

**A COMPARATIVE ANALYSIS OF URBAN GROWTH AND DEVELOPMENT IN
TRADITIONAL AUTHORITY AND NON-TRADITIONAL AREAS: THE CASE OF
RUSTENBURG AND MAHIKENG MUNICIPALITIES IN THE NORTH WEST
PROVINCE, SOUTH AFRICA**

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in Urban and Regional Science in the Faculty of Arts and Social Sciences at Stellenbosch

University

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AUTHOR'S DECLARATION

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ABSTRACT

Urban areas in South Africa have been growing rapidly over the last twenty years. The focus of the study is comparing the growth and development of those parts of cities located in traditional authority (TA) areas in relation to areas that do not fall within the traditional authorities. This study draws comparisons of the urban development and growth of the intermediate cities of Rustenburg and Mahikeng in the North West province

The study uses ward level census data for 1996, 2001 and 2011 aligned to census 2011 boundaries. The three dimensions of growth and development evaluated in the study include a range of socio-demographic, housing and basic services, and density indicators. The study deploys descriptive analysis and multivariate analysis in comparing the variation between tribal and non-tribal areas.

Statistically significant differences in the levels of development were only identified in 7 of the 17 indicators considered, and significant differences in the rate of change in only 4 of the 17 indicators. Development dimensions where TA wards had statistically significant higher values than non TA wards are the proportion of households living in formal housing (1996 & 2001), percentage female headed households (1996) and unemployment rate (1996). Non-TA wards had statistically significant higher values compared to TA wards for the percentage households with access to piped water (1996), percentage households with access to sanitation (1996, 2001 & 2011), the percentage households living in informal housing (2001 and 2011) and informal housing density (2001 and 2011). Statistically significant differences in the growth rates were only identified in the percentage households living in formal housing, population density, formal housing density, and informal housing density indicators (where the rates of increase of non-tribal areas were statistically significantly higher than in tribal areas. The results of the study thus revealed only limited statistically significant differences in the level and rate of growth for TA and none TA areas based on the indicators considered.

Keywords and phrases: Traditional Authority, Urban Growth, Infrastructure Development, Socio-economic development; Comparative Analysis

OPSOMMING

Stedelike gebiede in Suid-Afrika het hoë groeikoerse ondervind oor die afgelope twintig jaar. Die fokus van hierdie studie is om die tempo van groei en ontwikkeling van daardie dele van stede geleë in tradisionele owerhede te vergelyk met die van areas in die stede wat nie binne tradisionele owerhede val nie.

Hierdie studie vergelyk die stedelike ontwikkeling en groei van die intermediêre stede van Rustenburg en Mahikeng in die Noordwes-provinsie. Die studie maak gebruik van wykvlak sensus data vir 1996, 2001 en 2011 belyd met die sensus 2011 grense. Indikatore van drie dimensies van ontwikkeling word gebruik; sosio-ekonomies, behuising en basiese dienste, en digtheid. Die studie maak gebruik van beskrywende analise en meerveranderlike statistiese metodes om die variasie tussen tradisionele owerheidsgebiede en nie-tradisionele gebiede met mekaar te vergelyk.

Statistiese beduidende verskille tussen die vlakke van ontwikkeling in tradisionele en nie-tradisionele wyke is slegs in 7 van die 17 indikatore geïdentifiseer, en beduidende verskille in die tempo van groei in 4 van die 17 indikatore. Aspekte van ontwikkeling waar tradisionele areas statistiese beduidende hoër waardes het as nie-tradisionele gebiede is die persentasie huishoudings in formele behuising (1996 & 2001), persentasie huishoudings met vroulike huishoudingshoofde (1996) en werkloosheidskoers (1996). Nie-tradisionele wyke het beduidende hoër waardes vir persentasie huishoudings met toegang tot gepypde water (1996), persentasie huishoudings met toegang tot sanitasie (1996, 2001 & 2011), persentasie huishoudings in informele behuising (2001 and 2011), en informele behuisingdigtheid (2001 and 2011). Statisties beduidende verskille tussen die groeikoerse is slegs geïdentifiseer in die persentasie huishoudings in formele behuising, bevolkingsdigtheid, formele behuisingdigtheid, en informele behuisingdigtheid (waar die groeikoerse van nie-tradisionele areas statisties beduidend hoër is). Die resultate van die studie toon dus dat daar slegs beperkte statisties beduidende verskille is in die vlak en tempo van groei tussen tradisionele en nie-tradisionele gebiede.

Trefwoorde en frases: Tradisionele owerheid, Stedelike Groei, Infrastruktuur Ontwikkeling, Sosio-ekonomiese ontwikkeling, Vergelykende Analise

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ABBREVIATIONS AND ACRONYMS

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SECTION 1: INTRODUCTION AND PROBLEM STATEMENT

1. INTRODUCTION

1.1 Introduction and Background

South Africa's urban and rural areas experienced significant changes over the last twenty years with the majority of South Africans now living in the complex network of cities and towns. These changes also resulted in various policy and legislative responses. From a spatial development policy perspective, South Africa's National Development Plan (National Planning Commission 2012) calls for a denser land use pattern that is more efficient due to less infrastructure costs and the protection of the environment. The NDP further suggests that a mixture of race and income groups of human settlements should be promoted in order to avoid formation of new ghettos (National Planning Commission 2012:286). One of the development principles promoted by the Spatial Planning and Land Use Management Act (SPLUMA) (South Africa 2013a) is land development in locations that are sustainable and limit urban sprawl, inclusion of previously disadvantaged areas informal settlements, rural areas and slums in spatial planning. A specific aspect of focus in SPLUMA in Chapter 5 that deals with land use management is the inclusion of areas under traditional leadership in spatial planning activities (South Africa 2013a:36).

The role and influence of traditional authority areas in spatial planning and implementation remained contentious over the last 20 years. The Municipal Systems Act (Act 32 of 2000) made provision for the participation of traditional authorities in municipal councils. The NDP (National Planning Commission 2012:275) however, states that the ambiguity of the role of the traditional authorities brings difficulty in the planning system. Many of the functional urban core areas of intermediate cities in South Africa are characterised by a dichotomous structure: parts are located in areas under control of traditional authorities (TA) and other areas in the same cities are not. General protocol dictates that access to areas under the control of TA is through the traditional authorities and that development for public infrastructure should thus be cleared by the TA.

In this study, the term traditional leadership, traditional council, tribal council, royal administration, traditional authority or institution of traditional leadership are used interchangeably. These terms are used with the same meaning, even-though the Traditional Leadership and Governance Framework Act, (Act 41 of 2003), North West Traditional Leadership and Governance Act (Act 02 of 2005) and North West House of Traditional Leaders Act (Act 03 of 2009), Traditional and Khoisan Leadership Bill (South Africa 2015) provide definitions of a list of terms in Chapter 1.

The distribution of the population in the traditional areas is unevenly distributed in South Africa and in the North West province. In South Africa, 31.8% of the population lives in TA areas, with the comparative figure in the North West province 46%. The Rustenburg and Mahikeng municipalities are the focus of this research. A total of 30 % of the population in the Rustenburg local municipality resides in TA areas, whereas the figure in the Mahikeng municipality is as high as 75%.

Table1.1: Distribution of the population in TA and Non-TA areas

Geographic Area	TA	Non-TA	Percent TA
South Africa	16483817	35286743	31.8
North West	1625852	1884100	46.3
Rustenburg	165936	383639	30.2
Mahikeng	218979	72548	75.1

Source: StatsSA 2011

1.2 Problem Statement

South Africa's urban areas have been growing rapidly over the last twenty years. The NDP (National Planning Commission 2012) states that an additional 7.8 million people will be living in South African cities in 2030 and thus putting pressure on the provision of services. Census 2011 indicated that 66% of the North West urban population lived in the urban areas of Rustenburg, Klerksdorp, Brits, Potchefstroom and Mafikeng. The extent of the population in the North West province living in cities, the critical role of these cities in the provincial economy, and the fact that some cities within the province are partially located in traditional authority areas calls for objective empirical research to evaluate the impact of traditional authorities on the growth and development of these cities.

The NDP (National Planning Commission 2012:292) states that although the Municipal Structures Act gives municipal council responsibility over land use management, including in areas under traditional authorities, this is not necessarily the case in practice. There thus appears to be a disjuncture between the traditional authorities, land use rights and the municipal council's responsibilities towards the development and delivery of services. Harrison, Todes and Watson (2008:211) states that in areas under traditional leadership, implementation of the land use management system has been difficult due to a suspicion that the system is associated with municipal control.

Areas under the control of TA's generally have a higher degree of cultural homogeneity and TA's have an impact on the way services are rendered in areas under their control. There is a perception of lower quality of services in TA areas based on a generally lower level of understanding of development issues and participation by the TA's on issues related to spatial planning, leading to imbalances in the development within these cities. It is thus of interest to study the traditional-non-traditional dichotomy that exist with regard to the development of the municipalities.

1.3 Research questions

Based on the problem statement this research attempt to answer the following specific research questions:

- Does the rate and pattern of delivery of basic services and housing differ between those parts of municipalities located in TA areas and those parts that are not?
- Are there differences in the changes to demographic profiles between those parts of municipalities located in TA areas compared to those parts that are not?
- Are there differences in the density measures and trends between those parts of municipalities located in TA areas compared to those parts that are not?
- Does TA's affect urban development and growth; and if so, in a positive or negative manner?

1.4 Research aim and objectives

The goal of this research is to compare the patterns and the rate of development and growth of two North West municipalities (Rustenburg and Mahikeng) containing intermediate cities, and which partially falls within traditional authority areas. The overall aim is to establish whether there are differences in the development and growth patterns and rates in those parts of municipalities located within tribal authority (TA) areas, and those that are not. The study objectives can be defined as follows:

- To determine if there is any statistically significant differences between the rate and pattern of delivery of basic services and housing between those parts of municipalities located in TA areas and those parts that are not.
- To examine the differences in changes to demographic profiles between those parts of municipalities located in TA areas compared to those parts that are not and to determine whether there is any statistically significant differences.

- To analyse the differentials in population and housing density indicators between those parts of municipalities located in TA areas compared to those parts that are not.
- To compare the extent and the manner in which TA's affect urban growth and development in municipalities.

1.5 Research hypothesis

This study will test the following hypothesis:

- H_0 : Rate and level of development and growth in areas falling in TA's in municipalities containing intermediate cities are statistically significantly different from those areas not located in TA's
- H_A : Rate and level of growth of areas within and outside TA's are not statistically significantly different

1.6 Structure of study

This research article is structured in four sections. Section two focuses on the literature review based on the legislative framework and research themes, and is followed by Section three that outlines the theoretical framework, data sources, statistical and demographic techniques for the methodology to be followed for the study. Section four provides the results of the empirical analysis and discussions thereof. Section 5 provides a conclusion and highlights the policy relevance of the study.

SECTION 2: LITERATURE ON TRADITIONAL AUTHORITIES AND URBAN DEVELOPMENT

2 LITERATURE REVIEW

2.1 Traditional Authorities and its Role and impact on Urban Development: International evidence

Traditional authorities are the indigenous leadership of traditional communities. Tradition refers to issues that have a historic basis in the past, or the indigenous norm of doing things. The concept of traditional leadership refers to historic forms of leadership that exist in Asia, Latin America and Africa and are commonly referred to as kings, chiefs and elders (Lutz & Linder 2004). TA's are not unique to South Africa and also exist in countries like Botswana, Zimbabwe, Ghana, Namibia and Uganda, with these countries also recognising the significant role of traditional leaders post-colonialism.

In a country like Mozambique there are misconceptions in the modern and the traditional dichotomy of authority arising from the legitimacy and social inclusion of TA as drivers of change. Traditional authorities have been identified as the key to better inclusion of the local population, acceptance of policy implementation, potential for better responsiveness to communities and good advocates for peace building (Lutz & Linder 2004). South Africa and Ghana have adopted a similar constitutional approach to the recognition of TA's by establishing national and regional institutions of traditional leadership. A further similarity is the approach that traditional leaders are not supposed to take active part in party politics, but have the ability to coexist and enhance democratic institutions. This is however not the case in all African countries. In Sudan for example there are predictions of a tug of war between traditional authorities and the national bureaucratic elite over the existence of local authorities after independence (Vaughan 2010).

In a study that measures changes in TA's in postcolonial Namibia, Becker (2006) argues that traditional authorities that are aligned to the ruling political parties face challenges of divided societies. In these divided societies TA are regarded as being close to the elite group and against the people. In a country like Botswana (Jones 1983) chiefs were taken as members of public service and thus regarded as public servants. Jones (1983) further states that the move to change the traditional authority based on hereditary principles was challenged. The challenge was based on the '*Gemeinschaft*' nature of the traditional society based on a deep rooted sense of identity, close

traditional custom practices and close personal bonds. On the contrary, state administration provides for ‘*Gesellschaft*’ environment characterised by bureaucratic formal administration channels.

In many countries in sub-Saharan Africa, the role of customary land rights in modern land tenure systems have however been avoided. This situation provides a disjuncture in the role played by local institutions such as local government and TA’s in issues of development and land rights, and in areas under their control TA’s exercise total control in terms of land allocation (Lehman 2007; Bennett *et al.* 2013).

2.2 Traditional Authorities and its Role and impact on Urban Development: The South African case

2.2.1 Constitutional and legal mandates

From a legal and administrative perspective, the Constitution of SA, (South Africa 1996) in Chapter 12 provides for the roles of TA’s. Sections 211 and 212 of the Constitution provides for recognition and the role of the traditional leadership. The traditional leadership is charged with the responsibility to provide leadership on matters affecting local communities.

The Municipal Structures Act (Act 117 of 1998) in Section 83 further specifies that a municipal council should consult and allow traditional leaders to express a view on any decision made on any matter directly affecting areas under their control. The later developments involved the devolvement of developmental functions of local government. According to Ntsebeza (1999) traditional authorities were not happy with this devolvement. This is because the traditional authority understood the devolvement of developmental functions to local government as taking over their power in areas under their jurisdiction as Chapter 7 of the Communal Land Rights Act (Act 11 of 2004) which also provides for communal land administration to be performed by well recognised traditional councils.

Of specific importance to this study, the Traditional Leadership and Governance Framework Act (TLGFA) (Act 41 of 2003) that outlines the duties to be played by traditional leaders with regard to development. New legislative processes in the form of the Traditional and Khoisan Leadership Bill (TKLB) (South Africa 2015) also put emphasis on facilitation of development and service delivery by the traditional leadership including the Integrated development Plan (IDP) process. Their role as society leaders cannot be separated from their role as part of inclusive governance. According to Mashele (2004), TA’s perform legislative, executive and judicial functions according to the

majority wish. However, the legislated role of TA's is to support municipalities in the identification of community needs, facilitate the involvement of traditional community in the development, introduction and facilitation of the development of policy at local level, promotion of co-operative government, integrated development, and service delivery. The promotion of partnership between TA's and municipalities is required by section 5 of TLGFA. Section 17 specifically indicates that the local house of traditional leaders should develop planning frameworks that impact on traditional communities. Land administration and economic development are also part of the guiding principles provided for in Section 20 of the TLGFA.

More recently, the NDP of South Africa (National Planning Commission 2012) has viewed the role assigned to traditional leaders as complex. The developmental role of TA's in areas under their control is not explicitly spelled out. The plan further recognises the role of TA's to facilitate communication with citizens to improve local government effectiveness. However, legislating the roles of traditional leadership at times leads to confusion as the roles of traditional leadership are seen as duplicating the roles of the state.

2.2.2 Role and function of traditional authorities in municipal development

In SA traditional authorities existed long prior to 1994 and continue to play an influential role in the development of municipalities. Mashele (2004) in a study on traditional leadership in South Africa's new democracy discusses the history of traditional authorities from the pre-colonial times to the current period. In a historical context, traditional authorities were used by British policy and the later establishment of the Native Administration Act of 1927 that gave governor-general powers over traditional leadership including their establishment and their removal from their office. This was later followed by the Black Authorities Act of 1951 that saw chiefs as heads of ethnic homelands. According to Mashele (2004) South African intellectuals are not in agreement about the role TA should play. There are those that are adamant that TA leaders be done away with, whilst others are of the opinion that the institution of traditional leadership should be given more support and power.

In a study on peri-urban transformation in SA, Sadiki & Ramatsindela (2002:57) state that "South Africa provides a good example of how rural-urban distinction could be intermixed with state ideology". This was based on the level of abstraction that puts a distinction between rural and urban based on functions and services in those areas. On the role of traditional leaders, Mashele (2004) relates their role as an ambiguous situation with traditional authority's obligation to serve people

and the other to cooperate with the government. Post 1994 with the new South African constitution, traditional authorities continued to function in areas of indigenous law and as ex-officio members in local government matters. TA's play a central role as drivers for change in their areas. They hold community meetings and brief the communities about government programmes and planned projects. Van Kessel & Ommen (1997) argue that traditional leaders project themselves as drivers for rural development and traditional customs. They have a role to protect cultural values and promote the social value system. Communication and consultation platforms for the communities are facilitated through meetings called imbizos, lekgotla or kgothakgothe. In the North West province, for the Royal Bafokeng Administration (RBA) this concept of democratic consultation is embraced in a concept popularly known as Dumela Phokeng. Dumela meaning hello is Setswana, when King and the royal council visits all the villages (Mashele 2004; Thornhil & Selepe, 2010). The influence of TA's on spatial development mainly results from areas under the control of traditional leadership that commonly have a lower level and in other cases, non-existent land use management practices due to the suspicion that land management is under municipal control (Harrison, Todes & Watson, 2008).

2.2.3 Traditional authorities in the study area

Census 2011 (South Africa 2012a) identified 63 TAs in the North West province. In other cases TAs have the same name even-though there is no dependence between them like Bafokeng and Bafokeng ba ga Motlala. Of the listed authorities the Bafokeng are stated as the most conspicuous and successful (Thornhill & Selepe, 2010).

