



Is the public transport system failing the poor: A critical analysis of the South African Public Transport System. Case Study of Johannesburg.

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**A thesis submitted in fulfillment of the requirements of an
International Development Masters Degree**

**Palacký University Olomouc
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May 2017

Declaration of Authorship

I, Nobuhle Amanda Shange confirm that this Master's thesis *Is the public transport system failing the poor: A critical analysis of the South African Public Transport System. Case Study of Johannesburg* is my own work and I have documented all sources and material used.

In Olomouc 13 May 2017

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PALACKÝ UNIVERSITY OLOMOUC
Faculty of Science
Academic year: 2015/2016

DISSERTATION ASSIGNMENT

(PROJECT, ART WORK, ART PERFORMANCE)

First name and surname: **Bc. Amanda SHANGE NOBUHLE**
Study program: **N1301 Geography**
Identification number: **R150870**
Specialization: **International Development Studies**
Topic name: **Research Topic: Is the public transport system failing the poor: A critical analysis of the South African Public Transport System. Case Study of Johannesburg.**
Assigning department: **Department of International Development Studies**

Rules for elaboration:

The aim of the thesis is to investigate if the transport system is failing the poor, looking at some of the issues of the public transport system in terms of affordability, sustainability, safety and security. The thesis will firstly describe the various public transport systems used in South Africa and briefly naming some advantages and disadvantages. The second part will assess the public transport system which is widely used by the poor. The final part will introduce the case study of Johannesburg public transport system and how it impacts on the poor.

Scope of graphic works: **dle potřeby**
Scope of work report
(scope of dissertation): **20 - 25 tisíc slov**
Form of dissertation elaboration: **printed/electronical**
List of specialized literature:

Bhorat, H, Kanbur, R. 2006. Poverty and Policy in Post-apartheid South Africa, CPT: HSRC Press

Brebbia, C, A. 2014. Urban Transport XX, UK: WIT Press

Godard, X, Fatonzoun, I. 2002. Urban Mobility for All: La Mobilité Urbaine pour Tous, Netherlands: Swets & Zeitlinger

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Vilakazi, A, Govender, K. 2014. An Overview of Public Transport Services in Johannesburg South Africa, Germany: Lap Lambert Academic Publishing GmbH KG

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Department of International Development Studies

Date of dissertation assignment: **14 April 2016**

Date of dissertation submission: **15 April 2017**

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Olomouc, dated: 14 April 2016

Acknowledgements

I would firstly like to thank God for giving me the strength and the wisdom to complete my research paper.

To my family and friends who have been through all my good and worst times, especially my grandmother **Melta Shange** thank you for the love and support and for always encouraging me to strive for excellence. I wouldn't be the woman I am today without your love and dedication towards me.

I thank my Supervisor **Jaromír Harmáček** for supporting my ideas on this topic and for his insightful input. Thank You for being thorough, critical and for the constant advice that has made me strive for nothing but excellence. I also thank **Martin Schlossarek** for his support and guidance throughout the years I have been in the Czech Republic.

I would like to extend my gratefulness to the **European Union** for giving me the opportunity to study abroad. Thank you for the opportunity when I had almost given up on my dreams of achieving a Masters Degree.

To the Kolář family, you took me in and made me feel part of the family, I will be forever grateful for all the things you have done for me and ensuring that I am working hard on my studies.

Abstract

This thesis aimed to investigate if the public transport system is failing the poor in South Africa by critically analyzing the public transportation used by the poor in the Johannesburg area, looking at the transportation issues such as accessibility, affordability, sustainability, safety and security. The public transport system in Johannesburg is complex as it consists of buses (Metrobus and Rea Vaya Bus Rapid Transit), trains (Metrorail and Gautrain) and Minibus taxis which is a privately owned industry but works as a public transport system in South Africa. The public transportation in the Johannesburg area is widely used by those who are unable to afford their own private vehicles and are low income earners. The public transport system is riddled with many challenges and shortcomings and even with the newly established transportation there are still some issues that affect the poor's daily lives. The investigation of this thesis focuses on the public transportation that is frequently used including transport issues and how it affects the poor which will be presented in the findings.

Keywords: Public Transport, The Poor, Accessibility, Affordability, Sustainability, Minibus taxi, Rea Vaya BRT, Johannesburg.

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Chapter 1: An Introduction to the study

A progressive transport system is essential to the development of a region as well as the whole country. It is what builds networks among nations and it is crucial for the drive of the market and businesses. It is what aids commuters to get to their workplace and to their families. South Africa is in dire need of a sustainable and safe public transport although the country is making tremendous progress in terms of infrastructure and providing transport for the public, it is merely not enough as there are still problems concerning the usage of trains and buses and majority of the poor still do not have access to adequate transport.

As people become more affluent they are motivated to purchase their own vehicles as they cannot count on public transport being available at all times. Some people depend on taxis as their main source of transport but there are problems with safety and lack of respect for the passengers from the drivers. Another issue is cost, public transport in South Africa is not affordable for everyone, each plan to improve the transport system only benefits those who can afford it, however there are plans and policies in place that include the poor but the country is still struggling to get around the apartheid spatial planning in order to develop an efficient affordable transport system for everyone.

The purpose of this thesis will aim at investigating whether the transport system is failing the poor, mainly focusing on the most used public transport; minibus taxis, buses and trains. It will also be looking at some of the issues of the public transport system in terms of accessibility, affordability, sustainability, safety and security.

The thesis will attempt to describe the various public transport system used in South Africa and will assess the public transport system which is widely used by the poor while referring to the case study of Johannesburg public transport system.

1.2 Research Statement

According to the Living Conditions Survey (LCS) 2014/2015) South Africans spend a considerable amount of their salary on transport which results to transport being the second largest expenditure group at an estimated R280 billion or 16.3% of total household consumption expenditure (Stats SA). However, transport is lower than it was in 2011 when it estimated to

account for 17.1% (Stats SA, 2017). The amount of spending on public transport justifies the urgent need for a better functioning public transport system.

Johannesburg has a vast transportation system which is already mentioned above but it faces many challenges that restrict the mobility of those who can barely afford or access it. The ownership of a private vehicle is a sign of status and wealth therefore making the desire of using public transport less appealing which leads to a higher demand of private vehicles. Those who are unable to afford a private vehicle are left using public transport that is undesirable and inadequate. These inadequacies affect the poor population the most and increases the inequality that plagues South Africa.

Although transport problems for the poor has been highlighted in the past research, there is not much research done on the relationship between the poor and public transport. According to Hook (1998) the connection and inter-relationships between poverty and urban transport are poorly understood, however this is now slowly being recognised as transport is seen as a priority and a pressing issue that needs to be dealt with. The needs of the poor have to be the focal point in creating a sustainable public transport system and that is where research falls short whereby there is no clear understanding of how inadequate public transport affects the lives of the poor.

The aim of this research will be discussed in the next chapter and chapter 4 will present public transport data in the case of Johannesburg. The outcomes anticipated for this research will be useful in identifying the main problems with the public transport system that is mainly affecting the low income group.

1.3 Significance of the study and Scope

There is a sufficient amount of quantitative data on public transport that intends to improve the dire transportation problem in South Africa. This research intends to expand on the transport indicators that will be presented in chapter 4. The research will also reveal some gaps found in the quantitative data that are relevant for this study. The findings of this study will add to the existing literature on public transportation: accessibility, affordability safety and security as it investigates not only the general public but specifically focusing on the poor. The research highlights that not

all public transport is beneficial for the poor.

The scope of this research is to ensure that a clear understanding of what this research does and does not address. First, this research will address transport problems in Johannesburg that have a major effect on the commuters that are dependent on it. Public transport problems affect everyone including those who use private vehicles to access the city of Johannesburg. With transport being an essential element of people's lives, it is important to investigate the effect and draw solutions on how to improve the system. It should be noted that the research takes a look at the history of spatial planning during the apartheid era which reveals the one of the problems with the development of the Johannesburg transport system. The literature focuses on the transportation used in Johannesburg during and after the apartheid era which includes buses, taxis and trains. The review of the public transport system gives some introspect to the problems that could be affecting the poor people more that are currently ignored.

On a second note this research does not address government policy promises to improve the public transport system as it would derail the direction of where this research is heading. Although there are important points that highlight the potential economic and social benefits transport policy has. It is clear that these policies are often too broad to fit in this research and they tend to have unrealistic expectations that will need to be critically analysed and discussed. Furthermore, this research will not address transportation for those who have access to a personal vehicle and address opportunities to shift away from utilizing private cars to using public transport. However there are benefits to encouraging this shift such as environmental, energy and health benefits but there is not enough initiatives to deter private car usage. Thus, this research will only deal with public transport challenges that affect the poor.

Chapter 2: Research Design

2.1 Introduction

In this section the goals of this study will be emphasized as well as how the research will be executed using appropriate data collection methods. Due to the special circumstances of conducting the research while being in the Czech Republic has led to the decision of the use of secondary data material by respectable and valid researchers working in the field of Transportation. According to Cheng and Phillips (2014), secondary data provides much needed information that has already been properly cleaned up by professionals that is not readily available for researchers collecting primary research.

To be able to use secondary data to the fullest extent, it was important to study the previous research use of methods in order to be sure it correlated with the research topic. Although some of the past research that is analysed does not provide data that directly responds to the questions, it is important to note that it can be used to support the research study.

2.2 Aim of the study.

There is not much data out there about the public transport system in South Africa especially focused on its provisions for the poor. The aim of this research is to close the gap of the lack of information on public transport and the poor. This research will provide some introspect on the issues that surround South Africa's public transport system which could lead to aiding planners and developers to creating an all inclusive public transport system. The main aim, goal and focus of this study is to answer the main question: *Is the Public Transport System in South Africa failing the poor? A critical analysis of the South African Public Transport System. Case Study of Johannesburg.*

2.3 Research Questions

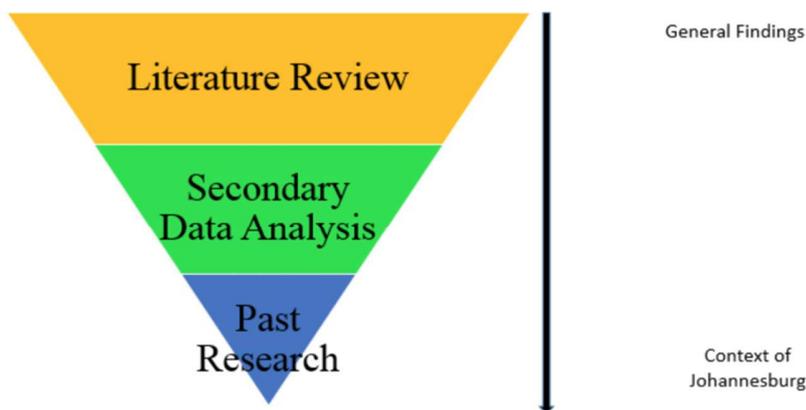
1. What are the public transport challenges facing South Africa?
2. Which modes of transport is frequently used by the low income groups in Johannesburg?

3. Is the public transport affordable for the low income groups in South Africa?
4. Is public transport accessible to the low income groups?
5. What problems do commuters have with the public transport they utilize on the daily?

2.4 Data Collection Procedure

This research makes use of three separate research methods that are presented as an inverse pyramid with each level down becoming more context specific to the Public Transport system in South Africa: Johannesburg.

Figure 1: Inverted Pyramid Diagram



Source: (Brech, 2013)

2.4.1 Literature review

The first method used for this research is that of a comprehensive literature review that will be presented in chapter 3. The literature review forms a basis of the theoretical framework of this study. It also solidifies the reliability, suitability and adequacy of the data. The literature review section provides an almost chronological development of the public transport industry starting off with the development of the city which highlights the difficult past of the apartheid era.

The development of the apartheid city is imperative to this study as it reveals the challenges of public transport reforms and how it has affected the most disadvantaged group of people: the poor. The review goes on to mention the modes of transport used during and after the time of apartheid (Buses, minibus taxis and rail transport) which reveals the challenges of the public transport system that affect commuters. The review goes on to look at accessibility and affordability which are some of the core themes which will be analysed in Chapter 4.

The literature review will identify the writings on public transport in South Africa especially in the case of the city of Johannesburg. The review also takes a look at other countries that have similar cases relevant to this study. This has been accepted earlier on that it will provide a sufficient look at the considerable literature on the topic. Therefore this review will often refer to findings that are outside of South Africa such as other developing and developed countries.

On a concluding note, the resources for this literature were obtained from a variety of sources including academic, government, and literature reviews which will be mentioned in this chapter in the next section describing secondary data analysis. The literature is deemed important source of material for this research of public transport.

2.4.2 Secondary Data Analysis

The second method utilized in this research is secondary data analysis also known as second-hand analysis. It was selected for this research considering the costs, distance and time. Secondary data refers to data that is already available and has been collected by someone else (Kothari, 2004). The collection of data involved reading through countless information that is available on the internet using sites that provide statistical information and other relevant information pertaining to the research topic.

The sources of secondary data were found in sites that have official statistics information which is collected by governments and their departments, this form of data is assumed to be reliable, suitable and adequate which are features of the secondary data that are required (Kothari, 2004). For example Statistics South Africa and the Department of Transport provides National Household Travel Survey (NHTS) data which was concluded 2013 to be made available for the year 2015.

Other types of secondary data sources included scholarly journals on transport written by experts. These were useful in providing qualitative data relevant to the study and it assisted in checking the consistency of the data found on the official government sites. Literature review articles were also utilized as they contained original research data that is appropriate for the topic about public transportation.

As already mentioned above the method utilized in this research was the collection of existing demographic data for Johannesburg. This was collected from Stats SA using the 2011 Census of population as the 2016/17 Census of Population data was not yet readily available. Data on public transport indicators was collected from The Department of Transport (DOT) Annual Report of 2012/13 and comparing it to other data available from the Gauteng Province Household Survey of 2014 and the Mobility Report in the Gauteng City Region 2014. Utilizing the data collected in the Gauteng City region gave access to data pertaining to the city of Johannesburg that was not adequately available.

2.4.3 Limitations of using Secondary data

The nature of secondary analysis of existing data that is available are not collected to address the particular research question (Cheng and Phillips, 2014). Therefore the research relied heavily on the quantitative data in order to draw its own conclusions. Although the data was precise and consistent, it lacked the specific information of population subgroups especially the low income group that the research is focused on. It gave a general data that was not robust enough to explain complex issues. For example the data about why some people used a specific mode of transport than the other is not mentioned. Another limitation of this research is that there was no questionnaires at the end of the collected quantitative data. Gaining an introspect in what questions were asked would have revealed if they were in line with the questions mentioned in this research. This is not to say the limits have made this research void as there was a lot of data used and covered most of the case study in chapter four.

2.4.4 Past Research Findings

In an attempt to answer the research questions, three themes, which are accessibility, affordability, safety and security, were in mind that could aid in this investigative question to find out if the transportation system in South Africa was failing the poor. These themes form an integral part to this investigation as they have been mentioned in the literature review and in the findings of this thesis.

This research incorporates findings from past research surveys undertaken in South Africa relating to transportation used in South Africa that is relevant to the case study of Johannesburg. The results were not specifically responding to the three themes but they did provide information that was used to supplement the other findings of this research. The findings are relevant and contribute a significant critical analysis view of the public transportation on the case of Johannesburg.

2.4.5 National Household Travel Survey (NHTS) Gauteng Province 2014

The NHTS Gauteng survey (2014), sample design is based on the Census of 2011 enumeration areas. The phases of data collection consisted of three stages which are: Pre-enumeration (planning, publicity, listing, quality assurance, Forward logistics and training); Enumeration (Publicity, completion of questionnaires, quality assurance and capturing); Post-Enumeration (Reverse logistics, data presenting, analysis, compilation of metadata, data and report dissemination).

