.5% of the provincial population of Eastern Cape in 2001 and 2011 respectively and about 1.6% and 1.5% of the national population in 2001 and 2011 respectively.

FIGURE 3.1

POPULATION SIZE OF BUFFALO CITY, 2001 AND 2011



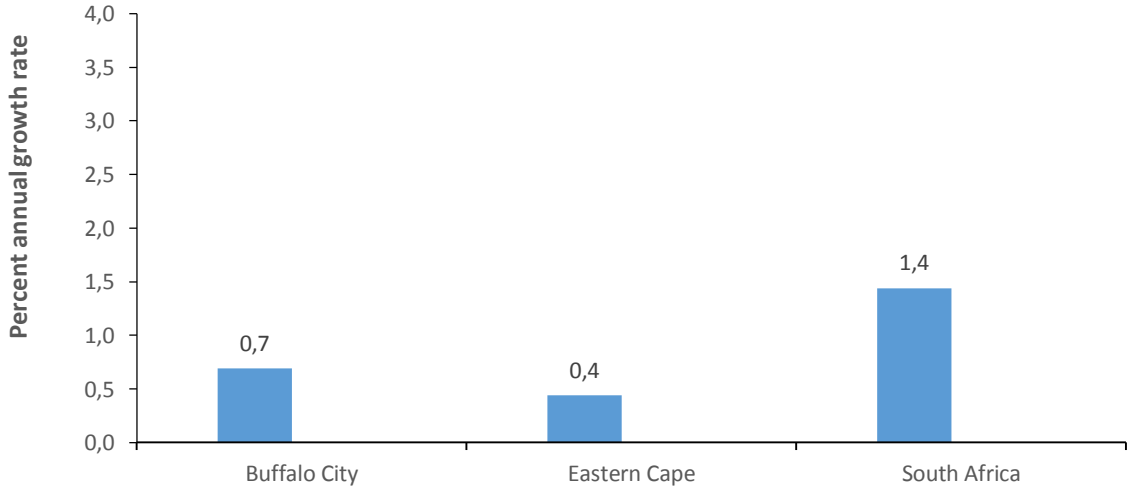
Source: Computed from South Africa's 2001 and 2011 Censuses

3.2.2 Annual growth rate and doubling time

The increase in the absolute size of the population of Buffalo City's population implies the annual growth rate during the period 2001 and 2011 in comparison with Eastern Cape Province and national population shown in figure 3.2. The increase suggests that Buffalo City's population is growing faster than the growth rate of the provincial population but lower than the growth rate of the national population. If the present growth rate continued, the population of Buffalo City could double in about 102 years in comparison with the doubling time of about 159 years for the population of Eastern Cape Province (figure 3.3).

FIGURE 3.2

PERCENTAGE ANNUAL GROWTH RATE, 2001-2011

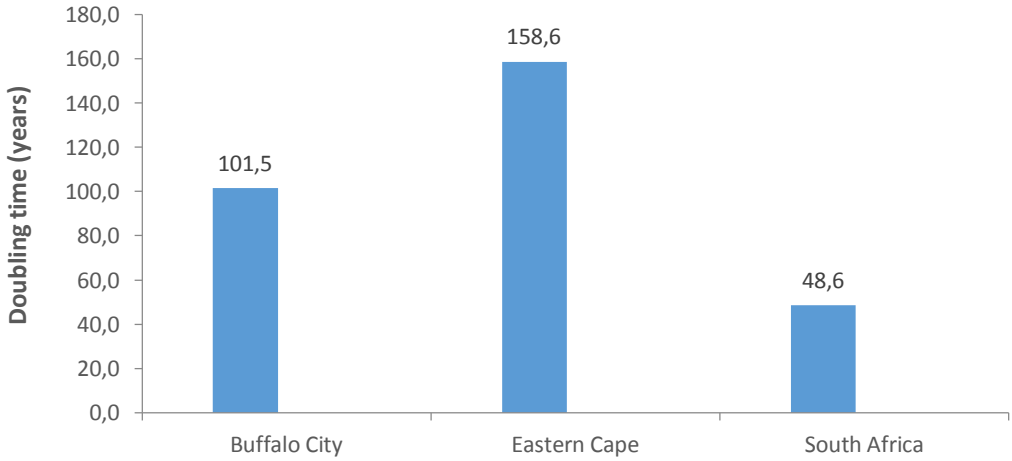


Source: Computed from South Africa's 2001 and 2011 Censuses

Comparing the above figures with the national figures, the 2001 and 2011 South African census figures implies that the national population could double in about 48.6 years if present trend continued.

FIGURE 3.3

DOUBLING TIME OF THE POPULATION



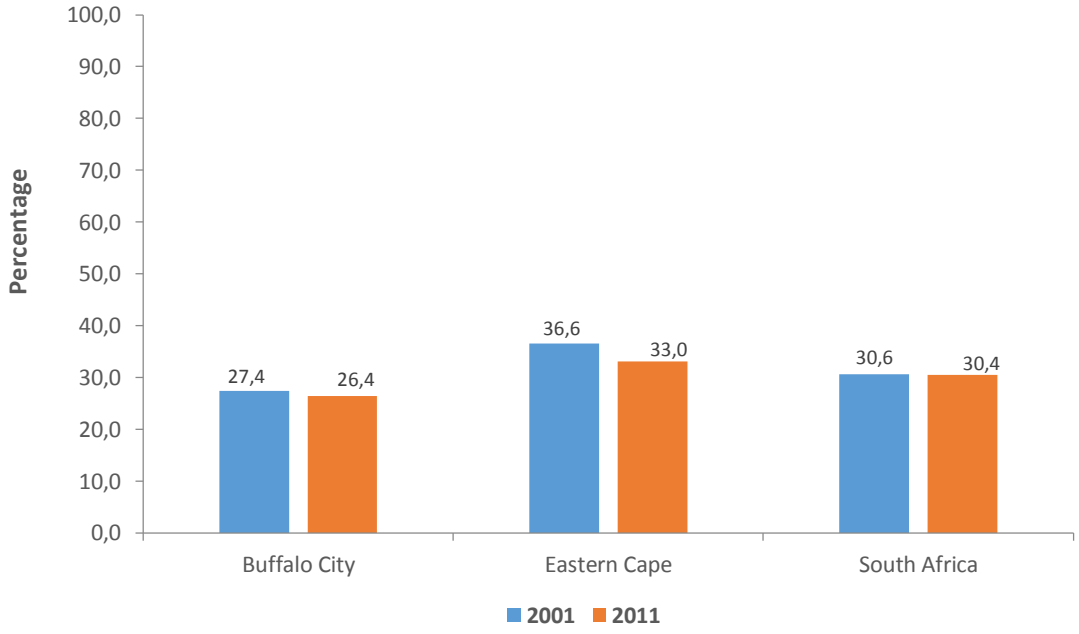
Source: Computed from South Africa's 2001 and 2011 Censuses

3.2.3 Age structure of the population

Figures 3.4-3.6 indicate that the proportions of the population aged 0-14 declined marginally while there was a marginal increase in the proportions aged 65 years and over during the period 2001 and 2011 in Buffalo City. The proportions aged 15-64 (working age group) remained stable during the period. The proportions aged 0-14 in Buffalo City were lower the corresponding proportions in the Eastern Cape province and national population in 2001 and 2011. Such a population dynamic is usually due to marginal decline in fertility resulting in a marginal increase in ageing of the population. Stable increase in net migration volume may have contributed to the stability in the proportions aged 15-64 in Buffalo City.

FIGURE 3.4

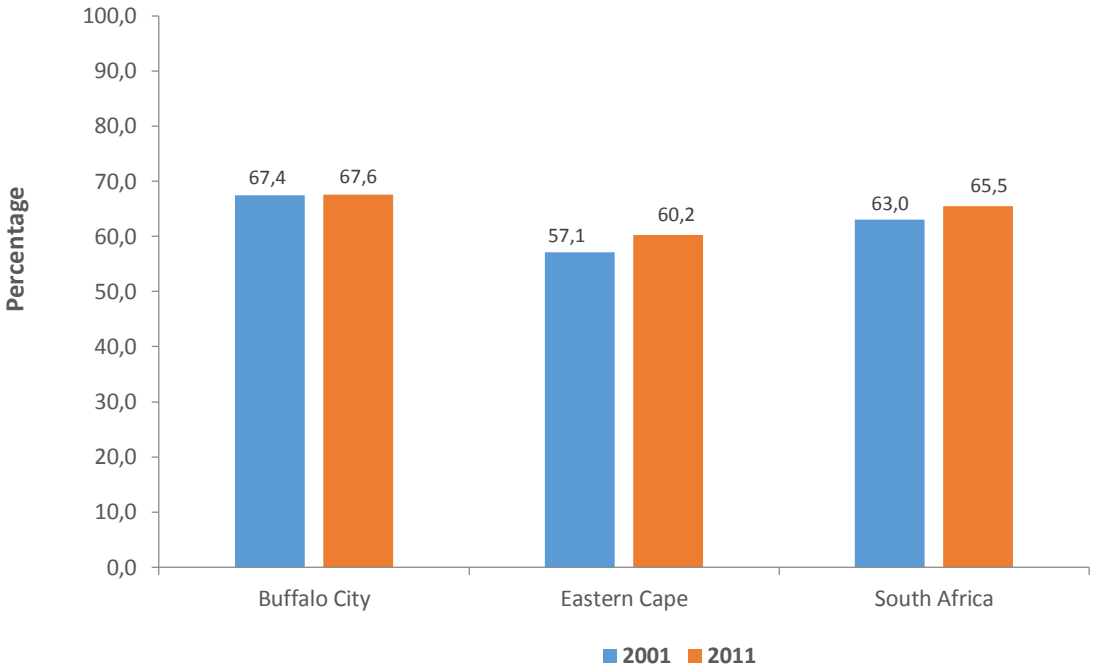
PERCENTAGE AGED 0-14 YEARS, 2001 AND 2011



Source: Computed from South Africa's 2001 and 2011 Censuses

FIGURE 3.5

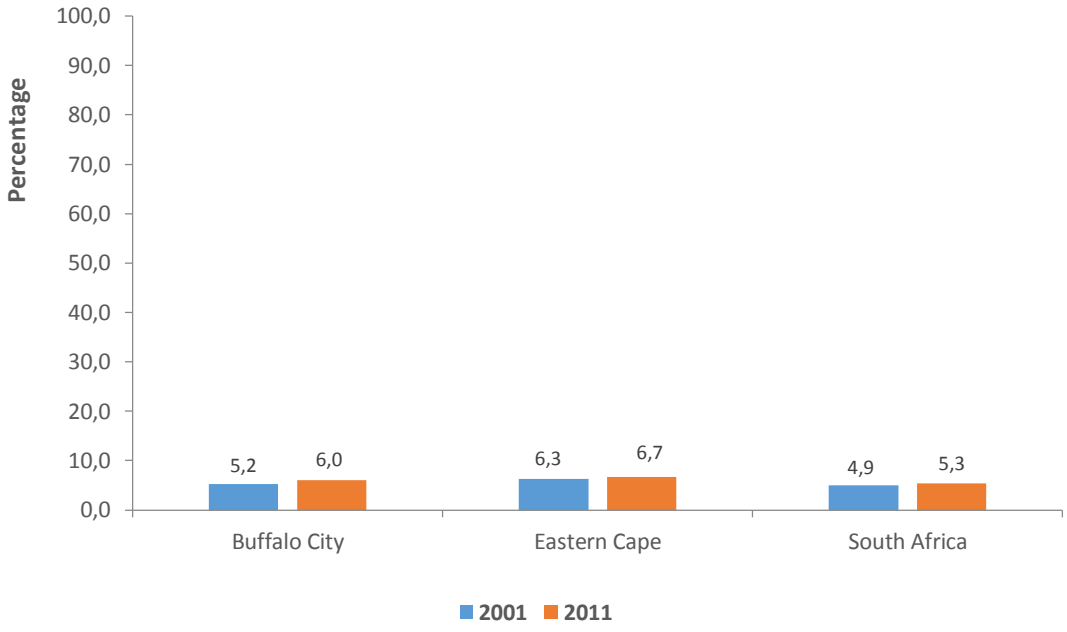
PERCENTAGE AGED 15-64 YEARS, 2001 AND 2011



Source: Computed from South Africa's 2001 and 2011 Censuses

FIGURE 3.6

PERCENTAGE AGED 65 YEARS AND OVER, 2001 AND 2011



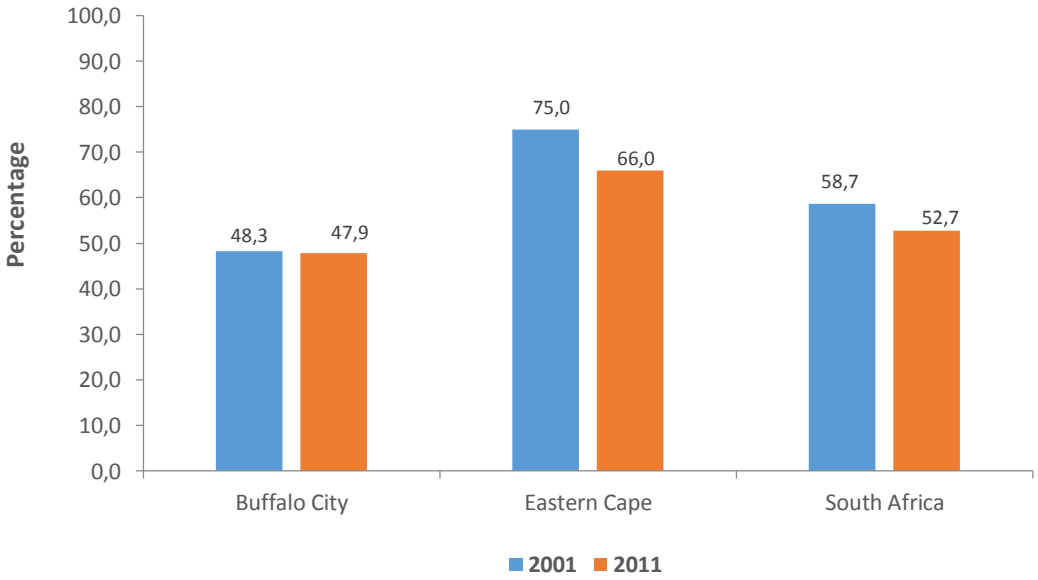
Source: Computed from South Africa's 2001 and 2011 Censuses

In view of the age structure, the overall age dependency burden in Buffalo City was about 48 dependents for every 100 persons in the working age group in 2001 and 2011 (figure 3.7). The overall dependency burden in Buffalo City was much lower than the overall dependency burden in Eastern Cape Province as a whole in 2011. The child and elderly dependency burdens are shown in figures 3.8 – 3.9.

