THE USE OF PUBLIC TRANSPORT SERVICES BY RESIDENTS IN
THE ACCRA METROPOLITAN AREA

BY

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DECLARATION

I, Dominic Edem Hotor, declare that apart from specific references which have duly been acknowledged, this work is the result of my own original research and that this dissertation either whole or in part has not been presented elsewhere for another degree.

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ABSTRACT

Public transport is crucial for the growth of any economy and trade, both of which are highly dependent on the conveyance of people and goods. However, there is, in many cities of developing countries, a major challenge of adjusting the existing system of mobility to the evolving transportation needs of the people. The situation in the Accra Metropolitan area provides a template of the circumstance in most of these city-regions. Against this backdrop, the study investigated the use of public transport service in the Metropolis through a comprehensive mode choice analysis, reasons for mode choice and challenges of urban transport accessibility.

Within a mixed method of research, 3 sub-metros of the Accra Metropolitan area were purposively selected, where 210 purposively selected respondents were obtained for the surveys. Additionally, 13 interviews were conducted with the various transport stakeholders.

The study reports trotro as the main transport mode choice of the residents and factors like income level, education level, age and occupation type other than factors like sex, household size and marital status, influence the modal choice of residents within the Metropolis. Also, respondents attributed their main reason for mode choice as due to economic reasons, timeliness, safety and personal security. Distance to transit points and terminals were also determining factors for modal choice. Waiting times at the terminals, time spent in vehicles before they set off all shape their choice and use of the transport services available. Major challenges associated with public transport included vehicular traffic delays, mechanical breakdowns and non-availability of services at salient periods.

The study recommends an improved BRT and a possible LRT system to aid mobility in the Metropolis. Also, development of arterial and access routes, road pricing, efficient traffic management and adoption of the Park and Ride system are put forward to ensure optimum accessibility of urban transport services within the Metropolis.
ACKNOWLEDGEMENTS

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DEDICATION

This thesis is dedicated to my parents Mr. Johannes Hotor, Mrs. Vinolia Hotor and all parents who strive to make a better life for their children.
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# LIST OF ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AMA</td>
<td>Accra Metropolitan Assembly</td>
</tr>
<tr>
<td>APTA</td>
<td>American Public Transportation Association</td>
</tr>
<tr>
<td>BRRI</td>
<td>Building and Road Research Institute</td>
</tr>
<tr>
<td>CBD</td>
<td>Central Business District</td>
</tr>
<tr>
<td>CES</td>
<td>City Express Services</td>
</tr>
<tr>
<td>CSIR</td>
<td>Council for Scientific and Industrial Research</td>
</tr>
<tr>
<td>DVLA</td>
<td>Driver, Vehicle and Licencing Authority</td>
</tr>
<tr>
<td>ERP</td>
<td>Economic Recovery Programme</td>
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<tr>
<td>GIS</td>
<td>Geographic Information Systems</td>
</tr>
<tr>
<td>GSS</td>
<td>Ghana Statistical Service</td>
</tr>
<tr>
<td>GUTP</td>
<td>Ghana Urban Transport Project</td>
</tr>
<tr>
<td>IID</td>
<td>Institute for Infrastructure Development</td>
</tr>
<tr>
<td>ISTC</td>
<td>Intercity State Transport Corporation</td>
</tr>
<tr>
<td>ITS</td>
<td>Intelligent Transport Systems</td>
</tr>
<tr>
<td>LEDC</td>
<td>Less Economically Developed Countries</td>
</tr>
<tr>
<td>LI</td>
<td>Legislative Instrument</td>
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<tr>
<td>LTA</td>
<td>Land Transport Authority</td>
</tr>
<tr>
<td>MEDC</td>
<td>More Economically Developed Countries</td>
</tr>
<tr>
<td>MMT</td>
<td>Metro Mass Transit</td>
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</table>
OSA  Omnibus Service Authority
SRPC  Strafford Regional Planning Commission
STC  State Transport Corporation
CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Movement, in general, is an essential aspect of the life cycle of humans. This activity enables people to commute while facilitating the growth and trade of societies, all of which are highly dependent on the conveyance of people and goods (Rodrigue et al., 2013). In this regard, transportation\(^1\) is very crucial for every economy as the various actors need to be mobile in order to achieve institutional development goals. This is necessary for both the rural and urban environments, however, due to the fast increase in the populations of the latter, more focus has been attached to the matter in current settings (UN, 2009).