The data collection took place between February and March 2013. A total of 51 341 households or dwelling units were sampled, using a random stratified sample design. The response rate in the Gauteng province was counted to be 85.7. According to the National Household Survey in South Africa the finding can be considered to be representative of the population of South Africa and can be analysed and reported on provincial, municipal and Transport Analysis Zone (TAZ) levels.

2.4.6 State of Transport Opinion Poll South Africa Survey 2016

Heyns and Luke undertook telephone surveys of at least 1000 South Africans aged 18 years and over and representative of all South African Provinces. The telephonic interviews were conducted by a market research company using trained interviewers. There were 1090 South Africans willing to participate out of a list of 5000 prospective respondents that were randomly selected. The random and quota sampling are representatives of the geographical and socio-demographic (provincial, ethnic, and employment status) characteristics of the population of South Africa. This survey provides a look at transportation in South Africa through the lens of the users and not the service providers. The findings provide qualitative data in the form of comments from the users.

2.4.7 Structure of the Research

This dissertation is structured into five chapters. The introductory chapter expresses the important features of the research which provide the context, motivations and scope of the study. Chapter two presents and justifies selected and applied research used in the study.

Chapter three presents the literature review which also forms the theoretical background regarding central issues of the topic. The literature utilized provides background to the establishment of public transport in South Africa. It examines some of the necessary themes relevant to answering the research questions of this study such as affordability and accessibility of public transport; transport challenges; and the emergence of the BRT and Gautrain.

Chapter four begins with a description of the city of Johannesburg followed by a presentation of overall transport indicators that are relevant to the aforementioned themes of this research. Chapter five presents a discussion of the findings of this research as well as providing recommendations.

Chapters six provides conclusions of the study and future research ideas in the field of public transport.

Chapter 3: Literature Review

3.1 Introduction

There is extensive quantitative data on the public transportation system that suggests that the South African state invests a substantial amount on public transport. According to The Department of Transport (DoT) (2013), The National Land Transport Transition Act of 2000 states that public transport subsidies should be targeted at “currently marginalized users and those who have poor access to social and economic activity.” Although the public service industry has improved over the years overcoming spatial difficulties, city designs and government policies there is still the question if the public transport is affordable to the poor civilians.

3.2 Poverty and Transport

According to Starkey and Hine (2014:7), more than half of the worlds population live in urban areas and the number of people is expected to grow. Due to the high density in cities, there is a need to accommodate motorised transport in the city and build low density housing on the outskirts (Starkey and Hine, 2014). In the case of Johannesburg low cost housing exists on the city outskirts which is populated by the poor. The further away they are from the city increases travel distances which causes difficulties to access public services due to public transport problems. Starkey and Hine (2014), mention that transport interventions such as new roads, metros, bus rapid transit are designed to reduce urban congestion due to increased car use and this could disproportionately benefit wealthier sections of the population unless properly designed. The studies on poverty and transport were not directly linked but now there have been case studies and other research that look at transport burden of the poor people in both urban and rural contexts (Starkey and Hine, 2014).

According to Titheridge, Christie, Mackett, Hernandez and Ye (2014), three groups of literature dominate research on the subject of transport and poverty which are; social exclusion, spatial mismatch and entrapment theory and social justice. These theories provide supporting evidence that there is a link between transport issues and the effects it has on the poor, justifying the research topic mentioned above.

According to Arnott (1997), the spatial mismatch hypothesis was first articulated by John Kain in 1964 whereby his paper on *Housing Segregation, Negro Employment and Metropolitan Decentralisation* provided the first statement and empirical investigation of the hypothesis. Since then there has been various empirical studies that focus on the hypothesis or relate to the aspect of it (Arnott, 1997). The spatial mismatch theory explores the relationship between transport and poverty from a geographical perspective whereby it focused on spatial barriers poor people face to access jobs in a context of suburbanization and high car-dependency (Arnott 1997, Titheridge et al 2014). People who could afford to pay more for transport move to suburban as well as retail and other services follow, taking jobs with them (Starkey and Hine 2014, Titheridge et al 2014).

In the case of Johannesburg, development is occurring Northwards where the wealthy reside, making access to jobs and service impossible for the poor residing on the outskirts. Therefore, spatial mismatch explains the generation of barriers for access to income resulting from the three-way dynamic relationship between jobs, housing and transport network (Sanchez, 2008). According to Titheridge et al (2014), the recent studies deriving from spatial mismatch theory address the effects of skills mismatch resulting from low-level education and production of spatial entrapment. Poor households have limited access to jobs, education and healthcare as they face transport deprivation. Women and children from poor households face limited mobility as they have household responsibilities and constrained schedules that often don't justify long commutes (Titheridge et al, 2014).

Social exclusion theory focuses more on the consequences of transport deprivation rather than the processes leading to it as explained above. According to Church et al 2000, the social exclusion theory is from social sciences and it is based on a term developed by the French in the early 1970s. It refers to the loss of the ability to connect with the services and facilities that are needed for full participation in society (Church et al, 2002). There are six categories besides geographies that can produce social exclusion identified by Church et al (2000), which are: physical impairments, barriers for accessing a given service, affordability, time limitations, fear of crime, and regulatory restrictions. The spatial approach to examine social exclusion influences how resources are allocated (Church et al, 2014). According to Titheridge et al (2014), social exclusion can be used in terms of access being addressed both in quantitative and qualitatively. It has been used in policy in several countries, mainly Europe looking at transport related disadvantages (Titheridge et al,

2014).

Lastly, the Social Justice Approach examines transport related disadvantages and their link to poverty from a perspective of inequality (Titheridge et al, 2014). According to Titheridge et al (2014), this approach relates more to the underlying idea of equality of access, therefore policies should focus on offering the best benefit to the disadvantaged members of society. This approach is mainly qualitative but can be applied to quantitative indicators for the analysis of transport-related inequalities (Lucas, 2012). These concepts, relations and theories of transport and poverty can be modified and used in framing the transportation issues and the effects it has on the poor.

3.3 Defining the poor

"A "poor" person was by definition someone without enough to eat."

(Banerjee and Duflo, 2006:4).

According to Banerjee and Duflo (2006) the identification of the poor using purchasing power parity exchange rates which are considered to be essential to compute a uniform poverty line, are deemed to be inadequate, infrequently updated and inapplicable to the consumption of the extremely poor. According to Statistics South Africa Technical Report (2008), poverty is measured using poverty line measures that provide statistical standards and a systematic approach to reporting monetary poverty indicators. The indicators include poverty levels such as; the headcount index, poverty depth and inequality indicators such as decile shares, Gini coefficient (Statistics South Africa, 2008). When providing non-monetary information such as access to basic services, educational attainment on households and individuals, there is a possibility to obtain statistical profiles of non-monetary indicators for various poverty groups (Statistics South Africa, 2008). Due to the large amount of people working in the informal sector, income expenditure indicators are not reliable. Low income households are employed in the informal sectors, their income tends to be difficult to measure as it is due to change (Banerjee and Duflo, 2006).

Therefore, poverty lines come from cost-of-basic-needs approach which calculates the minimum amount of money needed to survive including both food and non-food. Those who fall beneath this line are considered to be living in poverty (Statistics South Africa, 2008). Poverty in South

Africa is an undeniable reality for millions of people which exists in different forms of intensity and scale. Many of the poor reside in cities living in dire conditions with poor access to basic public services including transportation. With an increasing population and a large scale of poverty has required planners, policy and decision makers to focus on finding ways and solutions to reduce its impact on the poor. Therefore, the poor in South Africa are known as those living below the poverty line.

The poorest people in the city of Johannesburg can be located geographically by looking at the geographical map in Appendix E, the red circles indicate where the poorest people reside. These areas have common characteristics lack of public facilities and amenities as well as to social policy enabling them to participate in public affairs (De Wet et al, 2008). According to Kalthier (2002) the poor have common issues of; poor access to secure income sources; poor access to health facilities such as doctors, midwives and hospitals; poor access to educational institutions such as primary and secondary modern schools, vocational training institutions and higher education institutions; poor access to safe accommodation; and poor access to other social-cultural institutions.

People who live in these conditions are therefore known as the urban poor (Kalthier, 2002). According to Poswa (2008), the urban poor in South Africa lack access to adequate basic quantity of potable drinking water, sanitation, minimum energy requirements and have limited access to mobility and public transportation. The urban poor are subjected to vulnerable settlements which leads to a multitude of problems and basic access to the public facilities mentioned above. The people living in these areas have different financial incomes but they share the same access and services problems which makes them the urban poor.

3.2 Apartheid Spatial Planning and its impacts on the Development of Transport.

The transport system situation in South Africa is known to be plagued by the inherited Apartheid Spatial Planning which has made it difficult for planners to correct the legacy of the past. Apartheid is characterized by its central policy of 'divide and rule' which was aimed at ensuring white survival and hegemony (Christopher, 1987).

According to Christopher (1987), Apartheid in South Africa shaped the development of cities, townships and informal settlements. When looking at the city of Johannesburg it is evident that the black population that flocked the city lived in places that were closer to their workplace which is why there are areas which are occupied with inadequate infrastructure. Khosa (2002) mentions that post- 1994 there has been an influx of commuters to the city center.

“One of the greatest spatial challenges to overcome in the post-apartheid city is the inequality and spatial inefficiency caused by apartheid planning. Not surprisingly a World Bank report of the early 1990s considered South Africa’s cities among the most inefficient in the world. Cities were (are) characterized by low-density sprawl, fragmentation and separation, all of these contributing to the dysfunctional structure where privilege was racially determined. Over a period of four decades, black South Africans were systematically marginalized, among others, in terms of accommodation, leisure, employment, and transport. Structural deficiencies in the former apartheid city, resulting from segregation and low-density sprawl, created long-distance work-travel patterns.” (Donaldson, 2006:344)

Racial segregation in South Africa affected the pattern of the urban area and thus resulted to the emergence of the Apartheid City (Christopher 1987, Khosa 1995, Harrison and Zack 2012). Christopher (1987) realizes before Apartheid Cities emerged there were colonial cities whereby an area consisted of mixed races but the white population occupied better parts of the city and the black population were confined on the peripheries. Even to this day there are still remaining effects of apartheid that can be witnessed in the settlement patterns which are riddled with inefficiencies and inequality. Donaldson (2006) argues that these spatial inequalities and efficiencies that are caused by apartheid planning remain a spatial challenge in post- apartheid South African cities.

The Native’s Land Act of 1913 was a colonial law which sparked early separation which reserved nearly 90% of the land in South Africa for a tiny minority white population, which was found to be in better geographical settings (Mabin, 1986). Land use zoning was used to achieve the legislation put in place. It is quite evident that the inadequate transport system in Johannesburg is caused by the political history of South Africa which has transgressed to this millennium.

The Natives (Urban Areas) Act of 1923 entrenched the separation between planning for ‘locations’ and planning for the rest of urban South Africa (Christopher, 1987). It is arguable that this measure,

more than any other, underlay the division of planning as a technical exercise from the social reformist vision which had inspired its founders internationally and its apostles in South Africa (Mabin, 1986). The law of segregation made it difficult for people living on the outskirts of the main city to move around thus creating a lack of transportation corridors.

During the Apartheid Era, from 1948 to 1994, the ruling Nationalist Party, dominated by white Afrikaners, passed laws that institutionalized legal segregation, formalized racial categories and restrictions on movement, and embedded apartheid physically in the landscape (Christopher, 1987, Mabin 1986). Cities were designated whites and townships became, in effect, the mechanism for housing the black labour force. Such policies enhanced the growth of separate townships across the country at all scales from cities like Cape Town and Johannesburg to the smallest villages. Racially motivated land tenure policies were officially repealed in 1994, following the democratic election that brought the African National Congress party to power, but there persists a class barrier that follows the old racial lines (Christopher, 1987).

The main use of transport at that time was to transport labourers to their workplace which meant that the poor were subjected to travelling by foot, bicycle or by minibus taxis whilst the rich that stayed within the city used private vehicles (Thomas, 2013). The use of commuter buses that were subsidized by the apartheid government furthered segregation as the black people had only a limited number of seats and the rest of the other seats were reserved for the white people (Sey, 2008, Walters, 2012).

3.2.1 History of Bus Operations

Buses played a major role in the history of public transportation especially for black commuters travelling long distances to and from Bantustans (Sey, 2008, McCarthy and Swilling, 1985). The bus transport system originated in 1930 when the state intervened to reorganize the fragmented transport system that was dominated by the private transport carriers (McCarthy and Swilling, 1985).

State policy on transportation revealed racial bias whereby the Motor Carrier Transportation Act of 1930 dominated over the African bus and taxi industry and ran this industry out of business.

Black commuters at the time relied on the African bus and taxi industry as it was the only mode of transport that delivered them to their homes which was on the periphery away from the main city (McCarthy and Swilling, 1985).

The monopoly of the bus industry enabled the increase on fares which resulted in protests (McCarthy and Swilling, 1985). The bus industry was poorly subsidized and underfunded, black commuters were struggling to get adequate transport which led to the bus boycotts (Khosha, 1995). The Alexandra bus boycotts was one of the most significant protests to shift transport policy and entrench the Bantu Transport Service Act of 1957 that still exist today (McCarthy and Swilling, 1985).

Public Utility Corporation (Putco) is one of the first and oldest bus companies in South Africa which is still operating today. Although there was a breakdown of the bus service which ceased to operate on the 30th of June 2015 due to financial problems, there were protests which demanded the company to provide transport. This led to Putco renew their contract to provide transport for 350000 passengers in Gauteng, Mpumalanga and Limpopo (Zwane, 2016).

However Putco buses played a major role in the history of South African transport as it provided transport to non-whites. The bus boycotts of 1950 negatively impacted on the this industry as the violent protests led to the burning of buses and people would seek other modes of transport such as taxis, lorries and horse carts (Khoza, 1995). The Bantu Transport Service Act of 1957 shifted black transport subsidies from the Natives Affairs Department to the Transport Department (McCarthy and Swilling, 1985). These subsidies that were established for black commuters had their flaws as it did not include all classes of labour or the unemployed (Khosha, 1995).

This Act shifted the responsibility of black transport subsidies from the Natives Affairs Department to the Transport Department (McCarthy and Swilling 1985). Although subsidies were provided for Blacks, it did not include all classes of labour nor did it include the unemployed (Khosha 1995). The Taxi Industry developed during the apartheid era and was one of the few areas where African entrepreneurs could operate.

3.2.2 Taxi Association's big role in Public Transport.

The taxi industry revolutionary growth began in the 1980s whereby the taxi association had a strong bargaining power in mobilizing the involvement of big business in the industry and the financial means (Khosa, 1995).

The taxi industry has been a long standing form of public transport that was predominantly used by the black community and it was the only transport industry that the black race could be employed in during the apartheid era (Lomme, 2008). During the nineties mini-bus taxis were operational due to the Motor Carrier Transportation Act of 1930 (Sey 2008).

The industry did have its difficulties when it started expanding leading to the government to prevent taxis from operating. They deregulated the whole taxi industry with the Transport Deregulation Act of 1988 (Sey, 2008). Taxis were to only operate using the 16 seater policy, as the industry continued to grow the Taxi Association joined the South African Black Taxi Association in 1979 during that time only 21 taxis joined (Sey, 2008).

The taxi industry formed informal and formal taxi ranks, the growth of individuals entering the taxi industry resulted in illegal operation of unregistered taxis and because the government was not paying attention to the industry there was a lot of corruption and taxi violence (Barrett 2003, Sey 2008). The taxi violence escalated in 1993 during the times of the intensified political affairs which had to do with the upcoming elections (Sey, 2008, Dugard, 2001). When the ANC came into power in 1994 they came up with policies to end taxi violence by establishing the National Taxi Task Team (NTTT) in 1995 (Sey, 2008).