In absolute terms, the elderly population in Buffalo City was 36 767 in 2001 and 45 185 in 2011 (figure 3.10). This implied an annual growth rate of the elderly population of 2.1% during the period (figure 3.11), higher than the rate for Eastern Cape Province during the period.

FIGURE 3.7

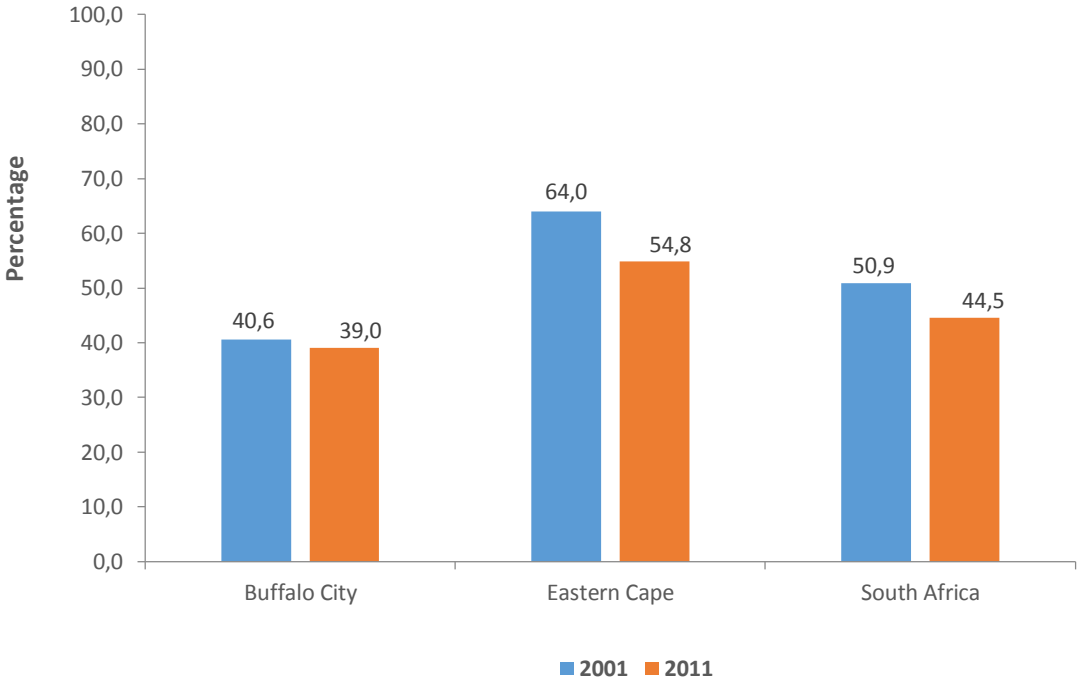
OVERALL DEPENDENCY BURDEN, 2001 AND 2011



Source: Computed from South Africa's 2001 and 2011 Censuses

FIGURE 3.8

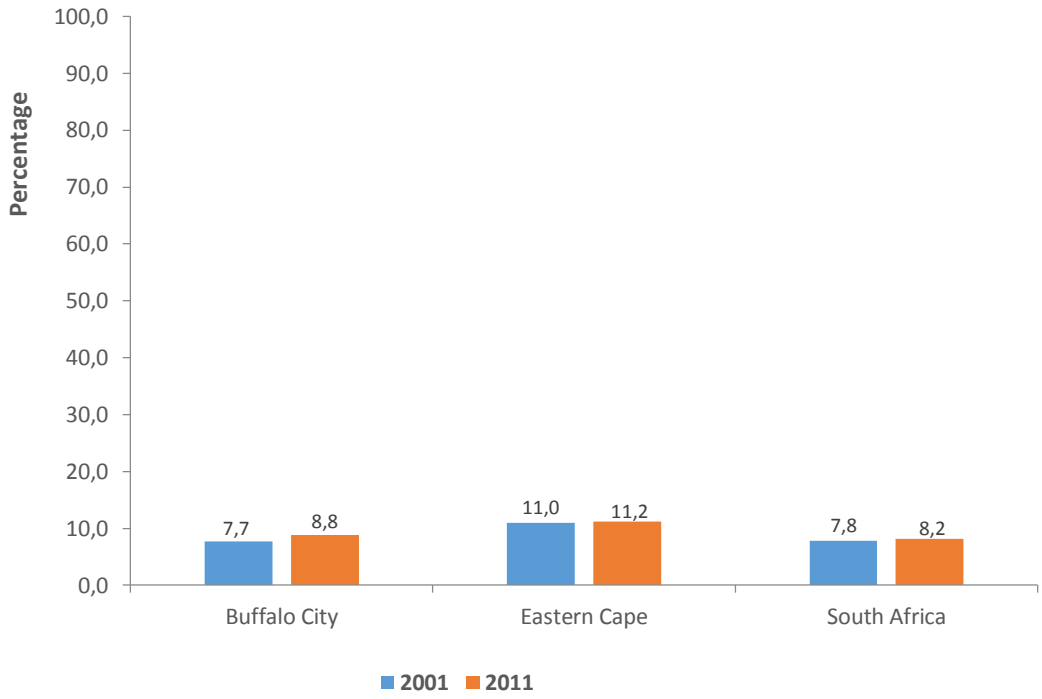
CHILD DEPENDENCY BURDEN, 2001 AND 2011



Source: Computed from South Africa's 2001 and 2011 Censuses

FIGURE 3.9

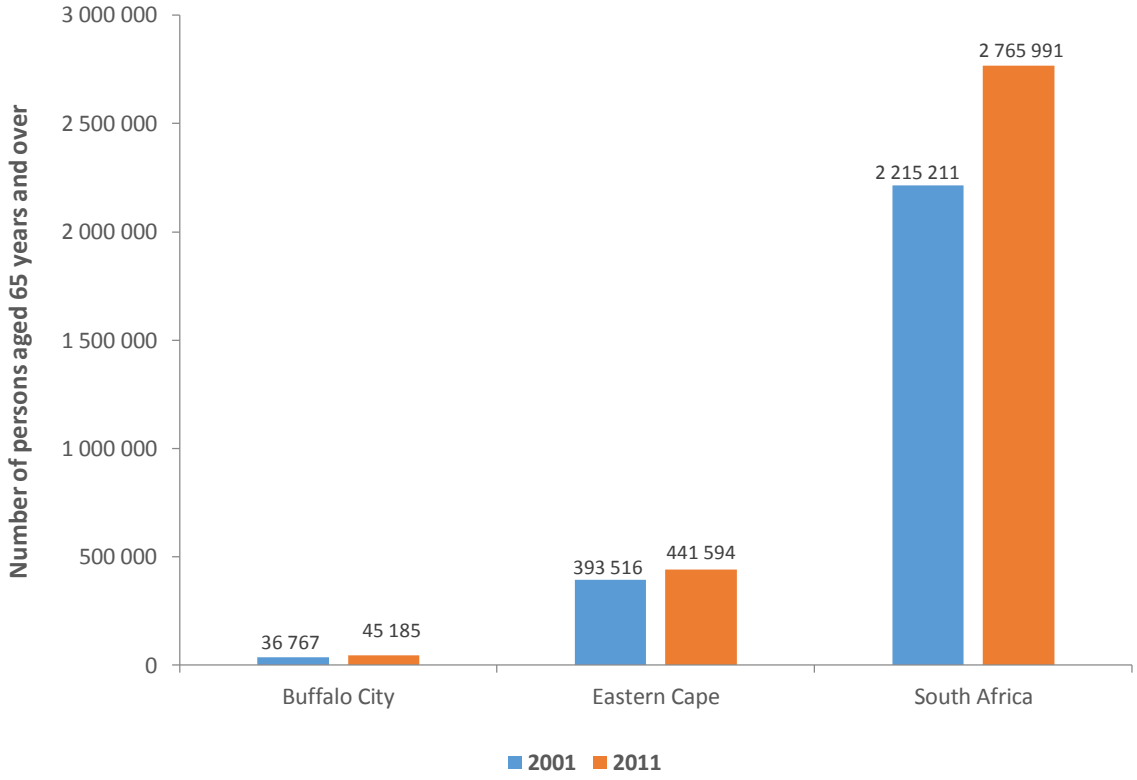
ELDERLY DEPENDENCY BURDEN, 2001 AND 2011



Source: Computed from South Africa's 2001 and 2011 Censuses

FIGURE 3.10

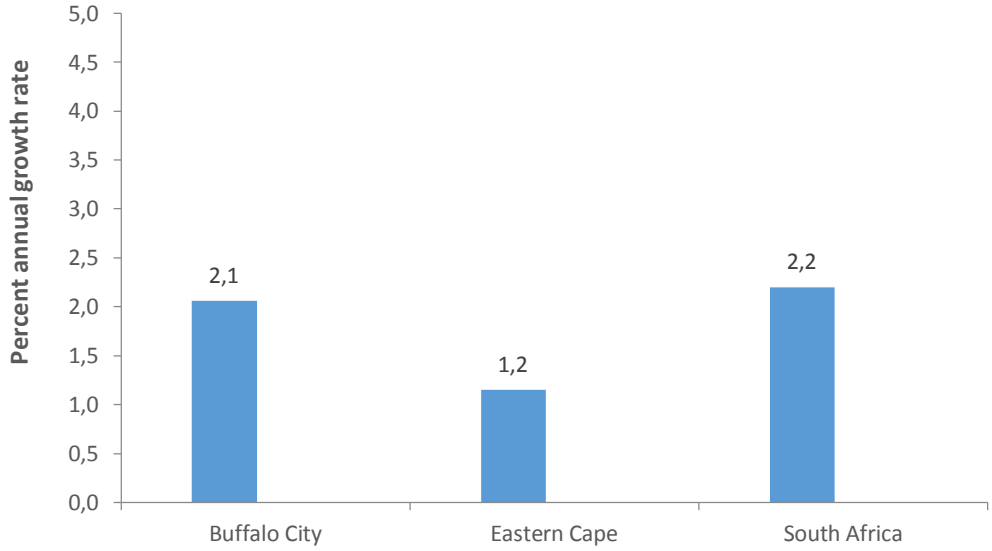
SIZE OF THE ELDERLY POPULATION, 2001 AND 2011



Source: Computed from South Africa's 2001 and 2011 Censuses

FIGURE 3.11

PERCENTAGE ANNUAL GROWTH RATE OF THE ELDERLY POPULATION, 2001-2011

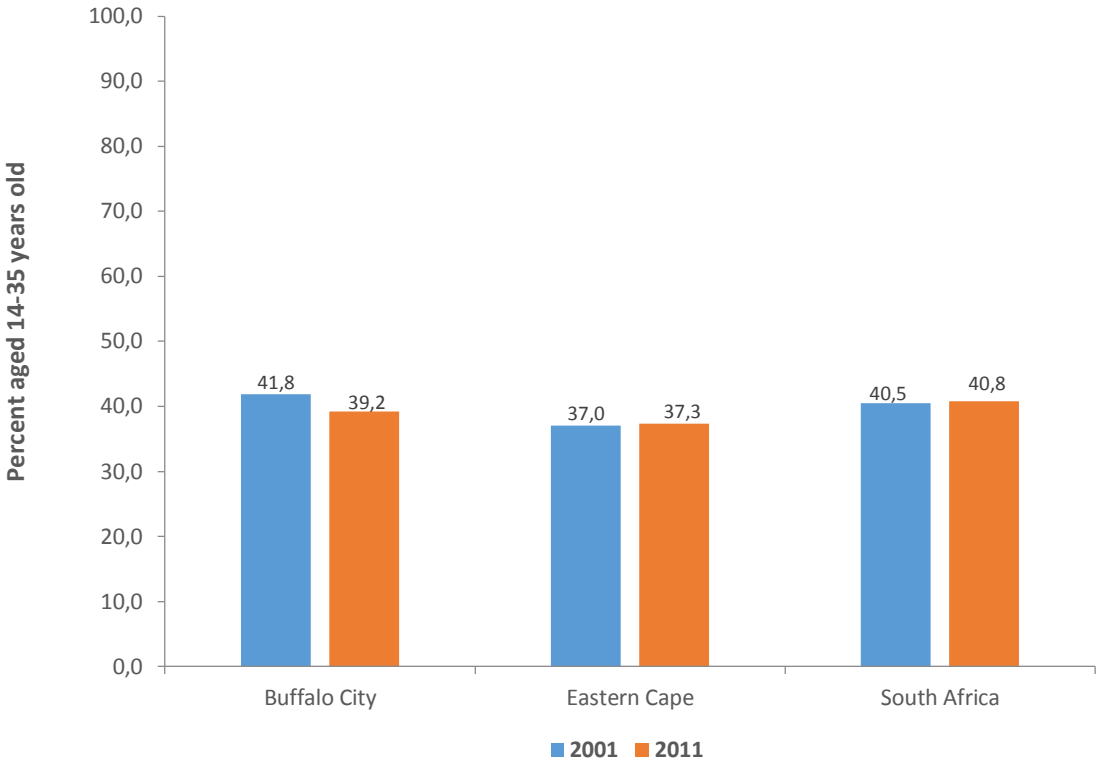


Source: Computed from South Africa's 2001 and 2011 Censuses

Youths (persons aged 14-35 years) constituted about 40% of the population of the population of Buffalo City, slightly higher than in Eastern Cape Province and about the same proportion as the national population in 2001 and 2011. (figure 3.12).

