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The relationship between government service provision and life satisfaction for South African individuals

A dissertation submitted in partial fulfillment of the academic requirements for the degree of Masters in Development Theory and Policy

Degree: Development Theory and Policy, SEBS

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Abstract

The present study contributes to the subjective well-being literature by looking at how the provisioning of government service affects subjective well-being in South Africa, how this differs by various groups, and whether the relationships have changed over time, specifically between 2009 and 2016. The study aims to provide an updated analysis of how subjective well-being and government service provision are linked within the current political climate for differing groups within the South African context. This paper utilises the South African Social Attitudes Survey (SASAS) data for both the 2009 and 2016. The SASAS survey is a nationally representative survey. The dependent variable (*Y*), life satisfaction, is derived from the question in the SASAS data set that is phrased as "Taking all things into consideration, how satisfied are you with your life as a whole these days?". Ordered probit regression modelling is used in the empirical analysis to explore the indicated research outcomes. The results suggest a decline in the effect that access to government services have on individuals' life satisfaction in South Africa. In 2009, access to electricity and access to a flushed toilet were both positively and significantly related to SWB. However, in 2016, only access to piped drinking water was statistically significant with a positive effect. This effect was particularly large in 2016 for those living in formal areas and for women, suggesting that service delivery affects different groups' SWB in different ways. The various control variables (unemployment, education, health, etc.) had the expected effects on SWB given evidence in the existing international and South African literature on this topic, providing some confidence in the specification and data reliability.

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1. Introduction

This section will provide a brief introduction highlighting the importance of and need for studies that measure Subjective Well-Being (SWB) to better examine the components of life satisfaction. Additionally, the paper's research objectives will be introduced, the data period analysed will be explained, and the research report's contribution to the South African SWB literature will be made clear.

1.1 The importance of SWB studies and measuring life satisfaction

SWB measurement studies have continued to increase and polarise academic debate, as they continue to be presented as alternatives to tried and tested income-based welfare measurement (Angner, 2015). SWB measures are normally based on questions that ask, "Taking all things into consideration, how satisfied are you with your life as a whole these days?" (Angner, 2015). These responses are normally attached to an ordinal rank, for example 1 would be very dissatisfied and 5 would indicate that the individual is very satisfied. SWB studies can provide a more dynamic and effective way of measuring perceived utility, which in turn could provide important behavioural insights often missed by studies based on traditional income utility measurements (Helliwell and Barrington-Leigh, 2010).

Proponents of the subjective well-being approach argue that valuable information can be obtained regarding individual utility from individuals themselves and that choices are not always rational in nature (Frey & Stutzer, 2002). Subjective well-being questions therefore allow individuals to express the quality of their own lives, reflecting on what is crucial for their lives and not just a state driven definition of the perceived good life (Adler & Seligman, 2016). Empirical quality of life data, particularly on SWB, can help policy-makers to identify not only specific needs, wants and goals in a population, but can also provide valuable information about the relative importance of individuals' diverse needs within a community (Kroll, 2015). With a more detailed understanding of how various factors, including income, service provision and education affect subjective well-being within communities, governments can then apply a more nuanced analysis to policy development.

1.2 Research Objectives and Contribution to the SWB Literature.

Subjective well-being literature has spanned a plethora of areas in attempting to understand policy questions relating to individuals within their communities, both internationally and in South Africa. Powdthavee (2005) states that a large emphasis has been placed on subjective

well-being research in developed nations, however he stresses the importance of the production of additional SWB research that is targeted to developing countries (Powdthavee, 2005). This study will aim to address a gap in the literature on subjective well-being for South Africa, by addressing the relationship between government service provision and life satisfaction for South African individuals. Service delivery in South Africa has been increasingly characterised by mass protests, demonstrations and petitions. These actions have illustrated a growing frustration among South African individuals regarding the lack of basic service delivery (Akinboade, Mokwena & Kinfack, 2013). The underpinnings of these protests have been related to elevated levels of poverty, inadequate levels and quality of infrastructure provision and a failing of municipal departments in addressing service delivery backlogs (Akinboade et al, 2013).

There have not been many studies that have looked at the relationship between SWB and government service provisioning. Bookwalter and Dalenberg (2004), who made use of data from South African Labour and Development Research Unit (SALDRU), analysed South African household data and the government services provided to the household in order to estimate SWB. However, this data was collected in 1994 and therefore an updated analysis of the relationship is warranted. Møller (2013), through the use of fieldwork collected household data in 2002 and 2009, explored if investment in government services provided increased levels of well-being for South African households. However, the data collection was limited to the Western and Eastern Cape regions. This study aims to provide an updated analysis of how subjective well-being and government service provision are linked for the more recent period, which coincided with a particularly difficult political climate.

The main objective of this report is to look at how access to government services affects the subjective well-being of South African individuals, and whether this relationship has changed over time. The study analyses data collected in the South African Social Attitudes Survey (SASAS) from 2009 and 2016. The reason for this time selection is that South Africa has been characterised by various presidential eras, each promising different policy outcomes. The Mandela presidency focused on reconciliation after the fall of the nationalist government, while the Mbeki era that followed concentrated on building the economy and addressing the backlog in services and infrastructure for the formerly disenfranchised (Møller, 2013). Finally, came the Zuma administration, which promised to create inclusive growth and address service delivery failings for various communities (Møller, 2013). With this context in mind it is important to track the performance of governments over time, to

assess if government service provisioning has had the desired effect on people's quality of life. The reason for the selection of 2009 is because it is the inception year of the Jacob Zuma presidency, and 2016 was selected as it represents the most recent year of SASAS data and provides information on SWB towards the end of the Zuma presidency. With the selection of these two data points, the research report aims to provide a cross-sectional comparison of the effect of access to services on life satisfaction under the Zuma presidency when it first began and towards its end. Ordered probit regression modelling is used in the empirical analysis.

The rest of this research report is structured as follows. Section 2 provides some background context on the increase in social unrest relating to the slow progress of government service delivery in South Africa. Section 3 includes a literature review of the relevant international and South African SWB studies. Section 4 describes the data and methods used, and presents some key descriptive statistics. Section 5 presents the results of the econometric analysis. Section 6 concludes.

2. Background

This section will look at the growing increases in social unrest and discontent experienced by South Africans when it comes to service delivery. Exploring this context is important, as it provides a motivation for why this research report focuses on the relationship between access to government services and SWB.

Due to the exclusionary and oppressive mechanisms of the Apartheid government, inclusive and expedient service delivery became a critical priority for South African citizens and the ruling African National Congress (ANC). As a result the current governing party had a significant service delivery backlog to address, particularly in impoverished communities within the country. Although the ANC has made great strides in addressing service delivery needs, challenges regarding both the quantity and quality of service delivery are still a key concern for a number of South African citizens. As a result of these persisting challenges and the slow progress made by the government to correct these concerns, discontent has begun to grow among individuals. This is evidenced by an increase in service delivery protests (Morudu, 2017). South African citizens continue to feel frustrated at the speed with which government services are provided to them and the quality thereof, particularly with respect to housing and sanitation services (Mafunisa, Sebola & Tsheola, 2012).

Through the use of archived media reports from the Centre of Social Change and supplemented with data from the Incident Registration Information System (from the South

African police), Alexander et al (2018) show that the number of service delivery protests has increased significantly in recent years. The number of media reported protests increased from 106 in 2005, to 375 protests in 2017 (Alexander et al, 2018). Furthermore, not only has the number of service delivery protests increased, but additionally the protests have become more violent and disruptive in nature. The data collected by Civic Protests Barometer indicates that violent protests in South Africa (defined as physical violence from protestors or law enforcement officials or destruction of property) increased from 67 per cent (as a total of all reported protests) in 2011 to 86 per cent in 2016 (Alexander et al, 2018). This signals a growing frustration among South African individuals, who in continuing to lack the requisite access to government services, grow increasingly disruptive. Importantly, individuals may have access to government services, but the quality and consistency of these services play an important part in how individuals react to government service provision. Additionally, De Juan and Wegner (2019) find that South African communities with high levels of inequalities were found to report higher levels of dissatisfaction, with the reported dissatisfaction positively correlated to service delivery protests.