The Mahikeng local municipality area encompasses six TA's. These are the Barolong Boo Ratshidi, Barolong Boo Rapulana, Banogeng, Batlou Ba Ga Shole, Bakwena Ba Ga Malopyane and Barolong Boo Rotlou Ba Ga Seete. The Rustenburg Local municipality area has four TA's which are Bafokeng, Baphalane, Bapo Ba Ga Mogale and Bakwena Ba Mogopa.

In a study that examined the role of the RBA in the promotion of municipal services within their area of jurisdiction, Thornhill & Selepe (2010) outlines how the TA's adopted a corporate approach from a traditional approach. In the era when portions of the society regards hereditary rule as backward and uncivilised form of rule, the RBA's achievements effectively balance the recognition of traditional custom and corporate approach. These corporate approaches necessitated the synergy between the royal administration and the municipality be formalised in a memorandum of understanding as some services are jointly provided. Such a synergy is necessary as the Royal Administration provides subsidised water services, emergency services, infrastructure development

services, tribal court system and law enforcement in the form of tribal police force that work jointly with South African Police Services.

2.3 Indicators of Urban Growth and Development

As outlined in the objectives of the study, the research will investigate the potential influence of TA's on three dimensions of urban growth and development: access to basic services and housing, socioeconomic development, and development density. The three measures are briefly reviewed in the subsequent sections.

2.3.1 Basic Services and Housing

Safe water and improved sanitation facilities are part of Millennium Development Goal 7. Lenton *et al* (2008) states that the requirements for water differ from goal to goal. MDG Goal 1 uses access to water in terms of basic services and in MDG Goal 2 as schools with water infrastructure, and in MDG Goal 7 as access to safe drinking water. Housing indicators include the housing types, household headship rates and the extent of crowding measured as persons per housing unit (Obudhu, 1976; Poku & Whitman 2011). In a study that measured changes on relative access to basic services in post-apartheid South Africa, Nnadozie (2013) focussed on piped water and formal housing as variables of interest using Census 1996, Census 2001 and Community Survey 2007.

In another South African study, Krugell, Otto & Van der Merwe (2010) evaluated the progress of delivery of basic services at the local municipality level using changes in the service delivery index for each municipality. This classification is based on a composite score of piped water inside the dwelling, use of electricity for cooking, use of lighting, flush toilet and refuse removal. In the ranking of municipalities according to the basic services index they used three categories, namely improvers, above average and below average. For the cities specific to this study, Rustenburg were classified as an improver and Mahikeng classified as below average. They also found that municipalities with higher population densities were able to provide better access to services.

2.3.2 Socio-Demographic Measures

Obudho (1976) argues that the demographic structure of any country or region plays an important role in defining the social environment. Knowledge of demographic processes such as mortality,

fertility, marriage, divorce and migration as components of population change is important (Shyrock *et al* 1980) and would enable understanding and formulation of policies with respect to growth and spatial population distribution. Akkerman (2005) states that there is a linear relationship between household head and the age distribution of the household membership. The household age and sex variables in relation to the household composition determine the level of development. For example there is a conceptual link between household composition and housing. Households represents occupied dwelling units, at adulthood people tend to settle for own accommodation and therefore the more entrants into adulthood increases the demand for housing.

Population age-structure and household consumption defined as the proportion of income spend on food items are related. The age structure of the consumer population is also related to the labour potential associated with it. A more youthful population structure has a more productive labour force than an aging population. The aging of the population increases dependency and a lower proportion of working age population (Kleinman 1967, Erlandsen & Nymoer (2008).

The results of a study of socio-demographic determinants of economic growth using data from Middle East, Asia, Africa, East Europe, Oceania and Latin America (Crenshaw & Robison 2010) showed that human capital formation in terms of secondary school enrollment influences economic growth. The study established that the dependency ratio is statistically significant in economic growth with an increase in the dependency ratio leading to a decrease in economic growth. Lutz *et al.* (2008) also studied the relationship between educational attainment and economic growth and concluded that better education does not only lead to improved income but also to long-term economic growth. Schooling also delays marriage and make women more marketable to enter into the labour force (Malhotra, 1997). Literature on female-headed households show that such households arise when there is no male in the household, while in other cases it is purposeful decision and action intended to liberate women towards economic power (Korbin 1973, Carliner 1975; Moultrie & Timaeus 2001).

Income is an important variable for most types of analysis in social sciences (Nnadozie, 2013). The reliability of income as a variable, however remains controversial. Obudho (1976) found that real income, distribution of income, and absolute level of income are all important indicators of change. In a study measuring the income inequalities in South Africa, Leibbrandt *et al.* (2012) used comparable income data for two time periods. The study showed considerable changes in the breakdown of the components of household income for 1993 and 2008.

2.3.3 Development density analysis

The concept of density measures refers to the degree of activity intensity within a defined space and can be measured by various indicators such as population density, urban density, and built-up areas. (Kasanko et al, 2006). Quantitative indicators for measuring the size and density of urban form should address at least three related elements (du Plessis & Boonzaaier 2015). The first element is the most common measure and includes various measures of population density. (Burton 2002)). The physical characteristics in the form of built-up densities is generally measured by exponential or power functions based on the principle of a continuous gradient of decreasing built-up densities (Bertaud & Malpezzi 2003) and represents the second element of density indicators. The third element measures the increase in built-up surface areas within constantly defined parameters and provides a clear indication of densification of built-up areas in relation to distance from the city centre (Guerios & Pumain, 2008).

SECTION 3: METHODOLOGY

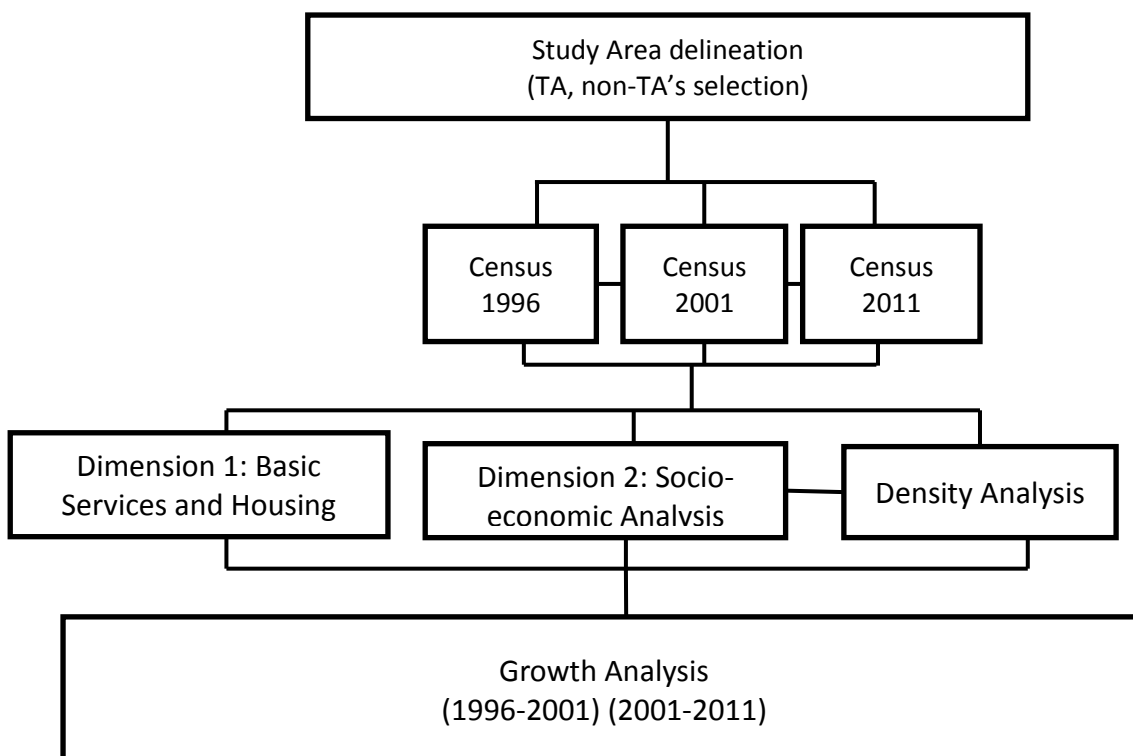
3 METHODOLOGY

3.1 Overall Research Design and Approach

The overall aim of this study is to establish whether the patterns and the rate of development and growth in areas falling within TA's and outside TAs within the same cities differ and adopts a case study approach to answer the identified research questions.

The cross-sectional investigation adopted a positivistic research philosophy as it performs an in-depth analysis on the 'traditional and non-traditional authority' dichotomy based on the selected indicators for urban growth and development for the two case study cities.

Figure 3.1: Flowchart for methodology



3.2 Description of the Study Area

This study investigates urban development and growth patterns of two municipalities containing intermediate sized cities with TA's in the NWP of South Africa: Mahikeng and Rustenburg. Rustenburg is the centre of Bojanala DM with a population of 549,575 of which 56% lives in formal urban areas and 30.2% in TA areas. Mahikeng is the provincial capital and the centre for Ngaka Modiri Molema DM with a population of 291,527 of which 20% is living in formal urban areas and 75.1% in TA areas. The total area of the Mahikeng and Rustenburg is 3698 and 3423 km² respectively. A total of 43% of the land area of Mafikeng is under control of TAs and 40% in the case of Rustenburg.

Mahikeng LM has six TA's in its area of jurisdiction namely Barolong Boo Ratshidi, Barolong Boo Rapulana, Banogeng, Batlou Ba Ga Shole, Bakwena Ba Ga Malopyane and Barolong Boo Rotlou Ba Ga Seete. The Rustenburg LM area of jurisdiction contains four TA's; Bafokeng, Baphalane, Bapo Ba Ga Mogale and Bakwena Ba Mogopa.

Figure 3.2 depicts the location of the two cities in North West province while Figure 3.3 depicts the location of traditional areas and the urban core area within the two municipalities. Traditional areas refer to those areas under jurisdiction of traditional authorities. The urban core area refers to the boundaries of the former local councils that included the formal parts of Rustenburg, Mafikeng, Marikana and Ottoshoop and that were traditionally the focus areas for development. Hybrid areas are wards that contain a mixture of both traditional areas and non-traditional areas.

Figure 3.2: Location of Mahikeng and Rustenburg in North West Province

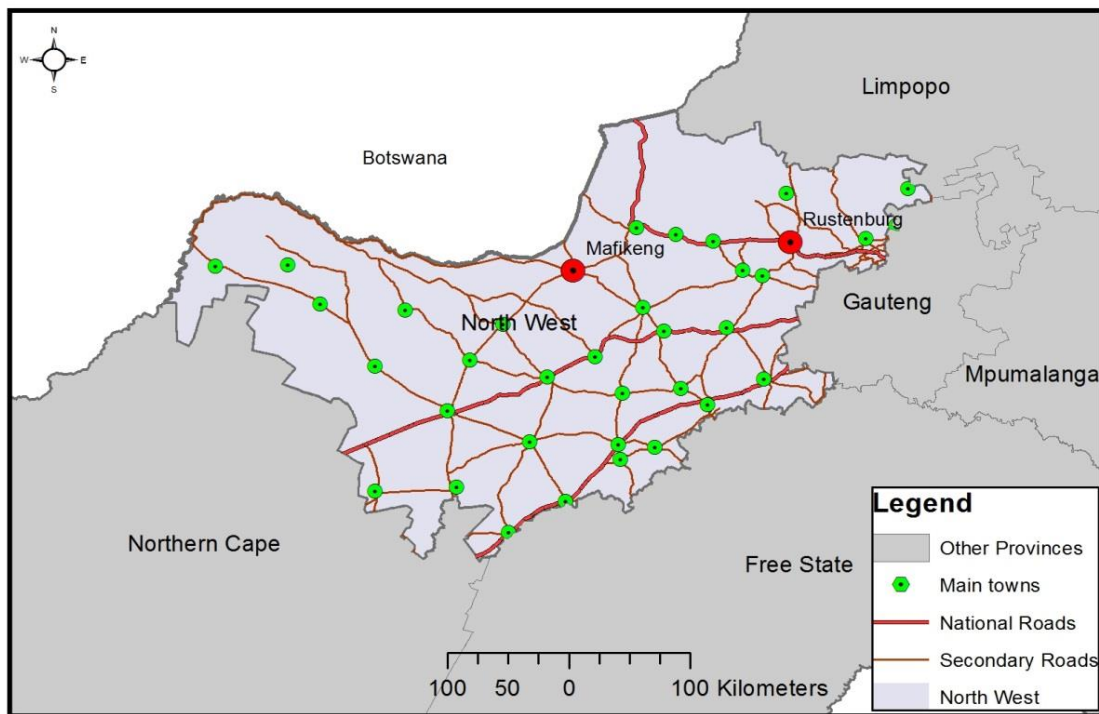


Figure 3.3a: Location of TA and Urban Core area within Mahikeng Local municipality

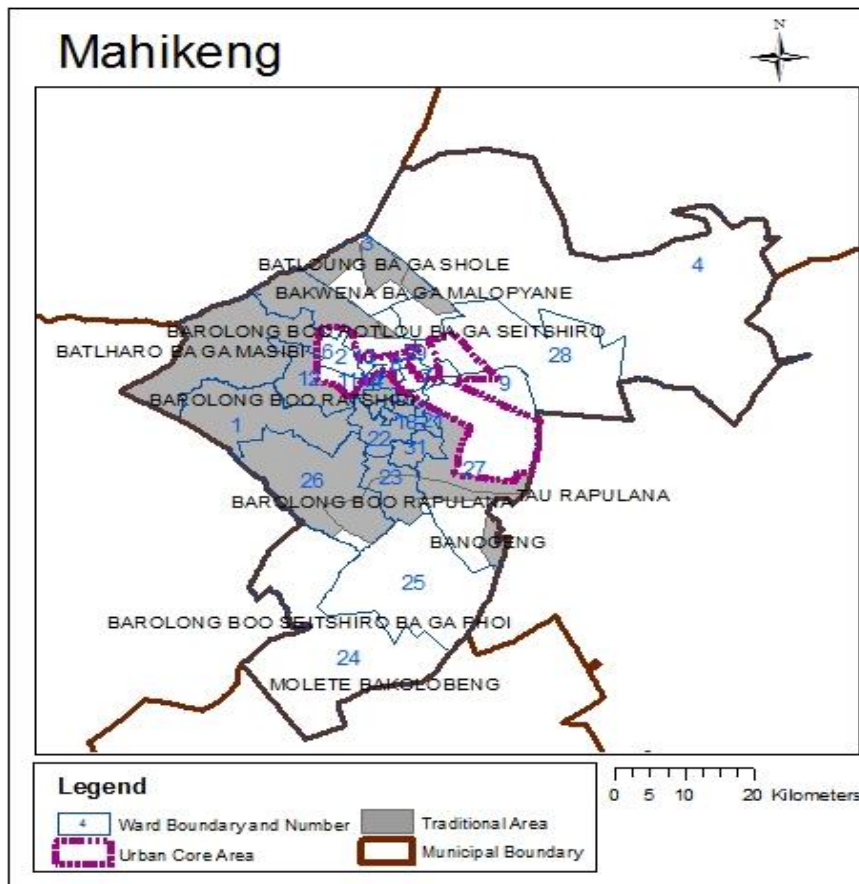
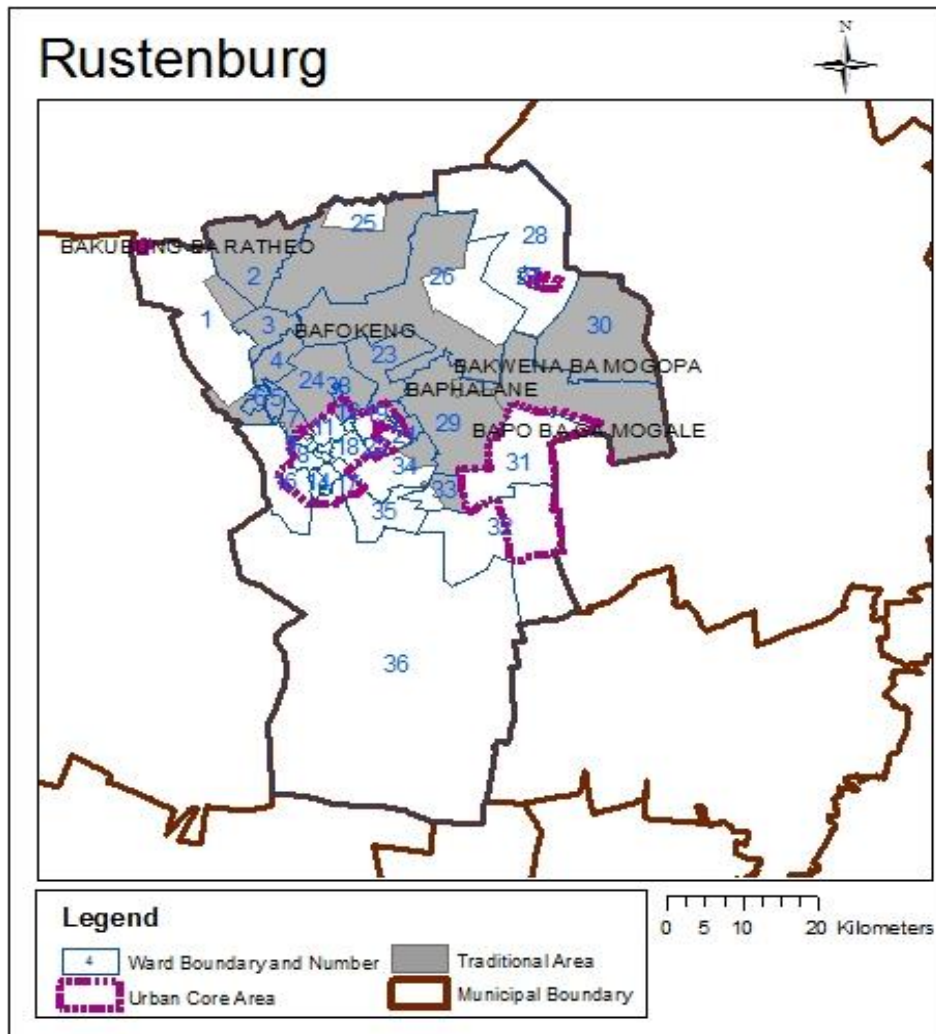


Figure 3.3b: Location of TA and Urban Core area within Rustenburg Local municipality

3.3 Data and Analysis Techniques

3.3.1 Analysis techniques

The study uses available Census 1996, Census 2001 and Census 2011 datasets from StatsSA. The spatial units of analysis for the study are municipal wards and focuses on two levels: the overall municipal area and the urban core area. Ward level data is used as it is the lowest level of spatial aggregation for which harmonised time series data across all three the census periods are available. To measure the rates and direction of changes from 1996 to 2011 a combination of descriptive statistics and Variance Estimation and Precision Comparison (VEPAC), a Variance Component Model that uses the Restricted Maximum Likelihood Method (REML) was applied. REML is chosen to test the hypothesis and thus conduct a pairwise comparison based on the Least Significant

Difference (LSD) of the main interaction effects for the Urban Core area, Traditional Area and hybrid areas as fixed effects. REML also takes into account the degrees of freedom used for estimating the fixed effects. The test determines the differences of wards between and within three groups; Wards that completely fall within traditional areas (1); Wards not located in TA areas (2), and wards partially located in TA areas and partially not (3) . Income is used as a control variable. VEPAC is performed at two levels; firstly a comparison of the percentage coverage as test means for the different categories and time periods and secondly the compounded average percentage changes in the period 1996 to 2001 and 2001 to 2011. A parametric test is applied to test the means on the parameters (Bless *et al* 2013).