FIGURE 3.12

PERCENTAGE OF THE YOUTH POPULATION, 2001 AND 2011

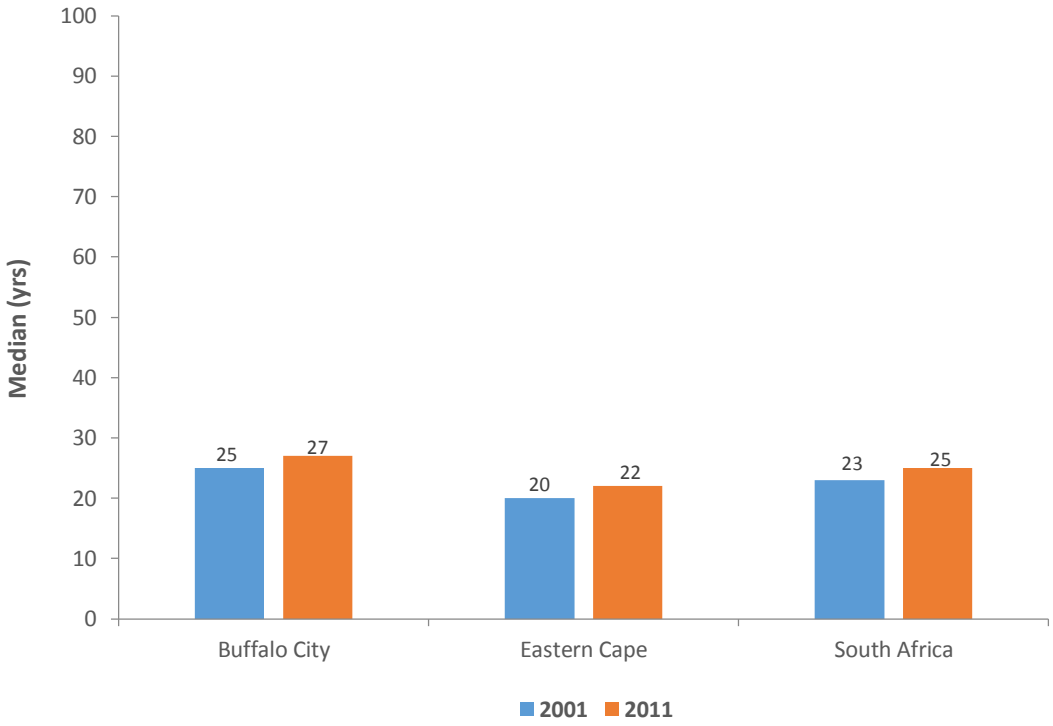


Source: Computed from South Africa's 2001 and 2011 Censuses

As a result of the age structure, the median age of the population of Buffalo City was 25 years in 2001 and 27 years 2011. The median age was much lower than corresponding median age in Eastern Cape in both periods (figure 3.13). According to Shryock and Siegal and Associates (1976), populations with medians under 20 may be described as "young", those with medians 20-29 as "intermediate" and those with medians 30 or over as "old" age. This classification implies that the population of Buffalo City is at an intermediate stage of ageing.

FIGURE 3.13

MEDIAN AGE OF THE POPULATION, 2001 AND 2011



Source: Computed from South Africa's 2001 and 2011 Censuses

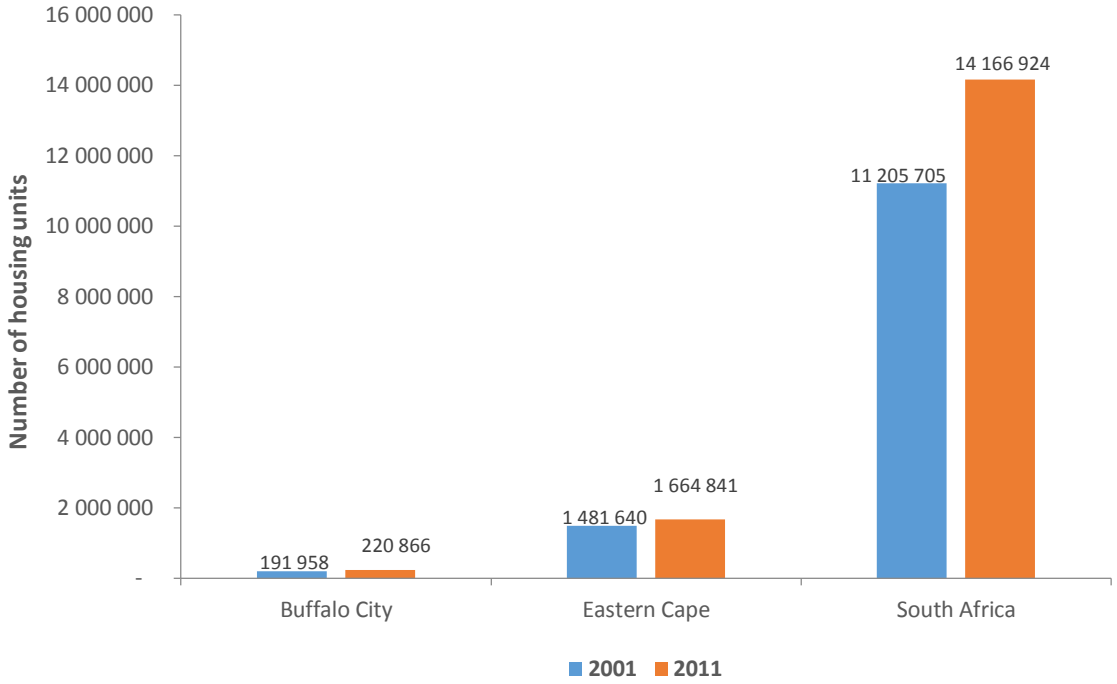
3.3 HOUSEHOLD PROFILE

3.3.1 Number of housing units and growth

Figure 3.14 indicates that Buffalo City experienced an increase in the number of housing units during the period 2001 and 2011 in absolute terms as in Eastern Cape Province and the country as a whole. This resulted in annual growth rate in housing units in Buffalo City of about 1.4% per annum during the period, higher than the growth rate in housing units in Eastern Cape as a whole during the period (figure 3.15).

FIGURE 3.14

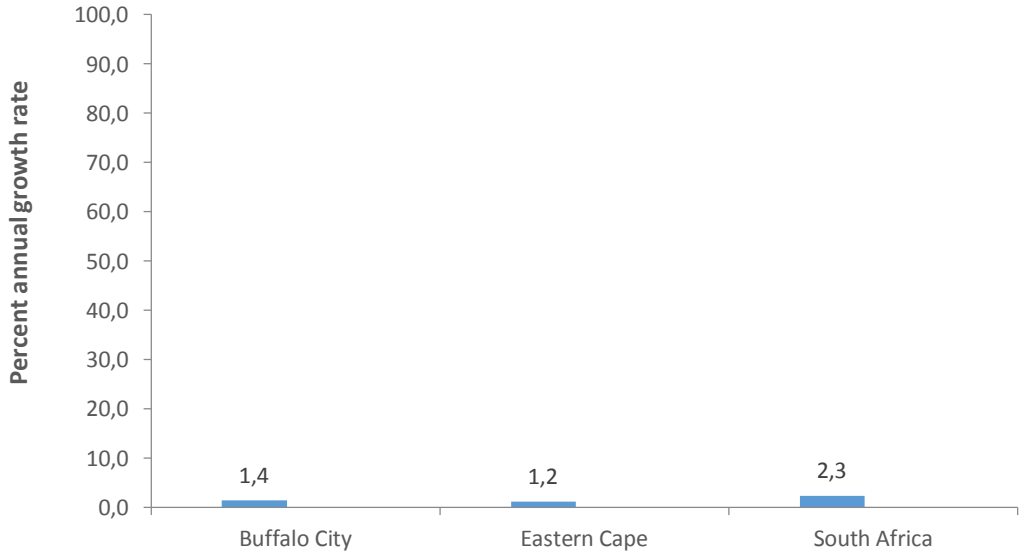
NUMBER OF HOUSING UNITS 2001 AND 2011



Source: Computed from South Africa's 2001 and 2011 Censuses

FIGURE 3.15

PERCENTAGE ANNUAL GROWTH RATE IN THE NUMBER OF HOUSING UNITS, 2001-2011



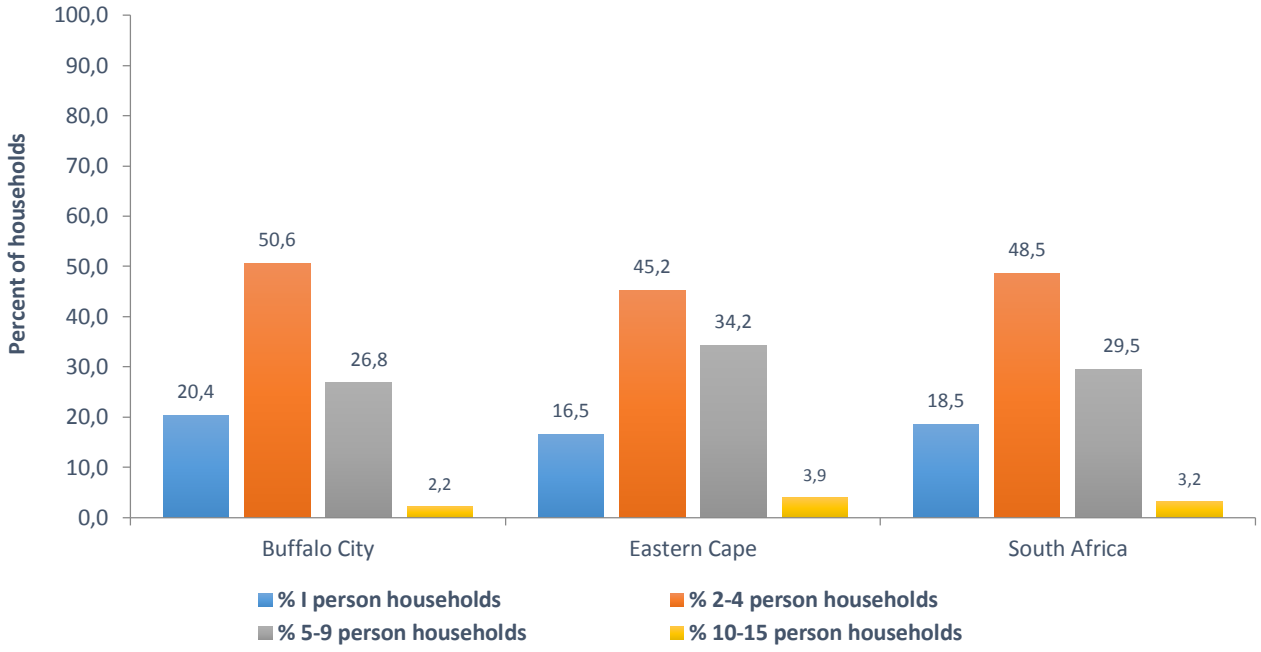
Source: Computed from South Africa's 2001 and 2011 Censuses

3.3.2 Number of persons in households

Figures 3.16 and 3.17 appear to indicate that the composition of households is that of increasing tendency towards fewer person households in Buffalo City as in Eastern Cape and the country as a whole. The percentage of 1-person households increased from about 20% in 2001 to about 27% in 2011 while the percentage of 5-9 person households decreased from about 27% in 2001 to about 21% in 2011 in Buffalo City. In both periods, 2-4 person households were the most common form of household occupancy. This constituted about 50% of all types of household occupancy groups.

FIGURE 3.16

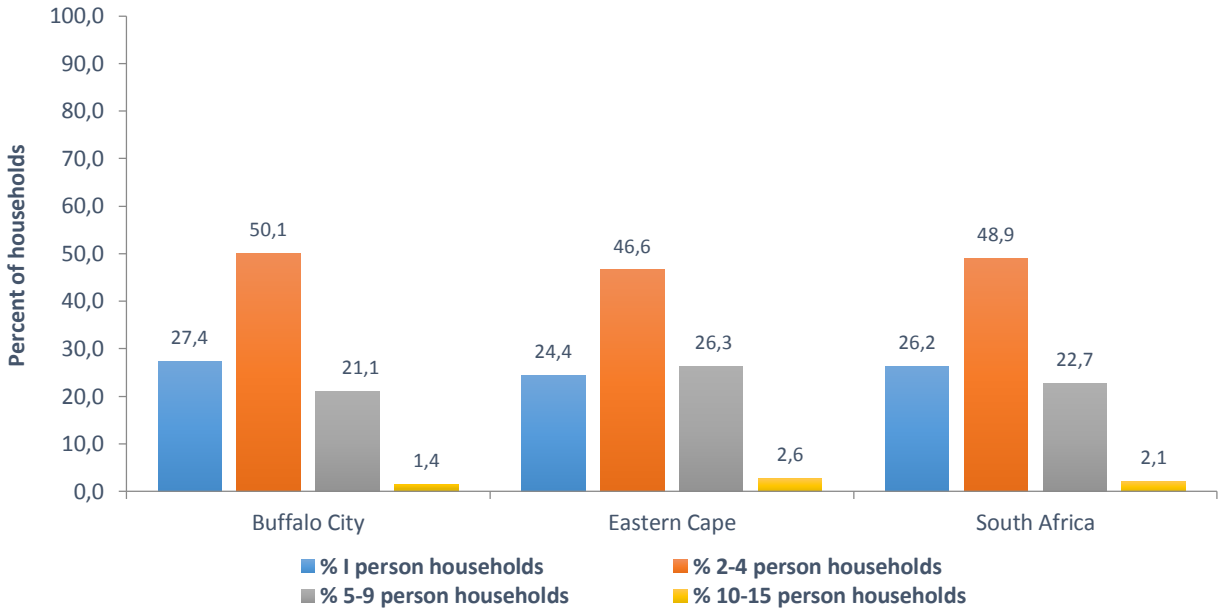
PERCENTAGE OF HOUSEHOLDS WITH SPECIFIED NUMBER OF PERSONS, 2001



Source: Computed from 2001 South Africa's Census

FIGURE 3.17

PERCENTAGE OF HOUSEHOLDS WITH SPECIFIED NUMBER OF PERSONS, 2011

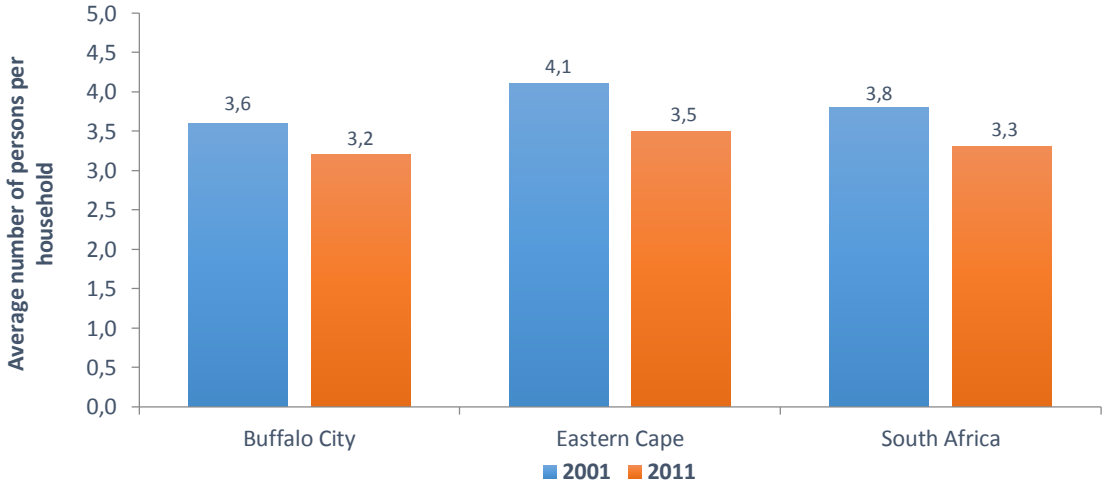


Source: Computed from 2011 South Africa's Census

Consequently, the average household size in Buffalo City was 3.6 persons in 2001 and 3.2 persons in 2011 (figure 3.18).