Ndevu and Muller (2017) discuss a variety of reasons that have hampered particularly local government from providing effective government service delivery. These reasons include local councillors that lack the required skillset to deal with local service provisioning needs, unsatisfactory compliance with regulatory frameworks for municipalities, and a lack of resources to provide effective government services. Notable constraints to effective service delivery also include misappropriation of public funds by local ward councillors, as well as poor interdepartmental coordination, resulting in a fragmented service delivery approach (Alexander, 2010).

Mpehle (2012) provides a breakdown per province of significant service delivery issues. Within both the Eastern Cape and the Free State, a misappropriation of funds led to shortages in the building of low cost housing for poor South African individuals. The Limpopo and Free State provinces continue to struggle with pit latrines and informal toilets, placing the health and safety of individuals at risk in these provinces. The North West, Northern Cape and Gauteng regions continue to have significant backlogs and inefficiencies related to the public health services sector. Adams et al (2015), with the use of the data from the General Household Survey (GHS), tracked the quality of public assets and service delivery in South Africa. Their study found that South African individuals reported lower levels of perceived quality pertaining to government services in 2012 compared to 2005 and 2008, particularly

piped drinking water. The study also highlights inequality among race groups in South Africa relating to the quality of government services provided, with African individuals reporting lower levels of perceived quality and access.

The above summary highlights the magnitude of issues that the government still faces with regards to service delivery in South Africa. Continued growth in violent discontent related to service delivery remains a concern for the governing party, which unchecked, could be problematic in a political sense, but also for social cohesion and stability.

Clearly, government service provisioning plays an important role in the lives of South Africans, and access and quality have both proven to be contentious issues in the recent post-apartheid period. As a result, this paper analyses the relationship between access to service variables and SWB over the last decade or so, with a focus on electricity, piped drinking water and access to a flushing toilet. The next section will provide a review of both the relevant international and local literature on SWB and service provision.

3. Literature Review

The literature review will begin by explaining the theoretical underpinning of subjective well-being and will discuss its importance in measuring life satisfaction, as well as its application to policy making. This will be followed by a discussion of the determinants of subjective well-being in the international literature. Finally, the review will analyse the determinants of subjective well-being in the South African context and will note the importance of evaluating government service provisioning in relation to measuring life satisfaction.

3.1 Theoretical underpinning of subjective well-being studies

Neef (2007) describes subjective well-being (SWB) as the subjective measurement of overall satisfaction with one's life. Neef continues by describing SWB as a cognitive evaluation of an individual's life, an evaluation that is open to all forms of determinants that the individual wishes to integrate into their evaluation. In recent times, there has been an increase in the number of studies that have begun to concentrate on the measurement and determinants of SWB, as a tool to better understand the utility derived by individuals. Hinks and Gruen (2007) cite two reasons for the increasing interest in SWB studies, the first being an increased availability of information on SWB in newer data sets and the second being a growing consensus that traditional neoclassical theory on observed preferences, fails to accurately explain individual decision-making. The literature surrounding subjective well-being suggests that these studies can provide a more holistic, meaningful and inclusive

understanding of individual welfare, when compared to classic objective measures such as consumption and income (Posel & Casale, 2011). Knies, Nandi and Platt (2016) state that measuring and increasing life satisfaction can be regarded as a truly legitimate policy aim and should be a source of continuous academic exploration.

Subjective well-being is theoretically underpinned by three types of measurement, namely evaluative, hedonic and eudemonic (Steptoe, Deaton & Stone, 2015). Evaluative well-being (the type of measure used in the empirical work for this paper) aims to understand through evaluations, how satisfied individuals are with their lives overall. Hedonic well-being refers to an individual's moods or feelings, with individuals asked to use both positive and negative adjectives to describe their emotional state, with examples including happiness, anger, sadness, etc. Steptoe, Deaton and Stone (2015) describe eudemonic well-being as a process whereby individuals make judgements that focus on the purpose and meaning of an individual's life. The authors further go on to describe eudemonic well-being as the study of well-being that focuses on meaning and self-realisation.

When pinpointing the historical origin of SWB and studies relating to happiness (with happiness and life satisfaction often used interchangeably), one would begin with Richard Easterlin's seminal 1974 work titled "Does Economic Growth improve the Human Lot?" Following Easterlin's seminal work, there has been continued interest in the subject of SWB, with Clark, Frijters and Shields (2008) estimating that 363 studies were published between 1995 and 2006, noting an increase of 61 per cent. This shows a continued and increased desire to use SWB as a measure to understand life satisfaction. Edwards (2010) posits that economic studies related to happiness or SWB, are used to challenge the scepticism displayed by economists towards subjective utility outcomes, as well as challenge hedonic psychological practices. Edwards further explains that economists that study SWB are more concerned with SWB determinants that pertain to economic outcomes, unlike psychologists that are concerned with every possible determinant related to SWB.

SWB studies can not only provide alternatives to traditional utility measurement studies, but can also provide important complementary insights. Stutzer and Frey (2010) discuss how SWB studies provide a complementary measure of welfare to traditional measures of welfare that make frequent use of gross national product and individual income. Stutzer and Frey additionally indicate that SWB studies can provide new important insights regarding measures of welfare. These insights include being able to perform comparisons across

different fields of economics simultaneously (models that predict behaviour vs models that predict differences in experienced utility) and provide important insights with respect to social policy formation. Frey and Stutzer (2002) indicate that life satisfaction in SWB studies is often measured by making use of a rating scale that ranges from very dissatisfied as the lowest point of scale and very satisfied as the highest point of the scale, with the question typically framed as "with all factors considered, how satisfied are you with your life are as a whole?" Frey and Stutzer (2002) note the importance of these questions in SWB studies, indicating that they can capture human well-being directly, provide researchers the ability to directly test economic assumptions and provide a much broader unit of analysis when accessing experienced utility.

Having discussed the importance and application of SWB studies as a tool to further understand human satisfaction, it is important to also discuss methodological concerns related to the field of study. Stutzer and Frey (2010) point out that results from SWB studies can be significantly influenced by respondents who provide answers that may place them in a more favourable light or that appear to be more socially acceptable. Kahneman and Krueger (2006) raise an important consideration and state that respondents may interpret response categories (very satisfied, very dissatisfied, etc.) in a manner that may differ from fellow respondents. Researchers have attempted to ensure that response categories are as clear and distinctive as possible when performing SWB studies, however misinterpretation may arise when ranking one's reported level of SWB. Easterlin (2005) discusses the reluctance by economists to make use of subjective data measures because they lack objective accountability when measuring utility. Easterlin cautions however, that subjective data measures cannot be dismissed in an offhand fashion, providing a variety of fields that have gained important insights from such data.

The next section will review some of the international literature on the determinants of SWB, followed by a review of the literature on the determinants of SWB in the South African context.

3.2 International literature on the determinants of subjective well-being

With the rise in popularity of SWB as a measure of utility, the amount of international literature on the determinants of SWB has increased significantly in recent times. In an effort to select the most pertinent international literature for the purpose of this study, studies related to the interaction between SWB and government services were selected. Additionally,

due to South Africa's status as developing country, this study thought it appropriate to select international SWB literature that included the perspectives of other developing countries. This sub-section starts by describing some of the main variables analysed in studies that have explored the determinants of SWB, namely absolute and relative income, gender and race. It then goes on to focus on findings with relation to service provision and SWB, given the focus of this work.

A large body of international literature exists depicting the effect that changes in income have on SWB, both from an absolute or relative income perspective. Knight, Lina and Gunatilaka (2009) study SWB and its determinants among the rural Chinese population. Using national household survey data, the authors find that perceptions pertaining to income within a rural village context play an important role in influencing SWB. Households are found to continuously compare their relative standing to other households within the communal area particularly when it comes to income. Furthermore, the study found that public goods and communal variables provide important insights related to how individuals in China report experienced levels of SWB. Possessing a phone, the individual's perception that his/her interests are represented amongst a local spokesman, and the presence of a reliable health clinic, were found to have played a significant role in affecting SWB.