For the **basic services and housing dimension**, the unit of measurement is households. Access to piped water, electricity for lighting, electricity for cooking, formal housing, informal housing and sanitation was used as dependent variables in this category and computed as follows:

- Access to Piped Water is measured across the three census years using piped water inside the dwelling unit and piped water inside the yard - 1996 Question B2.2; 2001 Question H26; 2011 Question H07).
- Electricity for lighting and cooking is measured using electricity option across the three census years (1996 Question B2.1; 2001 Question H28; 2011 Question H11).
- Formal Housing is measured using a house, brick/concrete block structure, flat or apartment in block of flats, cluster/town house, semi-detached house, backyard room options. Informal Housing on the other hand is measured using the informal dwelling in the backyard or informal dwelling on separate stand (1996 Question B1.4; 2001 Question H23a; 2011 Question H02).
- Sanitation is measured using flush toilet connected to sewer or septic tank and chemical toilet options (1996 Question B2.3; 2001 Question H27; 2011 Question H10).

In the **socio-economic dimension**, Census 1996, Census 2001 and Census 2011 datasets from StatsSA are used and the variables included in the analysis summarised in Table 3.1.

Table: 3.1: Socio-Demographic Measures

Indicator	Description of changes	Formulae	Census Year and Question
Population growth	Inter-censal population growth rate (1996-2001), (2001-2011)	$= \ln \left(\frac{Pop_{2001}}{Pop_{1996}} \right) \times 100$ and $= \ln \left(\frac{Pop_{2011}}{Pop_{2001}} \right) \times 100$	1996: A1.1 2001: P00 2011: F03
Median age	Median age of the population (1996-2001), (2001-2011)	$= l_{Md} + \left[\frac{\frac{n}{2} - \sum fx}{f_{Md}} \right]$	1996: A1.2 2001: P00 2011: F03/02
Population structure	Difference within and between cities	Based on the population pyramid change between the data collection period	1996: A1.2 2001: P003 2011: F03/02
Dependency Ratio	Proportion of economic active population to non- economically active population(1996-2001), (2001-2011)	$= \frac{P_{>14} - P_{<65}}{P_{15-64}} \times C$	1996: A1.1 2001: P00 2011: F02
Household headship rates	Sex and Age of Head of household (1996-2001), (2001-2011)	$= \frac{H \text{ head}_{sex,age}}{\sum H \text{ hold}} \times C$	1996: A1.2/A1.1 2001: P00-P17 2011: F01
Proportion completed secondary education	Percentage of population that completed grade 12 (1996-2001), (2001-2011)	$= \frac{P_{\text{completed secondary}}_{>20}}{P_{all}_{>20}} \times C$	1996: A16.1 2001: P17/P00 2011: P20/F02
Proportion of higher education	Percentage of population that achieved a higher education level (1996-2001), (2001-2011)	$= (\ln(STU(t+5)/STU(t)) \times 100$ <p>Where : STU is the number of students with higher educational attainment t+5 is the period end t is the beginning of period</p>	1996: A16.1 2001: P17/P00 2011: P20/F02
Unemployment	Unemployment rates (1996-2001), (2001-2011)	$= \frac{\sum Pop_{unemployed>15}}{\sum Pop_{>15}} \times C$	1996: A17-A19 2001: P18-P19 2011: P23-P31
CAPC = $(Rate_{y1} / Rate_{yn})^{1/n} - 1 \times 100$			

Census 2011 data were used to calculate **population density** as well as **housing unit density** based on the two main housing types, informal housing and formal housing.

Table: 3.2: Density Analysis

Indicator	Description of changes	Formulae
Population density	Average people per area 1996-2001), (2001-2011)	$\frac{\sum Pop}{km^2}$
Housing Density	Housing type and density change (1996-2001), (2001-2011)	$= \frac{\sum DU_{type}}{km^2}$
$CAPC = (Rate_{y1} / Rate_{yn})^{1/n} - 1 \times 100$		

3.4 Data Interpretation

VEPAC is used to determine the statistical differences between traditional, non-traditional and a mixture of the two areas (as the dependent variable), for independent variables (Basic services and housing; Socio-Demographic measures; density measures) while controlling for Income category as a covariate. The primary purpose of using the VEPAC method is to determine whether the differences between the figures and rates of change between TA and non-TA areas are statistically significant or not. The post - hoc test is selected to compare the means in the design. An alpha level of 0.05 (p-value) is used for all statistical tests. Common Logarithm ($\log_{10}x$) is computed for positively skewed independent variables to perform the restricted maximum likelihood test.

Analysis is performed mainly using tables and graphs. The tables depict analysis at three different geographic levels per area; urban core, non-urban core, TA area, non-TA area and hybrid. The tables present percentage growth change between the period 1996 to 2001 and 2001 to 2011. VEPAC Variability plots depict differences in means for 1996, 2001 and 2011 for the TA, non-TA and hybrid areas (see example in Figure 3.4a). The second part of the VEPAC graph indicates changes on period differences between TA and non-TA areas (see example in Figure 3.4b). VEPAC variability plots are annotated to assist with the identification of statistically significant changes. Change on the letter indicates statistical difference, but if the letter is the same that shows no statistically significant difference. The letter 'a' in Figure 4.1b shows no statistical significant change for TA and non-TA areas and also between the period 1996 to 2001 and 2001 to 2011. In Figure 4.1a the letter 'a' in 'ae' for TA and 'ab' for non-TA in 2011, shows that the means are not statistically significant. A summary interpretation of these graphs is discussed in Section 4 with the full set of graphs included in Annexures A, B and C.

Figure 3.4 a: Piped Water Access for 1996, 2001 and 2011

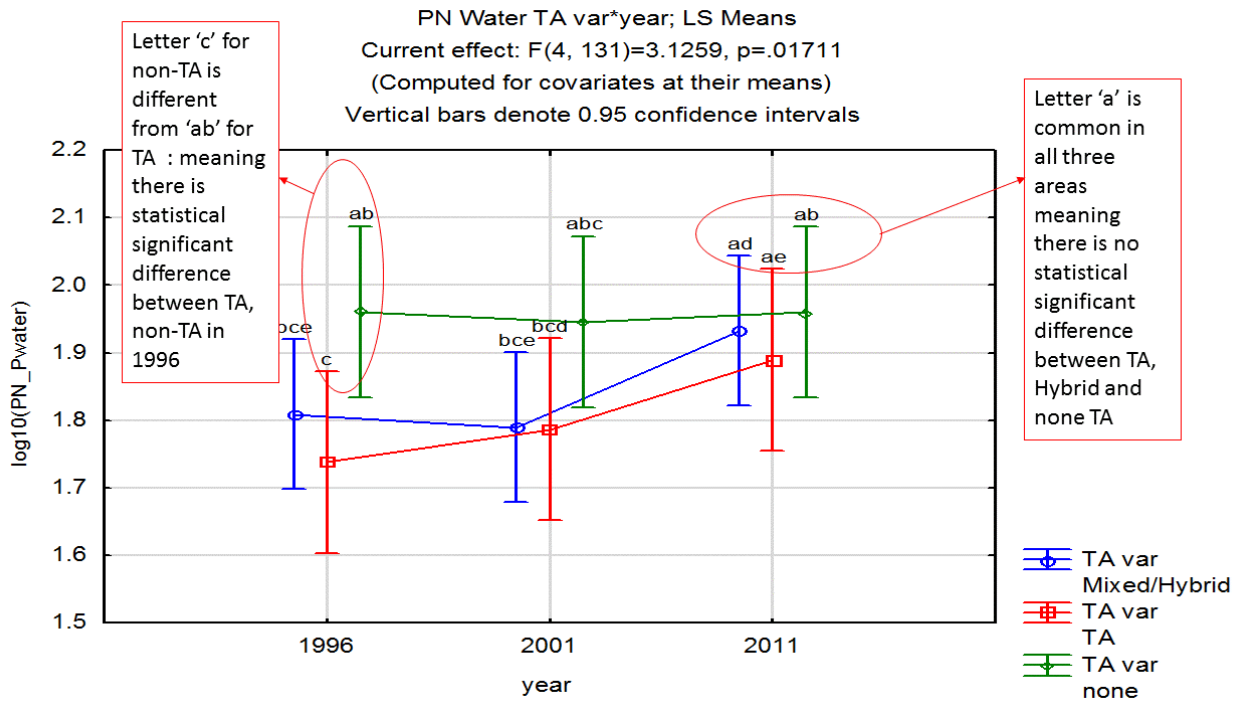
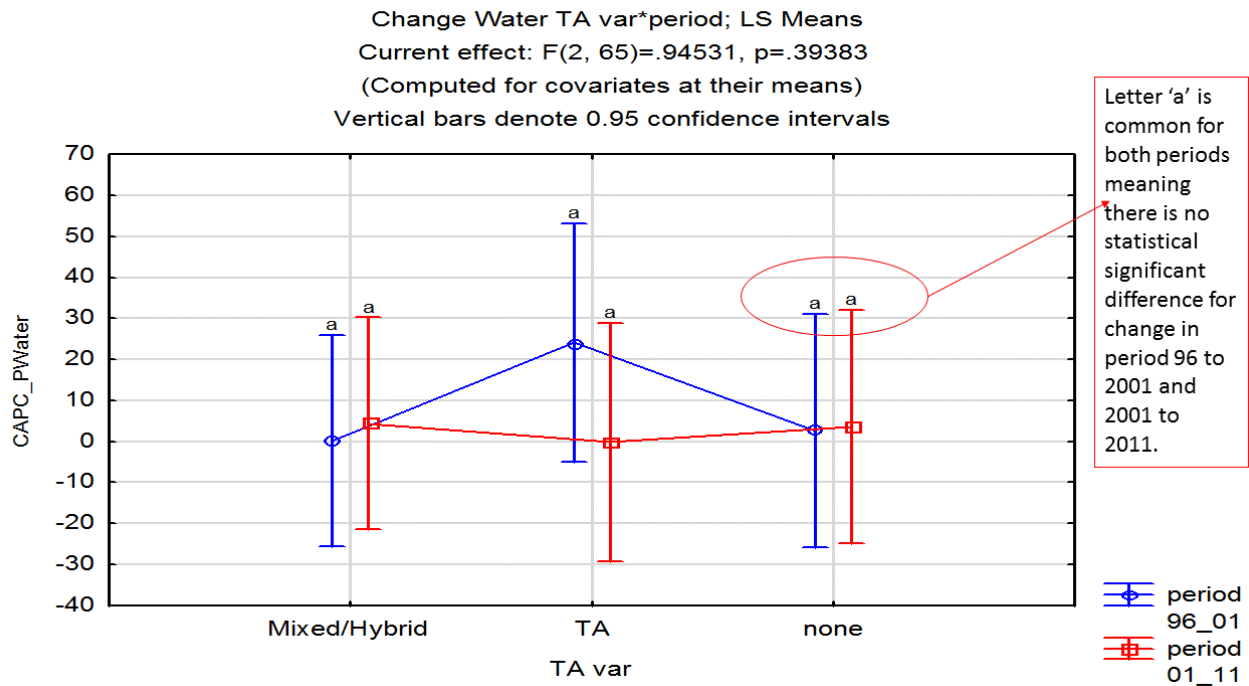


Figure 3.4 b: Scores of Changes on Piped Water Access growth



3.5 Possible Limitations of Technique

The main data sources used for this study are from census 1996, 2001 and 2011. There are three potential limitations associated with these data sources. The first limitation is that housing density could only be measured in 2011 due to the fact that dwelling frame unit data was only captured for

census 2011. The second limitation is based on the ward boundaries that do not always correspond with traditional and non-traditional areas. Not all wards could thus be classified as consisting of only TA or non-TA areas. A separate third category thus had to be used in the analysis referred to as Hybrid wards. Thirdly, due to availability of data, the multidimensional deprivation analysis variable is only used in 2001 and 2011.

SECTION 4: FINDING AND ANALYSIS

4 FINDING AND ANALYSIS

4.1 Overall Research Design and Approach

This chapter focuses on empirical evidence based on the three urban growth and development dimensions chosen for this study. Descriptive analysis is first performed based on the changes over the study period then followed by the multivariate analysis of variance, a VEPAC method.

4.2 Basic Services and Housing

Generally there have been improvements with regard to access to water in both TA and Non-TA areas. Table 4.1 reveals that for the period 1996 to 2001, major improvements occurred in TA areas, with a change of 48%. This figure increased even further to an improvement of 62% in TA areas between 2001 and 2011, although the Non-TA areas also experienced an increase of 66%. The improvements are due to change of government focus towards delivery of services at local level has and is lined with the general improvements in access to piped water also identified in other sources (Nnadozie 2013; StatsSA 2013b). These improvements in access to piped water closed the gap between TA and Non-TA areas to such an extent that the statistically significant differences between the TA and non-TA areas that existed in 1996 were not evident any more in 2001 and 2011. There is also no statistically significant difference between the average rate of change for access to piped water between TA and non-TA areas for both the periods 1996 to 2001 and 2001 to 2011 (Figure A1b in Annexure A & Table 4.2).

Table 4.1: Growth Rates on basic services and housing

Variable	Period	Mahikeng		Rustenburg		Total	
		TA	Non-TA	TA	Non-TA	TA	Non-TA
Piped Water	1996-2001	33.9	24.3	62.1	32.2	48.0	28.3
	2001-2011	66.7	41.7	56.2	90.9	61.5	66.3
Electricity for Lighting	1996-2001	274.1	22.2	314.3	58.6	294.2	40.4
	2001-2011	46.3	46	58.8	97	52.6	71.5
Electricity for Cooking	1996-2001	168.5	21	275	48.9	221.8	35.0
	2001-2011	105.6	45.6	128.7	131.9	117.2	88.8
Sanitation	1996-2001	161.6	20.9	271.1	26.1	216.4	23.5
	2001-2011	88.6	43.9	385.1	103.7	236.9	73.8
Formal Dwelling	1996-2001	27.5	23.9	50.6	36.8	39.1	30.4
	2001-2011	29.3	41.3	42.2	120.3	35.8	80.8
Informal Dwelling	1996-2001	64.5	200	56.4	42.2	60.5	121.1
	2001-2011	22.1	125	28.3	22.1	25.2	73.6

As indicated in Table 4.1, the rate of change of the percentage households with access to electricity for the lighting over the period 1996 to 2001 was significantly higher in TA areas (294%) compared to the non-TA areas (40%). This high proportional growth rate can probably be ascribed to growth taking place from a very small base in 1996. This trend was however not repeated over the period 2001 to 2011 when the rate of change in the Non-TA areas exceeded those in TA areas. The Statistical test (Figure A2b in Annexure A) however reveals no statistical significant difference for changes in electricity for lighting between TA and Non-TA areas for the period 1996 to 2001 and 2001 to 2011 . Similar to the case of lighting, electricity as a source of energy for cooking improved by 222% in the TA areas (compared to 35% in non-TA areas) for the period 1996 to 2001 and 117% in TA areas (89% in non-TA areas) between 2001 and 2011. The comparative figures in the Rustenburg TA areas for the two periods were 275% and 129% respectively. The increase in Non-TA areas for the two periods was generally much lower except for the period 2001 to 2011 in Rustenburg. There is an observed difference in the use of electricity for lighting compared to electricity for cooking, and this might be attributable to electricity prices and affordability constraints in rural areas. The average rate of change for access to electricity for cooking is not

statistically significant different between TA and Non-TA areas for both time periods (Table 4.2; Figure A3b in Annexure A).

Table 4.2: Statistical Significance for Basic Services and Housing measures

Dimension and Variable	Statistically Significant Difference (TA and non-TA)			Mean Difference (1996-2001)-(2001-2011)		Statistically Significant Difference between TA and non-TA areas	
	1996	2001	2011	TA	Non-TA	1996-2001	2001-2011
Piped Water	Yes	No	No	24.21	-0.97	No	No
Electricity for Lighting	No	No	No	19.59	13.77	No	No
Electricity for Cooking	No	No	No	18.09	13.13	No	No
Sanitation	Yes	Yes	Yes	29.75	-6.04	No	No
Formal Housing	Yes	Yes	No	-1.15	-2.14	No	Yes
Informal Housing	No	Yes	Yes	1.19	140.93	No	No

The North West province reported a lower percentage of households with access to sanitation (70%) as compared to South Africa with a figure of 77.9% (South Africa 2013c). Table 4.1 shows that TA areas recorded a significant 216% increase in the percentage households with access to sanitation for the period 1996 to 2001 whereas the Non-TA based wards recorded an increase of only 24% for the same period. For the period 2001 to 2011 the wards located in the TA areas recorded a 237% increase, whereas the Non-TA based wards recorded an increase of 74%. These higher growth rates in TA areas compared to non-TA areas are evident in both Rustenburg and Mahikeng. As indicated on Figure A4a (Annexure A) and summarised in Table 4.2, the proportion of households with access to sanitation was statistically significantly higher in Non-TA areas compared to TA areas in 1996, 2001 and 2011, although the gap has decreased significantly. The average rate of change for access to sanitation access is however not statistically significantly different between TA and non-TA wards for the two periods. Similar to electricity, it thus indicates that the high growth rate of access to sanitation in TA areas took place from a very small base, hence the high proportional changes. These growth rates thus closed the gap in the level of service between TA and non-TA areas, but with the non-TA areas still maintaining a higher level of service.