FIGURE 3.18

AVERAGE HOUSEHOLD SIZE, 2001 AND 2011



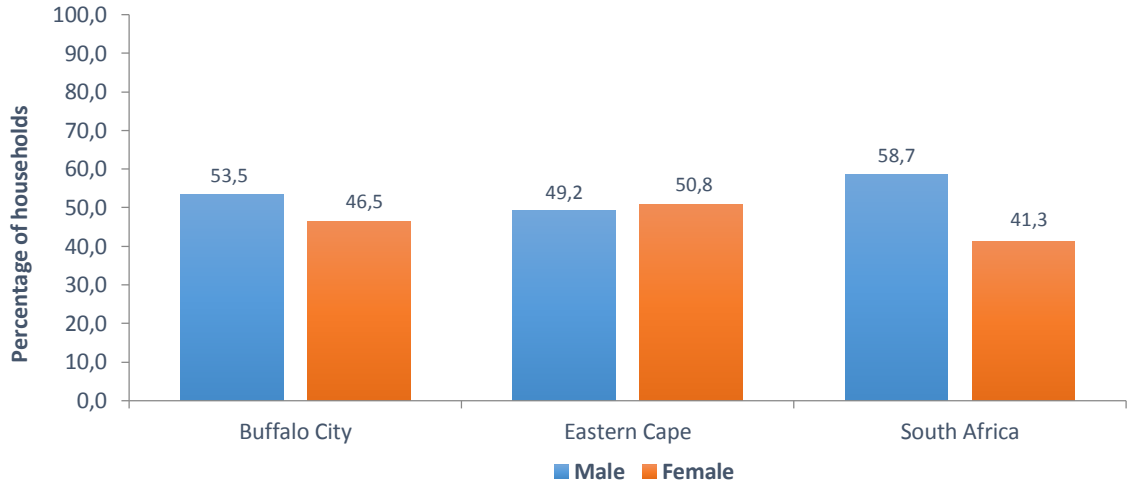
Source: Computed from 2001 and 2011 South Africa's Census

3.3.3 Household headship

Figures 3.19 and 3.20 suggest that Buffalo City had lower than the corresponding provincial average of the percentage of households headed by females in 2001 and 2011.

FIGURE 3.19

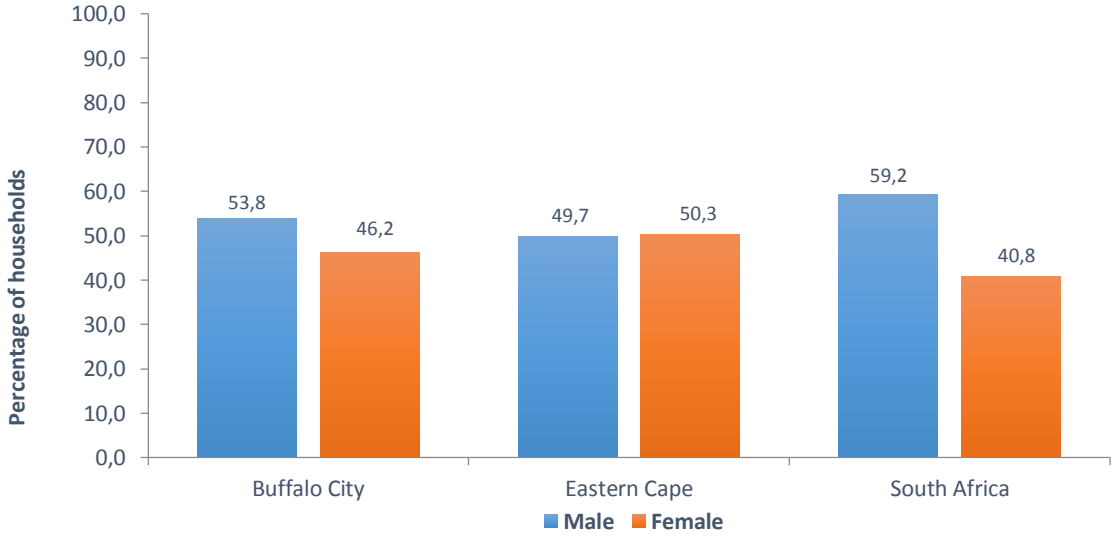
PERCENTAGE OF HOUSEHOLDS HEADED BY MALE/FEMALE, 2001



Source: Computed from 2001 and 2011 South Africa's Censuses

FIGURE 3.20

PERCENTAGE OF HOUSEHOLDS HEADED BY MALE/FEMALE, 2011



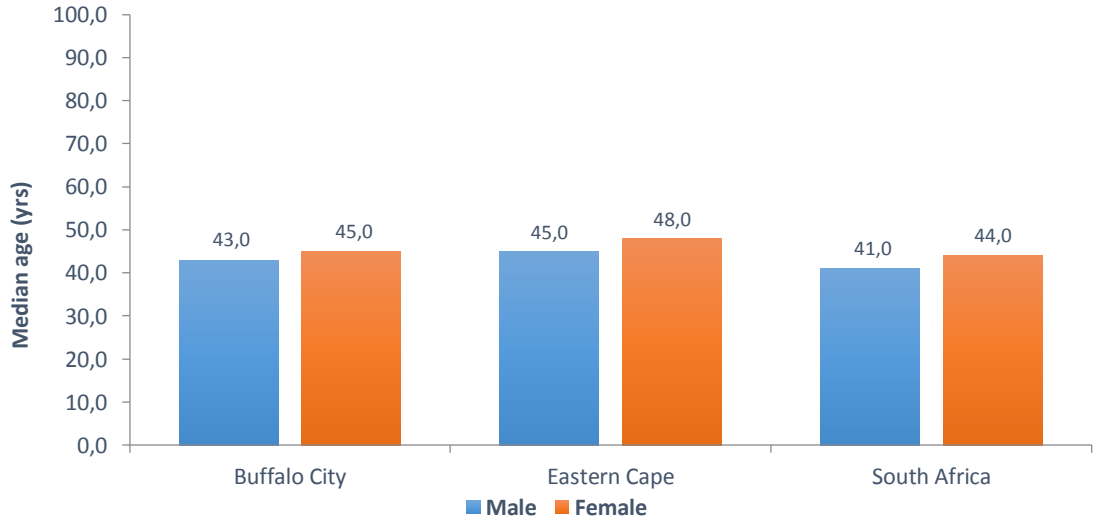
Source: Computed from 2001 and 2011 South Africa's Censuses

3.3.4 Median age of household heads

Female heads of households were on average older than male heads of households in Buffalo City as in Eastern Cape and the country as a whole in 2001 and 2011 respectively (figures 3.21-3.22). This is partly due to the known biological higher mortality among males than females at any given age.

FIGURE 3.21

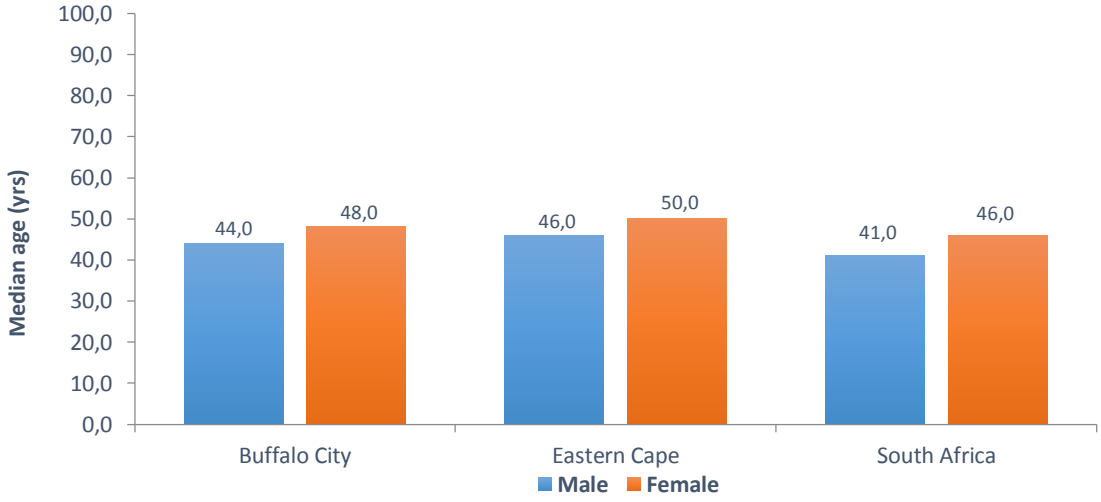
MEDIAN AGE OF HOUSEHOLD HEADS BY SEX, 2001



Source: Computed from 2001 and 2011 South Africa's Censuses

FIGURE 3.22

MEDIAN AGE OF HOUSEHOLD HEADS BY SEX, 2011



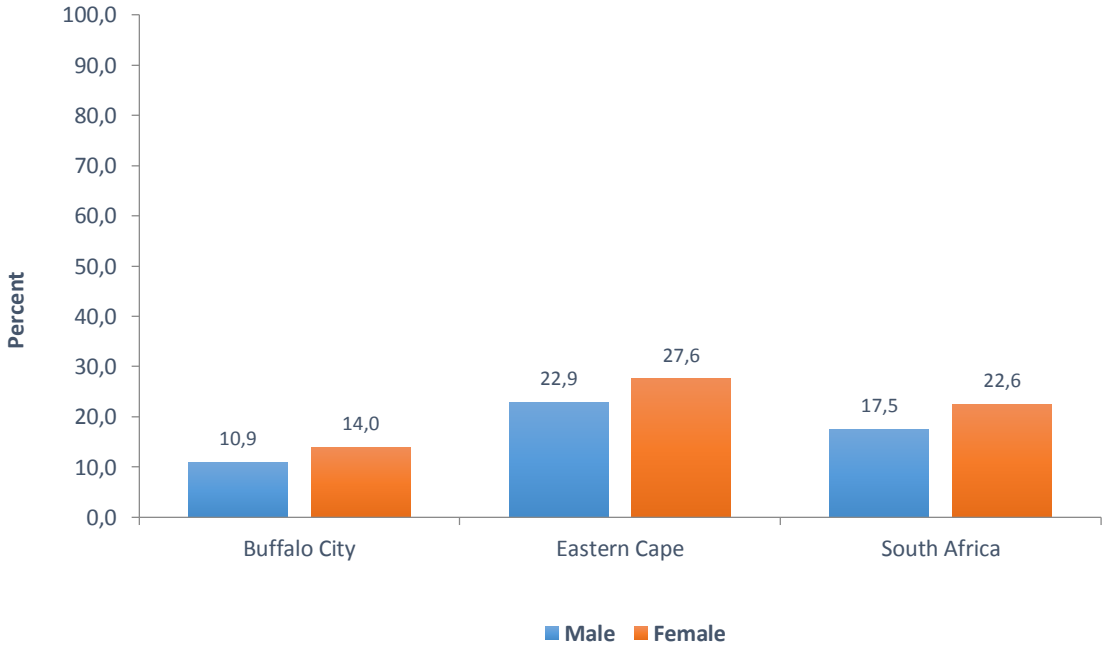
Source: Computed from 2001 and 2011 South Africa's Censuses

3.4 EDUCATIONAL PROFILE

The percentage of the population aged 25 years and above in 2001 with no schooling in Buffalo City was about 12% in 2001 but declined to about 6% in 2011 (figure 3.23). Conversely, the percentage with Grade 12 schooling in Buffalo City increased from about 19% in 2001 to about 25% in 2011 (figures 3.25 and 3.26). Only a small percentage of the population aged 25 years and above in Buffalo City had a bachelor's degree or higher in 2001 and 2011 with a marginal increase between 2001 and 2011. The pattern in educational profile in Buffalo City is similar to the provincial and national profiles.