Clark, Frijters and Shields (2008) note that income has a positive yet diminishing effect on SWB. The authors also note that the empirical work surrounding income and SWB faces a variety of challenges. These include the inability to gain consistent and reliable information on what groups individuals compare themselves to when it comes to relative income comparisons. Furthermore, Clark, Frijters and Shields (2008) indicate that researchers have found it challenging to identify significant changes in income, with significant changes in happiness over the longer term. Dolan, Peasgood, and White (2008) note the significance that relative comparisons play regarding income, noting that increases in income may not increase SWB if the comparative group receives a similar increase in income. This indicates that individuals place an importance on their relative standing within their comparison group. These comparative groups differ by study. Fahey and Smyth (2004) study absolute income comparisons among 33 European states and find that populations in rich areas possess high levels of SWB, while populations in poorer areas of Europe have lower levels of SWB. The authors emphasize the importance of analysing income and SWB not only from a purely national unit of analysis, but also from a cross-national perspective. In Latin America, Graham and Felton (2006) ask citizens to rank themselves from 1 to 10, with one being the

lowest level on the world income grouping and 10 representing the richest income grouping within the global context. The study notes that differences in relative income play a significant role when related to SWB for individuals from Latin America.

Gender is another key indicator of interest in the SWB literature. The international studies that follow, indicate the variety of ways in which the life satisfaction of females may be affected. Importantly to achieve a holistic understanding of the relationship between gender and SWB, a comparative analysis must be done to understand how the male populace interacts with SWB. Using data from the United States, Alesina, Di Tella and MacCulloch (2004) find that women report higher levels of happiness than men on average. Karabchuk (2016) examines a variety of SWB determinants among European women, including labour market conditions and motherhood. Women in the study who didn't have children reported higher levels of life satisfaction than those women who did have children. Additionally, the surveyed women noted that job satisfaction and self-fulfilment were significant factors when reporting SWB. As a result, the importance of motherhood or job satisfaction amongst women cannot be disregarded as an unimportant determinant when assessing the reported levels of SWB amongst women. D'Addio et al (2014), making use of long term panel data for both the United Kingdom and Germany, indicate that women with higher levels of education, income and those who were married reported higher levels of SWB in both countries.

Meisenberg and Woodley (2014) analyse differences in happiness and life satisfaction between men and women in 95 countries. The study finds that men reported higher life satisfaction in 46 countries, while woman reported higher satisfaction in 49 countries. These differences were relatively small however and when looking at those countries with a statistically significant difference, it was found that men reported higher satisfaction in 12 countries and women in 16 countries. The differences for the levels in reported life satisfaction are discussed by Arrosa and Gandelman (2013), citing a variety of observable characteristics including income, education and social factors. The above insight highlights important insights pertaining to the interactions between gender and SWB. Policy makers should take notice of these insights, in order to better estimate and understand SWB.

It is also important to understand how race and ethnicity interact with SWB. Knies, Nandi and Platt (2016) discuss the ever increasing literature that acknowledges that both ethnic minorities and immigrants have lower levels of reported well-being. Alesina, Di Tella and MacCulloch (2004) report that African American individuals in the United States (US),

report lower levels of SWB as a result of challenging social circumstances. Bartram (2011) confirms that US immigrants report lower levels of SWB and notes that increases in SWB determinants, particularly income, have a greater effect on their reported SWB than those of native citizens. Safi (2010), through the use of cross-sectional data for 13 European countries, comes to the conclusion that ethnic minorities (particularly African, Asian & Turkish) experience significantly lower life satisfaction than native European citizens. Safi also notes that the perception of discrimination may negatively affect immigrants reported SWB, as immigrants anticipate fewer economic opportunities and access to labour markets. The above literature helps understand how race and ethnicity interact with SWB. As a result, policy makers and researchers will need to be aware of this context when studying SWB as a measure of satisfaction.

There are a variety of international studies that attempt to understand the relationship between government service provision and SWB, however this area of research has not been extensively explored. Government service provisioning plays an integral role within societies and understanding how it affects SWB can prove to be useful in the creation of effective social policy. A study undertaken in Colombia illustrated that individuals of a lower socio-economic standing had higher levels of dissatisfaction regarding government service delivery performance (Martinez, Short & Ortíz 2015, 89). Martinez et al. (2015) provide further analysis to suggest that individuals with a higher socio-economic status reported higher levels of life satisfaction with respect to government service provision. The study indicated that government service provision did not prioritise the service provision needs of poorer community members. This highlights the importance of how life satisfaction analysis can provide more nuanced information by sub-group to improve government service performance.

Whitley et al. (2010) explore the relationship between public policy outcomes and subjective well-being in modern day Britain. The study found that micro policy outcomes that are effectively applied by government can positively influence life satisfaction. An important concluding point of the study was that a government that wishes to improve subjective well-being measurements among its citizens must ensure that on-the-ground service delivery is effective in nature.

Zhang and Hudson (2018), using an ordered probit model and the Chinese General Social Survey data, highlighted the importance of housing as a determinant, of increased SWB in

urban areas. The study indicated that home ownership and housing satisfaction play a pivotal role in ensuring increased levels of SWB. Younger individuals cited the importance of housing mobility (being able to freely move within the rental or property market), whereas older age groups placed a greater level of importance on housing size.

Electricity provisioning plays an important role in reported SWB. Welsch and Biermann (2014) use data from 26 European countries to estimate the relationship between SWB and electricity provisioning and find that electricity provisioning is a significant determinant when assessing SWB particularly in rural areas. Additionally, the study analyses the need to reform each national electricity grid towards a renewable energy mix, with respondents reporting a significant increase in levels of SWB with the increased prospect of the implementation of a renewable energy grid. Ahmad, Mathai and Parayil (2014), making use of data from the Indian Human Development Survey, illustrate that electricity access and availability have a positive and significant relationship with SWB in both urban and rural areas. Furthermore, the authors raise the importance of implementing additional capital projects to address the shortages in current electricity provisioning.

International literature pertaining to the relationship between service provisioning and SWB provides important context to policy makers. While it may seem an obvious connection to make that service provisioning is an important determinant of individual well-being, the detailed study of how it affects individual well-being can assist in the drafting of more nuanced policy that addresses the service delivery needs of the community. This information can allow policy makers to make more informed decisions and thus more effectively prioritise policy implementation.

3.3 South African literature on the determinants of subjective well-being

The South African literature on subjective well-being explores a variety of areas related to SWB including income, race, gender and other determinants. Numerous studies on South Africa have analysed income and household expenditure variables to understand SWB. Bookwalter and Dalenberg (2010) make use of data which surveyed 8000 South African households, to understand the effects that relative and absolute household expenditure has on SWB in South Africa. The study finds that increases in household expenditure have positive effects on individual well-being within the household and that these positive effects are more pronounced among non-white race groups. Bookwalter and Dalenberg (2010) indicate that income or expenditure groups can have significant effects on SWB, however the degree of

significance varies per income or expenditure class. Powdthavee (2007) highlights the relative comparison drawn made by adults to their parents, with increased well-being reported by respondents that found themselves in a better-off position relative to their parents.

Kingdon and Knight (2007) further illustrate the significant effect that income has on SWB and makes use of national survey data from 1993, taken from the South African Labour and Development Research Unit (SALDRU). They report that an increase in absolute household income increases the probability of a rise in the level of SWB reported. A further conclusion drawn from the paper with respect to relative income, is that higher income in other households in smaller communities also increase individual SWB, with smaller communities being more likely to share risks amongst their members. Hinks and Gruen (2007) analyse the data provided by the Quality of Life/Needs Assessment Survey for the Durban area and conclude that individuals that reside in households below the median household income, are significantly less satisfied than households above the median threshold.