The percentage change of households residing in formal houses between 1996 and 2001 in Tribal and non-tribal areas were very similar at 39% and 30% respectively. For the period 2001 to 2011 the growth rate in the Non-TA wards (81%) were however significantly higher than the TA areas (36%). The percentage households residing in formal housing in both 1996 and 2001 were statistically significantly higher in TA wards than non-TA wards, but the higher growth rates in the

TA areas eradicated the significance of this gap by 2011 (Figure A5a Annexure A and Table 4.2). The VEPAC test however reveals no statistical significant differences in the rate of change for formal housing between the TA and Non-TA areas for the period 1996 to 2001. The rate of change between 2001 and 2011 was however significantly different (Figure A5b Annexure A and Table 4.2). These figures could thus indicate that the majority of formal housing delivery projects took place in non-TA areas, especially over the period 2001 to 2011. The Reconstruction and Development and the Urban Renewal Programmes of government played an important role in the delivery of formal housing and consequently the reduction of informal housing. The IDP for Ngaka Modiri Molema District Municipality (2012) for example, indicated that between the years 2000 and 2010, informal dwellings decreased by 15000 units

North West as a province reported a higher proportion of informal dwellings of 22.1% compared to the national figure for the country 13.7 % (South Africa 2013c). As far as informal housing is concerned wards located in TA areas recorded a lower increase of 61 % compared to 121% for none TA based wards for the period 1996 to 2001. Over the period 2001 to 2011 the increase in households in informal housing in TA and non-TA wards was 25% and 74% respectively. These growth rates resulted in the a situation where the proportion of households residing in informal housing in non-TA wards being statistically significantly higher than TA wards in 2001 and 2011, whereas it was not the case in 1996. VEPAC results however indicate no statistically significant differences in the growth rates for informal housing between TA and Non-TA areas in any of the two periods (Figure A6b in Annexure A and Table 4.2).

4.3 Socio-Demographic Analysis

The population growth patterns for Mafikeng and Rustenburg is indicated in Figure B1 (Annexure B). As indicated in Table 4.3, the population growth rate in TA areas was 3.7% and 0.8% for the period 1996 to 2001 and 2001 to 2011 respectively. Over the same two periods the non TA wards recorded a higher population growth rate of 4.5% and 2.9%. Figure B3 (Annexure B) indicates that the interaction effect between the variables for population growth was statistically insignificant for both the period between 1996 to 2001 and 2001 to 2011.

The median age of both TA and non-TA wards increased in both Mahikeng and Rustenburg. The median age of the population in the wards that are located within the TA areas was 23 years for Mahikeng and 28 years for Rustenburg for 2011 whereas for non TA areas the median age was 24 years for Mahikeng and 27 years for Rustenburg. The percentage increase in median age was higher in TA wards than in non TA wards (1.5% compared to 0.5%, and 1.1% compared to 0.3%)

respectively for 1996-2001 and 2001-2011. The LSD test did not reveal any statistical significant differences between the mean age growth in TA areas and the areas falling in non-TA areas (Figure B4b Annexure B and Table 4.4)

Table 4.3: Growth rates for socio-demographic measures

Variable	Period	Mahikeng		Rustenburg		Total	
		TA	Non-TA	TA	Non-TA	TA	Non-TA
Population Growth	1996-2001	2.7	-0.55	4.6	9.5	3.7	4.5
	2001-2011	0.52	1.6	1.1	4.1	0.8	2.9
Median Age	1996-2001	1.1	0.3	1.9	0.7	1.5	0.5
	2001-2011	1.2	0.3	0.9	0.3	1.1	0.3
Dependency Ratio	1996-2001	-1.9	-1.1	-1.1	-2	-1.5	-1.6
	2001-2011	-0.7	-0.7	-1.3	-0.5	-1.0	-0.6
Female Headed Households	1996-2001	2.6	3.1	-2.3	3.8	0.2	3.5
	2001-2011	-0.1	0.1	-2.7	-1.4	-1.4	-0.7
Secondary Education	1996-2001	7.4	0.8	10.3	3.7	8.9	2.3
	2001-2011	4.4	0.3	3.7	2.7	4.1	1.5
Higher Education	1996-2001	7.2	0.6	5.6	2.2	6.4	1.4
	2001-2011	7.4	2.8	2	2	4.7	2.4
Unemployment	1996-2001	3.1	11.9	1.4	5.2	2.3	8.6
	2001-2011	-3.4	-2.1	-3	-0.2	-3.2	-1.2

The dependency ratio for wards located within the TA areas were higher than the ratio of wards that are located outside TA areas in all three years, but these differences are not statically significant (Figure B5a in Annexure B and Table 4.3). The dependency ratio for both TA and non-TA wards decreased in all three years, 1996, 2001 and 2011 in both Mahikeng and Rustenburg. The difference in the rate of change of the dependency ratio between TA areas and Non-TA for both periods is however not statistically significant (Figure B5b in Annexure B & Table 4.4).

The percentage female headed households increased in both TA and non TA areas over the period 1996 to 2001 (0.2% and 3.5%, respectively), but thereafter recorded a negative growth rate between 2001 and 2011 in both types of wards (-1.4% in TA wards and -0.7% in non TA wards). Although the female headed household rates remained higher in TA wards than non-TA wards for all three census periods; this difference was however only statistically significant in 1996 (Figure B7a Annexure B and Table 4.4). The VEPAC test revealed that the differences in the growth rates of female headed households was not statistically significant different between the TA and Non-TA areas in any of the two periods (Fig B7b in Annexure B).

Table 4.4: Mean Difference for Socio Demographic measures

Dimension and Variable	Statistically Significant Difference (TA and non-TA)			Mean Difference (1996-2001)-(2001-2011)		Statistically Significant Difference between TA and non-TA areas	
	1996	2001	2011	TA	Non-TA	1996-2001	2001-2011
Population Growth	**	**	**	2.63	4.39	No	No
Median Age	No	No	No	0.31	0.38	No	No
Dependency Ratio	No	No	No	-0.71	-1.33	No	No
Female Headed Household	Yes	No	No	1.91	4.91	No	No
Higher Education	No	No	No	1.14	-0.11	No	No
Secondary Education	No	No	No	4.29	0.96	No	No
Unemployment Rate	Yes	No	No	5.77	6.65	No	No

** - can only be measured between two time points

The proportion of the population that completed secondary education is a good indicator of the level of development of an area. Table 4.3 indicates that that growth rate for completion of secondary education for the period 1996 to 2001 was higher in TA areas (8.9%) compared to Non-TA areas (2.3%). Further major improvements were also recorded in TA areas over the period 2001 to 2011 with a growth rate of 4.1% (compared to 1.5% in non TA areas). In 1996 the percentage of the population older than 20 years who completed secondary education was higher in non TA wards than TA wards. The substantial differences in growth rates of secondary education however resulted in TA wards having a higher proportion of the adult population with secondary education than non TA wards in both 2001 and 2011 and with the gap widening (Figure B8a in Annexure B). The difference in the growth rate of secondary education between TA and Non-TA areas were however not statistically significant in any of the two time periods (Figure B8b in Annexure B). The reviewed IDP of Rustenburg recorded that the overall levels of education have improved with secondary education attainment being the highest in the entire municipality (Rustenburg LM, 2013).

Although the gap between the percentage of population with tertiary education is widening in favour of TA wards, these differences are not statistically significant in any of the three census periods (Figure B9b in Annexure B). Similar to the secondary education trends the growth rate of the percentage of the population with tertiary education was notably higher in the TA areas compared to the Non-TA areas for both time periods (6.4% and 4.7% in TA wards and 1.4% and 2.4% in non TA wards). The statistical test however, also reveal no statistically significant differences in the growth rates of TA and non TA wards recorded over the two time periods.

Table 4.3 shows changes in unemployment rates between 1996 to 2001 and 2001 to 2011. The table shows an increase of 2.5% in TA areas and 8.6% for Non-TA areas for the period 1996 to 2001.

Some improvements were recorded during the period 2001 to 2011 with the decrease in unemployment rate of 3.2% for TA areas and 1.2% for Non-TA areas. The Rustenburg LM unemployment rate has decreased over the period 1996 to 2010 (Rustenburg LM, 2013). This situation might be attributed to mining sector employment opportunities. The LSD test reveals unemployment differences between TA areas and non-TA area ($M=0.177$ $SE=0.08$) to be significant in 1996 but not in 2001 and 2011. Changes in unemployment rate in TA and non-TA areas are not statistically significantly different from the period 1996 to 2001 and 2001 to 2011. (Figure B10a and Figure B10b in Annexure B).

4.4 Development Density Analysis

Although the overall population density in TA wards and non-TA wards are similar, some subtle changes did occur between 1996 and 2011. In 1996 the density in TA wards were somewhat higher than non-TA wards, in 2001 it was nearly similar, and by 2011 the density of non-TA wards were slightly higher than TA wards. The differences in population densities were however not significant in any of the three years. As indicated in Table 4.5, both the TA and non-TA areas experienced population density increases between 1996 and 2001 (93% in TA wards and 118% in non-TA wards). This difference was however not statistically significant. The increase in population density over the period 2001 to 2011 was however much higher in the non-TA wards compared to the TA wards and the difference in growth rate was now statistically significant.

Table 4.5: Growth rates for Density measures

Variable	Period	Mahikeng		Rustenburg		Total	
		TA	Non-TA	TA	Non-TA	TA	Non-TA
Population density	1996-2001	91.6	-132.3	93.4	368.7	92.5	118.2
	2001-2011	19.4	329.1	26.4	771.6	22.9	550.4
Formal housing density	1996-2001	45.7	100.3	21.1	112	33.4	106.2
	2001-2011	67.2	188.9	45.2	344.3	56.2	266.6
Informal housing density	1996-2001	5.1	2.2	31.8	21	18.5	11.6
	2001-2011	-18.6	-3	-82.2	232.3	-50.4	114.7

Table 4.6: Mean Difference for density measures

Dimension and Variable	Statistically Significant Difference (TA and non-TA)			Mean Difference (1996-2001)-(2001-2011)		Statistically Significant Difference between TA and non-TA areas	
	1996	2001	2011	TA	Non-TA	1996-2001	2001-2011
Population Density	No	No	No	70.41	-411.26	No	Yes
Formal Housing Density	No	No	No	-22.4	-211.73	No	Yes
Informal Housing Density	No	Yes	Yes	54.99	217.85	No	Yes

As indicated in Figure C4a (Annexure C) the formal housing density is somewhat higher in TA areas compared to non-TA areas but the gap have decreased significantly between 1996 and 2011. The difference in density was not statistically significant in any of the three years. The increases in formal housing density were significantly higher in Non-TA areas compared to TA areas over both the time periods analysed. This could be indicative of major improvements with regard to the provision of formal housing in Non-TA areas. It could also be indicative that most formal housing projects are taking place in non TA wards. The LSD test showed that the difference in the growth rate of formal housing density in non TA wards over the period 2001 to 2011 were statistically significantly higher than TA areas.

Figure C5a and Table 4.6 indicates that informal housing density is significantly higher in non TA areas and that the gap between TA and non TA wards are widening between 1996 and 2011. The informal housing density in non TA wards were statistically significantly higher than TA wards in

both 2001 and 2011. The increase in informal housing density also shows significant differences between TA and Non-TA areas and between the different time periods. Both TA and Non-TA areas experienced moderate increases over the period 1996 to 2001. However, over the period 2001 to 2011 the informal housing density increased significantly in the Non-TA areas of Rustenburg while all TA areas showed a decrease. The difference in informal housing density growth rate between 2001 and 2011 was also statistically significant.

SECTION 5: CONCLUSION AND RECOMMENDATIONS

5 CONCLUSION

5.1 Conclusions and revisiting the research objectives

The first objective of this research was to determine if there are any statistically significant differences between the level and rate of delivery of basic services and housing between those parts of municipalities located in TA areas and those parts that are not. Statistically significant differences in the levels of development were identified in four of the six indicators used in this dimension. These include the percentage households with access to piped water (1996), percentage households with access to sanitation (1996, 2001 and 2011), and percentage households residing in informal housing (2001 and 2011) where non-TA wards had statistically significant higher values than TA wards. In the case of the percentage of households living in formal housing, TA areas had significantly higher values.

Objective two was to examine the differences in changes to demographic profiles between those parts of municipalities located in TA areas compared to those parts that are not. Only two of the eight indicators in this dimension revealed statistically significant differences. These are the proportion female headed households (1996) and the unemployment rate (1996). In both these instances the TA areas had significantly higher values. None of the eight indicators used showed any statistical significant difference between the growth rates of the variables.

The third objective was to analyse the differentials in population and housing density indicators between those parts of municipalities located in TA areas compared to those parts that are not. The informal housing density was statistically significantly higher in the non-TA areas (2001 and 2011), while the growth rates of population density, informal housing density and formal housing density was statistically significantly higher over the period 2001 to 2011 in TA areas.

Objective four was to compare the extent and the manner in which TA's affect urban growth and development in municipalities. Overall the results indicate that there are no real differences in the growth and development in the two areas investigated. Statistically significant differences in the levels of development were only identified in 7 of the 17 indicators considered, and significant differences in the rate of change in only 4 of the 17 indicators. Although the difference in the levels of development between TA and non-TA areas remain substantial (statistically significant differences in 7 of the 17 indicators), there are no significant differences in the rate of growth and development (significant differences in only 4 of the 17 indicators). The biggest differences

between the two types of the areas has been the housing component where both formal and informal housing has grown statistically significantly faster in non-TA areas compared to TA areas.

Chapter 12 of SPLUMA advocates for planning to be inclusive for areas under the control of traditional leadership. TAs are part of municipal governance structures and mediate the translation of legislation and policies into practice in areas under their jurisdiction. The findings of this research thus advocates for integrated planning that fully involves TA in the planning process and subsequent implementation and monitoring as proposed by the Traditional and Khoisan Leadership Bill.

5.2 Value and contribution of the research

This research presents strong evidence that there are no differences in the manner and level of development and growth of urban areas between TA and non TA areas. The research forms the basis for future comparative studies of growth and development, especially in the study of TA and Non-TA areas. The research further recommends implementation of policies for integrative planning across TA and Non-TA areas. The research design presented in this study can be applied in other comparative studies. VEPAC analysis performed in the study is useful to study changes for individual variables and as a battery of variables within components.

5.3 Limitations of the study

The research design and methodology used in this study produced a range of statistical outputs, based on the analysis of census data at ward level. The study could have been more robust if the information at a sub place level was fully aligned across the three census periods and thus suitable for statistical testing at a lower level of spatial aggregation. A detailed analysis of the land use pattern of the two study areas was not possible due to the unavailability of comparable land use data coinciding with the three census periods. The density analysis presented in this study is based on the total area of wards and thus presents a gross density. No detailed urban footprint data was available for the two municipalities coinciding with the census years that would have allowed for the calculation of net densities based on the urban footprint area only.

5.4 Recommendations for further future research

Key findings of this research have critical implications for a democratic and diverse developmental state like South Africa. The study triggers interest for further research based on the subject for lower level geography and increased sample size of TA and Non-TA areas. A recommendation

from this study is that analysis of the lower level of geography as subplace name areas on the same hypothetical tests would be of interest. Further research on the comparison of TA versus non-TA areas on the level of development and growth could include a wider range of developmental dimensions such as proximity to facilities, capital investment and health indicators. The findings of this research are based on the analysis of two municipal areas in the North West province. It would thus be of value to conduct further similar research in other provinces with Traditional authorities to determine the extent to which these findings can be generalised to a national level.