FIGURE 3.23

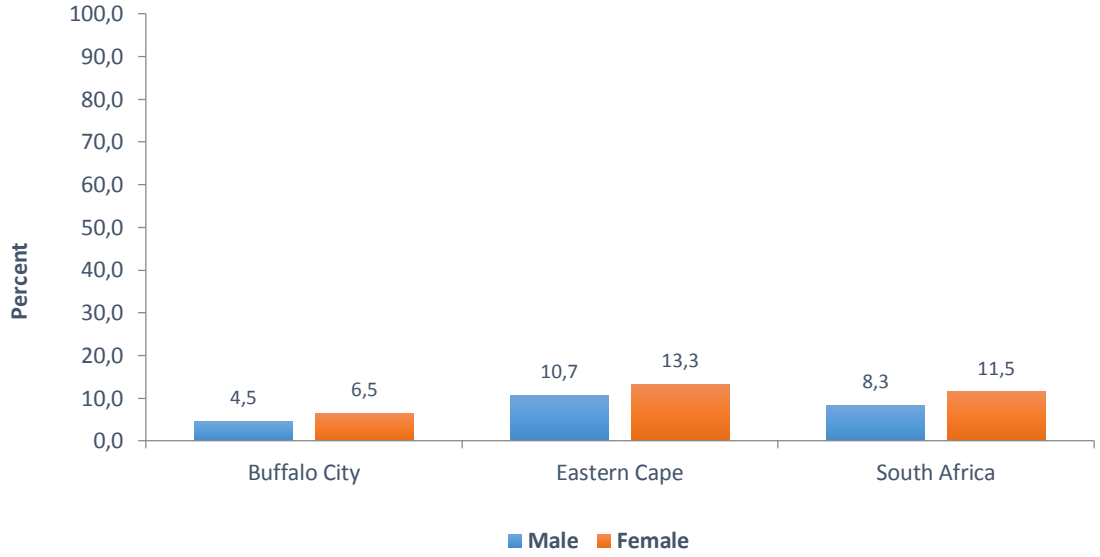
PERCENTAGE OF THE POPULATION WITH NO SCHOOLING BY SEX (PERSONS AGED 25 YEARS AND OVER), 2001



Source: Computed from 2001 and 2011 South Africa's Censuses

FIGURE 3.24

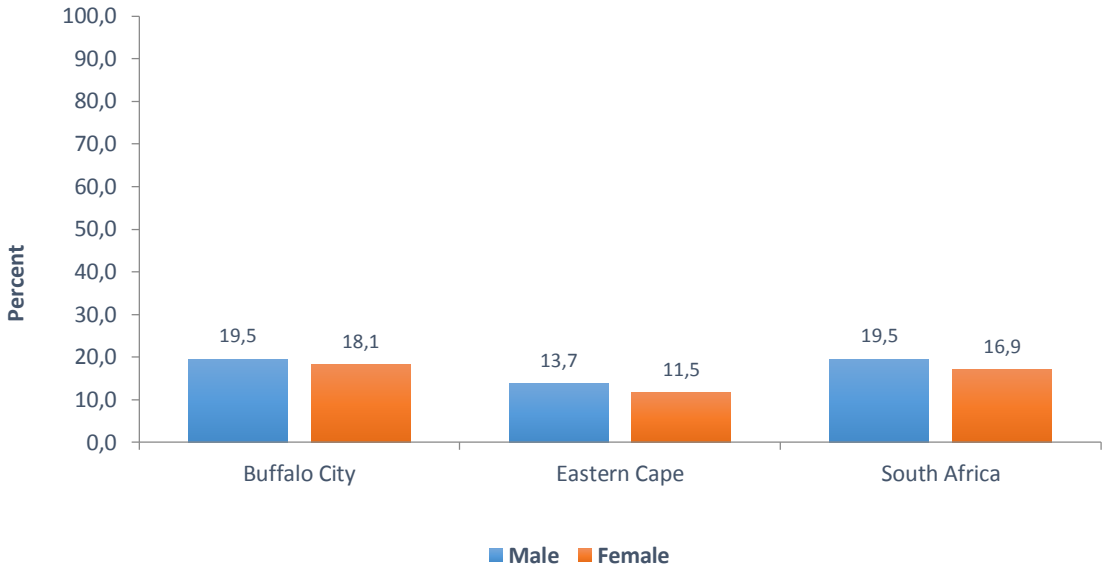
PERCENTAGE OF THE POPULATION WITH NO SCHOOLING BY SEX (PERSONS AGED 25 YEARS AND OVER), 2011



Source: Computed from 2001 and 2011 South Africa's Censuses

FIGURE 3.25

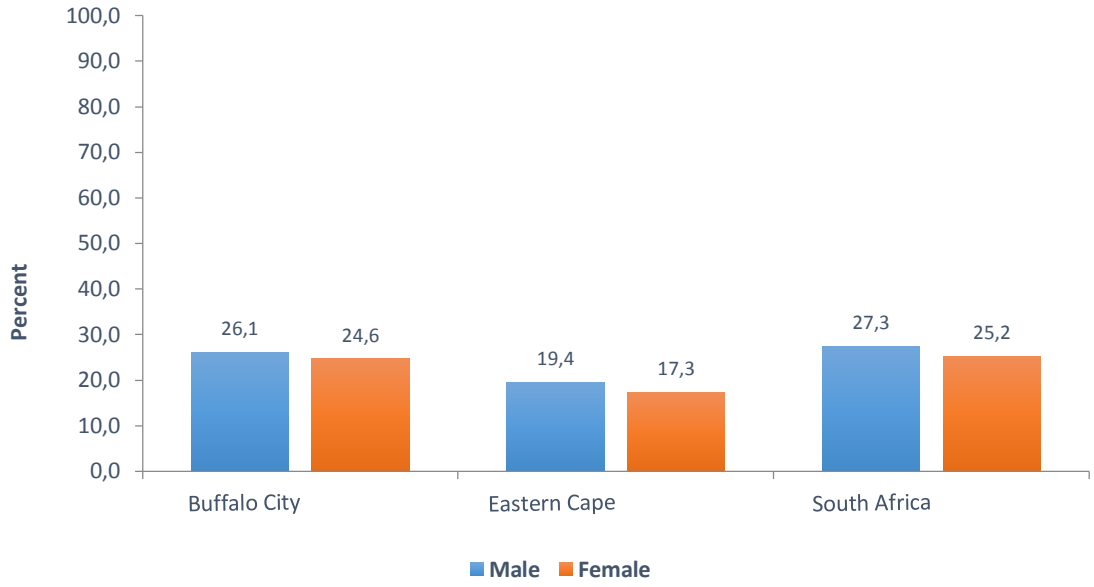
PERCENTAGE OF THE POPULATION WITH GRADE 12 BY SEX (PERSONS AGED 25 YEARS AND OVER), 2001



Source: Computed from 2001 and 2011 South Africa's Censuses

FIGURE 3.26

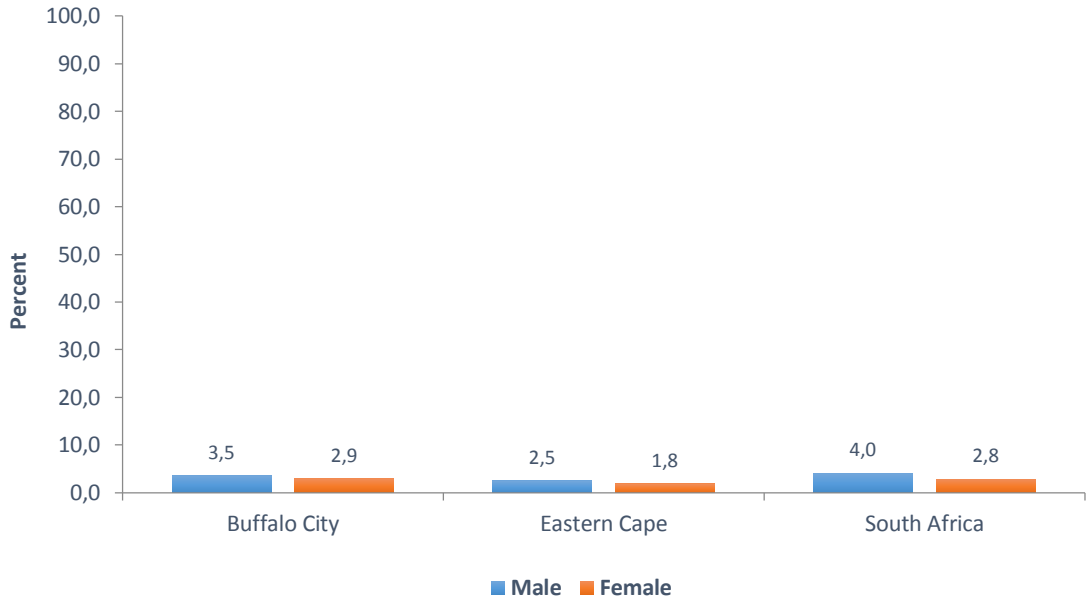
PERCENTAGE OF THE POPULATION WITH GRADE 12 BY SEX (PERSONS AGED 25 YEARS AND OVER), 2011



Source: Computed from 2001 and 2011 South Africa's Censuses

FIGURE 3.27

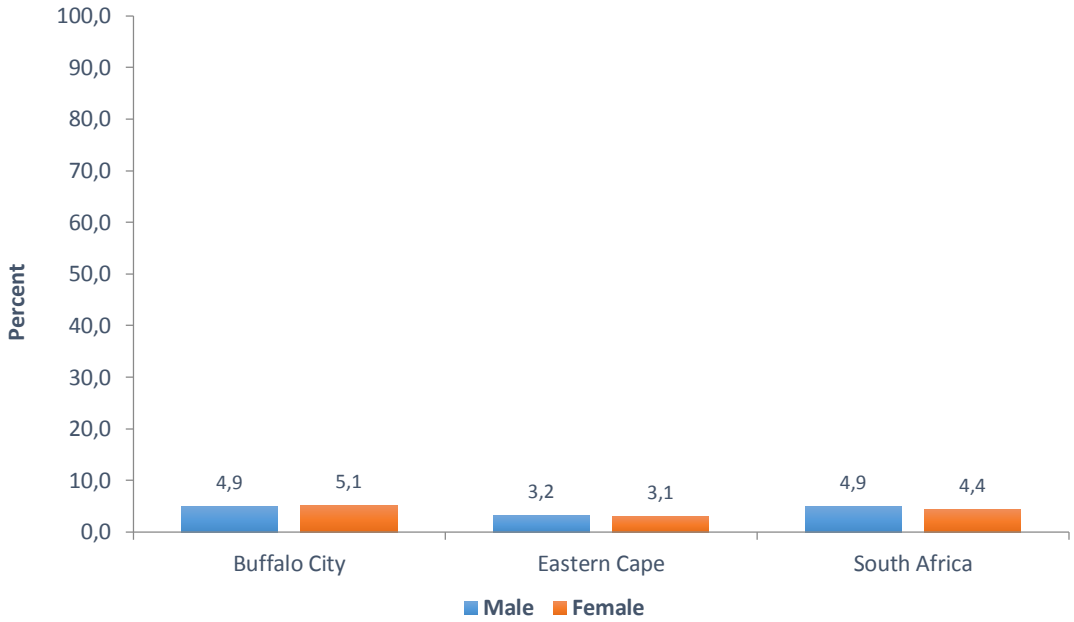
PERCENTAGE OF THE POPULATION WITH BACHELOR'S DEGREE OR HIGHER BY SEX (PERSONS AGED 25 YEARS AND OVER), 2001



Source: Computed from 2001 and 2011 South Africa's Censuses

FIGURE 3.28

PERCENTAGE OF THE POPULATION WITH BACHELOR'S DEGREE OR HIGHER BY SEX (PERSONS AGED 25 YEARS AND OVER), 2011



Source: Computed from 2001 and 2011 South Africa's Censuses

3.5 VULNERABILITY AND POVERTY

3.5.1 Unemployment

The percentage of persons unemployed in the last seven days (before interview) among the economically active persons (persons employed or unemployed but want to work) declined in Buffalo City as in Eastern Cape Province for both sexes during the period 2001 and 2011 (figures 3.29 and 3.30). The prevalence of unemployment was higher among females than males in 2001 and 2011. In 2011, nearly one-half of the economically active females in Buffalo City were unemployed in the last seven days before the census interview.

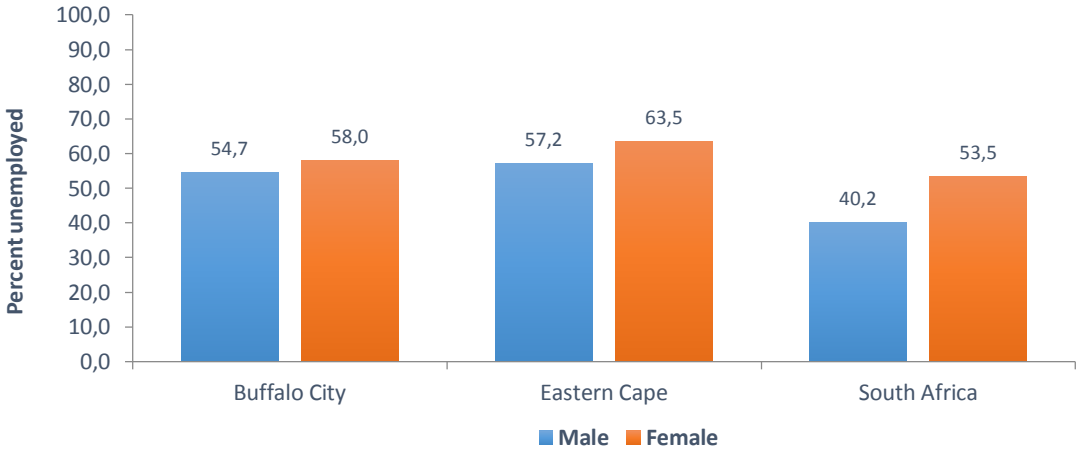
The prevalence of unemployment was also high among household heads. In 2011, seven days before the census, for example, the percentage of the unemployed among the economically active population in Buffalo City who were household heads was about 31%. However, the prevalence of unemployment among household

heads in Buffalo City was lower than the provincial average during the period (figure 3.31).

Although the prevalence of youth unemployment (economically active persons aged 15-35) declined during the period 2001 and 2011 in Buffalo City, and was lower than the provincial in both periods (figure 3.32), over 50% of the economically active youths were unemployed in both periods.