The taxi industry has continued to grow and it is one of the biggest public transport system in South Africa that transports majority of the population. In an effort to increase the quality of minibus taxis the government initiated the Taxi Recapitalization Program in 1999 (Barrett, 2003). It was aimed at providing high quality and safe transportation for the people by getting rid of the old taxi fleets and replacing them with new ones as well as providing training for the drivers in customer care (Barrett, 2003). However, the government has failed to stick to promises and goals of this program which has resulted to many minibus taxis to use taxis that are not roadworthy and unlicensed vehicles.

The taxi industry which is riddled with violence and corruption is threatened by any new road public transportation that is cheaper and efficient. The new subsidized public transport; Rea Vaya BRT is causing more tension and will be discussed later below. The problems experienced by the taxi industry also affects the people in a major way such as when taxis go on strike their protests are violent and can cause other public transport to stop operating. This leads to people missing work and losing out on income.

3.2.3 Rail Transport

There is not much literature published about passenger rail transport in South Africa, however, the railway system dates all the back to the late 1850s when the concept of rail transport was proposed for the Cape and Natal Colonies (Metrorail, 2007). In the Gauteng area the first passenger commuter train was introduced on the 17th March 1890 to run the 20km between Johannesburg and Boksburg (Metrorail, 2007). Although the passenger rail sector has come a long way it has received some negative backlash from commuters who are not happy with the operations of this system (NHTS Gauteng, 2014).

According to Shaw (2006) and Schalkwyk (2008), the passenger rail sector carries the least number of commuters, despite it being the cheapest mode of transportation in South Africa. The Department of Transport (2003) stated that the passenger rail sector moved about 585000 passengers per day. This number has grown due to the increasing population density in the cities but not as much as other modes of transport. Therefore, passenger rail in South Africa is facing many challenges to keep up with the growing number of commuters as the lack financial means to roll out new train fleets (Metrorail, 2007).

Consequently, train commuters are affected by these inadequacies on top of that trains are not easily accessible, commuters wake up early in the morning and travel long distances to catch the first train and risk having to wait for a long time at the stations (Department of Transport, 2003). The improvement of passenger rail could make train travel efficient within dense corridors (Shaw, 2006). According to Metrorail (2007), passenger rail has the potential to be the most efficient, affordable and safe mode but the problems of funding and maintenance hinders it from achieving its objectives.

3.3 Post –Apartheid Transport Solution

The Gautrain and the Rea Vaya BRT system were designed to provide world class public transport that will be reliable, efficient, safe and cheap. The BRT system which was part of the city's revitalization plan to bring back business back into the city center has its successes and failures especially when it comes to the needs of the commuters in the city. On the other hand the Gautrain was designed to commute people coming from the airport which was clearly an effort to provide transport for those who can afford it which further perpetuated inequality.

3.3.1 Gautrain entrenching further inequality

The government spared no expenses when it came to the development of the Gautrain Rapid Rail Project which connects Tshwane/Pretoria, Johannesburg and the OR Tambo Airport (Gautrain, 2017). The Gautrain which is South Africa's luxury fast train, travels at a speed of 160 to 180 kilometers per hour (Gautrain, 2017). It has ten stations over the distance of 80 kilometers which are;

- Hatfield
- Pretoria
- Centurion
- Midrand
- Marlboro
- Sandton
- Rosebank
- Park Station
- Rhodesfield
- OR Tambo

Gauteng has the highest number of cars of per kilometer in the road in South Africa. This causes a negative effect to the environment due to the amount of air pollution that is emitted (Gautrain, 2017a). The Gautrain project was mainly targeted to car users travelling between Johannesburg and the Tswana region it also targeted airport passengers in an effort to reduce the usage of private cars (Gauteng, 2017a). The Gauteng Provincial government stated that the project brings a lot of

positives for the country such as; generating economic growth by creating jobs related to the project; it will ease traffic congestion between Johannesburg and Tshwane; it will also stimulate growth through tourism promotion; and develop an environmentally friendly mode of transport for the region (Gautrain 2017a).

Box 1: Gautrain Fares converted into Czech Koruna

To/from OR Tambo	Single Train
Sandton	R151- Kč 274,39
Marlboro	R151- Kč 274,39
Rhodesfield	R151- Kč 274,39
Rosebank	R162- Kč 293,77
Park	R162- Kč 293,77
Midrand	R162- Kč 293,77
Centurion	R174- Kč 315,33
Pretoria	R174- Kč 315,33
Hatfield	R174- Kč 315,33

(Gautrain, 2017c)

Since the beginning of its operation the Gautrain revealed some problems that were critically analysed before it became operational. When observing the provincial government’s motives in implementing this project and the amount of money that was spent reveals some interconnected

issues regarding the project. Firstly the target group for this project is for the wealthy commuters rather than the poor. This exclusion is one of the reasons why the South African transport is failing the poor. Instead of focusing on providing public transport that will be affordable and accessible to everyone, funds are pooled in to provide transport for the elite class of citizens.

These concerns were recognized in 2005 by The national government's Portfolio Committee on transport (2005) when they recommended that the project should not be implemented because of the ticket prices and the up-market location of the majority stations (Thomas, 2016). The Gautrain has further perpetuated inequality between the rich and the poor and has entrenched mobility related exclusions. Thomas (2016) mentions that the issue with mobility related exclusion creates a two-tier system of transport which is based on geographically distinct areas of the province.

The allocation of resources to keep this project running is not feasible as there are other unexplored alternatives that are much more cost effective and beneficial for the poor people in South Africa. Other less expensive alternatives include designated bus lanes, electric trolleybuses or light rail system that would be affordable and accessible to all (Van der Westhuizen, 2007). These alternatives have not been debated by the provincial government to the fullest extent as there is no evidence to say that there are such alternatives that have been planned for future developments.

The problems with the Gautrain project sparked many debates and disapprovals before it even existed but the project still continued and functioning today, why? Van der Westhuizen (2007) argues that the mega project is a political symbol that is associated with the government in power at the time. It is meant to show how progressed the country is becoming and modern enough to be 'up there' in international affairs.

Thomas (2016) mentions that Jane Barrett eludes that Mbhazima Shilowa who was the Gauteng Premier had an idea of a smart train and wanted a legacy project that would have his name on it. Which is why the Gautrain is often referred to as the Shilowa express. This would explain why a project such as the Gautrain with so many flaws would be continued without a second thought or considerations for less expensive alternatives that would be beneficial to the underprivileged population of the city.

Van der Westhuizen (2007) argues that, Political symbolism overrides utilitarian or rational considerations when it comes to mega-projects. He elucidates that the Gautrain needs to be

understood as South Africa's entrance to modernity above all other African states (Van der Westhuizen, 2007). The importance of the country's modern image shows that the government's unwillingness to really plan and implement all-inclusive transportation projects further entrenches inequality. The elite continue to enjoy state privileges while the poor are left destitute in terms of transportation needs.

3.3.2 Rea Vaya Bus Rapid Transit (BRT)

In order to provide an affordable transport system, Rea Vaya, Bus Rapid Transit (BRT) was implemented (Allen, 2013). The FIFA World Cup 2010 is said to have inspired the South African government to upgrade the transport system by providing transport that will be viable, safe and reliable (Allen, 2013). The Rea Vaya, which means 'we are going' in Sesotho, is Johannesburg's own BRT system. Other countries which have this form of transport system are; Brazil, Colombia, Nigeria, India and the United States. In these countries the BRT system has been deemed to be implemented successfully (Kumar et al, 2011).

The BRT was initiated in the Department of Transport's Public Transport Strategy Action Plans of 2007 (Thomas, 2016). Unlike the Gautrain the project connects the townships and the main city by providing buses with dedicated bus lanes and stations that are accessible to individuals. The Rea Vaya BRT system connects people residing in Soweto to the core of Johannesburg and does a much better job in connecting people from historically segregated areas to their places of work (Thomas, 2016). It is also much less expensive than the Gautrain and the project has been cost-efficient to meeting the needs of the people.

According to Wright and Hook (2007), some of the common advantages of BRT systems are:

- Dedicated bus lanes, mixed traffic lanes, reserved lanes on freeways.
- This provides exclusive right of way to buses allowing them to reach
- Greater speeds than conventional buses.
- Level boarding, off-boarding fare payment and multiple doors for
- boarding all allow for ease of passenger flow on to buses
- Intelligent Transportation Systems (ITS) are more commonly used in developed countries

because of its capital cost. ITS provide buses with real time information and bus signal priority (Wright and Hook 2007)

Although the BRT system is one of the most promising projects that is currently running, it also has its fair share of challenges. One of the major challenges has been integrating it with the minibus taxi industry. Walters (2012) noted that taxi owners and their drivers were concerned about their future earnings as some of their taxi vehicles had to be removed from the route. This would obviously lead to job losses and loss of revenue.

Although there were formal meetings and many negotiations with the Regional Taxi Council (GJRTC) and The Top Six management positions which represent 100 taxi Associations in Johannesburg they were still not satisfied with the deal. This hostile transition causes many delays in implementing the project in new sections as the negotiations are long and challenging and this leads to fewer overall jobs in the transport sector (Walters, 2012). This lack of integration between the BRT and the taxi industry causes problems for commuters as well. There have been countless of cases whereby BRT bus drivers and commuters are threatened and intimidated by the taxi drivers.

Thomas (2016) notes that another concern relates to a larger problem with public transport in the region where there is a lack of overall integration and holistic thinking. The BRT was implemented after the Gautrain which was a standalone project, planners did not consider how to integrate it with other modes of transport (Thomas, 2016). This lack of integration with the existing transport that is available will lead to future planning flaws whereby new transport plans will overlap the current transport situation.

Figure 2: Rea Vaya fares converted to Czech Koruna

Journey length	2015/16 Fares	Czech Koruna	2016/16 Fares	Czech Koruna
0 - 5km	R5.80	Kč 10,54	R6.20	Kč 11,79
5.1 - 10km	R7.60	Kč 13,82	R8.10	Kč 14,70
10.1 - 15km	R9.50	Kč17,27	R10.10	Kč 18,33
15.1 - 25km	R11.30	Kč20,54	R12.00	Kč 21,77
25.1 - 35km	R12.20	Kč22,17	R12.90	Kč 23,41
More than 35km	R13.30	Kč24,17	R14.10	Kč 25,59
Penalty fees	R13.30	Kč24,17	R14.10	Kč 25,59
Single trip cards	R13.80	Kč24,17	R14.60	Kč 26,49
Double trip cards	R26.50	Kč48,16	R29.20	Kč 52,95

Source: (Rea Vaya, 2017)

3.3.3 Defining Sustainable Transport.

In order to understand the concept of sustainable transport this section will provide definitions from different authors to cover the multi dimensions of sustainable transport.

According to Black (1996) Sustainable Transport is transport that meets the current transport and mobility needs without compromising the ability of future generations to meet these needs. This definition is based on the 1987 Brundtland report definition of sustainable development (Black, 1996). Since the Brundtland Commission was issued there have been many changes that have taken place to ensure environmental sustainability which touched on different areas of expertise such as transport which is the main focus of this research.

According to Schipper (1996) Sustainable transport is transportation where the beneficiaries pay their full social costs, including those that would be paid by future generations. He generally attributes non-sustainability to the negative externalities generated by transport (Schipper, 1996).

Akinyemi and Zuidgest (2000) define sustainable transport as a transport system that meets the needs of the people in terms accessibility, mobility and safety. They reinforce that sustainable transportation development is a combination of sustainable development and transportation

(Akinyemi and Zuidgest 2000). They explain that the concept of sustainable development can be applied to the idea of a transportation system.

Transport Research Board (2008) states that sustainable transport allows the basic access and development needs of individuals, companies and society to be met safely and in a manner consistent with human, ecosystem and health and it promotes equity within and between successive generations. Therefore sustainable transport is affordable, operated fairly and efficiently, offers a choice of transport mode and supports a competitive economy as a balanced regional development (Transport Research Board, 2008).

The Gautrain project aimed at the reduction of car use to reduce carbon emissions is deemed to be sustainable by the Gautrain management. There is no evidence or literature that proves that the Gautrain uses sustainable energy but their websites states that the Gautrain will reduce air pollution CO₂ emissions by 70 tons (Gautrain, 2017b). However, on a grand scheme of things one can argue that it is not sustainable due to it using electricity. Majority of the electricity generated in South Africa comes from coal and it feeds other local industries too. With the ever occurring power outages in South Africa leaves railway commuters stranded and those who can only afford to use Metrorail are left with no other alternatives. Sustainable transport requires balanced approaches towards its multiple dimensions of development.

3.3.4 The Importance of Accessibility

Accessibility is a dominant concept to the sustainable transport argument. According to Munier (2007) transport access is the crucial objective of practically all commuting and therefore it is a key influence for trip generation and distance. Inaccessibility is then a major cause of social exclusion in studies of the poor in urban areas (Gwilliam, 2003). Littman (2008) defines access as a measure of ease whereby destinations can be reached and Vasconcellos (2001) defines access as a great measure of flexibility in selecting mode of transportation to specific destinations. The definitions of access suggest that access has elements of being a product, a good and service. In this case, transport and accessibility are closely interlinked as public transport provides access to services such as better health care and education (Sohail et al, 2006).

Accessibility could help with future plans of land development whereby it will include all groups of people who are disadvantaged and underprivileged (Deng and Nelson, 2013). Planners in Barcelona have achieved to decrease the use of cars and encourage people to cycle and walk by creating ample space to do so. This is possible due to the fact that the city has a perfect spatial grid. This has improved economic activity and people to have access to social and economic opportunities. According to Geurs and Wee (2004) accessibility has influence on travel demand as well as social and economic opportunities.

Accessibility plays an important role in the economic development of cities as it connects people and businesses. Munier (2007) and Vasconcellos (2001) argue that accessibility is often confused with mobility, whereby mobility is the ability to move and it is largely a product of income and physical health. Transportation planning tends to be focused on mobility as a measure for building transport efficiency and planning. In the case of South Africa transport and mobility have been the main focus to overcome the apartheid spatial difficulties and that has led to urban sprawl. Herala (2003) and Vasconcellos (2001) mentions that the middle to high income, healthy citizens benefit from this urban spatial arrangement at the expense of the underprivileged and disabled by propagating the use of private cars and encouraging urban sprawl. Therefore making other alternatives to transport such as walking which is not recognized as a form of transport in literature, it becomes an unrealistic transportation mode because travel distances become longer and travel conditions are more dangerous and risky.

Many of the poor population are subjected to living on the peripheries this could be due to the fact that majority of cheap and unoccupied land is located on the outskirts of the city. According to Rodrigue *et al* (2006) states that all locations have some level of accessibility, however, there are some locations that are more accessible than others and because of transport these locations will have higher land values. According to The Department of Transport (2007) land on the peripheries is abundant and cheap. The South African Reconstruction Development Plan of 1994 built millions of houses for the impoverished populations (Bond, 1999), but many of the houses are built on the peripheries where people have little to no access to public transport. With a burgeoning car oriented city it still manages to cut off poor people's abilities to access services and economic opportunities around the city.

Public transport in developing countries is not only used by the poor but also the middle and high

income groups. Even though these groups are affected by the problems of urban sprawl, the impact is felt differently whereby the poor experience the most shocks. That is why transportation planning needs to be informed by these elements mentioned above in order to achieve integration between transport and land use planning. The aim of transportation planning should be focused on the connectivity of urban areas and improvement of the quality of life, rather than to focus on predictions regarding future congestion levels.

3.3.5 Affordability of Public Transport in South Africa

According to Statistic South Africa (Stats SA) survey, the poorest households spend most of their money on transport costs. Studies have shown that people spend more than 20% of their disposable income on public transport whereas Public transport is considered to be affordable when commuters spend only 10% of their disposable income (Stats SA, 2013).