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ANNEXURE A: BASIC SERVICES AND HOUSING**Table A1: Access to Piped Water**

Percentage Change and Geographic Area	Mahikeng				Rustenburg				
	Urban Core	Mixed	Non-urban Core	Total	Urban Core	Mixed	Non-urban Core	Total	
% Change 1996-2001	24.3	55.8	20.9	28.9	37.1	40.8	61.3	47.9	41.4
TA	NA	172.8	28.9	33.9		NA	62.1	62.1	48.9
Hybrid	NA	47.3	6.1	25.8	2867.9	120.5	38.4	75.2	49.4
Non_TA	24.3	NA	NA	24.3	27.3	18.9	212.5	32.2	31.1
% Change 2001-2011	41.7	61.1	59.9	57.1	118.1	62.9	97.6	98.4	85.5
TA	NA	113.2	63.2	66.7		NA	56.2	56.2	60.7
Hybrid	NA	54.1	52.4	53.4	301	132.9	149.2	162	114.3
Non_TA	41.7	NA	NA	41.7	103.5	27.3	174.3	90.9	84.4

Table A2: Access to Electricity for Lighting

Percentage Change and Geographic Area	Mahikeng				Rustenburg				Grand Total
	Urban Core	Mixed	Non-urban Core	Total	Urban Core	Mixed	Non-urban Core	Total	
% Change 1996-2001	22.2	127.3	172.7	122.	52.8	126	199.9	112.4	115.9
TA	NA	562.7	260.6	274.	NA	NA	314.3	314.3	292.4
Hybrid	NA	93.7	41.8	66.5	2250	377.1	83.7	154	104
Non_TA	22.2	NA	NA	22.2	45.9	83.2	146.4	58.6	52.1
% Change 2001-2011	46	65.8	50.4	53	120.5	58.7	110	103.4	85
TA	NA	45.6	46.3	46.3	NA	NA	58.8	58.8	52.3
Hybrid	NA	71.1	65.9	68.8	351.1	126.1	193.7	186.1	131.4
Non_TA	46	NA	NA	46	108.7	28.8	279.6	97	89.6

Table A3: Access to Electricity for Cooking

Percentage Change and Geographic Area	Mahikeng				Rustenburg				Grand Total
	Urban Core	Mixed	Non-urban Core	Total	Urban Core	Mixed	Non-urban Core	Total	
% Change 1996-2001	21	86.6	124	84.9	50.5	111.2	165.8	92.3	89.6
TA	NA	248.5	164.5	168.5	NA	NA	275	275	212
Hybrid	NA	74.6	51.2	63.9	1760	323.1	67.9	139	94.2
Non_TA	21	NA	NA	21	44.8	61.3	72.8	48.9	43.3
% Change 2001-2011	45.6	87.3	96.6	84.5	129.9	140.6	198.2	158.3	131.5
TA	NA	172.2	101.3	105.6	NA	NA	128.7	128.7	117
Hybrid	NA	74.6	82	77.7	460.5	179.6	307.2	277.6	176.8
Non_TA	45.6	NA	NA	45.6	115.8	116.5	442.3	131.9	117.5

Table A4: Access to Sanitation

Percentage Change and Geographic Area	Mahikeng				Rustenburg				Grand Total
	Urban Core	Mixed	Non-urban Core	Total	Urban Core	Mixed	Non-urban Core	Total	
% Change 1996-	20.9	66.5	83.8	50.6	28.6	43.5	169.1	43.8	45.7
TA	NA	-40.7	205.6	161.6		NA	271.1	271.1	194.2
Hybrid	NA	71.3	50.1	62.2	3235.7	187.5	134.4	202.7	105.4
Non_TA	20.9	NA	NA	20.9	22.9	12.5	187.5	26.1	25.3
% Change 2001-	43.9	23.7	54.3	40.8	106	89.3	330.8	139.6	110.8
TA	NA	490.6	71.6	88.6		NA	385.1	385.1	199.9
Hybrid	NA	16.4	44.6	27.6	328.5	110.1	363	259.8	132.7
Non_TA	43.9		NA	43.9	95.3	77.8	255	103.7	94.3

Figure A1a: Piped Water Access 1996, 2001 and 2011

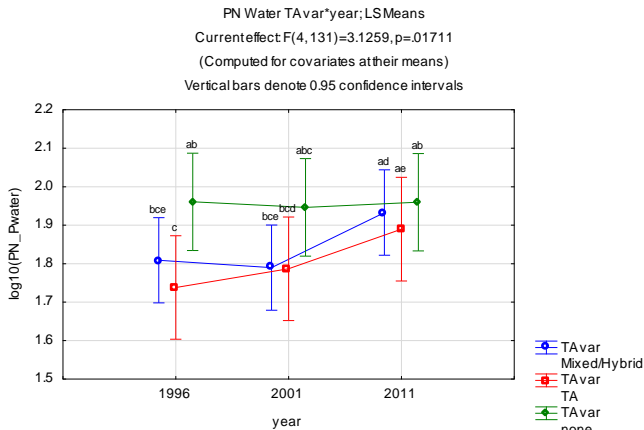
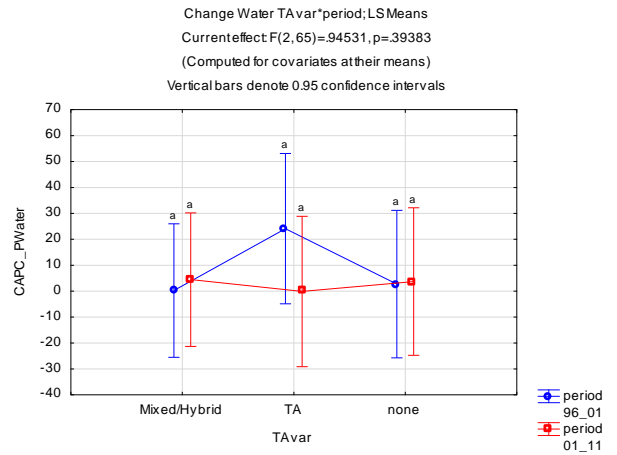


Figure A1b: Scores for Changes on Piped Water Access



growth

Figure A2a: Access to Electricity for Lighting 1996, 2001 and 2011

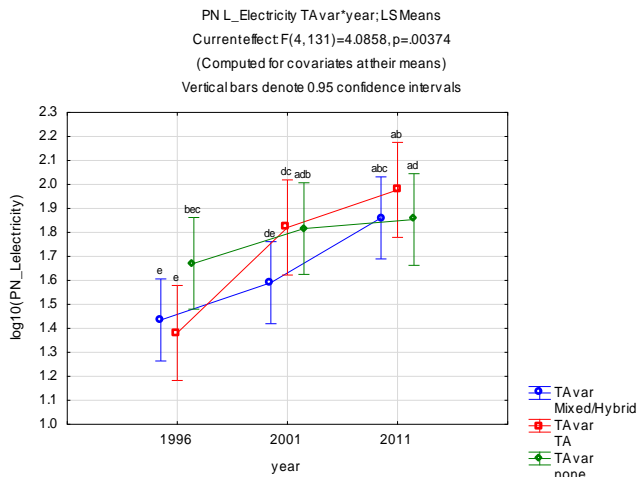


Figure A2b: Scores for Changes on Electricity for Lighting growth

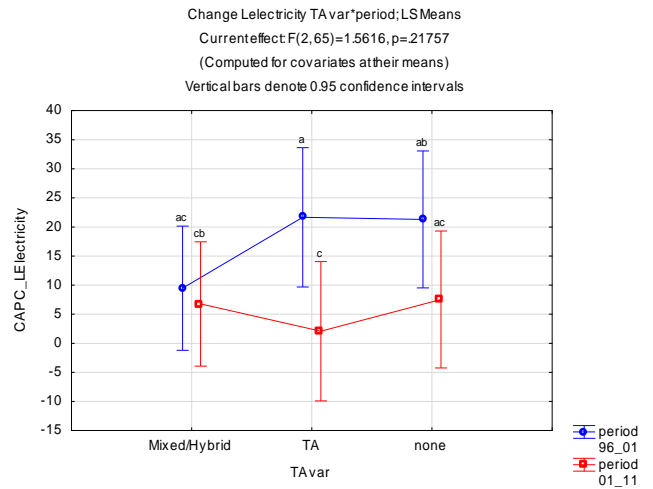


Figure A3a: Access to Electricity for Cooking 1996, 2001 and 2011

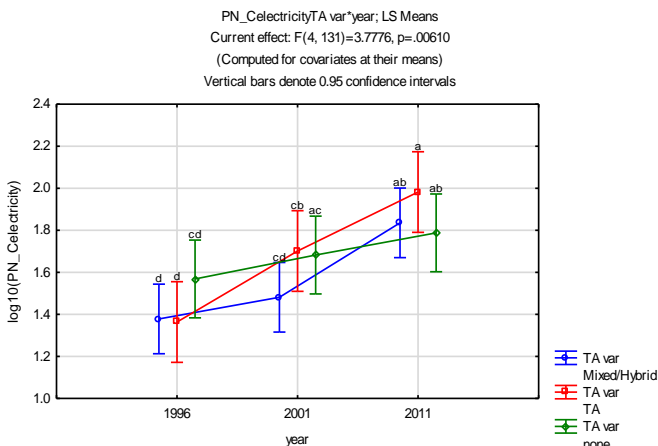


Figure A3b: Scores for Changes on Electricity for Cooking growth

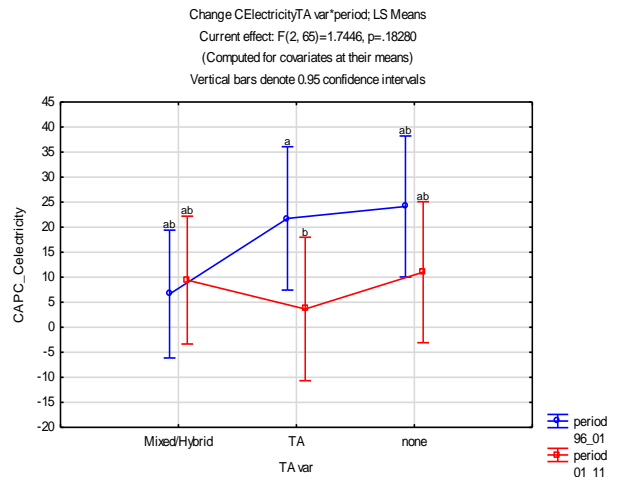


Table A5: Change on Formal dwelling

Percentage Change and Geographic Area	Mahikeng				Rustenburg				Grand Total
	Urban Core	Mixed	Non-urban Core	Total	Urban Core	Mixed	Non-urban Core	Total	
% Change 1996-2001	23.9	44.3	22.5	27.1	35.6	85.2	45.8	46	36.6
TA	NA	34	27.2	27.5	NA	NA	50.6	50.6	36.1
Hybrid	NA	45.8	10.2	27.5	1195.7	108.2	35.9	64.2	40
Non_TA	23.9	NA	NA	23.9	31.3	68.7	43.3	36.8	34.2
% Change 2001-2011	41.3	29.5	28.5	30.4	128	101.7	99.5	110.9	73.4
TA	NA	54.1	27.9	29.3	NA	NA	42.2	42.2	34.6
Hybrid	NA	26.3	30.4	28.1	563.1	96.8	201.3	191.1	93.2
Non_TA	41.3	NA	NA	41.3	112	106.1	255.4	120.3	105.6

Table A6: Informal dwelling

Percentage Change and Geographic Area	Mahikeng				Rustenburg				Grand Total
	Urban Core	Mixed	Non-urban Core	Total	Urban Core	Mixed	Non-urban Core	Total	
% Change 1996-2001	200	103.9	54.5	66.3	101.7	5.1	77.8	59.8	60.5
TA	NA	481	39.7	64.5	NA	NA	56.4	56.4	58.4
Hybrid	NA	30.9	116.7	68.3	9076.9	10.5	61	86.3	84.3
Non_TA	200	NA	NA	200	40.4	3.2	854.1	42.2	42.3
% Change 2001-2011	125	97.9	36.7	54.3	60.2	20.5	18.7	29.6	32.3
TA	NA	11.9	24.6	22.1	NA	NA	28.3	28.3	26.7
Hybrid	NA	171.8	69.5	114.4	78.2	149.4	-0.1	38.2	45.9
Non_TA	125	NA	NA	125	52.1	-27.2	53.6	22.1	22.3

Figure A4a: Access to Sanitation 1996, 2001 and 2011

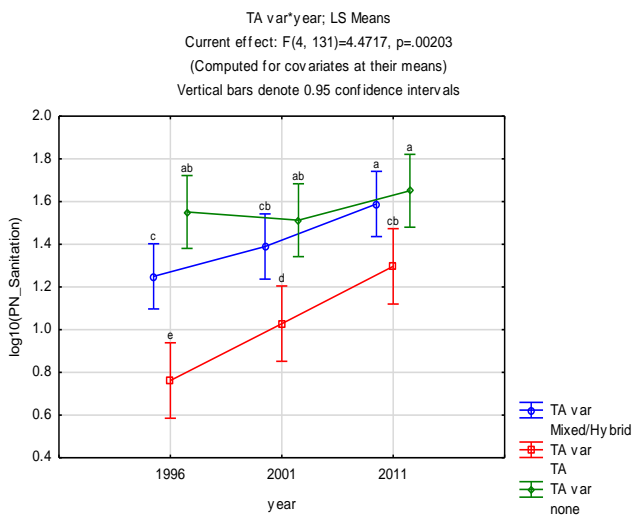


Figure A4b: Scores for Changes on Access to Sanitation growth

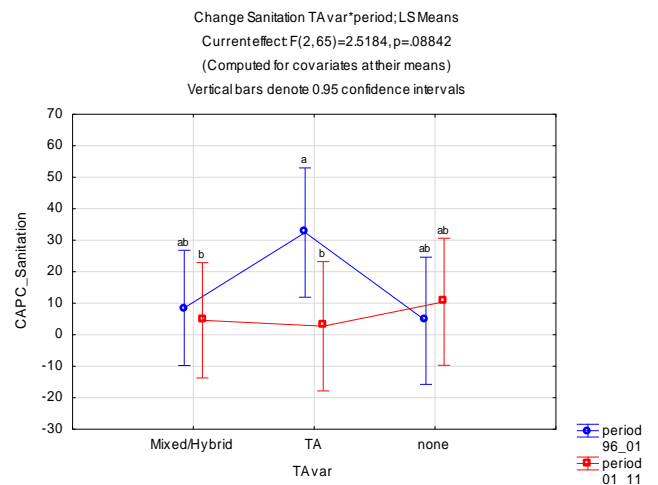


Figure A5a: Access to Formal housing 1996, 2001 and 2011

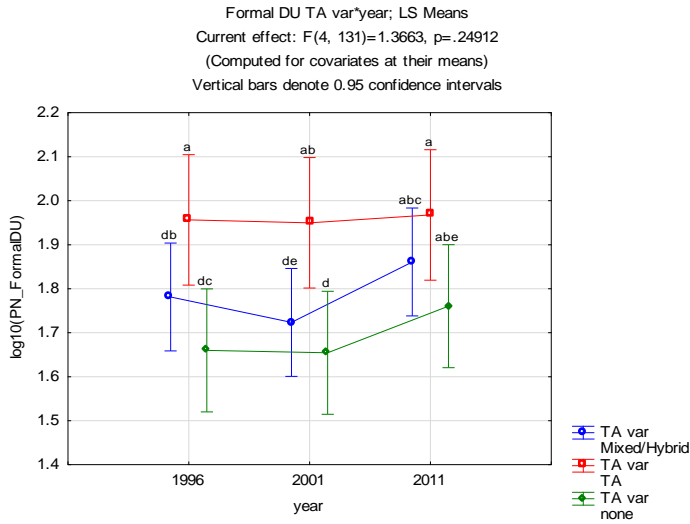


Figure A5b: Scores for Changes on Access to Formal housing growth

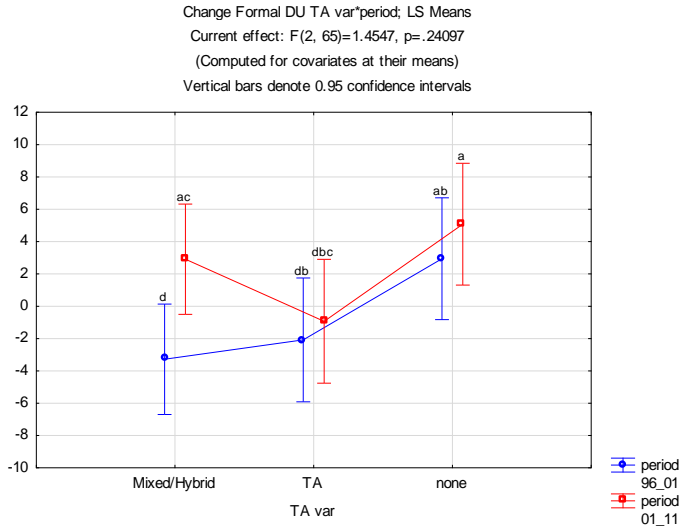


Figure A6a: Percentage coverage for Informal Housing 1996, 2001 and 2011

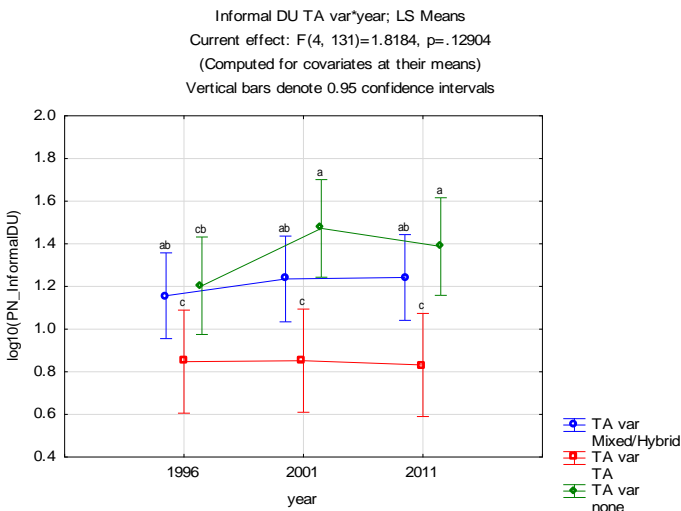
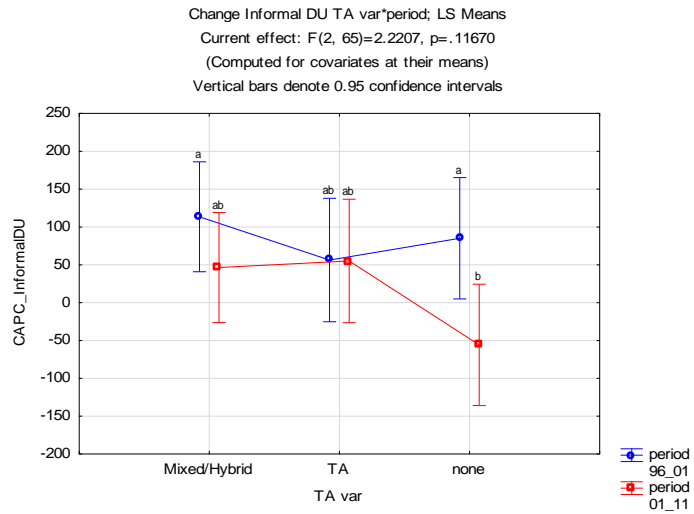