FIGURE 3.29

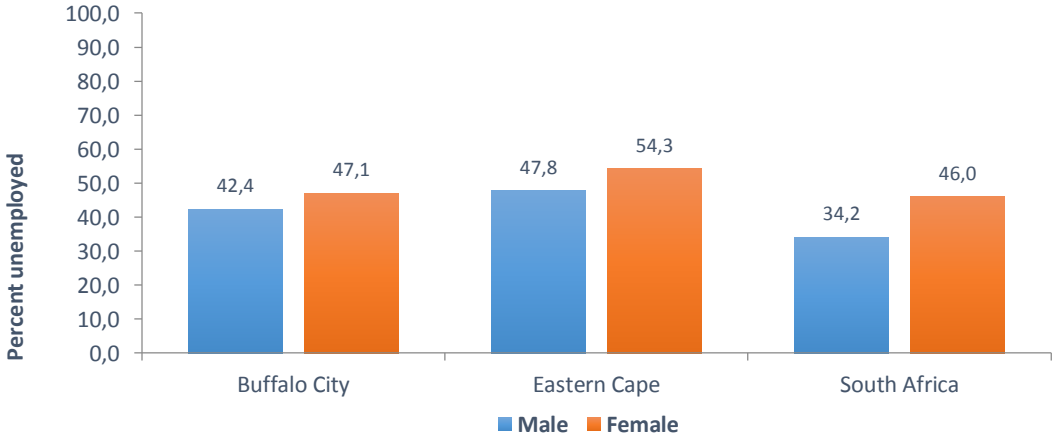
PERCENTAGE UNEMPLOYED (EXPANDED DEFINITION) LAST SEVEN DAYS BY SEX, 2001



Source: Computed from 2001 census South Africa's Census

FIGURE 3.30

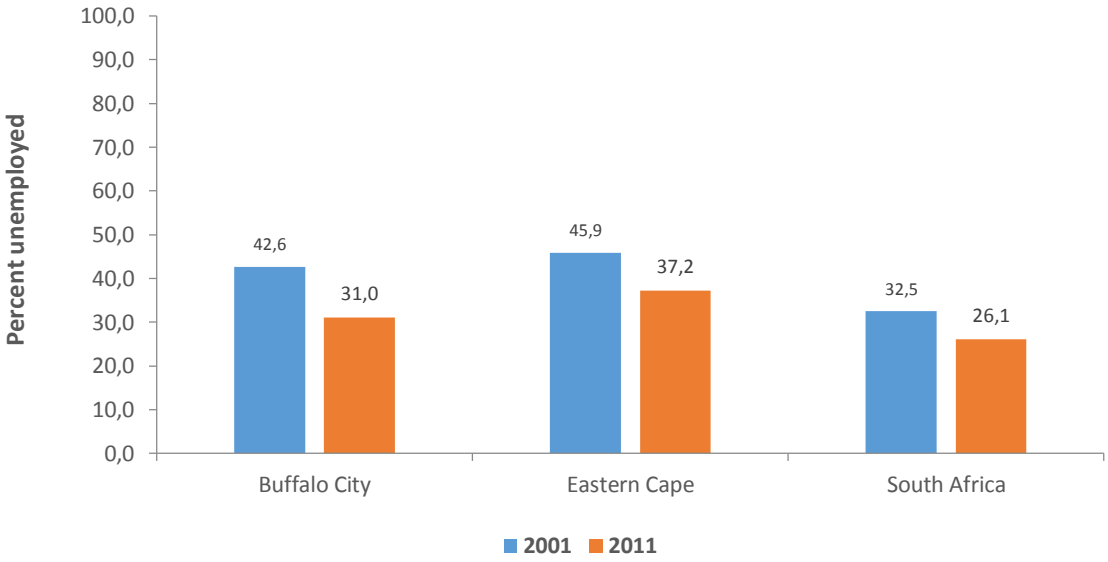
PERCENTAGE OF UNEMPLOYED (EXPANDED DEFINITION) LAST SEVEN DAYS BY SEX, 2011



Source: Computed from 2011 census South Africa's Census

FIGURE 3.31

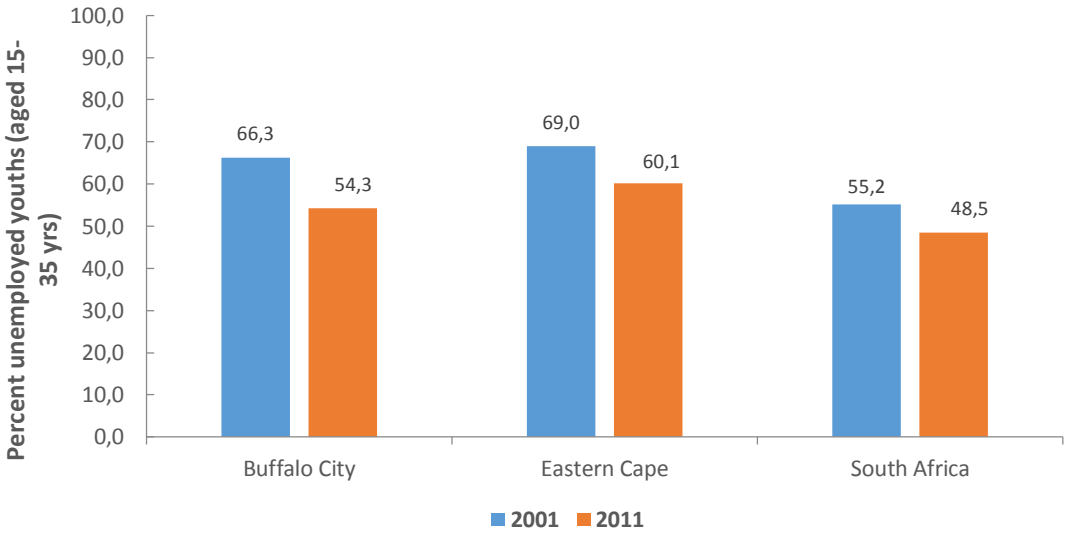
PERCENTAGE OF HOUSEHOLD HEADS UNEMPLOYED (EXPANDED DEFINITION) LAST SEVEN DAYS, 2001 AND 2011



Source: Computed from South Africa's 2001 and 2011 Censuses

FIGURE 3.32

PERCENTAGE OF YOUTHS UNEMPLOYED (EXPANDED DEFINITION) LAST SEVEN DAYS, 2001 AND 2011



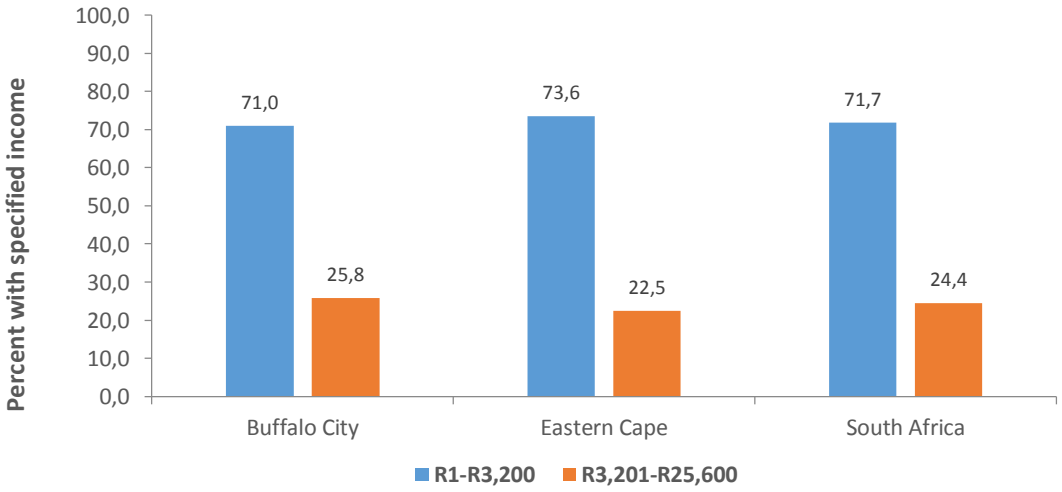
Source: Computed from South Africa's 2001 and 2011 Censuses

3.5.2 Income

Over 70% of employed persons in Buffalo City in 2001 were in the low income (R1-R3 200 per month) category (figure 3. 33). Although the proportion of employed persons in the low income category declined during the period 2001 and 2011, about 40% of employed persons were in the low income category in 2011 (figure 3.34). Eastern Cape Province and the country as a whole had a similar pattern.

FIGURE 3.33

PERCENTAGE OF THE EMPLOYED WITH SPECIFIED INCOME PER MONTH, 2001



Source: Computed from South Africa's 2001 Census

FIGURE 3.34

PERCENTAGE OF THE EMPLOYED WITH SPECIFIED INCOME PER MONTH, 2011

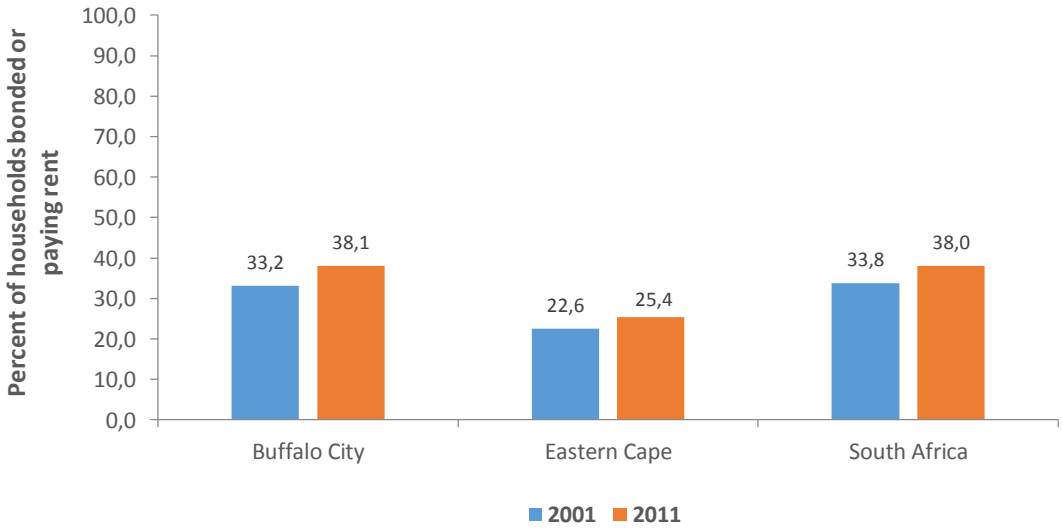
Source: Computed from South Africa's 2001 Census

3.5.3 Tenure status

Over a third of households in Buffalo City were either bonded or paying rent during the period 2001 and 2011, the percentage increased during the period. This implies that increasingly, more households are in debt to either financial institutions or landlords/landladies. The percentage of bonded households or paying rent in Buffalo City was higher than the corresponding proportion in Eastern Cape Province and about the same corresponding proportion as the national average during the period 2001 and 2011 (figure 3.35).

FIGURE 3.35

PERCENTAGE OF HOUSEHOLDS BONDED OR PAYING RENT, 2001 AND 2011



Source: Computed from South Africa's 2001 Census

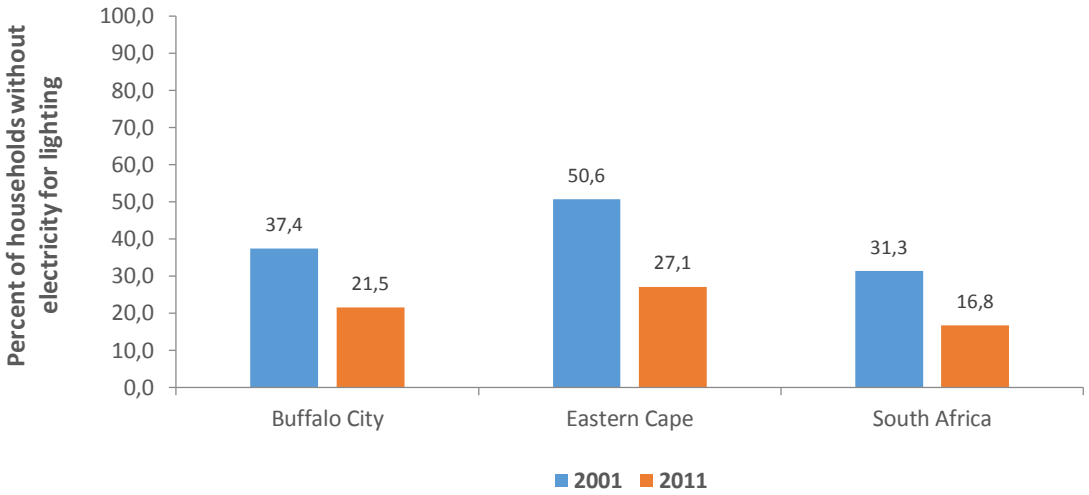
3.5.4 Household access to energy and sanitation

Although access to electricity for lighting improved in Buffalo City between 2001 and 2011, about 22% of households still did not have access to electricity for lighting in 2011. This was however lower than the percentage for Eastern Cape but higher that percentage for the country as a whole that did not have access to electricity for lighting in 2011 (figure 3.36).

Regarding sanitation, it would appear that there is a challenge with access to flush toilets. In 2011, about 32% of households in Buffalo City did not have access to flush toilets. However, this percentage was much lower than the national average (figure 3.37).

FIGURE 3.36

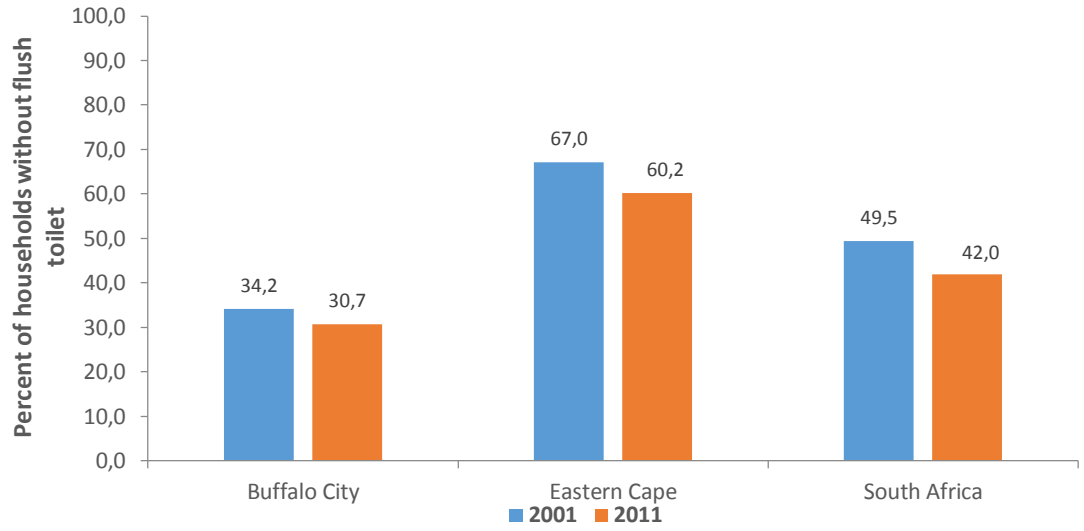
PERCENTAGE OF HOUSEHOLDS WITHOUT ELECTRICITY FOR LIGHTING, 2001 AND 2011



Source: Computed from South Africa's 2001 and 2011 Censuses

FIGURE 3.37

PERCENTAGE OF HOUSEHOLDS WITHOUT ACCESS TO FLUSH TOILETS, 2001 AND 2011



Source: Computed from South Africa's 2001 and 2011 Censuses

CHAPTER 4

RESULTS PART 2: PROJECTED POPULATION OF BUFFALO CITY, 2011 – 2021

4.1 ABSOLUTE NUMBERS AND GROWTH RATES

Although the focus of this study is on South African cities, the methodologies employed required that the projections first be carried out at provincial level. In view of this, the population projections for Eastern Cape Province, in which Buffalo City is located, are first presented for the beginning and end of the projection period.