Posel and Casale (2011) suggest that relative comparisons to other parties and self-assessments over time have a significant impact on SWB. Their study finds that individuals that believe themselves to be in the upper and middle bands of the national income distribution, have higher levels of SWB over those that place themselves among the lower income bands, and that perceptions of relative standing are more strongly related to SWB than objective measures of relative standing. Additionally, it is noted that the perception of an individual's income ranking within a communal geographical area and in relation to other community members, is significantly related to SWB. This indicates that individuals place importance on how they rank with regards to income amongst their geographical peers.

A large portion of the work on SWB in SA explores whether SWB differs by race and if there are different determinants of SWB by race group. Moller (2007), making use of the 2002 General Household Survey, selected a variety of indicators that influence SWB and analysed these separately by race. Moller (2007) finds that African individuals experience significantly lower life satisfaction when compared to other race groups. Furthermore, the study reports that African households experience the greatest backlog in service provisioning (negatively affecting their experienced SWB), including that only a quarter of African households had access to piped drinking water. Von Fintel (2015), using the 2008 National Income Dynamics Study (NIDS) data, highlights that differences in the levels of SWB between race groups remain largely unaltered post 1994. These differences are particularly prominent when

comparing the white race group to the African race group, with the white race group reporting higher levels of SWB.

Posel (2014) also finds divergent levels of SWB between whites and Africans, and finds that this is because whites have greater access to resources and have higher income levels. The study finds that in 2010, 53 per cent of African adults reported a low level of satisfaction compared to 9 per cent of white adults. Ebrahim et al. (2013) report that race groups have different determinants when accessing SWB with white individuals placing a greater emphasis on health and Africans focusing on employment and income levels. Ebrahim et al. (2013) find moreover that rural African individuals report lower levels of life satisfaction when compared to their urban counterparts. Bookwalter and Dalenberg (2009) theorise that well-being equations differ among white and African groups as a result of past racial discrimination, which included limiting African individual's ability to obtain a quality education and forcing them to live in certain geographical areas that limited their economic opportunities. Hinks and Gruen (2007) add to this citing the historical legacy of Apartheid and the deeply entrenched racial discrimination rooted within the labour market of the time. Posel and Casale (2011) indicate that these factors have played a role in affecting the aspirations, opportunities and current expectations of Africans.

Differences in life satisfaction and subjective well-being occur not only in terms of income levels or race, but also with regards to gender as a unit of analysis. Posel and Casale find that only a third of cohabiting or married men and women, report having the same level of subjective well-being in relation to their respective partner (Posel & Casale 2015, 47). These differences were explored and the analysis of the paper indicated that women's life satisfaction increases with the presence of piped water within the household, but this was not the case for men. Casale and Posel (2010) used the NIDS data to analyse the SWB of women in South Africa particularly within rural areas. They find that African rural women are the most disadvantaged sub-group within the South African population, with more than 50 per cent of women reporting a life satisfaction of four out of 10 or less. Furthermore, only 30 per cent of women in the study felt that their surroundings had improved over the last 10 years. The insights gained from this study point to the fact that a large disparity in reported life satisfaction exists for South Africa women in rural areas. Blaauw and Pretorius (2013), using the first wave of NIDS data, indicate that females overall report lower levels of SWB when compared to males.

Income, race and gender have been some of the key determinants of SWB analysed in the existing studies in South Africa. While there has been much less focus on how government service provisioning affects SWB, there are some studies in this area, which will be described below.

Bookwalter and Dalenberg (2004) use the SALDRU data to explore the effect of various household factors on SWB by estimating an ordered probit model. The constructed analysis of the household factors looks at housing, the level of education, access to water, access to sanitation and transportation. Bookwalter and Dalenberg find that reported levels of SWB for poorer income groups are significantly influenced by housing, transportation and sanitation factors. This is a logical finding, as poor South African households lack the required access to adequate sanitation facilities and are continuously exposed to a dangerous transportation system. Wealthier households do not experience as significant increases to their well-being from access to these services. The authors find that South African policy makers can play an important role in increasing levels of SWB through the use of expanded housing grant programmes and sanitation infrastructure.

Møller and Radloff (2013) states that piped water, electricity and RDP housing are key determinants when evaluating household well-being. Møller finds that households reported far higher levels of SWB when they have access to the before-mentioned determinants. The data used in this study was collected by fieldworkers in 2002 and 2009, from over 1000 households in the Eastern and Western Cape region. Møller (2007) in her study further describes the challenges captured by dissatisfied household respondents, which included constant interruptions to piped water and unreliable sources of electricity to perform daily tasks. Greyling and Tregenna (2017) investigate life satisfaction among Gauteng residents and create an index of well-being that aims to measure levels of reported well-being within the Gauteng region. Greyling and Tregenna note (through a quality of life index), that to improve reported levels of SWB, policy makers must concentrate on provision of formal housing, reliable water supply and uninterrupted electricity connectivity particularly for cooking activities.

There is an unexplored gap in the South Africa literature when it comes to how government service provisioning affects SWB. Studies that been carried out thus far to estimate the relationship between SWB and government service provisioning, are limited in both the number studies undertaken and geographical scope, with the analysis often limited to a single

province. Although these studies are important for the SWB body of literature, this study aims to fill the gap that exists. The contribution made by this study will look at how the provisioning of government service affects subjective well-being in South Africa, how this differs by various groups, and whether the relationships have changed over time, specifically between 2009 and 2016. Firstly, previous subjective well-being literature in South Africa has not looked extensively at the effect of government service provision and has made use of less recent data, and secondly, few studies regarding subjective well-being have looked at a comparative analysis using more than one-time period within South Africa in the same study. The study aims to provide an updated analysis of how subjective well-being and government service provision are linked within the current political climate for differing groups within the South African context.

In a country like South Africa with substantial challenges and growing frustration with regards to service provisioning, it is important to further understand how individual well-being can be improved. Important to note, each race group, gender and geotype have unique interactions with public services and as a result it is of critical imporatance to understand each these of interactions. In understanding each of these interactions with public services, one is able to achieve a more nuaised understanding of well-being for different groups.

4. Research Methodology and Descriptive Statistics

This section will specify the research questions asked in the paper, describe the data used for the empirical work, explain the research methodology, and summarise some of the main limitations of the work. Furthermore, descriptive statistics of both the dependent and independent variables will be provided.

4.1 Research Methodology

In line with the paper's overall objectives (as discussed in the introduction), the research questions are as follows:

- How does access to government services affect the life satisfaction of South African individuals?
    1. Which government services affect life satisfaction the most – water provision, electricity provision or access to a flushing toilet?
    2. Do some individuals suffer greater life satisfaction consequences from the poor provision of particular government service items than others? In

particular, how does gender, race and geotype (urban/rural) interact with government service provision?

3. Have these relationships changed between 2009 and 2016?

The South African Social Attitudes Survey (SASAS) data was used in this paper to explore the above-stated research questions. The SASAS survey is a nationally representative survey. The SASAS surveys measure the South African public's attitudes, beliefs, behaviour patterns and values with regards to democracy and governance, social identity, service delivery, access to information and other social issues. The unit of analysis in the SASAS surveys is individuals who are 16 years of age and older. The SASAS surveys are conducted annually and currently span between the years 2003 to 2016. The data set contains approximately 450 variables, with surveys usually containing around 3000 observations. Estimates of the population numbers for various categories of the census variables were obtained per primary sampling area. Survey weights are used in order to take into account the fact that not all units covered in the survey had the same probability of selection.

This paper applies the following regression equation when estimating the relationship between life satisfaction and government services:

- $Y = b_0 + b_1(W) + b_2(T) + b3(E) + b4(X) + e$

The dependent variable (*Y*), life satisfaction, is derived from the question in the SASAS data set that is phrased as "Taking all things into consideration, how satisfied are you with your life as a whole these days?" The satisfaction variable is ranked from 1 to 5, with one representing very satisfied and five being very dissatisfied. This has however been recoded so the SWB variable dependent variable is increasing in life satisfaction, with 1 representing very dissatisfied and 5 representing very satisfied.