Figure A6b: Scores for Changes on Informal Housing growth



ANNEXURE B: SOCIO DEMOGRAPHIC MEASURES

Figure B1: Population growth for Mahikeng and Rustenburg 1996 to 2001

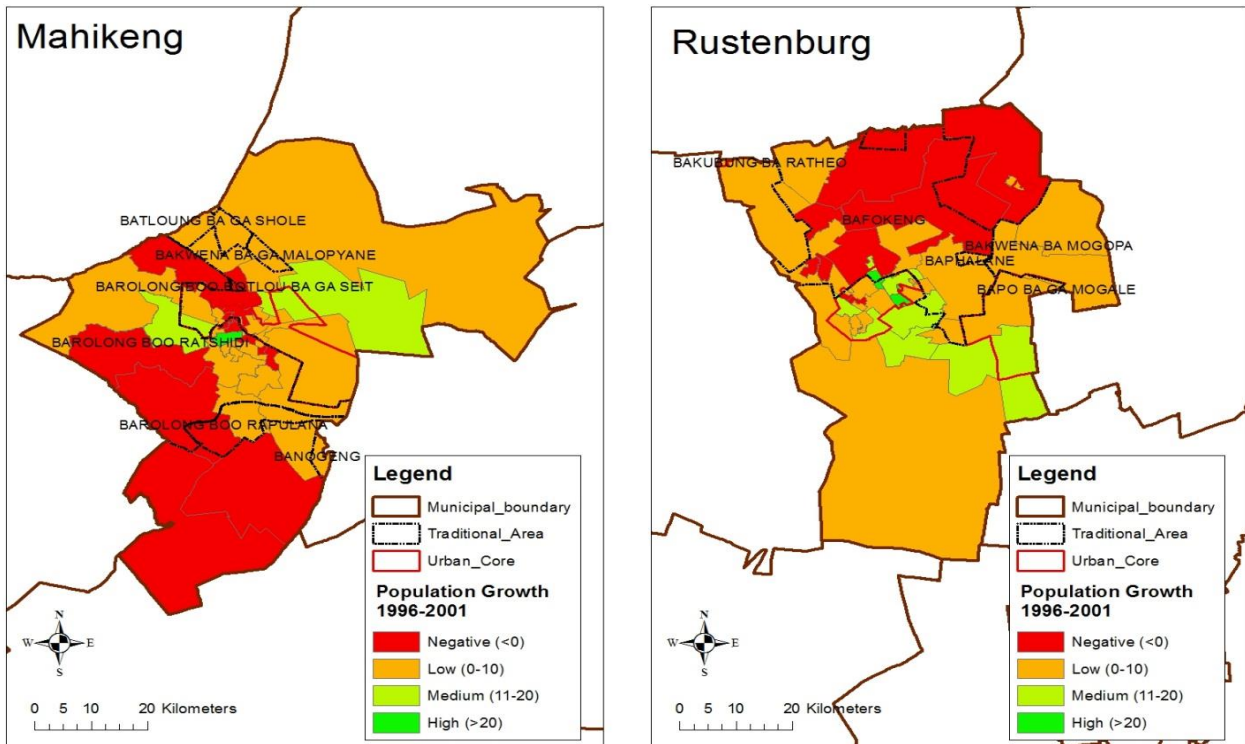


Figure B2: Population growth for Mahikeng and Rustenburg 2001 to 2011

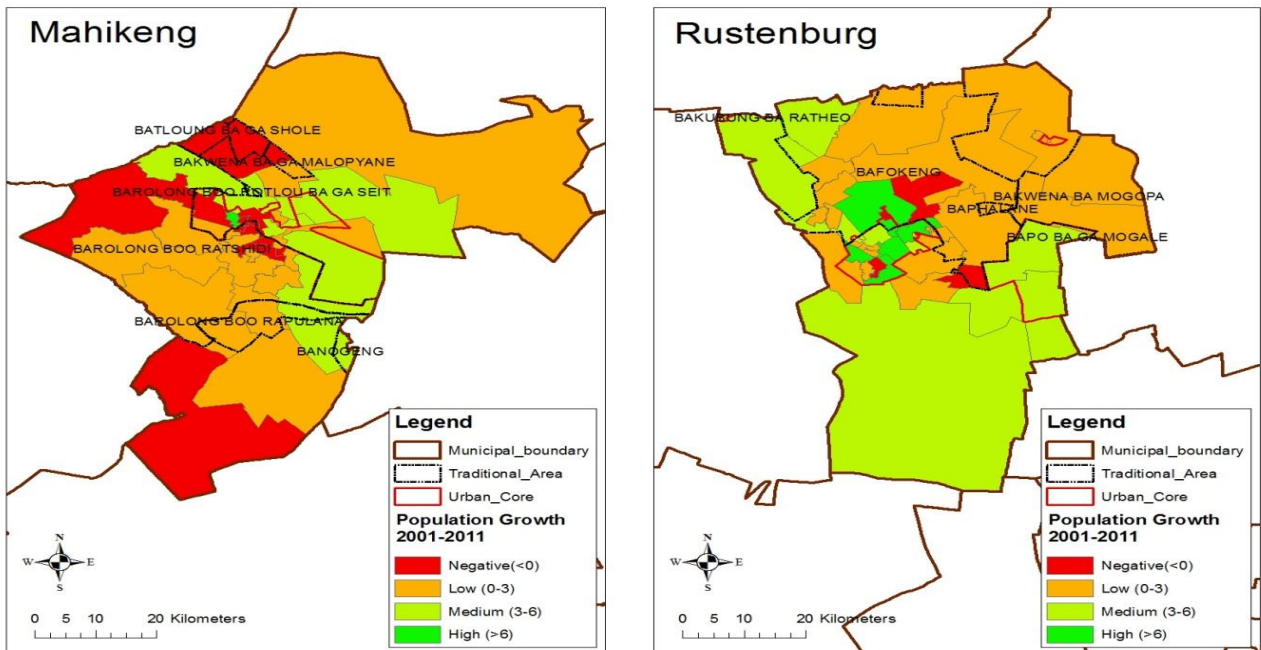


Figure B3: Scores for Population growth

Population growth TA var*period; LS Means
 Current effect: $F(2, 65)=.12456, p=.88309$
 (Computed for covariates at their means)

Vertical bars denote 0.95 confidence intervals

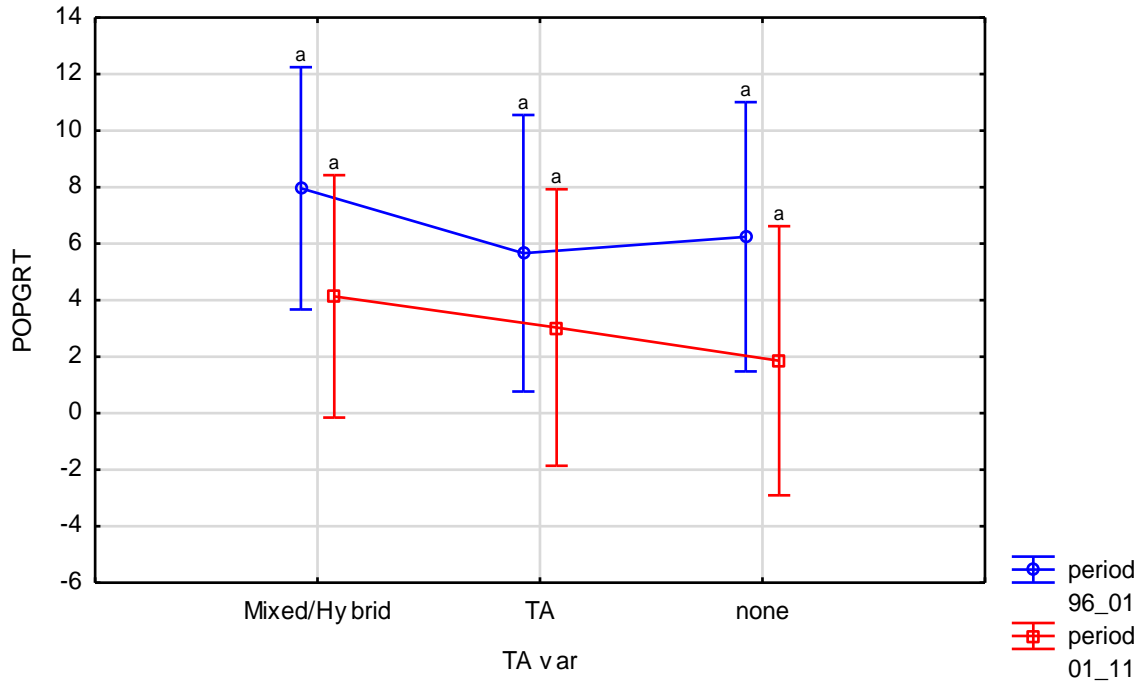


Table B1: Changes in the Median Age for Mahikeng and Rustenburg

Percentage Change and Geographic Area	Mahikeng				Rustenburg				Grand Total
	Urban Core	Mixed	Non-urban Core	Total	Urban Core	Mixed	Non-urban Core	Total	
% Change 1996-2001	0.3	2.7	1.3	1.5	-0.3	0.8	1.3	0.6	1.0
TA	NA	1.0	1.1	1.1	NA	NA	1.9	1.9	1.4
Hybrid	NA	3.0	2.0	2.5	-6.0	0.5	0.7	-0.5	1.0
Non_TA	0.3	NA	NA	0.3	0.7	1.0	0.5	0.7	0.7
% Change 2001-2011	0.3	0.3	1.2	0.9	0.0	0.7	0.3	0.3	0.6
TA	NA	1.0	1.2	1.2	NA	NA	0.9	0.9	1.1
Hybrid	NA	0.2	1.2	0.6	-1.5	0.5	-0.1	-0.3	0.2
Non_TA	0.3	NA	n	0.3	0.3	0.8	-0.5	0.3	0.3

Figure B4a: Median Age 1996, 2001 and 2011

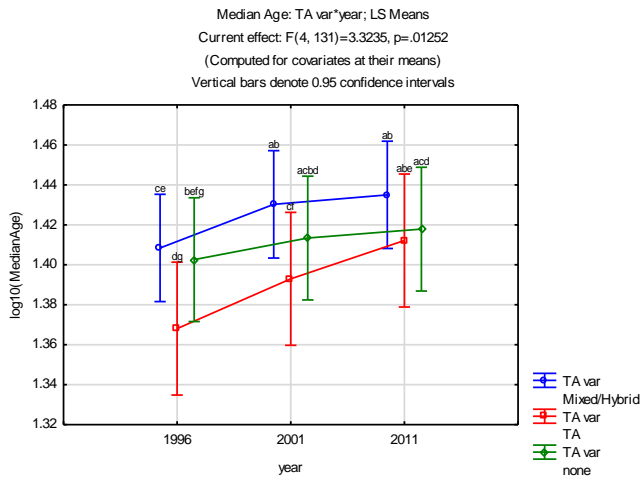


Figure B5a: Dependency Ratio 1996, 2001 and 2011

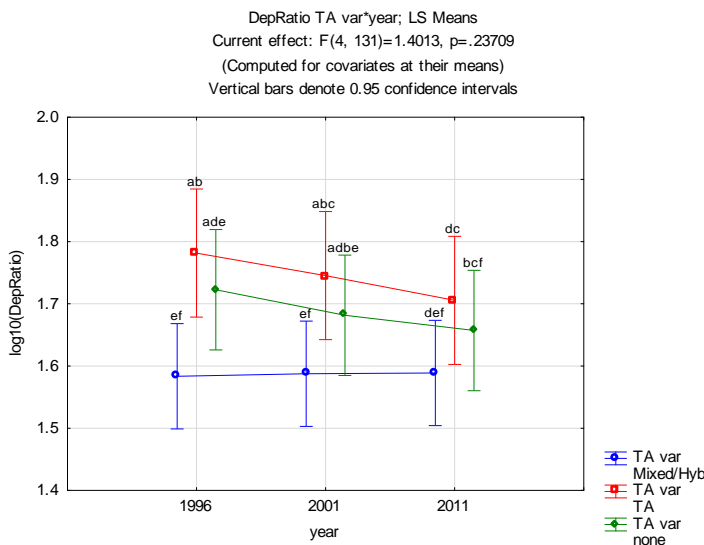


Figure B4b: Scores for Average Annual Change in Median Age

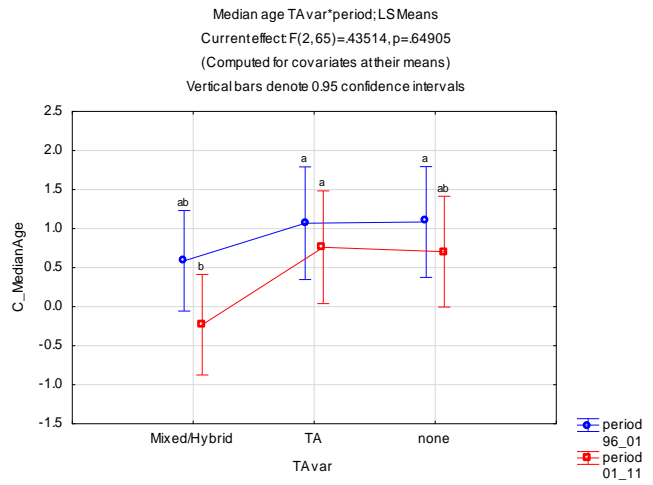


Figure B5b: Scores for Average Annual Changes in Dependency Ratio

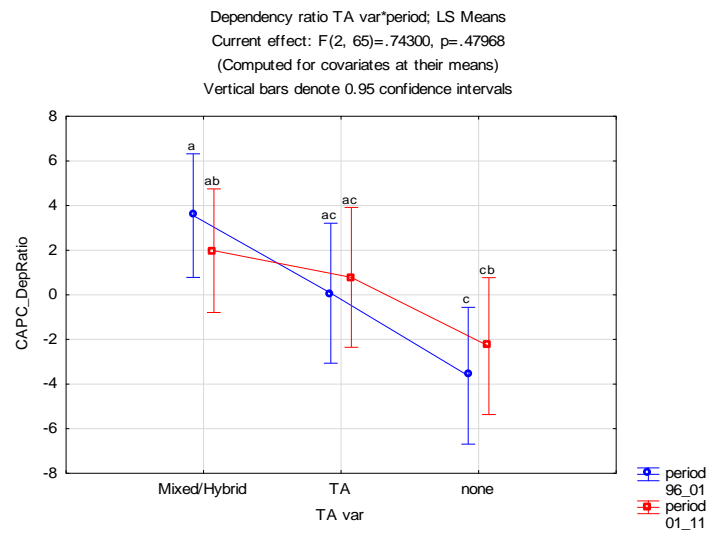


Figure B6: Population pyramid for Mahikeng and Rustenburg 1996 to 2011

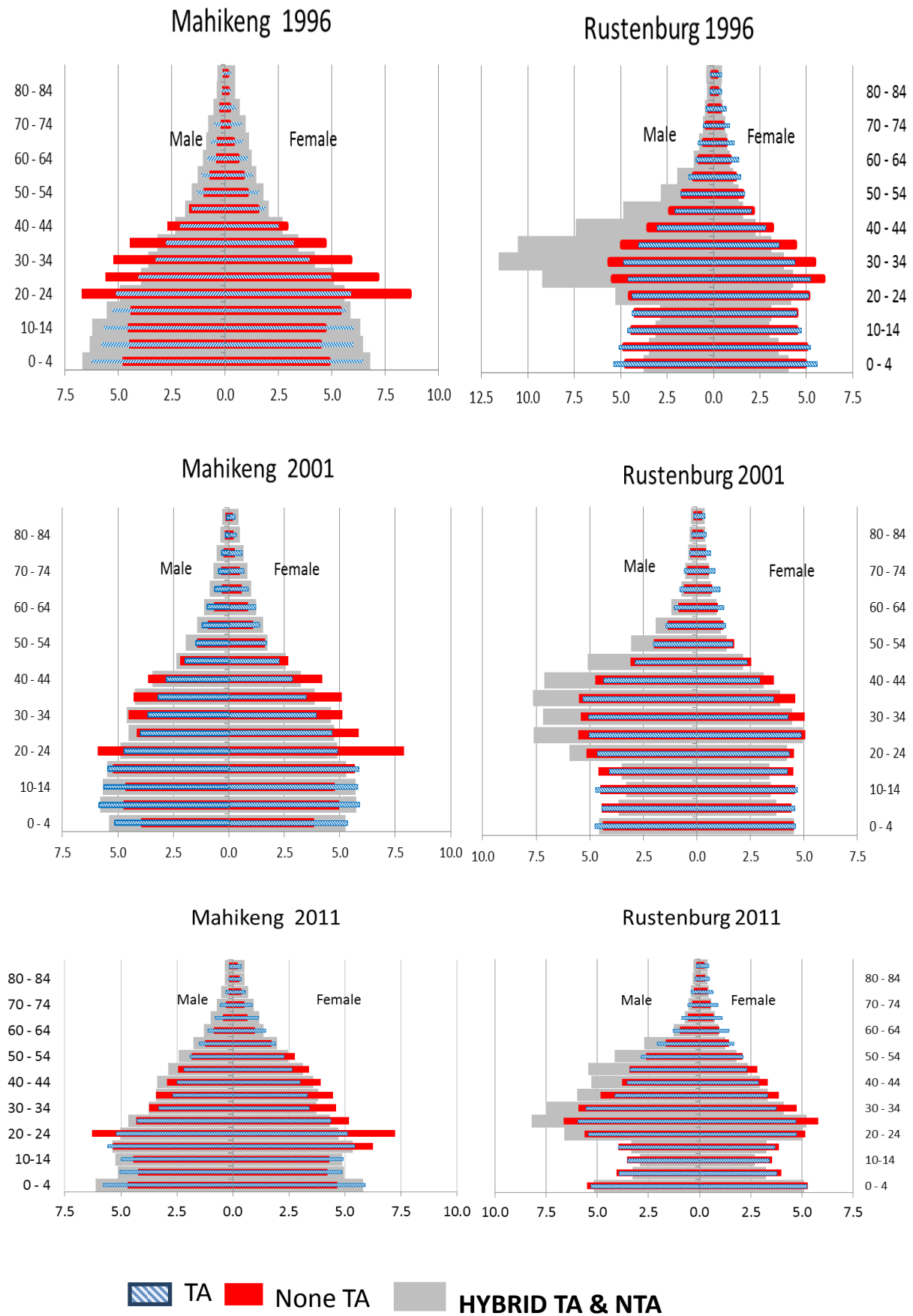


Table B2: Percentage Change on Female Headed Households

Percentage Change and Geographic Area	Mahikeng				Rustenburg				Grand Total
	Urban Core	Mixed	Non-urban Core	Total	Urban Core	Mixed	Non-urban Core	Total	
% Change 1996-2001	3.1	3.2	2.5	2.8	2.8	1.9	-1.2	0.8	1.7
TA	NA	1.6	2.7	2.6	NA	NA	-2.3	-2.3	0.9
Hybrid	NA	3.5	2.2	2.9	-3.7	1.4	-2.2	-1.8	0.5
Non_TA	3.1	NA	NA	3.1	3.9	2.2	7.1	3.9	3.8
% Change 2001-2011	0.1	-0.2	-0.2	-0.2	-1.4	-1.4	-3.0	-2.2	-1.3
TA	NA	-0.2	-0.1	-0.1	NA	NA	-2.7	-2.7	-1.0
Hybrid	NA	-0.2	-0.5	-0.3	-2.5	-2.2	-3.5	-3.1	-1.7
Non_TA	0.1		NA	0.1	-1.2	-1.1	-2.6	-1.4	-1.1