According to Carruthers, et al (2005:1) “Affordability” refers to the extent to which the financial cost of journeys put an individual or household in the position of having to make sacrifices to travel or the extent to which they can afford to travel when they want to. In some cases people are not able to afford public transport leading them to walk or hitchhike to where they want to go.

Affordability of transport is influenced by many factors such as inflation rate and increase of fuel prices. According to Littman (2008: 3) the affordability is often influenced by factors such as daily household and work responsibilities, special needs, physical and mental disability. People who live on the peripheries have to travel longer distances in South Africa with an average of 20 km than in any other country which vary at an average of 11 km in Europe and 9km in Asian countries (Harrison et al, 2003). This causes households on the periphery who are predominantly poor to spend most of their earnings on transport which has already been mentioned above.

Transport affordability is linked to methods being adopted by the government to recover expenses related to transport to make transport more affordable for commuters such as the BRT system. Littman (2008) and Munier (2007) note that governments recovered costs by tax increases and subsidizing by reducing fuel costs, transport affordability may increase but this could be done by other means of cross subsidizing.

3.3.6 Public Transport Safety and Security Issues

The study of safety and security has been very limited in the case of public transport. This study is very important as safety and security in public transport deals with human life on a large scale. According to the World Bank (2002) an estimated 1.171 million people were killed in 1999 in road accidents and 85% of these deaths occurred in developing and transitional economies. South Africa experiences a lot of traffic accidents especially during the holidays whereby masses of commuters go visit their families or they are embarking on a religious pilgrimage. In a statement made by The Minister Of Transport Mr Joe Maswanganyi on the release of road safety figures, people who died on the road this easter were; passengers at 50%; followed by pedestrians at 24.5%; drivers at 19.8% and cyclists at 5.7% (Arrive Alive, 2017).

The high numbers of the death of pedestrians and cyclists is caused by the aggressive approach that drivers have (OASC, 2016). In South Africa drivers do not yield for pedestrians at the crossing unless they are crossing at the traffic lights. The disregard of pedestrians has resulted to pedestrians crossing wherever they want which causes traffic and congestion in the inner cities.

To reiterate, traffic and congestion can cause some serious health issues which could possibly lead to death. According to Whitelegg and Haq (2003) an estimated 1.5 billion people are exposed to air pollution levels which exceeds WHO recommend levels that cause 400 000 deaths each year globally. Transport noise pollution affects people from both developing and developed countries. According to Whitelegg and Haq (2003) cities in developing countries experience approximately 75 to 80 decibels of noise pollution which is above the WHO required minimum of 55 decibels. About 20% of Europeans are exposed to high noise pollution (UITP, 2003:3) reinforcing that transport noise pollution is not a developing country problem. These issues could lead to hearing loss, high blood pressure, psychological problems and premature death.

Security in public transport is becoming one of the challenges that policy needs to tackle. In the South African Crime and Safety Report tourists and expats are warned to avoid public transport at all costs as it is risky and dangerous (OASC, 2016). People who use public transport are in danger of robbery with a deadly weapon, theft, and sexual assault. With an increasing number of women reporting crime when using public transport, safe public transport becomes imperative to stop the accessibility limits for women using public transport. Safety and security measures should

be at the forefront in public transportation planning as it evaluates the likelihood that passengers will be involved in an accident, be it vehicular or otherwise or become a victim of a crime (Joewono and Kubota, 2005).

3.3.7 Protests in South Africa

There is not much literature on transport and protests in South Africa. This part of the study will look at the notion of protests and linking it with public transport issues in South Africa that affect commuters. According to South African Institute of Race Relations (2013), approximately 200 striking South Africans were killed, 313 injured and over 3058 arrested during the period of 1999 to 2012. South Africa is notoriously known as the striking nation due to the intensity of the strikes and how it affects the economy (Murwirapachena and Sibanda, 2014). Strike actions have negative impacts on the economy such as; loss in production; lost contacts; loss in investment; loss of employment and socio-political effects (Murwirapachena and Sibanda, 2014)

There are no adequate statistics on public transport strikes in South Africa but there are countless news headlines that detail the effects of the protests. Murwirapachena and Sibanda (2014), mention that protests in South Africa result from workers not being happy with their wages. According to Shuma (2017), article in (SABC News) The recent bus strikes has caused major losses for small business and they have affected the commuters negatively as they have to seek alternative transport.

The poor who rely on buses are affected by the strikes even more as they have no other alternatives which results to wage losses. The loss of businesses and wages due to strikes has lost the country millions of rands as well as potential investors (Murwirapachena and Sibanda (2014). Judging by the notion of South Africa being known as a striking nation shows that protesting is a lose-lose situation where nobody wins.

Violent protests are common in South Africa and they have negative impacts (economically and socially) whereby protesters damage property and act aggressively to bystanders. Commuters dependent on public transport are forced to find other alternatives or stay home where it is safe. This results to money loss for those who work in the informal sector and job losses

(Murwirapachena and Sibanda, 2014). The failed integration between the Rea Vaya Management and the Minibus Taxi Industry has resulted too many minibus taxi strikes. The minibus taxi driver have fears that they will lose their jobs and only income. This resistance from the minibus Taxi Association could hinder the plans to extend the system all over the country.

3.3.8 Overall Public Transport Challenges

Developed and Developing countries experience problems with public transport and they are dealing with the challenges accordingly by developing sustainable transport systems that will address these problems. There are common features in transport related problems in developing countries. Developed and developing countries have major differences when it comes to social, environmental and economic problems which impacts the developing countries at a much higher rate as they face difficulties due to the lack of finance, resources and infrastructure. This exacerbates the transportation problem in developing countries.

According to Barrett (1991) Developing countries have to contend with the increasing population growth, lack of financial resources, urbanization, poverty and lack of infrastructure. The growing number of people commuting to the city is causing a number of problems such as traffic congestion and accidents which makes cities inaccessible for many people (Mpofu, 2008). This especially affects people with low income who are dependent on road public transport who would be unable to reach their place of employment. Other factors that contribute to accidents are unroadworthy vehicles, congestion and inadequately maintained roads. According to Chakwizira et al (2011), the increasing number of road fatalities is caused by unplanned and poorly maintained roads. In the case of Johannesburg city, road accidents are caused by reckless driving, drinking and driving and un-roadworthy vehicles.

Public transport in developing countries have common characteristics that affect the low-income earners. Such as the variety of public transport that includes, cars, buses, taxis etc present problems regarding to safety and efficiency (Barrett, 1991). The lack of proper designated lanes result to traffic congestion and accidents. Inefficiency results in commuters having to wait a long time for transport, which is time consuming (Button, 1993). Commuters in Johannesburg relying on BRT have often complained about having to wait for hours for the buses at off-peak times and during

peak time the buses quickly get full and it takes hours for the next one to come.

These problems have also led people to buying their own personal vehicles because it allows them to move freely. However, the increasing number of vehicles on the road cause more traffic related challenges but people would rather have their own vehicle than using public transport (Banister, 2007). The growing numbers of people and their dependence on private vehicles as well as the high costs of commuting are all compounded by an un-integrated public transportation system which is unable to meet the needs of the people (Walters, 2008). The public transport system in South Africa which comprises of minibus taxis, buses and trains is not well integrated. Thomas (2016), recognizes that the BRT which came after the Gautrain are not well coordinated as they use completely different ticketing systems as well as different management. Shaw (2006) argues that the different modes of transport should be coordinated to support each other. However, South Africa has a problem with such integration due to commuters not changing modes of transport when going to work NHTS Gauteng (2014).

Another concern that is not properly researched is the stigma that comes with using public transport. Public transport is stigmatized as only being suitable for the poor. In the case of South Africa old buses and Metrorail trains are stigmatized while minibus taxis and the new BRT and Gautrain are not. The stigmatized modes of transport could influence decision-makers to ignore them when they are more important to the majority of the population (Barter, 1998). Although there is not much research that is done that looks at public transport and stigmatization it would be important to consider it in terms of transport policy.

With new technology being available the younger generation prefer to use metered taxis more preferably the new Uber system that is cheaper than a metered taxi. Uber has caused a lot of controversies across the world and has generated a lot of competition and dislike from other cab drivers. However it has gained popularity among the young generation due to its efficiency and fair prices. Uber is a new mode of privatized transportation that could potentially cause a decline in the use of public transport and the modes that low income groups are accustomed to could be ignored. The Gauteng Department of Roads and Transport has taken an official decision to license Uber driver partners as public transport operators (SAnews, 2016). This brings up the question if this will become a transport challenge in the near future. According to Brebbia (2014), urban transport systems require considerable studies in order to devise and then safeguard their

operational use, maintenance and operational safety.

3.4 Summary

This chapter presented the literature as well as the theoretical framework on urban transport systems. From the studies presented in the literature review, it is evident that the public transport system needs major improvements. Even with the emergence of the BRT and Gautrain there are still some concerns if these systems are beneficial for the public. There is resistance from the minibus taxi industry to accept the BRT system which has been hostile and violent. Thus leading to the failed attempt to integrate the minibus taxi industry with the BRT. The chapter also looks the definitions of sustainable transport and the elements related to where there is a clear connection between accessibility and affordability as well as safety and security. The next chapter will present the case study of Johannesburg.

Chapter 4: Case Study of Johannesburg

4.1 Introduction

This chapter will present the three themes that have been highlighted in the previous chapter which will now be presented in the case of Johannesburg. This section will begin with a description of Johannesburg followed by a presentation of overall transport indicators.

4.2 Background and Context

The city of Johannesburg Local Municipality is located in the Gauteng Province (see map in appendix A). As of 2011 South Africa's ranking by population size, the city of Johannesburg is number 1 with 4,434,827 people living in the city (Stats SA, 2011). The city has a diverse population of which 76.4% are black African, 12.3% are white people, 5.6% are coloured people, and 4.9% are Indian/Asian (Stats SA, 2011).

Appendix D represents the graphs depicting age and sex structure of the city's population in 2011. The image shows that Johannesburg has a large portion of its population aged 25-29, demonstrating a young adult population. This can be viewed as a disadvantage in a country such as South Africa due to high unemployment rates especially for the youth (see Appendix C). Recent studies have shown that Johannesburg population is growing at about 2% a year. This increase will lead to heightened urban problems related to traffic, pollution and overpopulation (Stats SA, 2011).

Johannesburg is considered the economic hub of South Africa which makes it appealing for national and international job seekers. Its recognized economic sectors include: Finance and business services, community services, manufacturing, trade and small portion of agricultural activity (Stats SA, 2011). Inequality in the city of Johannesburg is at its most visible whereby there is extreme wealth and dire poverty living side by side in many areas.

The legacy of the past is apparent when looking at Sandton which is a suburb north of the city centre of Johannesburg and its neighbour Alexandra township. The inequality still persists but has shifted from racism to classism as there is a growing number of a black middle class. It is important to examine how the city was shaped in order to be able to identify and consider the poor communities that are also living outside of the city centre. These communities are important to the discussion of public transport as they are predominantly excluded when it comes to the

development of sustainable transport.

The literature review discusses the political history of South Africa and how the apartheid city came about. It is evident that the transport system is inadequate due to the country's apartheid laws that segregated and fragmented the city. Fourace, Dunkerley and Garrdner (2003) mention that an inefficient public transportation system has a negative effect on the functioning of the centre which puts it at economic risk. Alternatively, an efficient public transportation could assist in meeting the needs and standards required by commuters and at the same time support urban development policies and programmes (Fourace et al, 2003).

According to the National Household Travel Survey (2014) mini-bus taxis are the most used mode of transport in the country (see Table 4). About 7.2 million households of the 14.2 million cited taxis as their main mode of transport and passengers of cars at 1.6 million (NHTS Gauteng, 2014). Commuters choose to use this mode of transport because it is easily accessible, fast and convenient to use than any other transport that is available (Walters, 2012). However, mini-bus taxis are considered to be the most dangerous mode of transport to use. According to the South African public opinion poll commuters found taxis to be unsafe and unreliable (Heyns and Luke, 2016). There are no time schedules which results people to wait for long periods of time which leads the frequently used public transport to be inefficient.

The introduction of the Rea Vaya BRT has been met with mixed reactions from the different stakeholders whereby some people welcomed the project while the taxi industry opposed the system. As already mentioned in this paper the conflict between the mini-bus taxi industry and the BRT negatively impacts the lives of commuters. The mini-bus taxi protests are often violent and they deter people from using public transport making cities inaccessible for those who rely on public transport.

Overall, the issues mentioned above are important considerations for the public transport within Johannesburg. Transportation plays a crucial role in connecting people to employment opportunities and to public services. There is an urgent need for a better public transport system that will allow the poor to access to explore possibly better income and employment opportunities. There is a need for National, Provincial and the local government to work hand in hand to adhere to the policy objectives that have been set up in the White Paper on the National Transport Policy

which will be briefly discussed below.

4.2.1 Transport Policy

The 1996 White paper on the National Transport Policy is one of the post-apartheid transport policy documents that exist in the country which aimed at ensuring South African Transportation systems is adequate to meet basic accessibility needs such as to work, healthcare, schools, shops in developing rural and urban areas (Heyns and Luke, 2016, NHTS Gauteng, 2014), Bickford, 2013). The Statistics South Africa Technical Report (2015: 1) listed some of the strategic objectives as follows:

- "Affordable public transport, with commuters spending less than about 10 per cent of disposable income on transport;
- Passenger transport services that address user needs, including those of commuters, pensioners, the aged, scholars, the disabled, tourists, and long distance passengers;
- Improve accessibility and mobility, limiting walking distances to less than about one kilometre in urban areas;
- Provide an appropriate and affordable standard of accessibility to work, commercial and social services in rural areas;
- Promote safe and secure, reliable and sustainable passenger transport."

The goals of the policy were recognised to broad-based, unrealistic and expensive. The National Development Plan 2030 which has similar transport objectives and the National Transport Masterplan which seeks to address specific transport issues is viewed to be unachievable in the long run due to limited government financial resources (Heyns and Luke, 2016).

4.3 Transportation in Johannesburg

Transportation in Johannesburg has come a long way from using animal-drawn carts to the use of private cars. The development of transport plays a crucial role in improving people's livelihoods and it contributes to the reduction of poverty by removing barriers of economic, social and environmental isolation (Sohail, 2005). The history of transport in Johannesburg shows that it had a tremendous impact in shaping the city and the transport in the city. Transport such as buses, taxis

and trains are the most used modes of transport in the city of Johannesburg but they have been many challenges with these forms of transport which challenge the government in terms of policy implementation and the passengers in terms of affordability, sustainability, safety and security.

This section will provide a look at the existing empirical transport situation for Johannesburg. It includes information vehicle ownership, mode usage, accessibility, affordability, safety and security. Overall it demonstrates that commuters rely more on minibus taxis more than any other public transport that is available.

4.3.1 Private car ownership

As already mentioned in the literature Gauteng has the highest number of private owned vehicles in the whole of South Africa, making the Johannesburg the most car populated city. There is no statistical data on the number of private car owners in Johannesburg, but the NHTS Gauteng (2014) survey provides a glimpse of the number of license holders.

Table 1. : Number of persons aged 18 years and older with a driver's' licence (light motor and heavy motor vehicle) by population group and district municipality.

Population group	Statistics Number ('000)	District municipality (per cent within municipality)					
		Sedibeng	West Rand	Ekurhuleni	City of Johannesburg	City of Tshwane	Gauteng
Black African	Number	105	96	448	656	424	1 729
	Per cent	50,5	44,7	51,3	49,4	46,2	48,8
Coloured	Number	1	2	16	69	21	109
	Per cent	0,5	0,9	1,8	5,2	2,3	3,1
Indian/Asian	Number	4	9	47	115	39	214
	Per cent	1,9	4,2	5,4	8,7	4,3	6,0
White	Number	98	107	362	487	433	1 487
	Per cent	47,1	49,8	41,5	36,7	47,2	42,0
Total	Number	208	215	873	1 327	917	3 540
	Per cent	100,0	100,0	100,0	100,0	100,0	100,0

*Unweighted numbers of 3 and below are too small to provide reliable estimates.