The main independent variables of interest are the service provisioning variables. *W* denotes a piped drinking water variable. In the survey, the following was asked: "What is the most often used source of drinking water by this household", with response options ranging from piped tap water in a dwelling-metered area to a public or communal tap that is free of charge. A dummy variable has been created where piped tap water in the dwelling is equal to one and the other options are equal to zero (including borehole water sources, rivers, wells, communal taps). *T* is a toilet facility variable based on a question in the survey phrased as "What type of toilet facility is available within the household", with options ranging from a flush toilet that

is connected to a municipal sewage system, to a pit latrine without a ventilation pipe or bucket toilet. A dummy variable has been created where a flushing toilet that is connected to a municipal sewage system or a sewage tank is equal to one, with the other options equal to zero. Variable *E* is a dummy variable equal to one if the household has an electricity connection connected to an in-house meter or pre-paid meter (with 0 representing all other options). This was based on the question "Do you have access to electricity in your household?", with response options ranging from an in-house electricity meter to no electricity connection or illegal connections.

X is a vector of additional controls including age, gender, race, education, income, geotype, unemployment status, health status and marital status. Education is included as four dummy variables, namely primary education, incomplete secondary, matric and post-secondary education, while no education is the omitted category. Geotype is included as 3 dummy variables, namely urban formal, urban informal and traditional areas, with rural formal the omitted category. The geotype variable is based on the 2011 Census demaractions. Health status is included in the regressions as two dummy variables, above health average status and below average health status, with average health the omitted category. Respondents in the SASAS questionnaire were asked to provide a health rating ranging from 0 to 10 (0 being completely dissatisfied, 5 neutral and 10 completely satisfied). Below average health was defined as a rating between 0 and 4, average health was defined as a rating of 5, whereas above average health was defined as a health rating of between 6 and 10. The unemployed dummy uses the expanded definition of unemployment, i.e. including both the individuals who are not looking for work and those who continue to look for work (with employed and not economically active equal to zero). Age is a continuous variable limited to individuals aged 16 and over. Finally the per capita household income variable used recodes the household income brackets available in the survey to the midpoint of that range and divides this value by the number of individuals within the household.

In addition, three regressions are run with interactions between the access to service variables and the gender, geotype and race variables. These interactions are included to test whether the relationship between access to services and life satisfaction differs across certain groups in the population.

- $Y = b_0 + b_1(F) + b_2(W) + b_3(T) + b_4(E) + b_5(F)(W) + b_6(F)(T) + b_7(F)(E) + b_8(X) + e$
- $Y = b_0 + b_1(UF) + b_2(UI) + b_3(TA) + b_4(W) + b_5(T) + b_6(E) + b_7(UF)(W) + b_8(UF)(T) + b_9(UF)(E) + b_{10}(UI)(W) + b_{11}(UI)(T) + b_{12}(UF)(E) + b_{13}(TA)(W) + b_{14}(TA)(T) + b_{15}(TA)(E) + b_{16}(X) + e$
- $Y = b_0 + b_1(B) + b_2(C) + b_3(I) + b_4(W) + b_5(T) + b_6(E) + b_7(B)(W) + b_8(B)(T) + b_9(B)(E) + b_{10}(C)(W) + b_{11}(C)(T) + b_{12}(C)(E) + b_{13}(I)(W) + b_{14}(I)(T) + b_{15}(I)(E) + b_{16}(X) + e$

Y represents the subjective well-being variable defined above. The three service provision variables, W, T and E (defined above) are interacted with the gender, geotype and race dummies in three separate regressions. F represents the female dummy variable, UF, UI and TA represent the urban formal, urban informal and traditional areas dummies respectively, and B (black African), C (coloured), and I (Indian) represent the race dummy variables.

4.2 Descriptive Statistics

Table 1 below provides a frequency breakdown of the dependant variable, life satisfaction, as well as a breakdown of the government service provisioning variables. Table 1 indicates an increase in the number of individuals reporting being dissatisfied and very dissatisfied between 2009 and 2016. Of the total 2016 sample, 12.9 per cent of individuals reported to be very dissatisfied (up from 7.6 per cent in 2009) and 24 per cent of individuals reported being dissatisfied (up from 20.9 per cent in 2009). Additionally, a lower percentage of individuals in 2016 reported being satisfied at 44.69 per cent (down from 49.5 in 2009), while there was only a slight increase in the percentage of individuals that reported being very satisfied at 8.8 per cent (up from 7.7% in 2009). Table 1 provides a general indication that on average individuals in 2016 seem to be less satisfied than in 2009.

When looking at the government service provisioning variables, one sees a percentage increase in the level of access that individuals have for all three service provisioning variables. Access to electricity, piped drinking water and flushed toilets increased in 2016 to 93.43 per cent (up from 85.78 in 2009), 78.88 per cent (up from 76.53 in 2009) and 71.70 per cent (up from 69.22 in 2009) respectively. The increases in access to piped drinking water and a flushed toilet, were marginal though and unlikely to be statistically significant.

Table 2 provides the full set of descriptive statistics for the dependant variable and all the independent variables for the regression sample of 3277 individuals in 2009 and 3068 individuals in 2016.

Table 1: Frequency Breakdown of Life Satisfaction and Government Services

	2009		2016	
Life Satisfaction	**Frequency**	**Per cent**	**Frequency**	**Per cent**
Very dissatisfied	251	7.66	398	12.97
Dissatisfied	685	20.90	738	24.05
Neither satisfied nor dissatisfied	474	14.46	291	9.49
Satisfied	1625	49.59	1371	44.69
Very satisfied	242	7.38	270	8.80
	3277	**100**	**3068**	**100**
Government Service Variables				
No Access to Electricity	467	14.22	197	6.57
Access to Electricity	2818	85.78	2802	93.43
	3285	**100**	**2999**	**100**
No Access to Piped Drinking Water	772	23.47	636	21.12
Access to Piped Drinking Water	2518	76.53	2376	78.88
	3290	**100**	**3012**	**100**
No Access to a Flushed Toilet	1012	30.78	853	28.30
Access to a Flushed Toilet	2276	69.22	2161	71.70
	3288	**100**	**3014**	**100**

Table 2: Summary statistics for the dependant and independent variables for the regression sample

	2009		2016	
Dependant Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Life Satisfaction	3.28	1.11	3.12	1.24
Independent Variable				
elec	0.858	0.349	0.934	0.248
pdwater	0.765	0.424	0.789	0.408
ftoilet	0.692	0.462	0.717	0.451
income	2652.488	4283.479	2630.541	5200.635
income_squared	25400000	104000000	34000000	214000000
unemployment	0.268	0.443	0.343	0.475
married	0.405	0.491	0.377	0.485
Divorced	0.136	0.343	0.183	0.387
PrimaryEduc	0.159	0.366	0.146	0.353

Incomplete~y	0.348	0.477	0.351	0.477
Matric	0.281	0.450	0.337	0.473
PostSecond~y	0.161	0.368	0.131	0.337
abhealthr	0.588	0.492	0.691	0.462
belhealthr	0.170	0.375	0.097	0.296
UrbanFormal	0.617	0.486	0.688	0.463
UrbanInFor~l	0.093	0.290	0.070	0.255
Traditiona~s	0.184	0.387	0.185	0.389
age	39.330	15.670	53.430	16.210
ageSquared	1792.798	1396.151	3117.70	1775.48
african	0.598	0.490	0.605	0.489
coloured	0.175	0.380	0.155	0.362
indian	0.114	0.318	0.117	0.322
female	0.597	0.491	0.458	0.498
Total Observations	**3277**		**3068**	

4.3 Limitations of the study

While the purpose of this study is to identify how government service provisioning affects SWB and while the literature in this paper has discussed the increased popularity of life satisfaction studies for identifying utility in economics, it does not exempt the study from attracting criticism. There are those who may take the view that the dependent variable used in this study is subjective in its measurement and as a result may see it as a limitation. Objections raised by those who prefer more conventional objective utility measurement studies include that subjective well-being data is not decisive enough in its ability to make conclusions regarding development policy decisions (Frederick, Loewenstein & O'donoghue, 2002) and that the data is “fluffy” or “fickle” in nature.