The results indicate that if the assumptions underlying the projections hold, Eastern Cape population could increase from about 6.5 million in 2011 to about 7.1 million in 2021 (table 4.1).

TABLE 4.1

PROJECTED POPULATION OF EASTERN CAPE PROVINCE AND BUFFALO CITY

Mid-year	Eastern Cape	Buffalo City
2011	6 549 560	753 762
2015	6 700 628	778 716
2016	6 747 832	786 108
2017	6 799 892	794 093
2018	6 856 878	802 684
2019	6 919 038	811 914
2020	6 986 807	821 839
2021	7 060 677	832 522

Source: Authors' projections

It is projected that Buffalo City's population could increase from about 753 762 in 2011 to about 832 522 in 2021 (table 4.1) if the assumptions underlying the projections hold.

The annual growth rates implied in the projections are shown in table 4.2 and suggest that Eastern Cape population could grow at a rate of between 0.7% to 1.1% per annum during the period 2016 – 2021 while the population of Buffalo City could

grow at a rate of about 0.9% to 1.3% per annum during the same period. Thus, the population of Buffalo City is projected to grow at a faster rate than the rate of growth in the population of Eastern Cape as a whole.

TABLE 4.2

PROJECTED ANNUAL POPULATION GROWTH RATES (PERCENTAGE) OF EASTERN CAPE AND BUFFALO CITY

Mid-year	Eastern Cape	Buffalo City
2015	0.6	0.8
2016	0.7	0.9
2017	0.8	1.0
2018	0.8	1.1
2019	0.9	1.1
2020	1.0	1.2
2021	1.1	1.3

Source: Authors' projections

CHAPTER 5

RESULTS PART 3: MID-2016 WARD LEVEL POPULATION ESTIMATES WITHIN BUFFALO CITY

5.1 INTRODUCTION

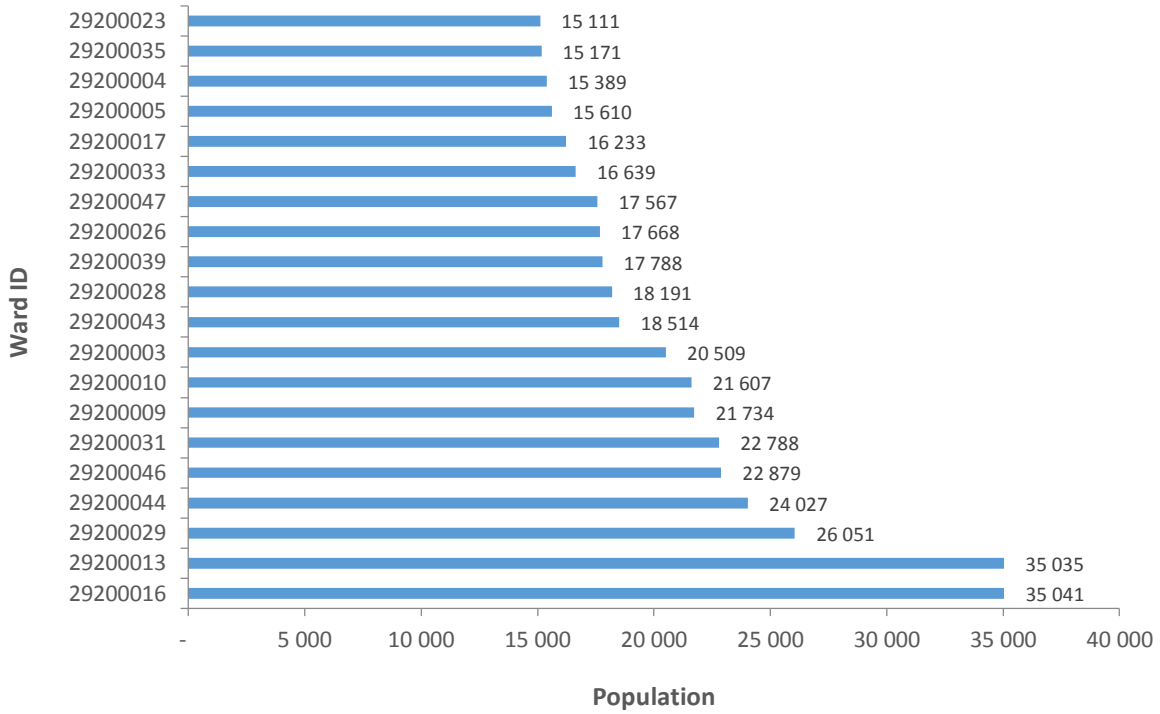
This chapter presents the results of the mid-2016 ward population estimates within Buffalo City. The estimated absolute population ward sizes are shown in Appendix 2. The projected ward population should be treated with caution and interpreted as indicative. Some of the values seem too low and this is because in some of the wards, the enumerated ward population in the 2011 census was lower than the enumerated ward population in 2001 adjusting for boundary changes indicating a decline in the ward population in the inter-censal period (i.e. between 2001 and 2011). For example, the estimated population of Ward 29200001 in 2001 adjusting for undercount according to the official census figures was 15 044 persons; 13 084 persons were estimated in that ward in the 2011 census adjusting for undercount and the 2011 municipal boundaries, indicating a decline of 1 960 persons in that ward during the inter-censal period. It may very well be that the decline was due to out-migration from the ward to other places in or outside South Africa. When this trend was projected to 2016 using the methods described above, a lower population than in the 2011 census was obtained. A summary of the ward population estimates is provided below.

5.2 THE ESTIMATED 20 LARGEST WARDS IN BUFFALO CITY IN MID-2016

The projected population of Buffalo City in 2016 constituted about 1.4% of the projected population of South Africa in 2016 and about 11.6% of the projected population of the Eastern Cape in 2016. The estimated 20 largest wards in Buffalo City in mid-2016 shown in figure 5.1 (about 52.6% of Buffalo City's projected population in 2016) indicate that the largest ward is 29200016 (35 041 persons) and 20th largest ward is 29200023 (15 111) as at mid-2016. The estimated ward populations in Buffalo City ranged from 8 570 persons (Ward 29200014) to 35 041 persons (Ward 29200016).

FIGURE 5.1

THE ESTIMATED 20 LARGEST WARDS IN BUFFALO CITY



Source: Authors' estimates

CHAPTER 6

RESULTS PART 4: FINANCIAL IMPLICATIONS OF POPULATION CHANGE FOR REVENUE AND EXPENDITURE IN BUFFALO CITY

6.1 INTRODUCTION

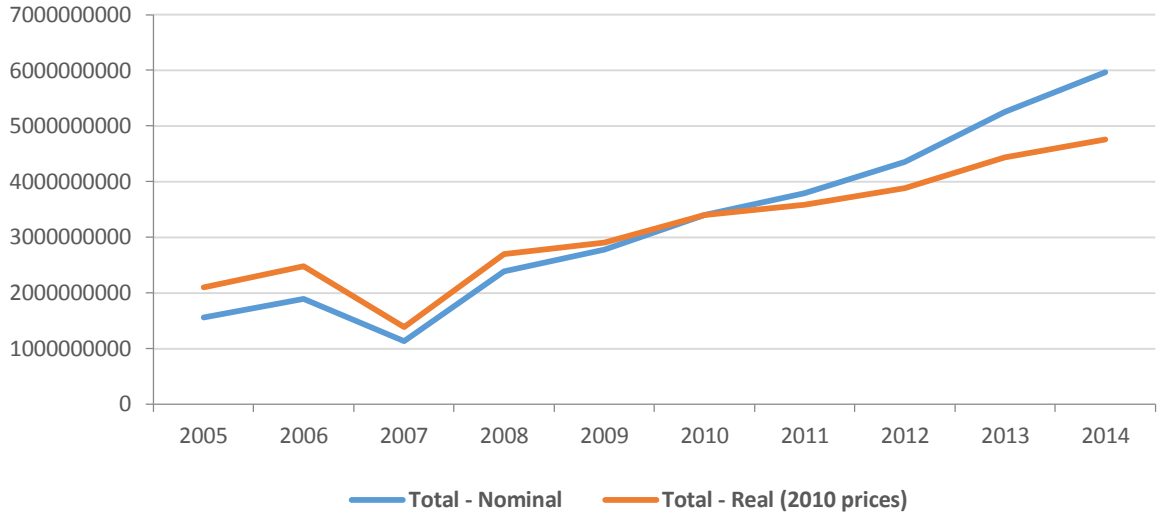
Chapters 3 to 5 of this report provided the population projection results with respect to Buffalo City. This chapter shows the municipal revenue projection results for the period 2015 to 2021 with respect to Buffalo City. This is followed by the results of bringing the revenue and population results together in order to produce per capita municipal revenue estimates for the period 2015 to 2021 (see Section 6.3). But before focusing on the 2015 to 2021 municipal revenue projection results, it is important to have a look at the 2005 to 2014 municipal revenue results as background to the discussion of the 2015 to 2021 projection results (see Section 6.2).

6.2 BUFFALO CITY MUNICIPAL REVENUE OUTCOMES FOR 2005 TO 2014

The Buffalo City municipal revenue outcomes for the period 2005 to 2014 as derived from the Stats SA municipal revenue data sets (see Chapter 2) in nominal Rand and real Rand (2010 constant prices) are shown in figure 6.1 below. In figure 6.1, the actual municipal revenue outcomes for Buffalo City Municipality for the period 2005 to 2014 are provided. It appears from the line graphs shown in figure 6.1 that during the period 2005 to 2014 there has been high growth in municipal revenues in both nominal and real terms in Buffalo City, namely; 2839% growth in nominal terms and 127% growth in real terms. It is important to note that during the period 2012 and 2014, fairly rapid revenue growth was experienced that will continue during the projection period due to a variety of factors including, inter alia, relatively high increases in electricity tariffs and above inflation annual municipal rate hikes.

FIGURE 6.1

MUNICIPAL REVENUES FOR BUFFALO CITY, 2005 TO 2014 (RAND)



6.3 BUFFALO CITY MUNICIPAL REVENUE PROJECTION OUTCOMES FOR 2015 TO 2021

An overview of the Buffalo City municipal revenue dynamics during the period 2005 to 2014 was provided in figure 6.1 above. The Buffalo City municipal revenue results obtained by using the data and methods were described in chapter 2. The aim was to derive municipal revenue projections of greatest likelihood in nominal and real terms as well as per capita municipal revenue projections in nominal and real terms are provided in this chapter.

The municipal revenue projection results for Buffalo City are provided in table 6.1 below. It appears from this table that real revenue growth for Buffalo City is being projected to be 29.4% over the period 2015 to 2021 while the population growth is expected to be 6.9% giving rise to a per capita real revenue growth of 21.0% over this period.

The Buffalo City Metropolitan Municipality (2016) did not provide a revenue forecast up to 2021 but rather up to the 2018/2018 tax year. The municipality produced a 22.3% revenue growth estimate over the period 2015/2016 to 2018/2019, which is

substantially lower than the municipality's revenue growth in the preceding four years.

TABLE 6.1

MUNICIPAL REVENUE PROJECTION RESULTS FOR BUFFALO CITY, 2015 TO 2021

	2015	2017	2019	2021	% growth (2015-2021)
Rates income	2 923 968 391	3 421 883 068	4 052 877 376	4 840 010 805	65.5
Trading income	3 963 794 384	4 885 819 336	6 094 940 883	7 666 306 162	93.4
Total	6 887 762 775	8 307 702 403	10 147 818 259	12 506 316 966	81.6
Total - Real (2010 prices)	5 192 051 117	5 593 849 375	6 102 217 742	6 717 865 922	29.4
Population	778 716	794 093	811 914	832 522	6.9
Per capita revenue - nominal	8 845	10 462	12 499	15 022	69.8
Per capita revenue - real	6 667	7 044	7 516	8 069	21.0

There are various reasons for the expected growth in municipal revenues in Buffalo City municipality as shown in table 6.1 above. The Buffalo City Municipality (2016) mentions inter alia accelerating urbanization giving rise to metropolitan population growth, increasing life expectancy, evolving technologies, growth in the number of people with a secondary or tertiary qualification, growth in the number of households and household income growth.

The municipal revenue projection results with respect to the Buffalo City Municipality were provided in table 6.1. Figure 6.2 provides a comparative analysis of the municipal revenue projection of the Buffalo City Municipality with that of the other large urban municipalities in South Africa. It appears that the forecasted municipal revenue growth of the Buffalo City Municipality is lower than most of the other large urban municipalities.