Source: (NHTS Gauteng, 2014)

Information on the number of licensed drivers within Johannesburg can be seen in table 1. The legal age where drivers can obtain a license is 18 years and older. The above table shows that there are 1,327,000 people who have a driver's license. This number is expected to increase over the years (NHTS Gauteng, 2014). With a population of young adults who are most likely to want or buy a car there will definitely be an increase in the number of cars on the road. In an attempt to decrease car use in Johannesburg, car prices are increased and drivers are obligated to pay etoll taxes each time they renew their license (Heyns and Luke, 2016).

4.3.2 Travel Patterns in Johannesburg

According to the findings from the NHTS study of (2014) and the Mobility Report of (2014), the survey identified some overall travel patterns in Johannesburg. Of the 12,6 million people that resided in Gauteng, 10,7 million people indicated that they took trips seven days prior to the interview. Most of those people resided in the city of Johannesburg with a number of 39.4% of people who undertook those trips, which can be seen in table 2.

Table 2. Persons who undertook trips in the seven days preceding the survey

District municipality	Undertook trip		Population	
	Number ('000)	Percentage of GP	Number ('000)	Percentage of GP
Sedibeng	795	7,4	894	7,1
West Rand	725	6,8	857	6,8
Ekurhuleni	2 464	23,1	3 154	25,0
City of Johannesburg	4 206	39,4	4 741	37,5
City of Tshwane	2 492	23,3	2 983	23,6
Gauteng	10 682	100,0	12 628	100,0

Percentage calculated within the district municipality.
Totals exclude unspecified cases of trips.

Source: (NHTS Gauteng, 2014)

Other travel patterns include day trips and overnight trips. According to the findings of NHTS Gauteng (2014) survey, 5,9 million persons aged 15 years and older in Gauteng had undertaken day trips in Gauteng. Johannesburg had the highest proportion whereby 45.4% undertook day trips. The reasons for these trips were either people are visiting home, shopping for business or personal

purposes and visiting friends or family.

Table 3. Persons who undertook overnight trips by main mode of travel and district municipality

Main mode		Statistics (numbers in thousands)	District municipality (per cent within district municipality)					
			Sedibeng	West Rand	Ekurhuleni	City of Johannesburg	City of Tshwane	Gauteng
Public transport	Train	Number	8	8	26	64	22	127
		Per cent	2,8	2,9	3,3	3,6	2,5	3,2
	Bus	Number	12	30	95	248	90	476
		Per cent	4,5	10,4	12,4	13,8	10,4	11,9
	Taxi	Number	116	128	326	602	276	1 447
		Per cent	43,0	43,6	42,4	33,5	31,8	36,2
Private transport	Car/bakkie/truck driver	Number	50	39	143	352	211	795
		Per cent	18,4	13,4	18,6	19,6	24,4	19,9
	Car/bakkie/truck passenger	Number	70	69	152	392	232	915
		Per cent	25,7	23,6	19,8	21,8	26,8	22,9
Aircraft	Number	11	10	25	107	26	179	
	Per cent	4,2	3,3	3,2	6,0	3,0	4,5	
Walking all the way	Number	3	5	*	23	6	38	
	Per cent	1,2	1,7	*	1,3	0,7	0,9	
Other	Number	*	3	*	7	4	16	
	Per cent	*	1,1	*	0,4	0,5	0,4	
Total	Number	270	293	768	1 796	867	3 995	
	Per cent	100,0	100,0	100,0	100,0	100,0	100,0	

*Unweighted numbers of 3 and below are too small to provide reliable estimates. Percentages calculated within municipalities.

Source: (NHTS Gauteng, 2014)

There are 4 million people who travel overnight and it was found that 44.9% came from the city of Johannesburg. Table 3 illustrates that more people used taxis as their mode of transport to their destinations but people preferred to use their cars over public transport in the city of Johannesburg.

4.3.3 Modes of Transport

According to the findings from NHTS Gauteng study (2014) and the Mobility Report survey (2014), taxis were the most used mode of public transport, followed by buses and trains being the least used mode of transport. This indicates that commuters relied on taxis more than any other

public transport that is available. According to the South African Opinion poll study commuters used taxis because they are a convenient mode of transport (Heyns and Luke, 2016). The remainder of the findings are presented in Table 4.

Table 4: Main modes of travel usually used by households, by district municipality

Mode of travel	District municipality (per cent within municipality)					
	Sedibeng	West Rand	Ekurhuleni	City of Johannesburg	City of Tshwane	Gauteng
Train	4,7	3,0	11,2	8,0	8,0	8,2
Bus	4,7	4,4	2,9	7,2	9,5	6,3
Taxi	34,8	39,9	41,2	39,2	33,9	38,2
Car/bakkie/truck driver	17,4	15,2	18,0	18,4	22,4	18,9
Car/bakkie/truck passenger	12,7	10,5	10,6	8,1	11,1	9,9
Walk all the way	21,7	24,4	13,9	15,7	12,8	15,7
Other	4,1	2,6	2,2	3,4	2,3	2,9
Total	100,0	100,0	100,0	100,0	100,0	100,0

Other includes: bicycle, scooter/motorcycle, animal-drawn transport etc.

Source: (NHTS Gauteng, 2014)

4.3.4 Overview of Public Transport in Johannesburg.

When the African National Congress (ANC) came into power in 1994 they aimed at undoing the legacy of Apartheid by putting forward some policies and strategies that would improve public transport (Walters, 2014). Transport that was available to the people post 1994 were buses, taxis and trains, but the main mode of transport used by the poor were taxis which was the only mode of transport established for the poor black communities that lived outside the city who did not have access to the buses and trains that were available (Barrett, 2003). Johannesburg has since established a viable transport system for the public which includes the following;

Minibus Taxis

Available since the apartheid era, this informal mode of transport is the most used transport system in South Africa mostly by the middle class and the low income households (NHTS Gauteng, 2014). It is the cheapest form of transport that people rely on a daily basis to be transported to their workplace and back to their homes. It even reaches the poorest areas in the cities that no other public transport goes to (South Africa, 2016). Unlike the Western- European countries the minibus taxis requires a knowledge base of hand signals to stop the taxi and where to find the location of taxis going to the destination you prefer (see Appendix B). The name of the stop you intend to stop

at should be announced loudly to the driver before hand.

Metered Taxis

Metered taxis in Johannesburg are called beforehand. Unlike in Western countries the taxi do not roam the streets, but they could be found parked in designated areas which are located in places such as the airport and near the train and bus stations (South Africa, 2016).

Metro Railway Systems

Trains are the cheapest mode of transport available in Johannesburg, its connection runs through all the way to Pretoria, Soweto and other satellite towns. The Metrorail is one of the oldest modes of transport which was developed during the time of apartheid transporting miners to the gold mines since then the railway line did not transcend to the Northern part of the city where the wealthy resided and continue to reside and even today the city has continued to develop Northwards in the cities such as Sandton, Rosebank and Midrand where there is no railway line (South Africa, 2016).

Bus Services

There are two major bus services used in Johannesburg which are the Metro Bus and the newly developed Bus Rapid Transit (BRT). The Metro Bus is owned by the city of Johannesburg, and it is the second largest municipal bus operator in South Africa and its main focus is to provide transport for major event purposes (South Africa, 2016)

Gautrain

The Gautrain is South Africa's first high speed underground train that links Johannesburg, from Park Station with main business districts of the north it also has stops in Sandton and Rosebank, and travels all the way to Pretoria, OR Tambo International Airport and various residential areas in-between (Thomas, 2013). Although there has been much initiative from the government to provide sustainable public transport such as the Gautrain and Rea Vaya BRT there are still some issues regarding affordability, accessibility and safety for the poor which will be mentioned below.

4.3.5 Public transportation advantages and disadvantages

It has been established that a viable transport system consists of effective and affordable modes of transport as well as adequate infrastructure (Gershon, 2005). In some developing countries there are issues of poor infrastructure which hinders the development of a safe and sustainable transport system which could lead to a growing number of informal modes of transport.

Johannesburg with a large population of people which demand there be a sustainable mass transit. The impacts of a viable public transport system can be seen in developed countries such as the United States (US) which has the largest transit in the world varying from buses, subways, light rail, commuter rail, monorail, passenger ferry boats, trolleys and tramways (Gershon, 2005). These modes of transport make the cities more liveable in terms of limiting urban sprawl, automobile congestion, energy use associated environmental emissions and decreases health problems associated with automobile congestion (Gershon, 2005).

The introduction of BRT in an effort to provide efficient and affordable transport has benefited the commuters in more ways than one. It is cost efficient, saves time and most likely to be eco-friendly. For those depending on mass transit for work related reasons have the means to get to their workplace. In the US mass transit accessibility and affordability assists people to stay employed due to having cheaper transport to get to work and it decreases the reliance on automobiles (Gershon, 2005).

Although public transport has been deemed to be efficient, environmentally friendly and cost efficient in Johannesburg, it still has its flaws that can be counted as disadvantages such as discomfort, overcrowding, waiting time, costs and breakdowns. Commuters using the BRT system have complained of crowding in the buses especially during peak times during the morning when people are going to work and in the afternoons when they have to get home. In some cases they miss the bus they have desired to catch and have to wait hours before another one arrives.

The cost of transport for commuters in developing countries is a major burden and it often takes a considerable amount of a household budget. In South Africa the poor spend twice more on public transport than in any other developing countries and they rely more on minibus taxis than the BRT system but that is due to other factors and situations that influence people's choice for commuting.

The mini-bus taxi industry is informal and it is not closely monitored by the government.

According to Pojani & Stead (2015) pricing mechanisms are more effective than regulatory approaches because they offer car users more choices, raised revenues and they can be adjusted according to different conditions. The absence of regulations perpetuates the chaotic nature of how mini-bus taxis operate, with unregulated fares the owners can increase prices whenever they want which becomes problematic for the frequent users who can barely afford the services. The reduction in the quality of the local environment is another disadvantage to the use of public transport. Commuters living in low income settlements are affected by noise and air pollution which can result to a cause of long term illnesses within the local area. In Johannesburg mini-bus taxis and buses have designated station areas but there is a problem with some taxis operating illegally causing overcrowding and poor hygiene conditions.

Another disadvantage of the use of public transport are the mass traffic accidents. The increasing number of vehicles leads to more numbers of fatalities and injuries on the road networks. According to the South African Institute of Race Relations report released in 2012 stated that the minibus taxi death rate was 27 deaths per 10 000 vehicles and three times higher than the nine deaths per 10 000 for motor cars (Oxford, 2013). Many of the traffic accidents that occur are caused by reckless driving, driving under the influence and poor road conditions. Taxi drivers are known for their violent attitude and lawlessness on the road which puts commuters at high risk. The indicators of commuters dissatisfaction will be mentioned later on this chapter.

4.4 Accessibility of public transport

As already mentioned above there are some places in Johannesburg that have difficulties with accessing public transportation and that is due to the distance between the transport services and their home. Data shows that some people walk long distances to reach transport services. The table below shows that there are disparities in terms of transport access where some people can easily access it and for some people it is not so easy.

4.4.1 Accessibility by public mode of transportation

Table 5: Time taken to walk to the nearest taxi rank/route stations by those who used taxis during the calendar month preceding the survey

District municipality	Time category (per cent within district municipality)			
	1–15 min	16–30 min	>30 min	Total
Sedibeng	81,8	14,4	3,8	100,0
West Rand	75,1	21,2	3,6	100,0
Ekurhuleni	74,1	21,5	4,4	100,0
City of Johannesburg	81,8	15,4	2,8	100,0
City of Tshwane	82,0	15,1	3,0	100,0
Gauteng	79,5	17,2	3,4	100,0
Geographic location				
Metropolitan	79,4	17,3	3,3	100,0
Urban	79,1	17,8	3,1	100,0
Rural	83,8	9,1	7,1	100,0

*Unweighted numbers of 3 and below per cell are too small to provide reliable estimates.
Total excludes unspecified time category.

Source: (NHTS Gauteng, 2014)

Table 6: Time taken to walk to the nearest bus stop/station by those who used buses during the calendar month preceding the survey

District municipality	Time category (per cent within district municipality)			Total
	1–15 min	16–30 min	>30 min	
Sedibeng	79,3	20,0	0,7	100,0
West Rand	90,8	*	9,2	100,0
Ekurhuleni	70,4	22,6	7,0	100,0
City of Johannesburg	82,8	15,1	2,1	100,0
City of Tshwane	84,4	13,1	2,5	100,0
Gauteng	82,5	15,0	2,6	100,0
Geographic location				
Metro	82,6	14,9	2,5	100,0
Urban	80,7	17,5	1,8	100,0
Rural	82,6	11,5	5,9	100,0

*Unweighted numbers of 3 and below are too small to provide reliable estimates.
Total excludes unspecified time category.

Source: (NHTS Gauteng, 2014)

Table 5 shows that approximately 80% of the households who use minibus taxis walked for 1 up to 15 minutes to get to the nearest taxi rank by geographic location. This shows that majority of the time commuters are able to access taxis with no problem. However, urban areas have the least transport access which results to more time being spent walking to the nearest taxi station which is the same case with buses (Table 6)

Table 7: Reasons for not having used trains during the past month by district municipality

Reason	District municipality (per cent within district municipality, all reasons combined)					
	Sedibeng	West Rand	Ekurhuleni	City of Johannesburg	City of Tshwane	Gauteng
Not available	19,9	31,2	18,9	26,4	16,1	22,1
Prefer bus	1,0	0,1	0,7	1,0	1,4	1,0
Prefer taxi	13,0	15,6	12,2	10,9	10,4	11,6
Prefer private transport	15,3	13,5	15,6	14,5	16,7	15,3
Can walk	6,0	4,0	5,5	4,0	3,6	4,4
Don't travel much	5,2	8,4	6,5	4,7	6,5	5,9
Reasons relating to service attributes	38,8	26,4	40,1	36,7	44,5	38,7
Other	0,8	0,7	0,5	1,8	0,7	1,1
Total	100,0	100,0	100,0	100,0	100,0	100,0

Total excludes unspecified time category.

Source: (NHTS Gauteng, 2014)

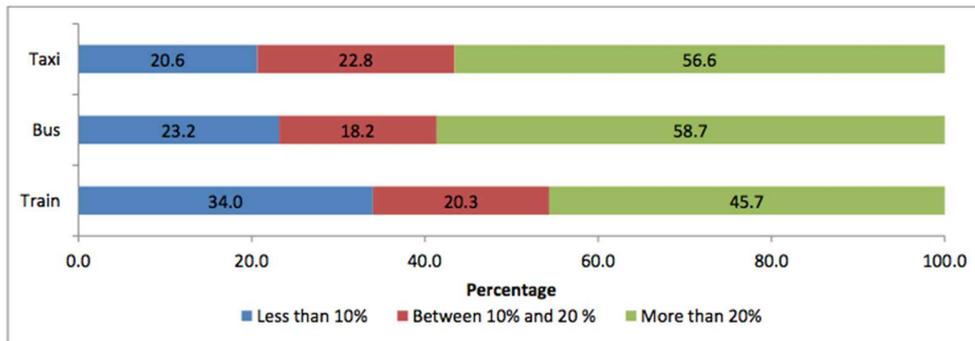
According to NHTS Gauteng (2014) 38.5% of households in Johannesburg walked about 16-30 minutes which shows that trains are inaccessible to most of the commuters. Table 7 shows that about 26.4% of the households in Johannesburg indicated they never used trains due to their non-availability.