Another limitation is that there is no data on the quality of the services provided (for example, the clarity of the piped water provided, or the frequency of disruptions in water or electricity provision). This means that one at present cannot distinguish between access and quality issues in the relationship identified between services and SWB in the analysis. Finally, the SASAS data is cross sectional and as a result the ability to identify causality is limited. Panel data can better capture the complexity of human behaviour as opposed to pure cross-sectional data and the inclusion of repeated measures of SWB within panel data can offer a means to control for unobserved individual heterogeneity within subjective reports (Posel, and Rogan 2016, 68). Panel data analysis is beyond the scope of this report however.

5. Regression and Marginal Effects Analysis

This section will provide a discussion of the output generated from the regressions specified above for both 2009 and 2016, as well as the marginal effects generated from the ordered probit models. The marginal effects show the effect (in per centage terms) of the independent variable on the probability of being in each of the five categories of the dependent variable (ranging from very dissatisfied to very satisfied). The second part of this section will present the results from the regressions that also include the interaction variables specified in the previous section, namely with gender, race and geographical area type.

5.1 Ordered Probit Results estimating Life Satisfaction

When looking at the results of the ordered probit for 2009 (Table 3), access to electricity and access to a flushing toilet emerge as statistically significant government service variables when estimating subjective well-being for South African individuals. Both electricity and flushing toilet have a positive coefficient when estimating SWB as would be expected if services increase life satisfaction. As shown by the marginal effects, having access to electricity results in individuals being 2 per cent less likely to report being very dissatisfied and 4 per cent less likely to report being dissatisfied. Conversely, individuals are 6 per cent more likely to report being satisfied and 1 per cent more likely to report being very satisfied if they have access to electricity (versus no access). In terms of access to a flushing toilet, individuals were 3.9 per cent less likely to report being very dissatisfied and 8.6 per cent less likely to report being dissatisfied. Conversely, access to a flushed toilet resulted in individuals being 11.9 per cent more likely to report being satisfied and 3 per cent more likely to report being very satisfied. The access to piped drinking water variable has a negative coefficient surprisingly, however it is statistically insignificant in the ordered probit model.

Moving on to the control variables, income, income squared, unemployment, health status, education and African are all statistically significant and have expected effect on SWB. Income has a positive coefficient (as is commonly found in the literature) while income squared has a negative coefficient indicating that income increases SWB, but at a decreasing rate.

Unsurprisingly, unemployment has a negative coefficient, as we would expect being unemployed to have an adverse effect on an individual's SWB relative to being employed/not economically active. Individuals were 2.7 per cent more likely to report being very

dissatisfied and almost 6 per cent more likely to report being dissatisfied in the case of being unemployed. In contrast, individuals were 8.1 per cent less likely to report being satisfied and 2.1 per cent less likely to report being very satisfied.

The education dummies also had positive and significant effects as expected, with the effects larger, the higher the level of education. When looking at those with a matric level of education particularly, individuals were 9.6 per cent more likely to report being satisfied and 2.5 per cent more likely to report being very satisfied, relative to those with no education. Looking at those with a post-secondary level of education, individuals were 12 per cent more likely to report being satisfied and 3.1 per cent more likely to report being very satisfied, relative to those with no education. This indicates that education serves as a statistically important variable when estimating SWB.

Health status is a statistically significant variable when estimating SWB. Above average health status has a positive coefficient, whereas as below average health status has a negative coefficient, relative to average health. Individuals with above average health status are 5.9 per cent more likely to report being satisfied and 1.5 per cent more likely to report being very satisfied. When looking at below average health status, individuals were 17.8 per cent less likely to report being satisfied and 4.6 per cent less likely reporting a very satisfied well-being. Notably individuals with a below average health rating, were 12.9 per cent more likely to report being dissatisfied. This indicated that health status within this context plays a very important role in determining SWB. This makes intuitive sense as individuals with poor or terrible health, are less likely to feel a sense of well-being when evaluating their lives, particularly in a country where private healthcare is very expensive and public healthcare is often limited and of poor quality.

Table 3: Ordered probit of life satisfaction and marginal effects, 2009

* p<0.10 , **p<0.05, ***p<0.01			Marginal Effects				
	Coefficient	Standard Error	Very Dissatisfied (1)	Dissatisfied (2)	Neutral (3)	Satisfied (4)	Very Satisfied (5)
Electricity	0.196***	0.076	-0.020***	-0.044***	-0.012***	0.062***	0.016***
Piped Water	-0.026	0.076	0.002	0.005	0.002	-0.008	-0.002
Flushed Toilet	0.379***	0.087	-0.039***	-0.086***	-0.024***	0.119***	0.031
Income	0.0001***	0.0001	-0.0001***	-0.0002***	-0.0006***	0.0003**	0.0008***
Income squared	-0.0002***	0.0005	0.0002***	0.0005***	0.0001***	-0.0007***	-0.0001***
Unemployment	-0.258***	0.053	0.027***	0.059***	0.016***	-0.081***	-0.021***
Married	0.080	0.059	-0.008	-0.018	-0.005	0.025	0.007
Divorced	-0.086	0.082	0.009	0.019	0.005	-0.027	-0.007
Primary Education	0.109	0.105	-0.011	-0.025	-0.007	0.034	0.009
Incomplete Secondary	0.236**	0.106	-0.025**	-0.054**	-0.015**	0.074**	0.019**
Matric	0.304***	0.113	-0.032***	-0.069***	-0.019***	0.096***	0.025***
Post-Secondary	0.384***	0.129	-0.040***	-0.087***	-0.024***	0.120***	0.031***
Above Average Health	0.187***	0.056	-0.020***	-0.043***	-0.012***	0.059***	0.015***
Below Average Health	-0.568***	0.069	0.059***	0.129***	0.036***	-0.178***	-0.046***
Urban Formal	-0.079	0.086	0.008	0.018	0.005	-0.025	-0.006
Urban Informal	-0.137	0.098	0.014	0.031	0.009	-0.043	-0.011
Traditional Areas	0.078	0.090	-0.008	-0.018	-0.005	0.025	0.006
Age	-0.146***	0.043	0.015***	0.033***	0.009***	-0.046***	-0.012***
Age squared	0.0001***	0.0003	-0.0001***	-0.0002***	-0.0006***	0.0003***	0.0008***
African	-0.223**	0.097	0.023**	0.051**	0.014**	-0.070**	-0.018**
Coloured	0.124	0.103	-0.013	(0.028)	-0.008	0.039	0.010
Indian	0.048	0.107	-0.005	(0.011)	-0.003	0.015	0.004
Female	0.037	0.046	-0.004	(0.008)	-0.002	0.012	0.003

The quadratic in age is significant and has the expected effects given what has been found in other work, namely a U-shaped relationship with SWB. In other words, SWB decreases with age but then at some point increases again. Finally for the 2009 data when analysing the race variables, only the African dummy variable is significant and has a negative coefficient. This is aligned with a variety of local literature (Ebrahim, Botha, & Snowball, 2013) that has found that African individuals often report lower levels of life satisfaction compared to the other race groups. African individuals were 2.3 and 5.1 per cent more likely to report being dissatisfied and very dissatisfied respectively. Additionally, African individuals were have found to be 7 per cent less likely to report being satisfied and 1.8 per cent less likely to report being very satisfied.

Table 4 presents the regressions for 2016. One notices similar patterns related to the specified control variables, however, the significance of the government service variables has changed. Access to piped drinking water is statistically significant and has a positive coefficient, whereas in 2009 it had no significant effect on SWB. In 2016, individuals with access to piped drinking water, are 5 per cent more likely to report being satisfied and 3.2 per cent more likely to report being very satisfied. In 2016, access to electricity and access to a flushing toilet are both not statistically significant, whereas in 2009 both variables were positively related to SWB. There may be a variety of reasons for why the relationship between government service variables and SWB may have changed over time. The quality of the government services provided may have significantly decreased for individuals and as a result individuals may feel that certain government services no longer significantly contribute to their SWB. Or, it may be the habituation effect, where individuals 'get used' to having a particular service and seeing others around them having the same service, and so it is 'worth less' when it comes to SWB effects. Another possible reason is a lack of comparability across surveys, however the questions relating to the government services variables have not changed over time, so this is unlikely to explain the changing relationship with SWB.