Table B3: Percentage Change on Secondary Education

Percentage Change and Geographic Area	Mahikeng				Rustenburg				Grand Total
	Urban Core	Mixed	Non-urban Core	Total	Urban Core	Mixed	Non-urban Core	Total	
% Change 1996-2001	0.8	7.4	6.9	6.4	3.6	9.8	9.9	7.6	7.0
TA	NA	6.6	7.5	7.4	NA	NA	10.3	10.3	8.4
Hybrid	NA	7.5	4.8	6.3	1.9	13.0	14.0	11.6	9.0
Non_TA	0.8	NA	NA	0.8	3.9	8.2	-6.4	3.7	3.3
% Change 2001-2011	0.3	2.5	3.9	3.2	3.0	3.4	4.2	3.6	3.4
TA	NA	5.1	4.3	4.4	NA	NA	3.7	3.7	4.1
Hybrid	NA	2.1	2.4	2.2	7.3	2.1	5.3	5.1	3.6
Non_TA	0.3	NA	NA	0.3	2.3	4.1	2.3	2.7	2.3

Table B4: Percentage of population completed Higher Education

Percentage Change and Geographic Area	Mahikeng				Rustenburg				Grand Total
	Urban Core	Mixed	Non-urban Core	Total	Urban Core	Mixed	Non-urban Core	Total	
% Change 1996-2001	0.6	9.6	6.2	6.4	0.1	8.9	3.8	3.3	4.7
TA	NA	15.2	6.7	7.2	NA	NA	5.6	5.6	6.7
Hybrid	NA	8.6	4.5	6.8	-17.0	11.4	6.3	3.0	4.9
Non_TA	0.6	NA	NA	0.6	3.0	7.6	-13.1	2.2	2.0
% Change 2001-2011	0.3	2.5	3.9	3.2	3.0	3.4	4.2	3.6	4.3
TA	NA	11.2	7.2	7.4	NA	NA	2.0	2.0	5.5
Hybrid	NA	5.8	2.8	4.4	6.1	3.1	6.4	5.8	5.1
Non_TA	2.8	NA	NA	2.8	2.6	1.2	-0.4	2.0	2.1

Figure B7a: Female Headed households 1996, 2001 and 2011

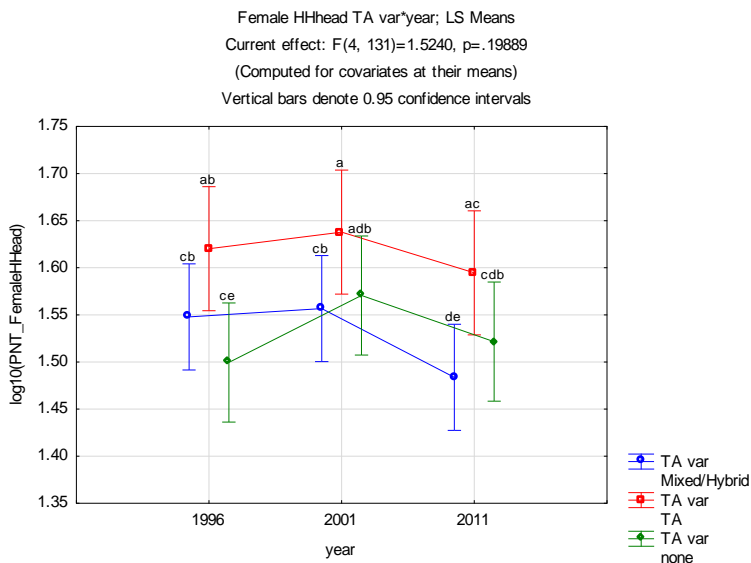


Figure B7b: Scores for Average Annual Change on Female headed households

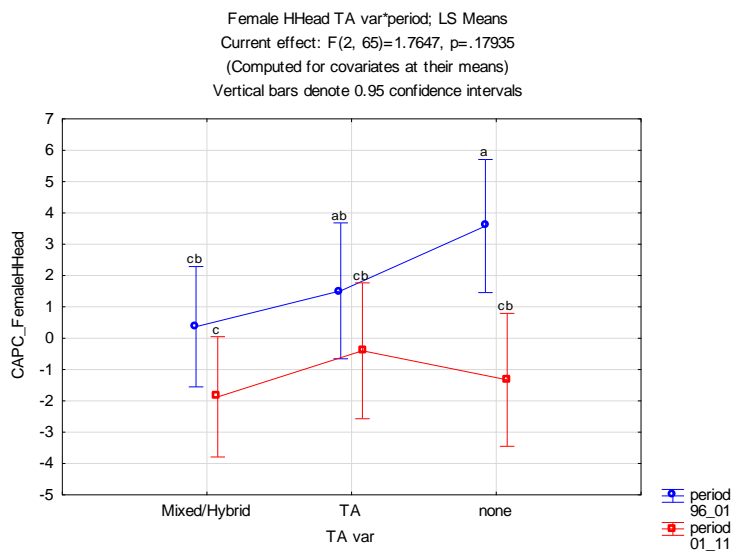


Figure B8a: Secondary Education 1996, 2001 and 2011

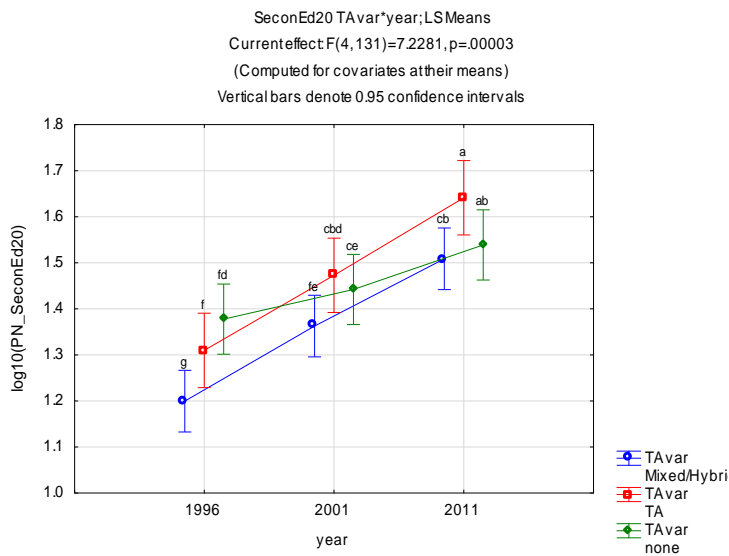


Figure B8b: Scores for Change on Secondary Education

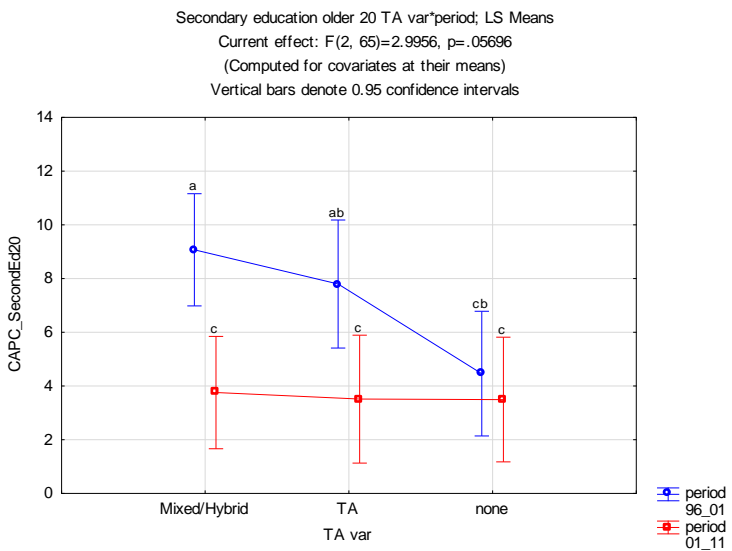


Figure B9a: Higher Education 1996, 2001 and 2011

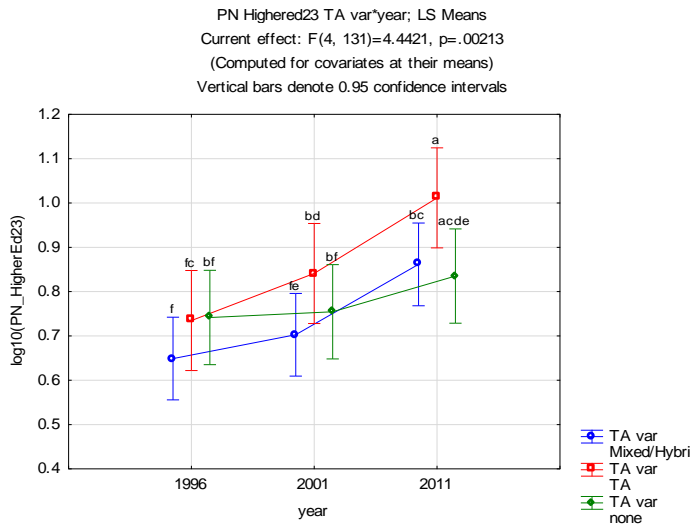


Figure B9b: Scores for Average Annual Change on Higher Education

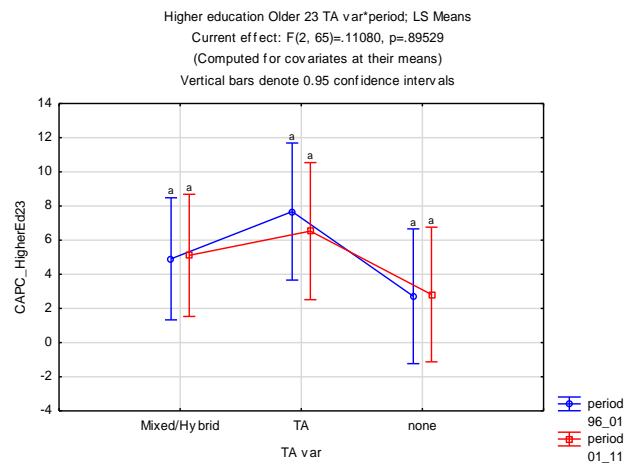


Table B5: Changes on Unemployment Rate

Percentage Change and Geographic Area	Mahikeng				Rustenburg				Grand Total
	Urban Core	Mixed	Non-urban Core	Total	Urban Core	Mixed	Non-urban Core	Total	
% Change 1996-2001	11.9	0.6	2.7	3.1	14.0	6.0	4.7	8.3	6.0
TA	NA	2.4	3.1	3.1	NA	NA	1.4	1.4	2.5
Hybrid	NA	0.3	1.3	0.8	64.6	6.2	9.6	19.0	9.9
Non_TA	11.9	NA	NA	11.9	5.6	5.9	1.8	5.2	6.2
% Change 2001-2011	-2.1	-2.8	-3.0	-2.9	-0.1	-1.5	-1.6	-1.0	-1.8
TA	NA	-3.7	-3.4	-3.4	NA	NA	-3.0	-3.0	-3.3
Hybrid	NA	-2.6	-2.0	-2.3	0.1	-1.9	-0.5	-0.6	-1.5
Non_TA	-2.1	NA	NA	-2.1	-0.1	-1.3	1.2	-0.2	-0.5

Figure B10a: Unemployment rate 1996, 2001 and 2011

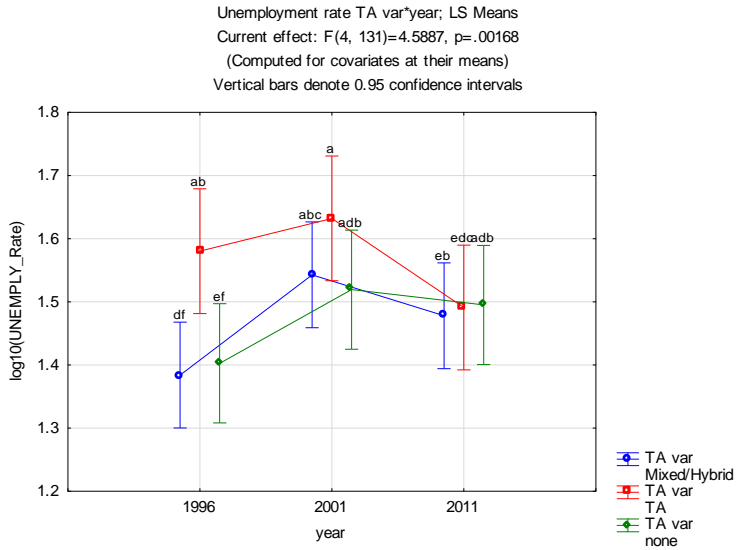
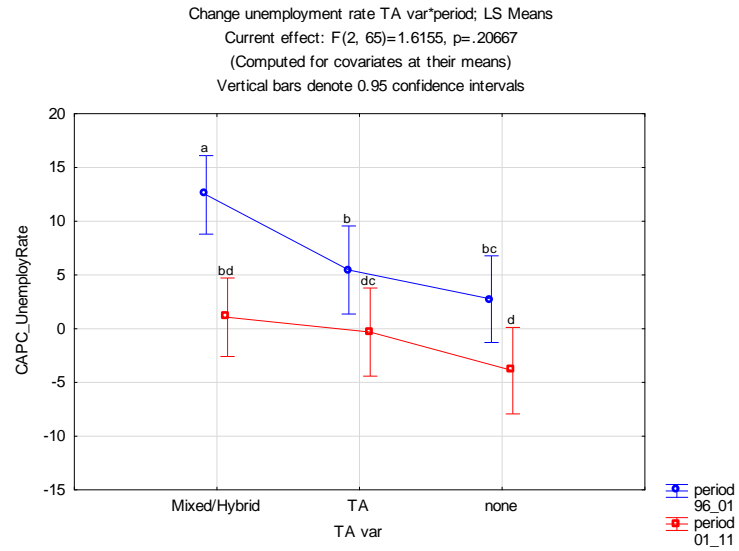