Transportation has various benefits both direct (people engaged in the transport activity) and external benefits (revenues generated by governments). Transportation is the backbone of every strong and prosperous economy and it has been estimated that for every $10 million allocated to both capital and operating investment in transportation, it will yield $30 and $32 million in increased business sales respectively (APTA, 2007). The need for efficient use of funds allocated to this sector will benefit not just the governments but populations at large.

Public transport has generally been described as a mode of transport available for use by the public usually against some established payments (Ubbels et al., 2001; Vuchic, 2002 & Littman, 2015). This transport mode plays significant and unique roles within transport systems by providing affordable and basic mobility options for the poor, non-drivers and proficient urban travel and also facilitates better land use development (Littman, 2015).

\(^1\) A means through which passengers, freight or information are conveyed from one place to another (Rodrigue et al, 2013).
Identifying transport mode choice is an important aspect of effectively managing public transport systems. Travel behaviour surrounding mode choice can be broadly classified into two; where one aspect studies the impact of urban form on travel behaviour and the other aspect studies the socio-demographic/economic and lifestyle factors that may influence travel behaviour. Nevertheless, a combination of both approaches may also be used in ascertaining modal choice (Ojo et al., 2014).

Passenger transport mode shares for developed countries have been largely by private transport whereas, in the developing countries, public transportation has been the widely used mode (LTA Academy, 2010). This further expresses the need for an efficient public transportation system in the developing part of the world to address the needs of their increasing populations.

Provision of public transportation has been the prime responsibility of national governments; while in others, it is a state or local government’s responsibility to provide this service (Hensher, 2002). Public transportation in the European cities was traditionally provided by publicly owned enterprises and has been regarded as a sector that provided “good bad jobs”: unskilled, but with job security and high informal autonomy and above all, unionised (European Commission, 2009). However, recent changes in the governance of urban public transportation have ensured that these enterprises are being privatised and exposed to competition (European Commission, 2009). This has made transport the backbone of the European economy, accounting for about 7% of GDP and more than 5% of the total employment within the EU (European Commission, 2009).

In developing countries, vehicle ownership is relatively low and dependency on public transport is high, however, the financial conditions and performance of all forms of government-organized public transport are ineffective and are in decline (Kumar, 2011).
These challenges have been surmounted in some developing regions such as Singapore and in South America whose advent of a Bus Rapid Transit model on the case of Curitiba has seen positive significant results in such realms (Goodman et al., 2005). The Curitiba Bus Model which was proposed by the city planning philosophy of Mayor Jaime Lerner of the Brazilian city of Curitiba has since been incorporated in other cities as TransMilenio in Bogota, Columbia; Metrovia in Guayaquil, Ecuador and the Orange Line of Los Angeles where urban transport and urban growth are incongruous. The essence of a Bus Rapid Transit hence is to improve bus operating speed and reliability on arterial streets by reducing or eliminating the various types of delay and hence encouraging the public to opt for the service (Goodman et al., 2005).

The history of public transport development in sub-Saharan Africa varies from one country to another (Trans-Africa Consortium, 2010). It remains a sector that is poorly organised across the continent as several companies have been created within various countries, even several times in the same country, but a greater number of them have been unsuccessful (Trans-Africa Consortium, 2010). Against this backdrop, it is interesting to note that the world population increased from 6.9 billion in 2013 to 7.3 billion in 2015; much of the growth has occurred in the developing countries which have a population of 6 billion compared to the much smaller 1.3 billion in the more developed countries (Population Reference Bureau PRB, 2015). Also, within the next two decades, more cars may be built than ever in the auto industry’s 110-year history (World Bank, 2016). This increasing human population connotes a concurrent increase in mobility activities, hence a need for a sustainable transport system that will allow movement to efficiently thrive on (Litman, 2015).
1.2 Problem Statement

As at 2010, about 2 million people lived in Accra and it is estimated that the figure would rise to 4 million by 2020 (GSS, 2010). Each day, an additional half a million commuters travel into the city to undertake educational, professional, commercial, industrial and administrative activities which inherently require the use of transport (World Bank, 2010). Consequently, one of the key challenges associated with population growth to government and stakeholders is the provision of a sustainable public transport to this growing population. When this is done, the urban populations can be able to make informed choices regarding the efficient mode of transport that satisfy their various travel needs.