FIGURE 6.2

COMPARATIVE ANALYSIS OF TOTAL REVENUE IN NOMINAL TERMS, 2015 TO 2021 (RAND)

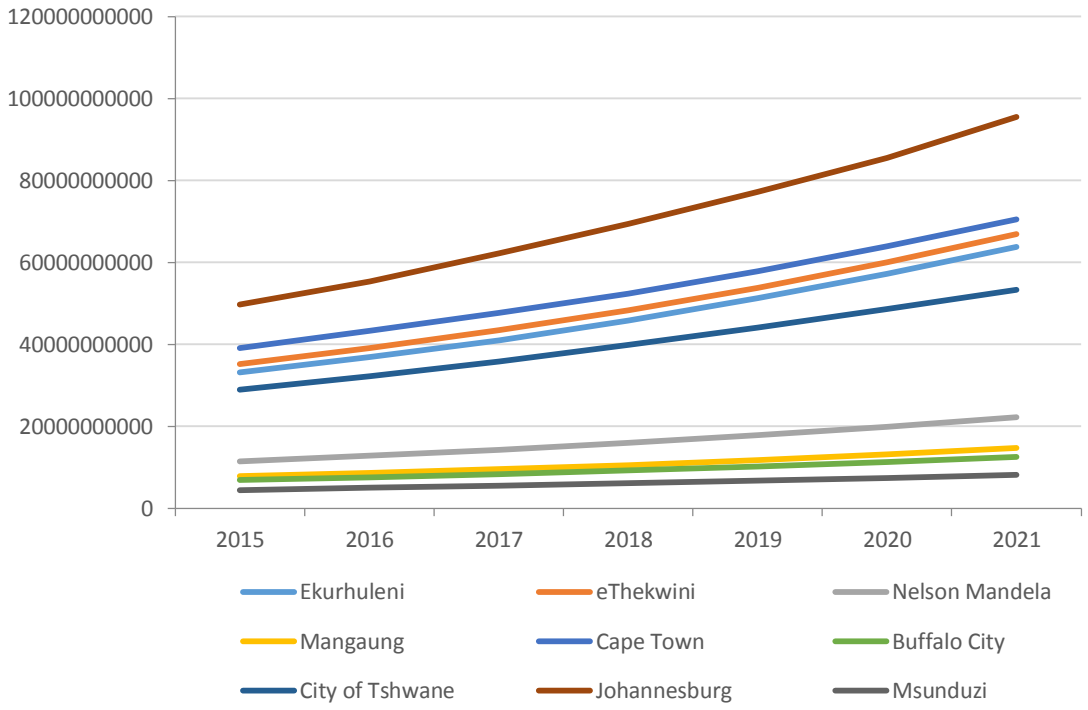
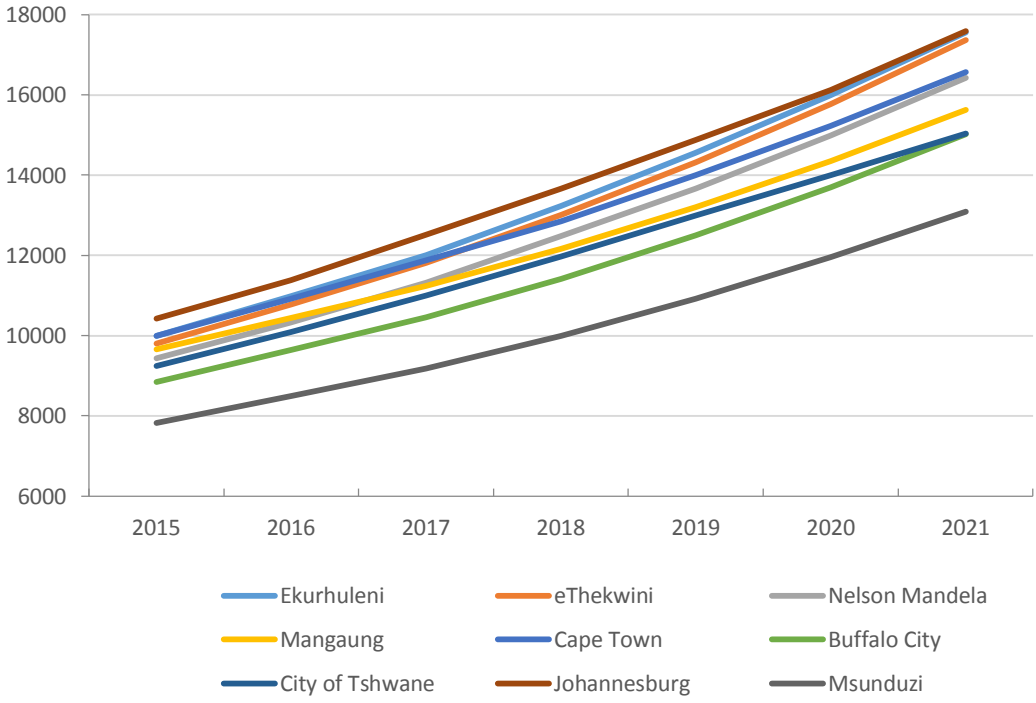


Figure 6.3 shows the projected per capita municipal revenue trends for the same nine large urban areas shown in figure 6.2. The forecasted per capita municipal revenues with respect to Buffalo City appears to be towards the bottom end of the spectrum compared to the other eight large urban municipalities shown in the figure.

FIGURE 6.3

COMPARATIVE ANALYSIS OF PER CAPITA REVENUE IN NOMINAL TERMS, 2015 TO 2021 (RAND)



CHAPTER 7

DISCUSSION, CONCLUSION AND LIMITATIONS

7.1 DEMOGRAPHIC ANALYSIS

The levels of the indicators presented in this study indicate that there are some areas where Buffalo City shows higher levels of human development than the general population of Eastern Cape and South Africa. However, development plans need to take into consideration some of the levels of the indicators. These include population growth. The current population growth rate estimated as 0.9% per annum implies that the population of Buffalo City may only double in about 77 years.

Another consideration is the age structure of the population. While the proportion of the population aged 0-14 has declined in Buffalo City Municipality, the survivors of this cohort in the next 1-15 years will be potential entrants into the labour market. Although the proportion of the elderly population in Buffalo City is still small, the annual inter-censal (2001 and 2011) growth rate was 2.1% per annum.

Regarding housing, the growth rate in housing units during the period 2001-2011 was about 1.4% per annum in Buffalo City. At the same time, over a third of the housing units in the city were bonded or paying rent in 2011. This implies a debt burden in a substantial number of household in the city.

These conditions raise of the following questions regarding development:

- Given competing allocation of scarce resources, is it possible to accelerate improvement in people's welfare if present growth rates in some of the cities continue?
- What is the implication for electricity provision by ESKOM, or for housing, health, et cetera? In view of the declining trend in the size of the 0-14 age group with accompanying increase in the working age group, what is the

implication for the education sector in absorbing the potential increase in entrants to tertiary institutions?

- What is the implication of the increase in the size of the working age group for employment and job creation, savings, capital formation and investment if there are more new entrants into the labour market than those that exit?
- What is the implication for resource allocations with regard to different forms of old age support by government in view of the high growth rate of the population of the elderly in the cities?

Regarding the population projections, the results indicate that the population of Buffalo City could increase from about 1.2 million in 2016 to about 1.3 million in 2021. This absolute increase in population size raises questions regarding development in the city; for example; in the housing sector, electricity, health, water and sanitation, etc.

The estimated ward populations of the city as of mid-2016 ranged widely. This implies different levels of development challenges in the city's wards such as provision of health care, schools, housing, electricity, water, sanitation etc. The fact that wards in South Africa do not have names makes it difficult to physically identify the extent of the wards even by those living in the wards. Could this possibly impede social and political identity with wards aside service delivery issues?

7.2.1 **Limitations of the demographic analysis**

It should be cautioned that the population estimates presented in this study are only as good as the quality or accuracy of the source data on which the estimates were based. The population estimates for some of the wards implies doubtful high negative growth rates even when migration is taken into account. The negative growth rates are due to the seemingly decline in the census population figures for these wards in 2001 and 2011 and projected forward using the methods described above. It should also be mentioned that the population estimates were based on the 2011 municipal boundaries. The new 2016 municipal boundaries together with

the necessary data required for the population estimation were not available at the time of this study. If the methods of population estimation were applied to the new municipal boundaries' populations, some of the results would be different from those presented in this study in those municipalities where the boundaries have been re-demarcated. Although this would likely only affect a few provinces, there is a need to re-visit the estimates presented in this study when the necessary data pertaining to the new municipal boundaries become available in an appropriate database. Lastly, migration is another issue to be taken into consideration. The assumptions about immigration and emigration in this study were based on obsolete data because there is no new processed information on these from Stats SA. Although the South African 2016 Community Survey by Stats SA included a module on migration, the raw data files were not available to the public at the time of this study. Therefore, there is a need to re-visit the projections when new migration data becomes available.

7.2 FINANCIAL ANALYSIS

In this study, projection figures of greatest probability with respect to Buffalo City's municipal revenues were provided. It is clear from the results of this study that relatively high levels of real municipal revenue growth during the period 2015 to 2021 will be realized with the demographic dividend of lower population growth providing the extra benefit of relatively high real per capita revenue growth rates. The main reasons which were identified for such growth include, inter alia, the strong growth of the middle and upper income groups in Buffalo City, increasing concentration in the metropolitan areas of economic activity in South Africa, growing trade and investment, new manufacturing and service projects as well as the broadening of the industrial and tourism base in the metropolitan areas (including Buffalo City).

However, a number of variables remain, which will have an impact on the realised municipal revenues of Buffalo City during the 2015 to 2021 forecast period. Such factors include:

- **economic growth rates** in the Buffalo City Municipal area during the period 2015 to 2021. It is currently expected that fairly low economic growth rates will be realised, giving rise to depressed nominal municipal revenue growth during the forecast period compared to what it could have been. Should higher than expected economic growth rates be realised, the municipal revenue outcomes for Buffalo City may be slightly higher than forecast in this report;
- **household income growth** rates for the forecast period are also expected to be low, giving rise to fairly low Buffalo City municipal income growth trajectories over the 2015 to 2021 period. Low household income growth rates are expected during the forecast period due to the above-mentioned expected low economic growth rates as well as low levels of elasticity between economic growth, employment growth and household income growth during the forecast period. Should higher than expected household income growth rates be realised, higher than the forecasted municipal revenue outcomes may be realised in the nine cities;
- there are at present severe **fiscal expenditure constraints** impacting negatively on municipal revenue streams (including that of Buffalo City). It is expected that such constraints will remain for the entire 2015 to 2021 forecast period. Should such fiscal expenditure constraints become less severe during the forecast period, higher municipal revenue outcomes may be realised than are reflected in this report;
- there are at present high levels of **financial leakages** at municipal level impacting negatively on municipal revenue streams. Such **leakages** include, inter alia, non-payment for services rendered, corruption, low levels of investment spending, etc. Should such leakages be effectively addressed during the period 2015 to 2021, substantially higher municipal revenue growth may be realised;
- possible national or **municipal investment ratings downgrades** were not factored in the forecasts shown in this report. Should such forecasts be realised, far lower municipal revenue growth may realise; and
- the future **financial administrative ability** of the Buffalo City Municipality will have an impact on the future revenue streams of the city during the forecast

period. Should such functions either dramatically improve or deteriorate during the forecast period, it will have a major impact on Buffalo City municipal revenues during that period.

The municipal revenue forecasts for the nine cities reflected in this report are based on current and expected future national, provincial and municipal realities. Should conditions change over the forecast period, it will be imperative to revise/update the municipal revenue forecasts being provided in this report in order to reflect such new realities.

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The study was authored by Prof. E. O. Udjo and Prof. C. J. van Aardt from UNISA Bureau of Market Research.

The authors wish to thank Stats SA for providing access to their data, conveying heartfelt gratitude to Mrs Marlanie Moodley for her assistance in linking the electoral wards to their respective local municipalities, district municipalities and provinces in the 1996, 2001 and 2011 Census data sets. The views expressed in this study are those of the authors and do not necessarily reflect the views of Stats SA.

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APPENDIX 1

DEFINITIONS OF IDENTIFIED DEMOGRAPHIC, POPULATION AND REVENUE INDICATORS

Autoregressive integrated moving average (ARIMA) model: In time-series analyses conducted in econometrics and ARIMA model is a generalization of an autoregressive moving average (ARMA) model. These models are used for projection purposes in some cases where time-series are non-stationary and where a differencing step (corresponding to the "integrated" part of the model) can be applied to reduce such non-stationarity.

Child dependency burden is the ratio of the number of persons aged 0-14 to the number of persons in the working age group multiplied by 100.

Deflator is an index of prices that can be applied to a nominal time-series in order to remove the effects of changes in the general level of prices in order to generate a real (constant) price time-series.

Doubling time entails the number of years it would take for the population to double its current size if the current annual growth remained the same.

Elderly dependency burden refers to the ratio of the number of persons aged 65 years and over to the number of persons in the working age group multiplied by 100.

Elderly population is the population aged 65 years and over.

Flush toilet refers to a toilet connected to sewerage and flush toilet with septic tank.

Growth rate of the Population is the ratio of total growth in a given period to the total population as given in the census results. The geometric formula of the exponential form was used in the computation.

Municipal revenue is the total revenue generated by a municipality through services, levies, municipal rates and taxes, transfers and interest earned during a specific financial year.

Nominal revenue growth is the growth of revenue at market prices (face value).

Overall dependency burden is the age dependency ratio and is a proxy for economic dependency. The overall dependency is defined as the ratio of the number of persons aged 0-14 (i.e. children) plus the number of persons aged 65 years and above to the number of persons in the working age group (i.e. 15-64) multiplied by 100.

***Overall sex* ratio** is the number of males per 100 females in the population.

Per capita revenue growth refers to total municipal revenue growth in nominal or real terms during a specific financial year divided by the number of people in a municipality during a given year.

Piped water refers to tap water in dwelling, tap water inside yard and tap water in community stand.

Real revenue growth refers to the growth of revenue at 2010 constant prices bringing about a situation where the effect of price inflation has been eliminated from the growth rate presented.

Refuse disposal refers to refuse removed by local authority, communal refuse dump and own refuse dump.

Tenure Status is a measure of the proportion of total households that are indebted in terms of ownership, occupying dwellings for free. The categories of households include fully paid dwellings, owned but not yet fully paid off dwellings, and rented dwellings.

Unemployed (expanded definition) is the value of the percentage that depends on how the *economically active population - aged 15-64* - (which is the denominator for calculating the percentage unemployed) is defined. In the expanded definition, the economically active population is defined as people who either worked in the last seven days (i.e. employed) prior to the interview or who did not work during the last seven days (i.e. unemployed) but want to work and available to start work within a week of the interview whether or not they have taken steps to look for work or to start some form of self-employment in the four weeks prior to the interview. The *strict definition* excludes from the economically active population persons who have not taken any steps to look for work or start some form of employment in the four weeks prior to the interview (Stats SA).

APPENDIX 2

THE ESTIMATED ABSOLUTE MID-2016 WARD POPULATION SIZE, BUFFALO CITY

WARD ID	ESTIMATED MID-2016 POPULATION
29200001	12 040
29200002	10 219
29200003	20 509
29200004	15 389
29200005	15 610
29200006	13 601
29200007	10 062
29200008	9 018
29200009	21 734
29200010	21 607
29200011	14 554
29200012	13 999
29200013	35 035
29200014	7 957
29200015	13 368
29200016	35 041
29200017	16 233
29200018	13 136
29200019	12 050
29200020	9 842
29200021	14 862
29200022	14 495
29200023	15 111
29200024	15 070
29200025	12 073
29200026	17 668
29200027	12 133
29200028	18 191
29200029	26 051
29200030	11 558
29200031	22 788
29200032	13 613
29200033	16 639
29200034	11 688
29200035	15 171
29200036	14 044
29200037	13 963
29200038	14 705
29200039	17 788
29200040	11 452

(cont.)

BUFFALO CITY (CONTINUED)

WARD ID	ESTIMATED MID-2016 POPULATION
29200041	12 602
29200042	13 579
29200043	18 514
29200044	24 027
29200045	13 145
29200046	22 879
29200047	17 567
29200048	11 352
29200049	11 721
29200050	10 648

Source: Authors' estimates