As in 2009, income and income squared remains statistically significant when estimating SWB in 2016, and has the expected inverted-U shaped curve. Unemployment as in the case of 2009 has a negative coefficient and is statistically significant when estimating SWB. Individuals that are unemployed are 4 per cent less likely to report being satisfied and 2.5 per cent less likely when reporting being very satisfied.

The effect of education on SWB is less pronounced in 2016 compared to 2009. Only post-secondary education has a statistically significant effect on SWB (with incomplete secondary having a weakly significant effect and matric having no significant effect). Individuals with a post-secondary level of education are 7.5 per cent more likely to report being satisfied and 3.8 per cent more likely to report being very satisfied. This suggests the 'value' of lower levels of education has diminished over time, which is consistent with the larger numbers of learners graduating with a matric and the poor quality of the qualification, which has been well documented in the South African education literature.

Above average health status remains a statistically significant variable, with a positive coefficient. Individuals with an above average health status are 8.7 per cent and 4.4 per cent more likely to report being satisfied and very satisfied respectively. Again, age has the expected U-shaped relationship with SWB (although in 2016 the quadratic term is not statistically significant). Lastly, as in 2009, African individuals report lower levels of life satisfaction compared to other race groups (although only at a 10 per cent significance level). African individuals are 3.3 per cent less likely to report being satisfied.

Table 4: Ordered probit of life satisfaction and marginal effects, 2016

* p<0.10 , **p<0.05, ***p<0.01			Marginal Effects				
	Coefficient	Standard Error	Very Dissatisfied (1)	Dissatisfied (2)	Neutral (3)	Satisfied (4)	Very Satisfied (5)
Electricity	-0.058	0.108	0.012	0.010	0.001	-0.015	-0.008
Piped Water	0.188**	0.081	-0.040**	-0.032**	-0.003**	0.050**	0.025**
Flushed Toilet	-0.112	0.091	0.024	0.019	0.002	-0.030	-0.015
Income	0.0002***	0.0001	-0.0001***	-0.0004***	-0.0003***	0.0006***	0.0003***
Income squared	-0.0001***	0.0002	0.0003***	0.0002***	0.0002***	-0.0004***	-0.0002***
Unemployment	-0.151***	0.054	0.032***	0.026***	0.002***	-0.040***	-0.020***
Married	0.050	0.060	-0.011	-0.008	-0.001	0.013	0.007
Divorced	0.055	0.071	-0.012	-0.009	-0.001	0.014	0.007
Primary Education	0.208	0.135	-0.044	-0.035	-0.003	0.055	0.028
Incomplete Secondary	0.243*	0.130	-0.052*	0.041*	-0.004*	0.064*	0.033*
Matric	0.170	0.135	-0.036	-0.029	-0.003	0.045	0.023
Post-Secondary	0.284**	0.150	-0.061**	-0.048**	-0.004**	0.075**	0.038**
Above Average Health	0.329***	0.059	-0.070***	-0.056***	-0.005***	0.087***	0.044***
Below Average Health	-0.057	0.089	0.012	0.010	0.001	-0.015	-0.008
Urban Formal	-0.096	0.109	0.020	0.016	0.001	-0.025	-0.013
Urban Informal	-0.214	0.131	0.046	0.036	0.003	-0.057	-0.029
Traditional Areas	0.020	0.123	-0.004	-0.003	0.000	0.005	0.003
Age	-0.067**	0.046	0.014**	0.011**	0.001**	-0.018**	-0.009**
Age squared	0.0002	0.0002	-0.0001	-0.0008	-0.0009	0.0001	0.0007
African	-0.123*	0.101	0.026*	0.021*	0.002*	-0.033*	-0.017*
Coloured	0.125	0.107	-0.027	-0.021	-0.002	0.013	0.016
Indian	0.046	0.108	-0.010	-0.008	-0.001	0.012	0.006
Female	-0.005	0.052	0.001	0.001	0.0008	-0.001	-0.001

5.2 Regressions with interaction terms

Tables 5 and 6 provide the output for the interaction regressions specified in the previous section. Three sets of interactions with the government service variables were explored, namely race, gender and geographical area type (geotype) interactions. The exploration of interactions between key control variables and the government service variables can provide insight into whether the life satisfaction of certain groups of individuals are affected more or less by access to the specified services.

For ease of exposition, the tables show only the coefficients and marginal effects for the interaction terms. However, all three sets of regressions included also the full set of variables shown in the baseline regressions presented in Table 3 and 4. When analysing the 2009 electricity interactions, the data indicates that the interactions between electricity provision and the urban formal geotype and the Indian race group are statistically significant. Those living in urban formal areas with access to electricity are 14.4 per cent more likely to report being satisfied and 3.6 more likely to report being very satisfied. This interaction effect is perhaps not unsurprising, as individuals who live in urban formal areas are more likely to be able to utilise electricity due to having access to greater means, than those who reside in more informal or rural geotypes (who may have access, but no means to pay for utilisation). It is also possible that those in formal urban areas have a better quality of connection than those in other areas, where the connection may be weak and variable. As for the Indian interaction term, the marginal effects are very high ((i.e. Indians are 78 per cent more likely to report being satisfied and 20 per cent more likely reporting being very satisfied when they have electricity access) and should be treated with caution. Given the very small sample of Indians in the survey, this is likely driven by outlier effects. None of the 2016 interactions with the electricity variable were significant.

Moving on to the interactions with the flushed toilet variable, rather surprisingly, for both the 2009 and 2016 results, some of the interactions have negative and significant coefficients. In 2009, the interactions with flush toilet and urban formal, urban informal and traditional areas have negative and significant effects, while in 2016 the interactions with urban formal and being female have negative and significant effects. One would expect access to a flushing toilet to have no or a positive effect on an individual's SWB or life satisfaction. Bookwalter and Dalenberg (2004), who found a similar result where access to flushing toilets negatively affected SWB, suggest multicollinearity is likely to play a role in affecting the coefficients. Following their approach, when separately dropping the access to electricity or the access to

drinking water variable, the sign reverted back to a positive coefficient. This included dropping all the electricity interactions and piped water interactions, to independently test the access to flushing toilet interactions.

Finally, the interactions with the piped water variable suggest that certain groups benefit more from having access to piped water than others. In 2009, individuals living in urban informal areas who had access to piped drinking water, are 18.5 per cent and 4.6 per cent more likely to report being satisfied and very satisfied respectively. In contrast, in 2016, individuals living in urban formal areas report greater life satisfaction if they had access to piped water. Coloured individuals with access to piped drinking water are more likely to report being satisfied and very satisfied in both 2009 and 2016. Lastly, in 2016 there is a statistically significant interaction between being female and access to piped drinking water. Often women, who perform the bulk of household duties, have to walk significant distances in South Africa to retrieve drinkable water for the household, so it would be expected that having access to piped water would affect their SWB more relative to men.