Ghana’s public transport system has been dominated by private sector provision of transit for many years. It serves about 95% of public transport needs, often using shared taxis and minibuses ‘trotro’\(^2\) (Fouracre et al., 1994; IBIS, 2005; Wilson, 2006). Moreover, the public transport in the Accra Metropolis has been overly characterized by the fundamental dichotomy of a market with an established excess demand and a paucity of supply (GUTP, 2007).

In a bid to improve public transport in Ghana, mainly in the cities of Accra and Kumasi, the government together with the French Development Agency and the Global Environment Facility conducted the Ghana Urban Transport Project (GUTP) backed by the World Bank of which the flagship was the implementation of a Bus Rapid Transit (BRT) system in September 2005 (Okoye et al., 2010).

Ghana is at the threshold of a socio-economic boom which is occurring concomitantly at a time where more people are living in urban areas as compared to those in rural areas.

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\(^2\) trotro is a local Ghanaian expression meaning “three pence”, which was the fare charged for local trips in trucks (known as “mummy trucks”) in GAMA in the late 1950s and 1960s (Abane, 2011). Today, the word loosely refers to all vehicles engaged in commercial transport, including Nissan Urvans, Toyota Hiace minibuses, and the 207 series Mercedes-Benz buses (Agyemang, 2015).
This has bedevilled the public transport operators with numerous problems. Within such a context, the result is a struggle for survival mainly due to the costs to be borne in order to continue the transport activity providing residents with limited and unattractive modes of travel (IAPT, 2008). This calls for the need to analyse the use of public transport services through current modal shares and choices and the challenges coupling their accessibility within the Metropolis.

Researchers such as Pucher (2004; 2005), Abraha (2007), Kassahun (2007), Niyonsenga (2012) and Awoyemi et al., (2013) have conducted studies on public transportation within urban settings in developing cities. In Ghana, studies have been done in the major cities with Accra and Kumasi benefitting from the majority of such works. These studies have looked at public transport within the urban sphere and have mostly been on injuries or traffic accidents (Mock et al., 1999; Jorgensen & Abane, 1999; Gumah, 2015), congestion (Agyemang, 2009; Agyemang, 2015; Anokye et al., 2013), passenger satisfaction (Aidoo et al., 2013), demand and service capacity (Poku-Boansi & Adarkwa 2014), supply of public transport service (Poku-Boansi & Adarkwa 2011) and on energy efficient public transport services (Anin et al., 2013).

Abane, (2011) for instance, observed travel behaviour in Ghana from four key metropolitan areas, while Amoh-Gyimah & Eric Nimako Aidoo (2013), studied the mode choice of transport to work by government employees in selected institutions in the Kumasi Metropolis. Subsequently, Ojo et al., 2014 looked at bus movements via the State Transport Corporation (STC) on the Accra-Takoradi route.

They specifically focused their research more on mode choice for formal sector employees and intercity travellers but this study encapsulates public transport use between formal and informal sector employees who also live in the city as they may tend to exhibit a totally
different travel behaviour. Also, their study locations confer a particular travel pattern that may be dissimilar to the case of the Accra Metropolitan Area (AMA). Moreover, this study expands the scope to include more respondents and participants of diverse origins and characteristics to effectively examine the use of public transport services. The study further contributes to the limited number of investigations on modal choice within and between city travels in the Ghanaian capital while presenting an updated picture of the travel behaviour of residents.

Moving forward, there is the need for continuous research in the urban sphere of public transport use to effectively understand the current situation and proffer policies that can help in addressing the changing dynamics within urban cities.