4.6 Affordability of public transport

Affordable public transport is undeniably the most pressing issue in South Africa. Transport policies post- 1994 echo the same sentiments. Public transport improvements will contribute to narrowing spatial divisions by providing people with faster, safer and more affordable transport to travel to work. Although transport has been improved with the roll out of Rea Vaya buses and the new Gautrain rail transit, some people are unable to access this form of transport.

As already mentioned in chapter 3, transport costs in South Africa are affected by fuel prices. Which means transport costs will continue to increase as the years go. According to the 1996 White Paper on Transport Policy, the benchmark of 10% of disposable income is set to measure affordability of public transport (Stats SA, 2015).

Table 8. Percentage of monthly household income per capita spent on public transport to educational institutions



Source: Stats SA (2015), NHTS Gauteng (2014)

According to the Statistics South Africa Technical Report (2015) of 5.3 million households who used public transport and provided information on their income and travel cost information, 2.2 million households spent less of their monthly household income per capita on public transport. An equal number was observed for both households who spent more than 20% and between 10% and 20% with a number of 1.5 million households (Stats SA, 2015).

Statistics South Africa Technical Report (2015) also found that households from the lowest income quintile spent a higher proportion of their income on public transport as already mentioned in above in section 4.2. It has been revealed that bus users were most likely to spend more than 20% of their monthly household income per capita (58.7%), followed by taxis (56.6%) and trains (45.7%). Furthermore the results showed that train users spent less than 10% of their monthly household income per capita (34,0%), buses (23.2%) and taxi users (20.6%), see table 4.

4.7 Safety and security of public transport

Image 1: Unroadworthy Taxi



Source: (Magome and Sapa, 2011. Image by Etienne Creux)

According to Arrive Alive statistics (2017), minibus taxis cause the most fatalities on the roads than light motor vehicles in South Africa. There are 301,000 registered minibus taxis that are legally registered, 117,000 of them are registered in Gauteng (Arrive Alive, 2017). The taxi recapitalization program has failed to keep un-roadworthy and unlicensed minibus taxis off the roads which contributes to the dangers of road accidents example is shown in image 1. The table below shows the number of fatalities involving minibus taxis.

Table 9: Summary of Fatal Crashes Involving Taxis January 2015 to April 2016

Year	Fatal Crashes	Fatalities
2013	202	291
2014	199	239
2015	191	84
Jan - Apr 2016	56	84
Total	648	857

Source: (Arrive Alive, 2017)

These statistics are complementary to the NHTS Gauteng survey (2014) commuter's dissatisfaction levels with the minibus taxi. Whereby households displayed high levels of dissatisfaction with crowding, lack of safety from accidents, un-roadworthy minibus taxis. Table 10 below displays the findings.

Table 10: Dissatisfaction levels with minibus taxi services by district municipality

Attributes of the minibus taxi services	District municipality (per cent of minibus taxi users who are dissatisfied across district municipality)					
	Sedibeng	West Rand	Ekurhuleni	City of Johannesburg	City of Tshwane	Gauteng
The distance between the taxi rank/route and your home	6,5	12,4	29,8	31,7	19,5	100,0
The travel time by taxi	5,4	13,2	31,6	30,4	19,3	100,0
Security on the walk to/from the taxi rank	4,6	10,9	30,2	35,1	19,2	100,0
Security at the taxi ranks	4,8	10,3	29,6	34,8	20,5	100,0
Security on the taxis	4,2	9,9	30,1	35,6	20,2	100,0
The level of crowding in the taxis	3,9	8,0	26,4	43,3	18,4	100,0
Safety from accidents	4,9	6,7	27,8	39,0	21,6	100,0
The frequency of taxis during peak period	4,7	8,2	33,4	37,6	16,1	100,0
The frequency of taxis during off-peak period	5,6	11,9	29,2	36,1	17,2	100,0
The waiting time for taxis	5,8	12,0	29,4	34,6	18,1	100,0
The taxi fares	4,9	8,4	28,4	36,3	22,0	100,0
The facilities at the taxi ranks, e.g. toilets, offices	6,8	8,0	27,4	37,5	20,4	100,0
Roadworthiness of taxis	5,5	7,0	27,0	38,5	22,0	100,0
Behaviour of the taxi drivers towards passengers	4,8	9,0	25,0	35,4	25,8	100,0
The taxi service overall	3,4	8,6	29,5	36,7	21,8	100,0
Attributes of the minibus taxi services	District municipality (per cent of minibus taxi users who are dissatisfied within district municipality)					
	Sedibeng	West Rand	Ekurhuleni	City of Johannesburg	City of Tshwane	Gauteng
The distance between the taxi rank/route and your home	21,0	39,8	26,3	18,9	20,4	22,8
The travel time by taxi	13,0	31,2	20,9	13,5	15,1	17,0
Security on the walk to/from the taxi rank	25,2	61,9	45,7	35,3	35,3	39,1
Security at the taxi ranks	27,1	60,8	46,3	35,8	38,8	40,3
Security on the taxis	22,4	54,4	43,9	33,8	35,2	37,3
The level of crowding in the taxis	21,2	42,3	39,1	42,7	31,9	37,8
Safety from accidents	36,2	50,2	56,3	53,2	51,6	52,2
The frequency of taxis during peak period	16,8	29,1	33,3	25,1	19,0	25,6
The frequency of taxis during off-peak period	23,1	48,2	33,1	27,4	22,8	29,0
The waiting time for taxis	27,6	56,0	38,2	30,0	27,7	33,3
The taxi fares	37,9	64,6	60,4	51,7	55,3	54,7
The facilities at the taxi ranks, e.g. toilets, offices	55,3	66,8	61,7	55,5	56,7	58,1
Roadworthiness of taxis	40,8	53,6	54,7	52,8	52,9	52,5
Behaviour of the taxi drivers towards passengers	31,8	61,2	65,7	58,6	59,8	58,4
The taxi service overall	21,2	52,8	49,7	41,6	43,5	43,5

Respondents could select more than one attribute.

Source: (NHTS Gauteng, 2014)

Arrive Alive statistics (2017), show that almost the same number of pedestrians are killed as the vehicle occupants whereby 85% of pedestrians are killed in taxi related crashes in urban areas and 43% of fatal non-pedestrian (Cyclists) crashes occurred in urban areas and 25% on freeways. This shows that there is an urgent need for the government to intervene on the current state of the minibus taxi industry to ensure the safety of commuters who are reliant on this mode of transportation. Commuters using buses felt safer and more comfortable using buses than those who use taxis and trains.

Table 11: Condition of transport areas

Condition of transport areas	Rating	Very Poor 0-20	Indifferent 30-80	Excellent 90-100
Bus Rapid Transit	62.0	16.9%	47.5%	35.6%
Bus services	58.1	20.0%	53.6%	26.4%
Minibus taxis	55.3	25.6%	51.9%	22.5%
Condition of roads	52.2	27.6%	47.8%	24.7%
Passenger rail services	49.3	29.8%	50.9%	19.3%
Road congestion	48.5	34.9%	49.4%	15.7%

Source: (Heyns and Luke, 2016)

Metrorail services transport approximately 2 million passengers daily in South Africa (Metrorail, 2007). The dwindling passenger rail sector has been unable to keep up with the numbers of commuters which results to the issue of overcrowding in the trains. This is evident by looking at the table below which indicates the high number of households that were dissatisfied with the level of crowding in the train

Table 12: Dissatisfaction with train services by district municipality

Attributes of the train service	District municipality (per cent within municipality)					
	Sedibeng	West Rand	Ekurhuleni	City of Johannesburg	City of Tshwane	Gauteng
The distance between the train station and your home	65,8	68,8	59,1	48,0	60,4	56,1
The travel time by train	49,5	67,1	55,4	56,9	65,4	58,3
Security on the walk to/from the station	44,2	39,4	62,3	47,9	54,9	53,3
Security at stations	17,4	17,6	36,0	29,6	31,6	30,8
Security on the train	26,1	31,0	54,6	46,5	42,0	46,3
The level of crowding in the train	65,4	70,2	84,7	81,7	81,0	81,1
Safety from accidents	24,3	30,5	33,2	28,5	41,6	32,5
The frequency of trains during peak period	48,2	44,6	55,8	47,3	57,4	52,0
The frequency of trains during off-peak period	51,6	42,6	54,0	52,3	60,6	54,0
The punctuality of trains	64,2	67,5	71,3	63,5	70,2	67,6
The train fares	10,1	7,7	13,0	8,7	12,6	10,9
The facilities at the stations e.g. toilets, offices	35,8	25,5	52,9	36,8	49,4	43,9
The train service overall	30,1	35,6	53,6	47,6	54,5	49,4

Respondents could select more than one attribute.

*Unweighted numbers of 3 and below per cell are too small to provide reliable estimates.

Source: (NHTS Gauteng, 2014)

The lack of train fleets lets down millions of people who rely on rail transportation as they have to deal with issues of overcrowding and the crimes that occur. Passengers have complained about the lack of security in trains and around the train stations where robberies frequently occur (De Waal, 2012). The Overseas Security Advisory Council (OSAC) (2016), warns foreigners especially from the United States against using trains due to the common violent crimes, accidents and disgruntled passengers acting out. Women fall victim to sexual harassment in trains. There were about 32,000 crimes reported to South African Police Service (SAPS) in 2013/14 which included a wide range of offences related to the system which is theft, sexual abuse, and contact crime attributed from service delivery strikes (Simelane and Nicolson, 2015).

Image 2: Overcrowding of Trains



Source: (The Citizen, 2015. Image by Michel Bega)

4.9 Summary

Chapter 4 provided the case study of Johannesburg, looking at the population of the city and how the city developed. Transport policy is briefly discussed and it is evident that transport has been a priority in the post-apartheid era and due to the unattainable goals, public transport continue to face a multitude of challenges. Furthermore, public transport patterns and modes are mentioned and it is evident that people rely on minibus taxis more. Lastly, the public transport issues that affect the commuters are presented. The following chapter 5 will present the main findings of the study.

Chapter 5: Findings and Recommendations

5.1 Introduction

This chapter will present a discussion of the findings of the case study mentioned in the previous chapter. It will also provide answers regarding the poor that were presented in chapter 2 of this thesis that highlight the themes of this study which are; accessibility, affordability safety and security. These themes are examined, considered and evaluated with reference to the investigation undertaken for this study. In addition the literature review supports and refutes some of the findings that have been mentioned in the previous chapter.

5.2 Commuters perception on public transport

As it can be seen from the surveys done by Stats SA (2015) NHTS (2014), Mobility Report (2014) and South African opinion poll (2016) there have been mixed reviews about the public transport system in South Africa. Some people found that public transport was satisfactory and has improved from previous years and some people have found it to be worse off.

5.2.1 Minibus Taxis

In the Johannesburg area it was found that people utilized taxis as their mode of transportation more than any other transport (see table 4). People who used this mode of transport found it to be unreliable, unsafe, and some taxis un-roadworthy as seen in chapter 4, image 1. In chapter 4 section 4.7 mentions that commuters were dissatisfied with taxis due to the behaviour of the taxi drivers as well as the poor facilities at the taxi ranks and the increasing taxi fares. Other services such as roadworthiness of taxis, safety from accidents contributed to the dissatisfaction levels.

Literature has shown that taxis have a tendency of being violent to have their way. This ruthlessness translates to driver's behaviour and how they interact with commuters. A study done by Vilakazi and Govender (2014) on commuters perceptions of public transport service in South Africa found that people did not use taxis because they found them to be safe but they used them due to their availability and convenience. This corresponds with the South African opinion poll study of 2016 whereby people mention that taxis are a convenient mode of transportation.

Literature has also shown that the taxi industry is not properly monitored by the government. This has led to the lawless behaviour of taxi drivers which puts commuter's lives at risk. Taxis also lack time schedules, which results to unpredictability and uncertainty of the arrival and departure times.

5.2.2 Buses

According to the NHTS Gauteng study (2014) buses were the least used mode of public transport. As already mentioned in the previous chapter, there are two major bus services used in Johannesburg which are: the metro bus and the BRT. Initially commuters are satisfied with the BRT services. In a study done by the South African opinion poll (2016) commuters found buses to be safer and in excellent conditions especially the BRT buses. Commuters that were not happy with the BRT services had a problem with the communication gap between commuters and Rea Vaya Management. According to Wright (2004), poor signage and the lack of information to assist commuters can result in commuter's dissatisfaction towards the system. The findings reveal that commuters were dissatisfied with the system because they were unaware of how to use the smartcard system and prices kept increasing without any notifications from the management.

Literature has shown that the BRT aims at meeting the needs of commuters by providing *viable, safe and reliable* transport (Allen, 2013). Table 11 indicates that majority of participants believe that BRT system has met those needs of the commuters as they have rated the BRT 62%. However, the above statistics also show that some commuters needs were not met which is due to the fact that the bus system is not accessible to everyone (Weakley and Bickford, 2011). This is a real concern as the BRT has the cheapest prices for the road public transport and commuters would spend less money to move around the city.

The NHTS Gauteng study (2014) revealed that most of the households indicated they walked less than 15 minutes to the bus stop, some of the commuters indicated they walked more than 30 minutes to the bus stop (see table 6). The NHTS study (2014) indicates that commuters were dissatisfied with buses due to them being unavailable, overcrowded, and the low frequency of buses during off-peak periods.

5.2.3 Trains

Trains are the second most used mode of transportation in the city of Johannesburg. There are two

rail transportation modes the first being the Metrorail and the second being the Gautrain. The literature shows that the Gautrain was built for car users in an attempts to reduce the number of cars on the road and encourage people to use public transport (Gautrain, 2017a). From what is mentioned in the literature about the Gautrain (chapter 3 section 3.3.1), it can be inferred that this mode of transport is reliable, safe and secure. However, it is not accessible and affordable to everyone as it only benefits the elites with cars and those who live in the high end areas it runs through.

Majority of the Metrorail users are not satisfied with this mode of transport. The NHTS Gauteng study (2014) found that majority of the commuters were dissatisfied with the level of crowding in the train, punctuality of trains, travel time of trains and distance they have to travel between their resident and the train stations. Other contributing factors to the dissatisfaction of train users were; low frequency of trains during off-peak and on peak hours and lack of security on the walk to or from the train station (NHTS Gauteng, 2014). People have also complained about poor communication whereby they are not given an update when trains have to suddenly stop. This results to late arrival at work and at schools. These perceptions of the commuters mentioned above are not gender specific or income specific. As part of investigating if the public transport system is failing the poor, the next section will look at the mobility limitations of the poor in the light of the mentioned perceptions.

5.3 Mobility limitations of the poor

Public Transport for the poor has been widely recognized in terms of policy but that did not happen until after 1994 and since then public transport policy have not been rigorously explored and implemented (Thomas, 2016). Examining the lives of the poor mentioned in chapter 3, section 3.3, it is evident that there is a considerable amount of people living below the poverty line. The populations with low-income can be seen in the map in Appendix E whereby they include people living in the surrounding areas of the city of Johannesburg. It is evident that the low-income groups are unable to afford private vehicles and are most reliant on public transport. Other form of transport that some people use is walking which is not adequately studied in the field of transportation. The indication of people who walk all the way should be studied further as it could

be due to the lack of accessible and affordable public transportation.

The NHTS Gauteng, Mobility Report and Statistics South Africa do not look at health care related travel patterns. This is an important aspect of the study to gain insight if commuters accessibility needs were met. Unlike the developed countries, South Africa's public transport does not operate until midnight, this limits people's movement according to the times of available transport. It can be inferred that the poor miss out on opportunities to work in places further away from their residents due to the lack of available transport.

“Availability” of transport is used to refer to route possibilities, timings and frequency. Whatever the purposes of an individual's journey, be it education, work, leisure, personal services, or another, her/his activities are constrained by the route and the time taken traveling. Even if an individual has a bus stop within a reasonable distance, say 400 meters of their home (the most common measure of public transport accessibility), the amount of use it will be to any individual entirely depends on where he/she wants to go, how often, and how long the whole journey is going to take. Furthermore, a bus stop 400 meters away from home, particularly one with no seats or shelter, or one which can only be reached by crossing a major traffic artery, may be of little use to a person with, for example, a weak heart or knees, heavy shopping, or young children. Timings and frequency are included since if there is no service when a person wants to travel, there is no available transport.”