Table 5: Ordered probit of life satisfaction and marginal effects with interaction terms, 2009

* p<0.10 , **p<0.05, ***p<0.01 [1]			Marginal Effects				
	Coefficient	Standard Error	Very Dissatisfied (1)	Dissatisfied (2)	Neutral (3)	Satisfied (4)	Very Satisfied (5)
Urban Formal * Electricity	0.454**	0.248	(0.046)**	(0.104)**	(0.029)**	0.144**	0.036**
Urban Formal * Piped Water	0.272	0.251	(0.028)	(0.062)	(0.018)	0.086	0.022
Urban Formal * Flushed Toilet	(0.477)**	0.241	0.049**	0.109**	0.031**	(0.151)**	(0.038)**
Urban Informal * Electricity	0.200	0.229	(0.020)	(0.046)	(0.013)	0.063	0.016
Urban Informal * Piped Water	0.584**	0.268	(0.060)**	(0.134)**	(0.038)**	0.185**	0.046**
Urban Informal * Flushed Toilet	(0.958)**	0.263	0.098**	0.220**	0.062**	(0.303)**	(0.076)**
Traditional Areas * Electricity	(0.048)	0.197	0.005	0.011	0.003	(0.015)	(0.004)
Traditional Areas * Piped Water	(0.159)	0.193	0.016	0.036	0.010	(0.050)	(0.013)
Traditional Areas * Flushed Toilet	(0.698)**	0.260	0.071**	0.160**	0.045**	(0.221)**	(0.055)**
African * Electricity	0.060	0.638	(0.006)	(0.006)	(0.004)	0.019	0.005
African * Piped water	0.420	0.421	(0.044)	(0.044)	(0.027)	0.132	0.034
African * Flushed toilet	0.829	1.367	(0.086)	(0.086)	(0.053)	0.261	0.067
Coloured * Electricity	0.036	0.681	(0.004)	(0.004)	(0.002)	0.011	0.003
Coloured * Piped Water	0.895*	0.486	(0.093)*	(0.082)*	0.057*	0.282*	0.072*
Coloured * Flushed Toilet	0.665	1.383	(0.069)	(0.069)	0.042	0.209	0.053
Indian * Electricity[2]	2.454**	0.998	(0.254)**	(0.254)**	(0.156)**	0.774**	0.197**
Female * Electricity	(0.163)	0.147	0.015	0.037	0.010	(0.051)	(0.013)
Female * Piped water	(0.087)	0.157	0.009	0.020	0.005	(0.027)	(0.007)
Female * Flushed Toilet	0.010	0.140	(0.001)	(0.002)	(0.001)	0.003	0.001

[1] A full set of controls were included for each regression, although not shown here due to space constraints.

[2] The Indian * Flushed Toilet and Indian Piped Water Interaction was automatically omitted from the regression output due to perfect collinearity.

5.3 Summary of Results

In summation, the above data analysis has provided interesting insights into the relationships between government service delivery variables and SWB. In the year 2009, the statistically significant government service variables were access to electricity and access to a flushing toilet. Both had a positive relationship with SWB. Other control variables such as unemployment, income, education and health status were statistically significant when estimating life satisfaction. In 2016, access to piped drinking water was positively and significantly related to SWB. The control variables had similar effects on SWB as in the 2009 analysis, except that the effect of lower levels of education weakened. Finally, the interaction regressions yielded some important insights into the estimation of SWB. Access to electricity in urban formal areas and access to piped drinking water in urban informal areas in 2009, as well as access to piped drinking water in urban formal areas in 2016 had additional positive effects. Interestingly, in 2016 piped water was found to be particularly important for women's SWB compared to men, consistent with women's traditional role in the household.

Table 6: Ordered probit of life satisfaction and marginal effects with interaction terms, 2016

* p<0.10 , **p<0.05, ***p<0.01 [3]			Marginal Effects				
	Coefficient	Standard Error	Very Dissatisfied (1)	Dissatisfied (2)	Neutral (3)	Satisfied (4)	Very Satisfied (5)
Urban Formal * Electricity	0.294	0.344	(0.062)	(0.050)	(0.005)	0.078	0.040
Urban Formal * Piped Water	0.471*	0.283	(0.100)*	(0.080)*	(0.007)*	0.124*	0.063*
Urban Formal * Flushed Toilet	(0.427)*	0.249	0.091*	0.073*	0.007*	(0.113)*	(0.058)*
Urban Informal * Electricity	0.156	0.318	(0.033)	(0.027)	(0.002)	0.041	0.021
Urban Informal * Piped Water	0.153	0.315	(0.033)	(0.026)	(0.002)	0.040	0.021
Urban Informal * Flushed Toilet	(0.258)	0.301	0.055	0.044	0.004	(0.068)	(0.035)
Traditional Areas * Electricity	0.179	0.319	(0.038)	(0.031)	(0.003)	0.047	0.024
Traditional Areas * Piped Water	0.053	0.253	(0.011)	(0.009)	(0.001)	0.014	0.007
Traditional Areas * Flushed Toilet	(0.183)	0.324	0.039	0.031	0.003	(0.048)	(0.025)
African * Electricity	(0.106)	0.536	0.022	0.018	0.002	(0.014)	(0.014)
African * Piped water	0.651	0.429	(0.138)	(0.111)	(0.010)	0.087	0.087
African * Flushed toilet	(0.262)	0.688	0.056	0.045	0.004	(0.035)	(0.035)
Coloured * Electricity	(0.189)	0.600	0.040	0.032	0.003	(0.025)	(0.025)
Coloured * Piped Water	1.108**	0.558	(0.235)**	(0.190)**	(0.017)**	0.149	0.129**
Coloured * Flushed Toilet	0.026	0.751	(0.005)	(0.004)	0.000	0.003	0.003
Indian * Electricity	(0.814)	1.223	0.173	0.139	0.013	(0.109)	(0.109)
Indian * Piped Water[4]	(0.440)	1.186	0.093	0.075	0.007	(0.059)	(0.059)
Female * Elec	0.027	0.107	(0.006)	(0.005)	0.000	0.028	0.014
Female * Piped Water	0.243**	0.156	(0.052)**	(0.041)**	(0.004)**	0.064**	0.033**
Female * Flushed Toilet	(0.301)*	0.140	0.064*	0.051*	0.005*	(0.079)*	(0.041)*

[3] A full set of controls were included for each regression, although not shown here due to space constraints.

[4] The Indian * Flushed Toilet and Indian Piped Water Interaction was automatically omitted from the regression output due to perfect collinearity.

6. Conclusion

Relatively few studies have looked at the relationship between government service provisioning and SWB in South Africa, and none using recent nationally representative data. The Zuma presidency saw an increase in social unrest related to problematic levels of service delivery as the backdrop, this paper sought to investigate the relationship between access to government services and life satisfaction at two points in time – 2009 and 2016.

The study made use of ordered probit models to estimate the relationship between government service delivery variables and SWB, and drew data from the SASAS surveys conducted in 2009 and 2016. The results suggest a decline in the effect that access to government services have on individuals' life satisfaction in South Africa. In 2009, access to electricity and access to a flushed toilet were both positively and significantly related to SWB. However, in 2016, only access to piped drinking water was statistically significant with a positive effect. This effect was particularly large in 2016 for those living in formal areas and for women, suggesting that service delivery affects different groups' SWB in different ways. The various control variables (unemployment, education, health, etc.) had the expected effects on SWB given evidence in the existing international and South African literature on this topic, providing some confidence in the specification and data reliability.

As to why the relationship between government service variables and SWB may have changed over time, there may be a number of reasons. The quality and stability of the government services provided may have decreased over the period (load-shedding is a clear example of this), and as a result individuals may feel that certain government services no longer significantly contribute to their SWB. This would be consistent with the rising number of protests related to service delivery in South Africa. Or, it may be the habituation effect, where individuals 'get used' to having a particular service and seeing others around them with the service. This means that the same access to that service 'counts for less' in the SWB equation over time.

This study is not without its limitations, however. A key limitation is that there is no data on the quality of the services provided (for example, the clarity of the piped water provided, or the frequency of disruptions in water or electricity provision). This means that one at present cannot distinguish between access and quality issues in the relationship identified between services and SWB in the analysis. Additionally, the SASAS data is cross sectional and as a result the ability to control for unobservable individual- or household-level factors through

fixed effects analysis, for example, is limited (although one would at least expect the direction of the effect to run from services to SWB, rather than the reverse). Therefore, insofar as these unobservables matter in the relationship between services and SWB, the estimates cannot be interpreted as causal.

Further research could integrate additional data that captures the quality of government services provided. This could provide a more nuanced analysis and provide policy makers with additional key insights into the relationship between SWB and government services. One could also make use of panel data or estimate the relationship for more data points, especially as additional datasets become available.

This information can allow policy makers to make more informed decisions and thus more effectively prioritise policy implementation.

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