Figure B10b: Scores on Average Changes on Unemployment



ANNEXURE C: DEVELOPMENT DENSITY MEASURES

Figure C1a: Population density for Mahikeng and Rustenburg 1996-2001

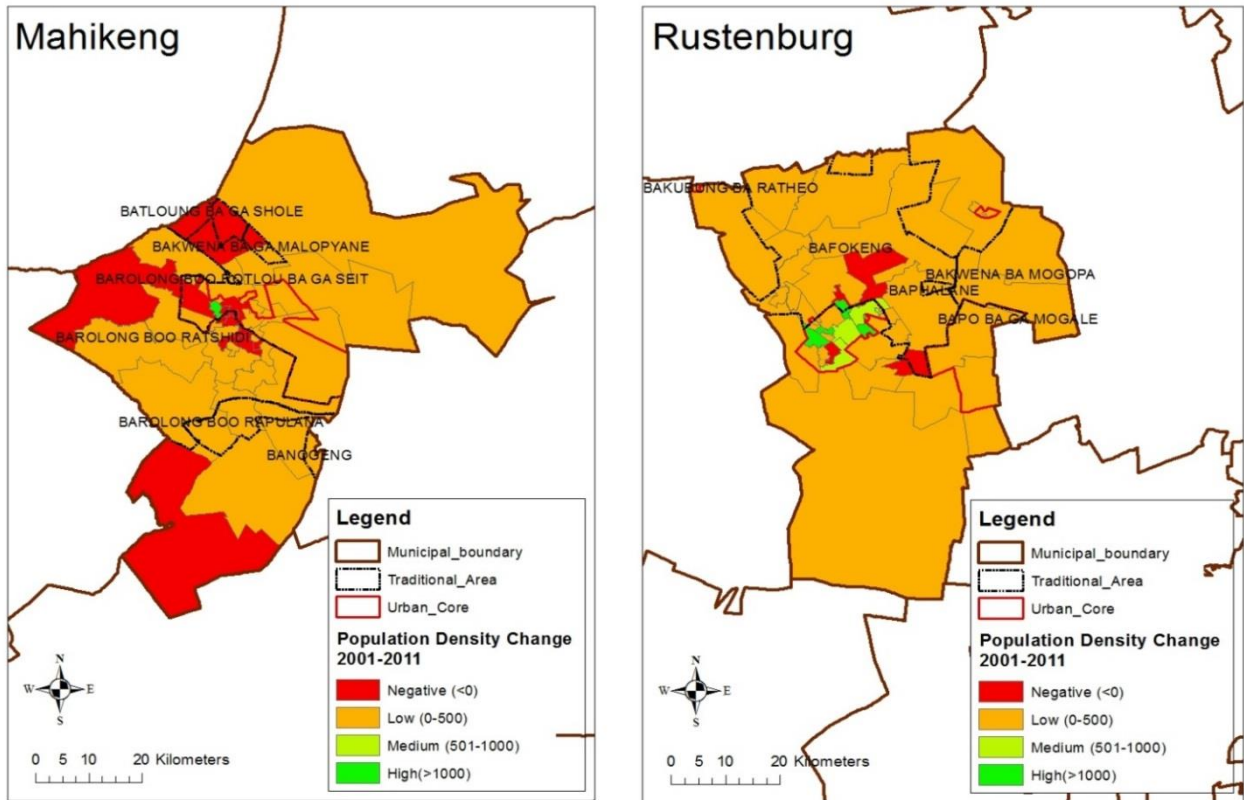


Figure C1b: Population density for Mahikeng and Rustenburg 2001-2011

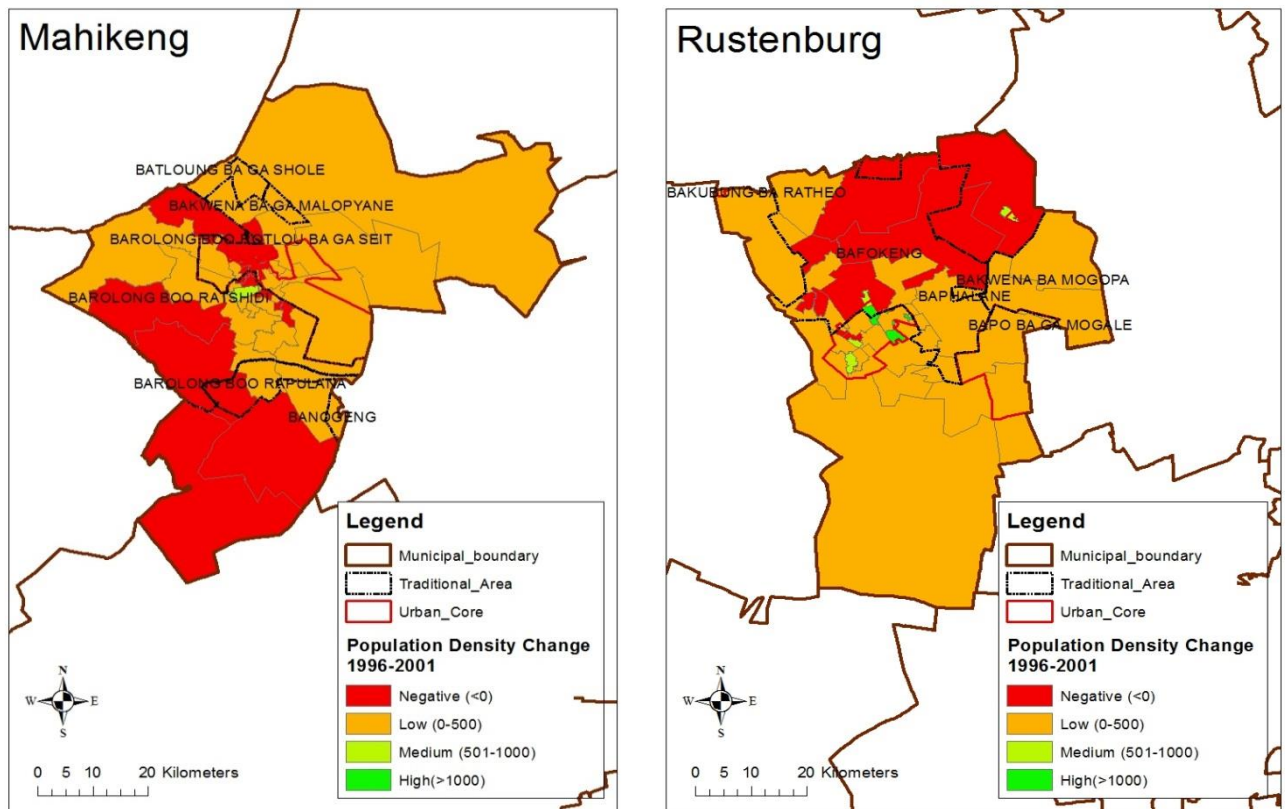


Figure C2a: Population density 1996, 2001 and 2011

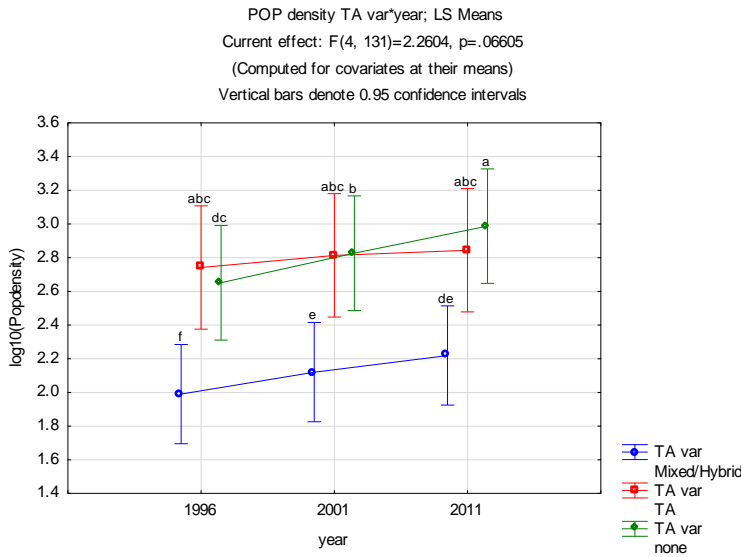


Figure C2b: Scores for Average Annual Change on Population density

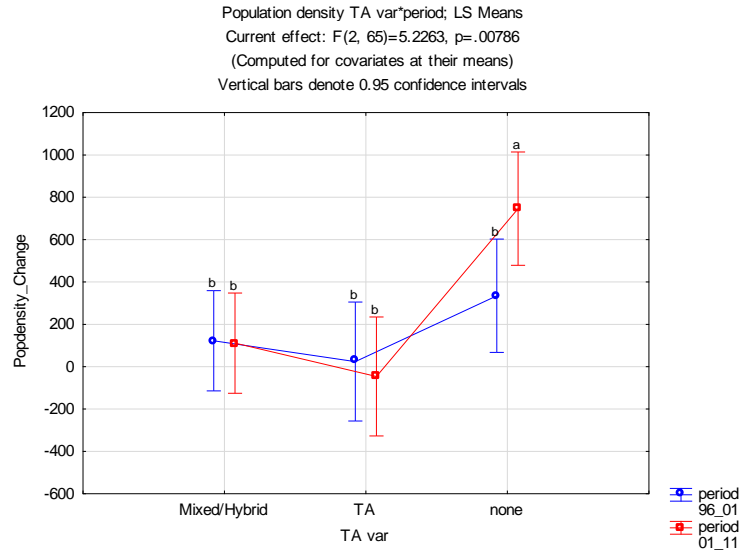


Figure C3a: Formal Housing density for Mahikeng and Rustenburg 1996-2001

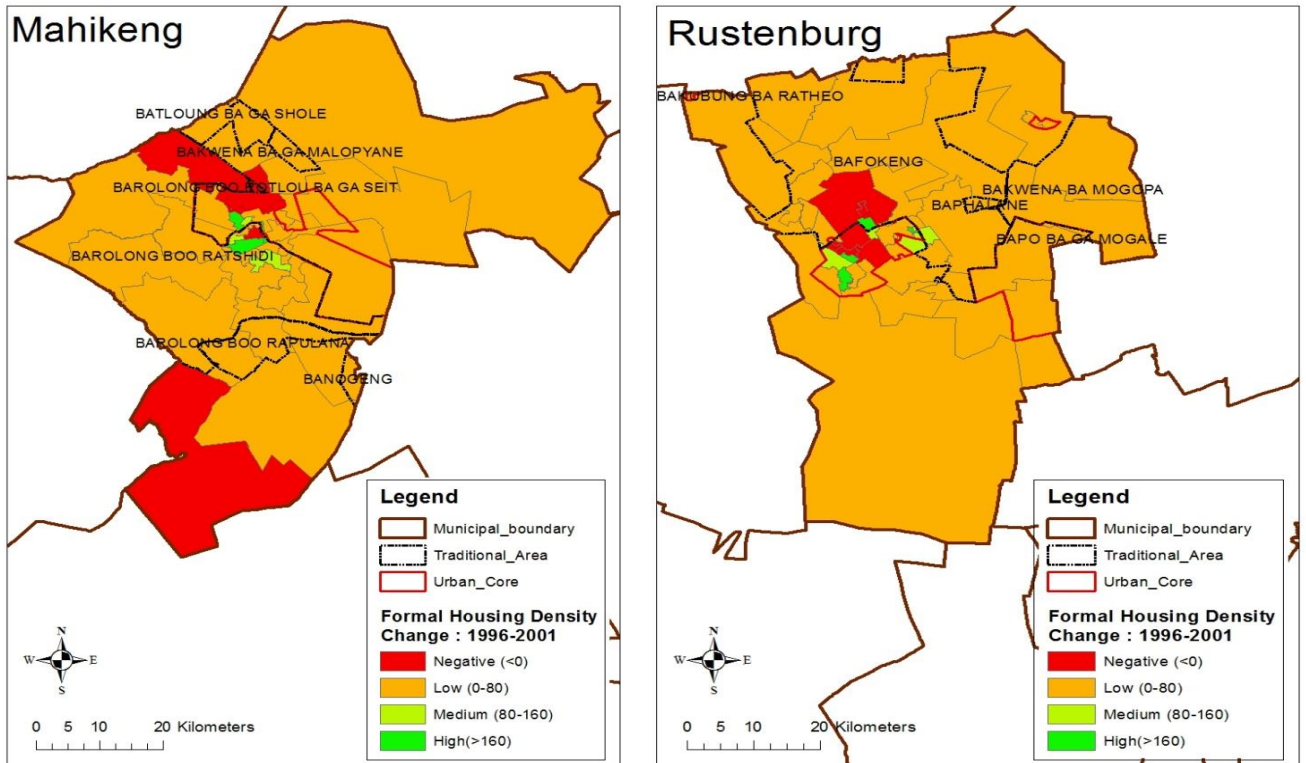


Figure C3b: Formal Housing density for Mahikeng and Rustenburg 2001-2011

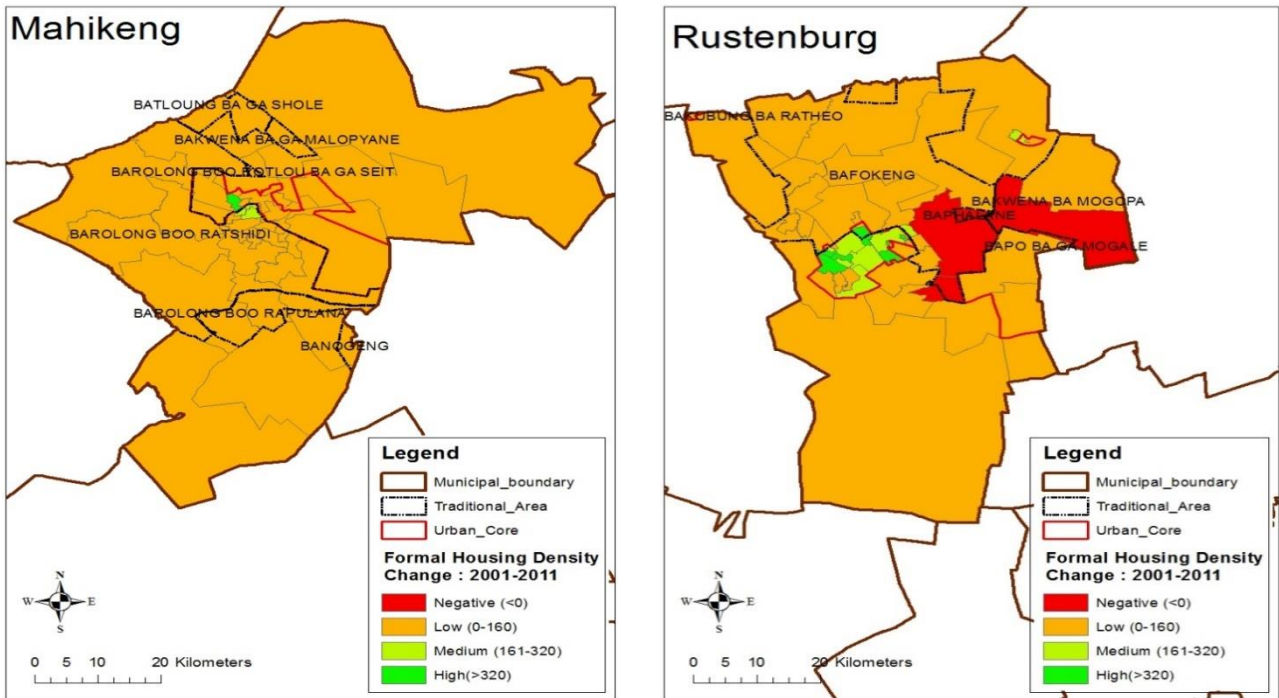


Figure C4a: Formal housing density 1996, 2001 and 2011

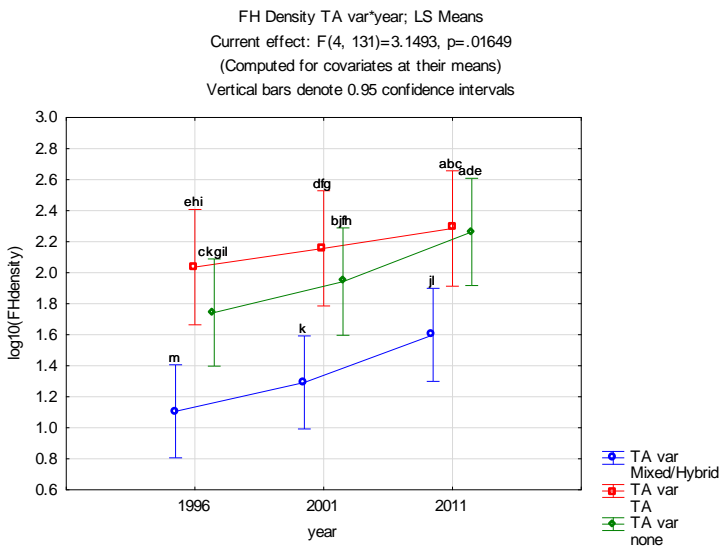


Figure C4b: Scores for Average Annual Change on Formal housing density

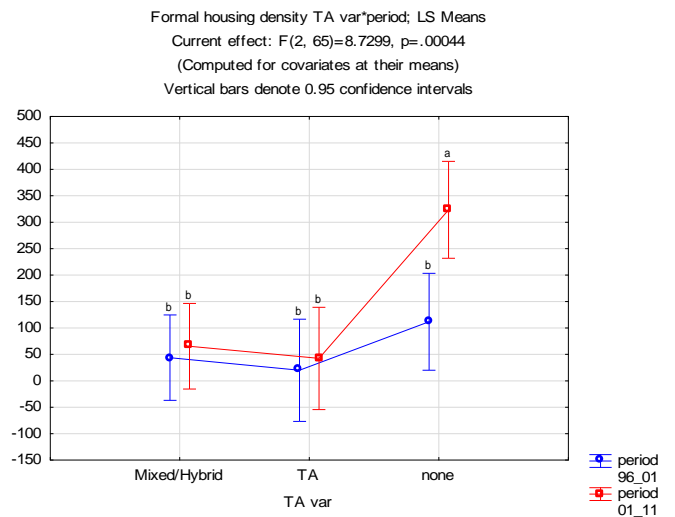


Table C1: Informal Housing density for Mahikeng and Rustenburg

Percentage Change and Geographic Area	Mahikeng				Rustenburg				Grand Total
	Urban Core	Mixed	Non-urban Core	Total	Urban Core	Mixed	Non-urban Core	Total	
% Change 1996-2001	2.2	14.5	1.5	4.5	4.1	39.6	50.8	31.8	19.5
TA	NA	100.6	-0.8	5.1	NA	NA	31.8	31.8	14.3
Hybrid	NA	0.1	8.9	4.1	204.3	7.5	17.5	49.6	26.9
Non_TA	2.2	NA	NA	2.2	-29.3	55.7	253.2	21.0	18.3
% Change 2001-2011	-3.0	-6.5	-13.6	-11.0	-231.2	-94.4	-85.9	-140.8	-82.5
TA	NA	-35.4	-17.6	-18.6	NA	NA	-82.2	-82.2	-3.3
Hybrid	NA	-1.7	-0.9	-1.3	-75.5	-121.0	-5.0	-38.9	-1.5
Non_TA	-3.0	NA	NA	-3.0	-257.2	-81.1	-385.3	-232.3	-0.5

Figure C5a: Informal housing density 1996, 2001 and 2011

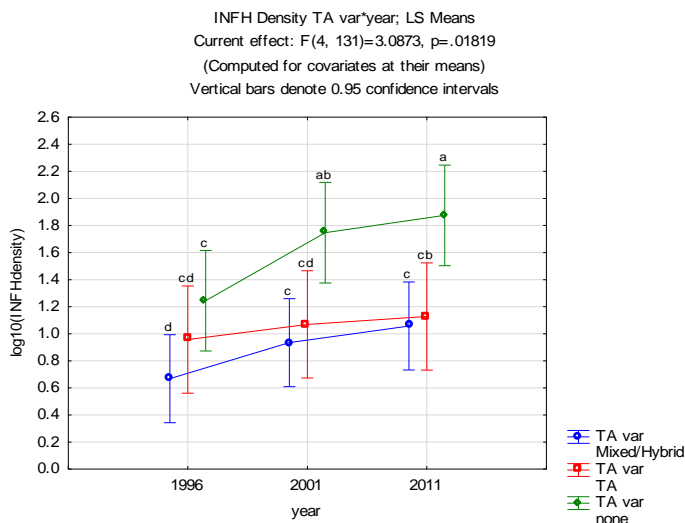


Figure C5b: Scores for Average Annual Change on Informal housing density