Carruthers et al (2005:2)

The literature shows that those who are unable to access and afford transport have limited opportunities to economic and social inclusion as well as healthcare and education facilities. A study done by Weakley and Bickford (2011) on Transport and Urban development in Johannesburg, found that public transport is mostly available in the most densely populated areas (see Appendix F). Although the Rea Vaya BRT has made improvements to commuters accessibility and mobility, there are still some people that are excluded from these developments especially those that reside in the peripheries. Areas such as Orange Farm and Doornkop with low density lack access to BRT buses but the urban poor residing in the city have access to all transport. However, there are plans to expand the Rea Vaya BRT systems to those areas (Rea Vaya, 2016)

Low income households use trains, as they are the cheapest mode of transport to get to their

destination. As mentioned above, it was found that the use of trains was highly unsatisfactory. The poor who cannot afford or access any other transport are left stranded which results in loss of economic opportunities.

5.4 Accessibility

According to the literature transport access provides many opportunities for the socially excluded. The access to sustainable transport provides commuters with access to basic services such as health care and education. Those who are unable to access transport will have limited access to economic opportunities (Pacetti and Trittipio, 2010). The Rea Vaya BRT aimed at providing access to sustainable transport that would enable commuters who had difficulties to access the city to do so. In a study done by Weakley and Bickford (2015) in Diepkloof which is large zone of Soweto township in the southwest Johannesburg. They found that majority of the population that used BRT were middle income earners around the age of 25 but younger than 45. Commuters had easy access to the city and the system is yet to expand to the Northern parts of Johannesburg such as Sandton and Rosebank (see Appendix A and E).

5.4.1 Taxis

In the city of Johannesburg 81, 8% of households who used taxis stated they walked up to 15 minutes to the nearest taxi rank (see table 5). This shows that commuters spend more time to walk to the designated public transport. The more time commuters have to walk shows that they have poor services of public transport. To reiterate, minibus bus taxis have the poorest services, but it is the most frequently used public transportation as shown in table 4. This means that commuters are able to access it with ease. Commuters should be able to have a choice on what public transport they want to use. Due to some commuters experiencing limited access to the Rea Vaya buses they opt to use minibus taxis because of their convenience.

5.4.2 Buses

Unlike minibus taxis, buses have the lowest numbers of commuters. Commuters will always use transport that is most accessible to them and will get them to their destinations much faster (Banister, 2005). It has already been established that the BRT is not accessible to all commuters

which would explain the low use of the transportation. Literature has shown that protests affect the accessibility of public transport. This could also explain the low numbers of people who use this public transportation. If commuters are unable to rely on a certain mode of transport will resort to them using other alternatives and in the case of Johannesburg, commuters resort to taxis. The study done by Weakley and Bickford (2015) found that many commuters who were unable to access the BRT used taxis instead.

5.4.3 Trains

Data has shown that metro rail and the Gautrain are not easily accessible to everyone especially commuters who live far from the railway stations. The literature that is available about trains in Johannesburg shows that passenger rail transport is falling apart. When looking at the travel times to get to the train station in Chapter 4 section 4.5.1 it is evident that commuters have to walk 30 minutes or more to be able access this mode of transport. The poor that rely on trains have to deal with problems of accessibility, reliability and safety on a daily basis. This limits the poor from being able to move around with ease to access work, education or healthcare.

According to the NHTS Gauteng study (2014) low income earners commuting to work rely mostly on minibus taxis. This is due to the inaccessibility of other modes of transport such as the Rea Vaya BRT and Metrorail. To answer the question mentioned in chapter 2 *is public transport accessible to the low income groups?* According to the studies referred to in this thesis, low income groups residing on the outskirts of the city are unable to access the BRT system which is a safer and cheaper option and therefore they use minibus taxis to commute. Due to the long distance from their homes to jobs and public services and the high cost of minibus taxis, low income earners travels are limited. This reinforces the theory of spatial mismatch and entrapment whereby transport is linked to geographical barriers of the poor which limits their access to better opportunities and services.

5.5 Affordability

Literature has proven that those who are unable to afford transport have limited access to public services. According to Carruthers et al (2005), people who are facing the most difficulties are working people on low income that have to travel to work using public transport. Their travel costs can form a significant part of their take-home income and they have no choice but to pay for it. Transport was the second most paid for expenditure the first being housing, water, electricity etc. Carruthers et al (2005), also mentions that public transport commuters are financially penalized by restricted hours of service operation which means that they may sometimes have to take a taxi (metered or uber) or they have to walk. Low income groups are unable to afford meter taxis as they cost much more than the available public transport. Currently there is no evidence from the Department of Transport that the taxi industry is being subsidized. This affects the low income commuters who have to deal with the increasing transport costs that are influenced by fuel prices and inflation.

To answer the question *is public transport affordable to the poor?* Data has shown that people spend more than 20% of their income on public transport (Stats SA, 2013). This figure changes depending on a household's geographical location. Households located on the peripheries far from the main city spend more as they have to travel longer distances. According to the NHTS Gauteng (2014), public transport is affordable when it is 10% or less, but it has been found that poorer household use more than that which makes public transport unaffordable.

Venter (2011) has found that in many cases poorer households pay more in, in absolute terms for public transport trips than their richer counterparts do. This is due to the poor location of the many low income households in the urban periphery as seen in Appendix E. This results to low demand and long distances push up fares and a high dependence on informal transport modes with unsubsidised fares (Venter, 2011). Literature has shown that with increasing fuel prices and inflation results to the increase of public transport fares. This affects low income earners as they have to spend more of their salaries to pay for transport.

It has already been noted that trains are the cheapest form of public transport except for the Gautrain which costs more than any other modes of public transport (See Box 1). The state of trains including issues with reliability, accessibility and safety deters people from using trains.

According to the NHTS Gauteng survey (2014) it was found that 44,5% of households did not use trains reasons referring to service attributes. Other reasons were unavailability and the preference of using other modes of transport.

5.6 Safety and security

Literature shows that traffic accidents account for the most deaths on the road in developing countries. It is also evident that majority of the accidents that happen on the road are caused by minibus taxis. It has already been established that taxis are the most dangerous mode of transport in South Africa as mentioned in chapter 4. This begs for an urgent call for the government to step up and find solutions to work with the taxi industry to ensure the safety of passengers.

Commuters found the BRT to be much safer as there are designated lanes for the buses and there are security cameras in the buses as well as the bus stations. This has helped to reduce petty crime incidences. The BRT system in the city of Johannesburg as well as the Gautrain are the safest modes of transportation but both are not easily accessible to all commuters which results to the use of the least safest transportation.

Metrorail on the other hand has been deemed to be unsafe, overcrowded and dangerous. A study done by the South African Institute of Race Relations (SAIRR) stated that more than 160 people died in mining accidents in 2009 and 2010 but close to 900 people lost their lives due to rail accidents between the years 2007, 2008 and 2009 (Xaba, 2012). This study was refuted by PRASA's spokeswoman who stated that SAIRR findings were inaccurate and lacked credibility. She goes on to say that most deaths that do occur are due to crossing the railway line or suicide (Xaba, 2012). Passenger rail in South Africa could make major improvements if they received funding from the government as well as the private sector but due to the lack of adequate investments Metrorail is unable to meet the demands of the passengers.

5.7 Apartheid Spatial Planning Solutions

Undoing the legacy of the past has proved to be a challenge for government policy. However, the implementation of the Rea Vaya BRT system is a start on the right directions. The Rea Vaya has

to a certain extent provided accessible transport to previously marginalized groups of people who were forced to live outside the city by the apartheid government. However, transport networks in geographical locations outside the cities are weak which causes mobility difficulties for the poor and they have to resort to using unsafe modes of transport (minibus taxis and Metrorail).

The city of Johannesburg has plans to restructure the apartheid city which is called The Corridors of Freedom. The Corridors of Freedom is a Transit Oriented Development (TOD) plan which aims at integrating the fragmented areas of Johannesburg in order to improve access to social and economic opportunities (Rysek, 2017). This plan was announced on the 10th of May 2013 by the Mayor of the city of Johannesburg, in an initiative to promote mixed land use in the city as well as creating employment by using a transit oriented approach (Joburg, 2014).

This long term development plan of 2040 is the hope for the city to thrive and if it is successful it could be used as a beacon of hope for the whole of South Africa. According to McGaffin and Gavera (2012), Transit Oriented Development (TOD) promotes the development of compact, walkable, mixed use communities around transit stations as an effort to reduce people's dependence on cars and improve the quality of life in cities.

5.8 Recommendations

This section provides some recommendations arising from the research on public transport within the city of Johannesburg. These recommendations address transportation in and around the city and are directed at municipal governments and planners alike. These recommendations could be applied to cities in South Africa that face similar characteristics.

Recommendation 1: Provide transport that will access necessary services.

Government and planners should focus on the modes that the poor use and build on that to provide affordable, accessible public transport. When coming up with a new mode of transport, they should consider if it will be available to everyone and if people will be able to access public services using this transport. Non-motorized options should be considered for those who have to travel long distances and services should be brought to them which will limit their need to travel.

Recommendation 2: Listen to the poor people's needs.

Planners should engage more with the public to find out the outcomes they want from the public transport systems as they are the ones who have to use it on a daily basis. It is imperative that the public be involved in the planning process as stakeholders in order for future projects to be accepted and fully utilized. A much greater effort should be made by a variety of actors to ensure that the voices of the poor are heard on the issues of public transport. As poor public transportation affects them most. Therefore, the poor should be involved in meaningful transport related decisions that affect them most.

Recommendation 3: Alternative modes of transport

This study has revealed that the government spent billions on one project which is the Gautrain and it only benefited a few that could afford it. The government should hold off on expensive mega-projects and focus on developing cheaper modes of transport that will be affordable, accessible and safer. The local government should take a lead on discussing alternative transport options with the general public rather than a specific group of people. This will lead to people accepting the mode of transport and avoiding future resistance to transport projects.

Recommendation 4: Crime prevention and security

It is evident that transport issues overlap with urban safety and crime prevention in several ways. Commuters using the trains are exposed to theft and women are sexually harassed in the train. There is an urgent need to enforce effective crime prevention strategies that will ensure the safety of commuters in the train and around the train stations. An investment in security cameras and private security guards will enhance the safety in and around the train stations.

Recommendation 5: Gender equity

Gender in public transportation should be studied and understood more as there are important transport issues that affect women more especially poor women. According De Wet et al (2008), the study on poverty and livelihoods in Johannesburg revealed that there is an increase in female headed households which means planners should be gender aware in the transport planning process. Special attention should be paid to women's voices on the issues of public transport. A study done by Potgieter et al (2006) reveals that there is link between transport and travel related

activities of women in the Eastern Cape province. There is a need for a country-wide study as women face different challenges by geographical location.

Chapter 6: Conclusions

6.1 Conclusions of the study

This paper investigated if the public transport system is failing the poor in Johannesburg. In order to collect the data on experiences of the commuters with regards to the public transport, secondary data from the National Household Travel Survey Gauging Report, Mobility Report, South Africa's opinion poll and Statistics South Africa were utilized to gain insight on commuters experiences. In Chapter 4 the case study of Johannesburg was presented including transport indicators and Chapter 5 presented the findings and recommendations. The conclusions presented in this chapter are based on the main themes presented in the findings of the study as well as the questions in chapter 2.

Public Transport Challenges faced by South Africa

The challenges highlighted in the literature review regarding public transport answered the question *what are the public transport challenges in South Africa*. It was found that the South African government is struggling with financing and maintaining public transport. Low income households using trains and the old metro buses are subjected to overcrowding and discomfort due to the lack new fleets of trains and buses.

Secondly, poor road infrastructure and traffic congestion was found to be a challenge in South Africa and with the increase of road transport is found to be unsustainable and bad for the environment. The issues of pollution tend to effect the poor people more than the wealthier people (Brebba, 2014). Literature has shown that poor households are located in areas that are overcrowded and congested and are most likely to suffer from long term health issues and it could lead to premature death (Whitelegg and Haq, 2003). Traffic congestion was also found to lead to road accidents that cause many deaths. This puts a burden to low income households as they are found to lack health insurance and when a death occurs in the family they have to spend a considerable amount of money on funerals (Banerjee and Duflo, 2007).

Public transport protests mentioned in the literature is also a major challenge in South Africa that effects all commuters as they can be dangerous and they hinder the movements of people who are

reliant on public transport. Poor households working in the informal sector lose out on wages due to the chaos of protests.

Accessibility, Affordability, Safety and security

Reviewing the questions in chapter 2 and the findings on accessibility and affordability of public transport for the low income groups, it is found that minibus taxis are the most accessible but not as cheap as Metrorail and Rea Vaya BRT. The study also found that different modes of transport served different purposes. The Taxi Industry which has been functioning since the apartheid era transported the marginalized black communities from their homesteads to the city. Today, the minibus Taxi Industry forms an important part in the public transport system whereby millions of commuters use it as their main mode of transportation.

Majority of low income households were found to use minibus taxis as their main mode of transport to travel to work. The use of this mode was found to be unsafe and undesirable but due to the lack of options for the low income households they have no choice but take that risk. The most affordable transport which are trains is the most troubling as it has the worst travelling conditions. Besides the fact that many commuters are unable to access the train station due to the long walking distance, commuters are unable to rely on trains because of the inconsistent services.

The Rea Vaya BRT system is what could save public transport in the city of Johannesburg as it is cheaper than taxi fares seen in figure 2. Literature has revealed that the protests orchestrated by the Taxi Association could prolong the completion of the BRT phases in Johannesburg which will provide a well connected bus route corridors. It could also hinder the plans for expansions to other provinces in South Africa. Rea Vaya is also safer for commuters to use as there was no evidence of occurring road accidents and crime related to the usage of the system. Furthermore, transport integration is needed between the modes of transport to ensure a successful public transport system that can also be enjoyed by the poor.

How is public transport failing the poor?

It has already been established that poor people rely more on public transport as they do not have the option or the money to purchase a personal vehicle. The transport problems that are mentioned above are more likely to impact the poor people the most as they are already in a vulnerable situation whereby they lack access to public services. Affordable, accessible and safe transport could make a difference to the poverty stricken households as they will have the mobility to access better services and better economic opportunities that they haven't been able to reach before.

The lack of integration and coordination between minibus taxis and the subsidized public transport (BRT) is becoming chaotic and frustrating for the public. In events when there is a strike of one of the modes of transport it is announced beforehand but for the poor who lack access to informative property are left stranded.

By analyzing the literature it is evident that an integrated transport network could create a number of benefits for a city. In the case of Johannesburg public transport systems are different and serve a different purpose. The lack of coordination between these systems has contributed to the challenges of urban sprawl and private vehicle dependence. This has also resulted to people having to pay high prices to commute. The lack of public transport integration in Johannesburg has led to an inefficient public transport system. From all that is mentioned above it is evident that the public transport system is letting down the poor as they have no other alternatives and they have to compromise their safety in order to get access to public services.

This study used secondary data to answer the research questions, the statistical data provided ample information on public transport and answered the important questions highlighted in chapter 2. A large scale study needs to be conducted that includes qualitative data on commuter's experiences and needs especially on areas that are on the outskirts of the city.

An in-depth study that combines quantitative and qualitative methods of data collections on the impacts of the newly developed public transport. There is a lack of evaluation data that follows up on the transport projects that have been implemented (BRT and Gautrain) that indicates if the initial aims and objectives have been met and what the final outcomes reveal.

Summary

This study aimed to investigate if the public transport system is failing the poor by looking at the minibus taxi, buses and train transportation. It discussed the main transportation issues accessibility, affordability, safety and security which included commuter's experiences and opinions towards the public transport that they use. This chapter also discussed the findings, recommendations and future research ideas.

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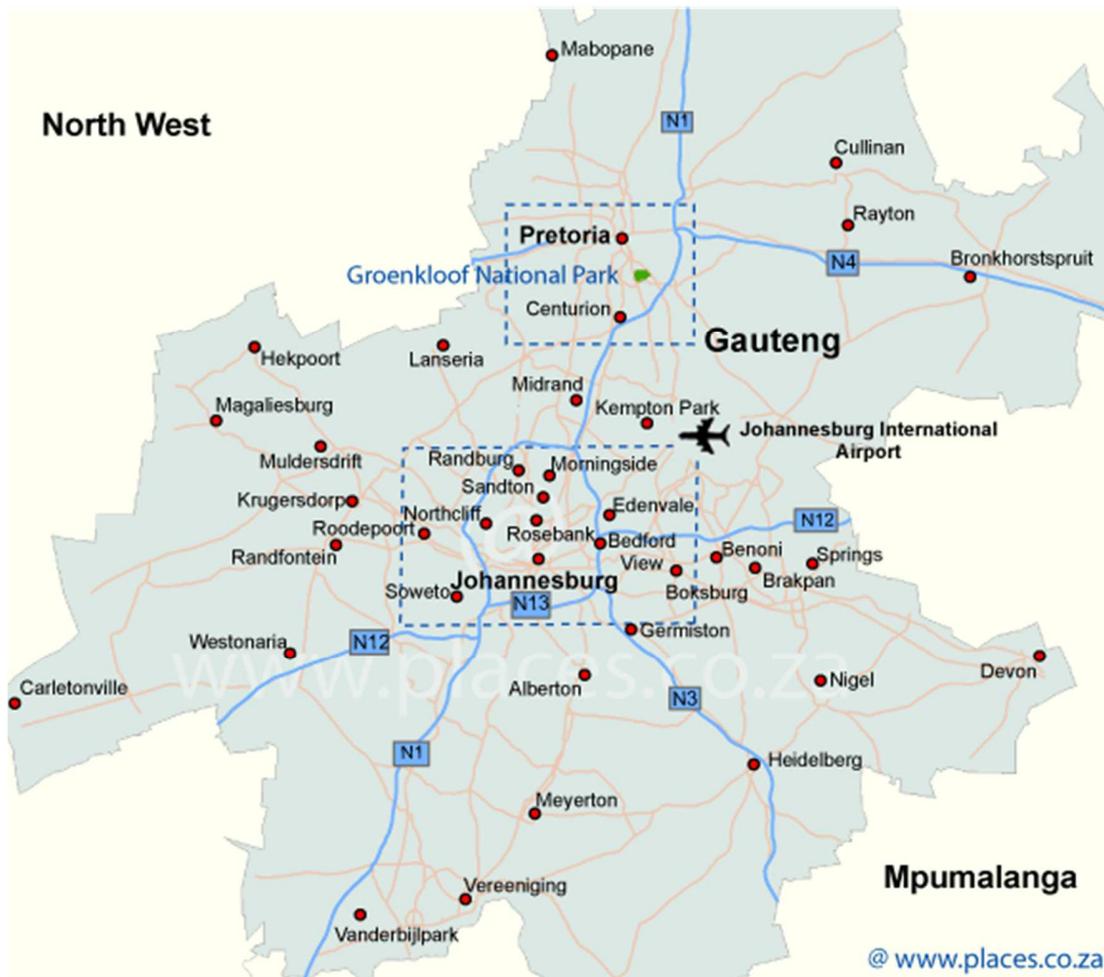
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Appendix Page

Appendix A: Map of Johannesburg



Source: SA Places (2016) http://www.places.co.za/maps/gauteng_map.html

Taxi hand signs are a practical,

multi-lingual and, typically, 'user friendly' gestural practice for millions of commuters. They have become a fully integrated part of a symbolic cultural landscape of Gauteng's minibus taxi transport system.

1	The index figure pointing up, which means town.	
2	The index figure pointing down, meaning local.	
3	The KwaThema taxi hand sign is performed showing two flat hands, palms together, resting on the left side of the person's face. KwaThema means Rest in Peace, which may have been chosen by African families in their relocation in 1951.	
4	The taxi hand sign to Kliptown is one hand waving left to right in front of their faces and the other hand waves up and down, to ask the taxi to slow down. The taxi hand sign to Kliptown is a social commentary about the living conditions of people and their particular circumstances.	

Source: South Africa (2015) <https://www.brandsouthafrica.com/tourism-south-africa/joburg-by-taxi>

Appendix C: Employment and Income Graph

Chart [Data](#)

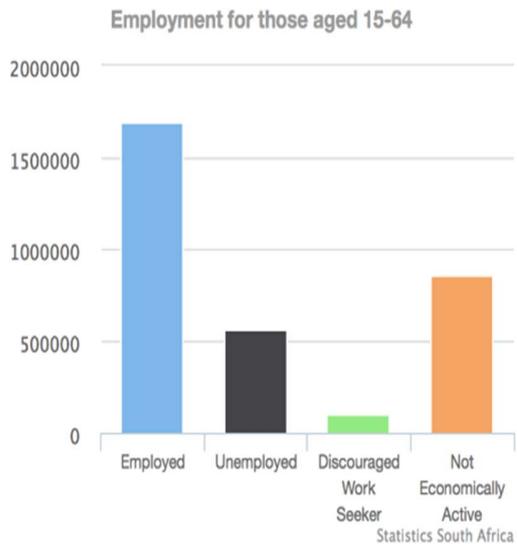
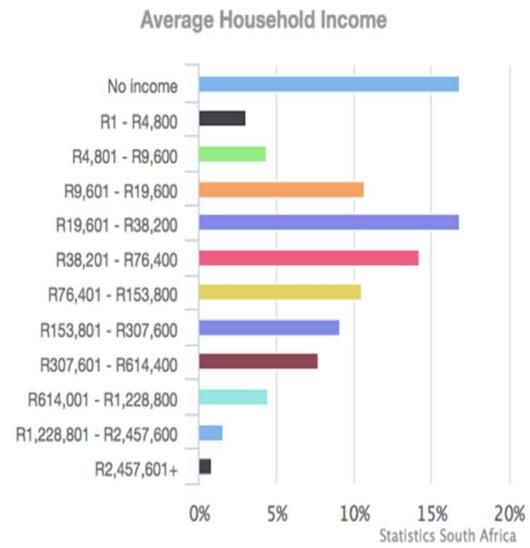


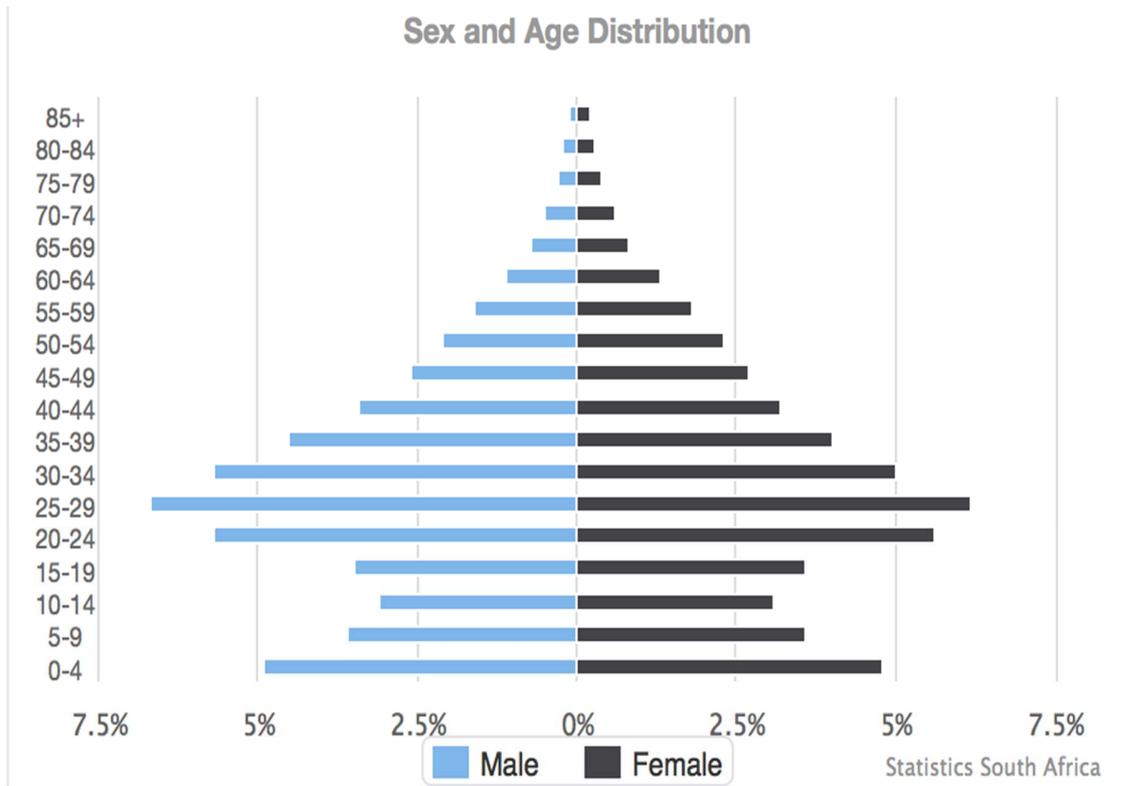
Chart [Data](#)



Source: Stats SA (2011)

http://www.statssa.gov.za/?page_id=1021&id=city-of-johannesburg-municipality

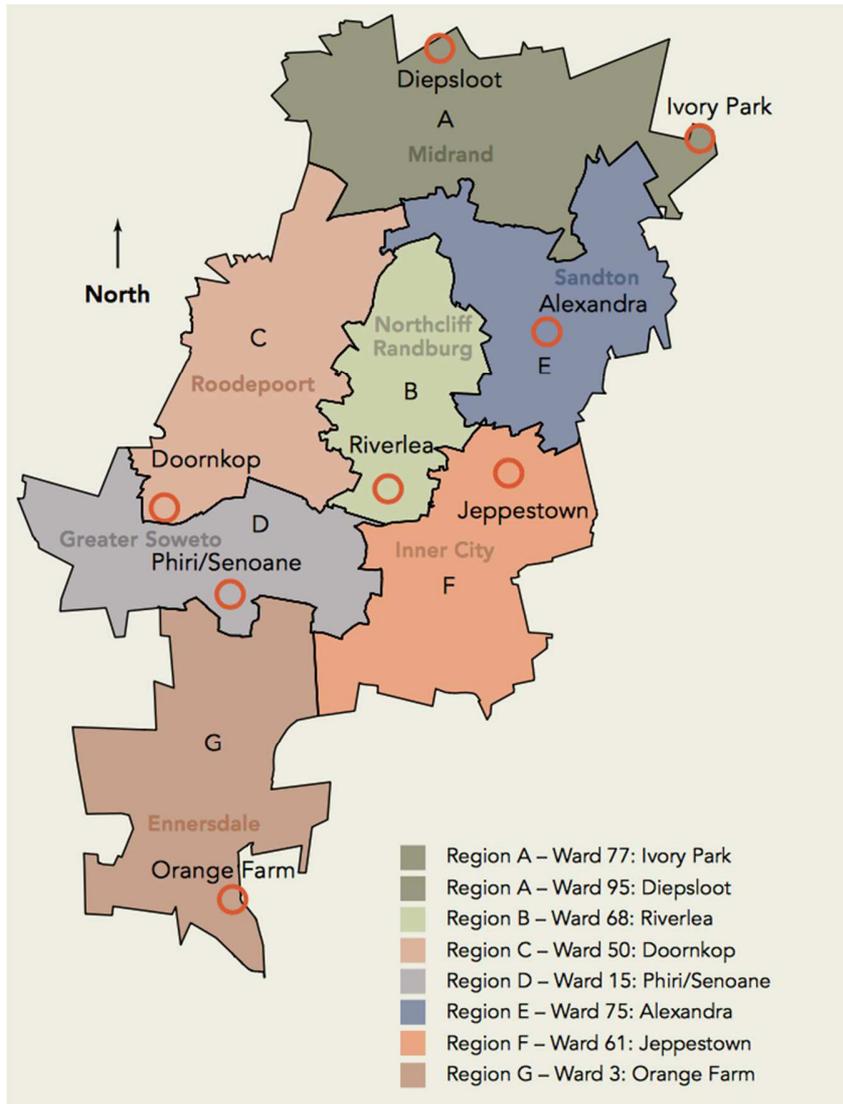
Appendix D Population by age and sex graph



Source: Stats SA (2011)

http://www.statssa.gov.za/?page_id=1021&id=city-of-johannesburg-municipality

Appendix E Geographic distribution of the selected poorest wards in the seven administrative regions in Johannesburg

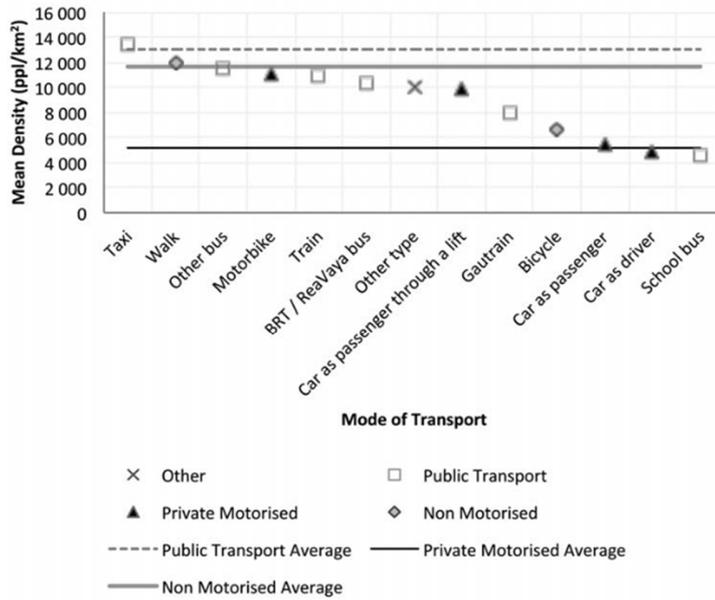


Source: De Wet et al (2008)

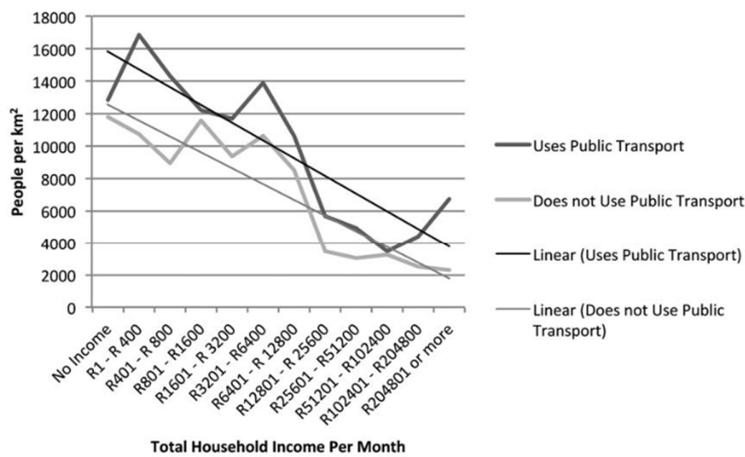
<https://www.uj.ac.za/faculties/humanities/csda/Documents/Johannesburg%20Poverty%20and%20Livelihood%20Study.pdf>

Appendix F

Main Transport Type by Mean Density



Public Transport Use by Mean Density and Income Category



Source: Weakley and Bickford (2011)