In Ghana, records available on urban transport indicate that private cars and taxis take up 70% of the road space and convey only 25% of commuters, while the remaining 30% of road space is taken up by buses and minibuses, conveying 75% of passengers (IID report, 2009). This depicts a low modal choice for private cars at the expense of limited road space left for the majority of the population. Clearly, a bus can undertake the work of several taxis and private cars. Thus, in addressing public transportation needs in Ghana, successive governments, inter alia, created public transport enterprises such as the Omnibus Service Authority (OSA) Transport Company, State Transport Corporation (STC), City Express Services (CES), and lately Metro Mass Transit (MMT) Limited for efficient delivery of public transportation to increase productivity and economic growth but these goals are still far from being attained (Wilson, 2006).

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3 The metro mass transit buses refer to a variety of large commercial buses of DAF, VDL Neoplan City, Ashok Leyland, VDL Jonckheere, Fiat/Iveco and Tata models that were used in the pilot BRT in Accra. Their seating capacity ranges between 34 and 63 persons per bus. [www.metromass.com/mmt](http://www.metromass.com/mmt) (accessed June 18, 2016).
Furthermore, the majority of people are likely to use public transport when it is able to offer accessible, efficient and good value transport. “Public transport is hence the live wire of the city as streets, roads, railways and walkways are to the city, what arteries and veins are to the human body” (IID Report, 2009). However, the share of public transport in this mobility growth has not changed much and still remains rather limited.

This study, therefore, aims to delve into the issues of public transportation: summing up modal choice, factors that influence modal choice and an assessment of the challenges associated with urban transport services within three selected sub-metros of the Accra Metropolitan Area. This will go a long way to providing the requisite feedback that could influence policy makers, transportation practitioners, transportation geographers and planners in general, to fuse in practical measures to address such concerns. This will ensure an overall improvement in the transport sector, which will have many positive impacts on the livelihood of residents of Accra.

1.3 Objectives

The main objective of the research is to investigate the use of public transportation services by residents in the Accra Metropolis.

Specifically, the research will:

1. Examine the modal choice of residents within the Metropolis.
2. Assess the factors that influence modal choice.
3. Assess challenges associated with urban transport services.

1.4 Research Questions

1. What are the distinct travel modes and trip patterns of residents in the Metropolis?
2. What are the factors that influence mode choice of residents?
3. What are the various challenges associated with urban transport services in the Metropolis?

1.5 Hypothesis

The core proposition of the study is that urban settlers will choose the transport mode which is most economical, timely and secure to get to their destinations. This premise is stated because it is assumed that human beings behave in a rational way to maximise utility and since purchasing power greatly determines a person’s modal choice, it can be said that people with higher economic statuses will opt for transport modes that are more secure, comfortable and timely than others with a relatively lower economic status.

The hypothesis to be tested in the study is based on the following:

Hypothesis 1:

- \(H_0\): There is no significant relationship between respondent’s socio-demographic characteristics and their alternate mode choice of transport.
- \(H_1\): There is a significant relationship between respondent’s socio-demographic characteristics and their alternate mode choice of transport.

A test of hypothesis when conducted will determine whether a difference in relationship likely exists between the modal choice of residents and their socio-demographic characteristics.

1.6 Significance of the Study

This study is of imperative value in the following ways. The outcome of this study will be able to bring to the fore, the dominant mode choice of residents within the Accra
Metropolitan Area as it stands presently and assess mobility within each of its corresponding sub-metros in consonance with their consequent reasons for mode choice.

As a result of mode choice analysis, the end product will offer an all-inclusive overview of the constraints as well as the potentials of transport among the various demographic groupings within the city. This study will also be important in terms of providing the necessary stakeholders with policy viewpoints of future urban public transport intervention projects and developments herein such as pricing policy analyses, which may encourage/discourage travellers from using specific routes (road pricing schemes) while ensuring optimum accessibility.

Moreover, the outcome of this research can serve as a springboard for further studies both in the urban and rural public transport milieu.

1.7 Scope of Study

Considering the large area and population of the Accra Metropolis and its sub-metros, the study only focuses on three (3) out of the six (6) sub-metros of the Metropolis. This demarcation is in accordance with the Local Government Act, 1993, (Act 462) and Legislative Instrument (LI) 1615-which also established the six (6) Sub-Metropolitan District Councils. The purposively selected sub-metros consist of Okai-Koi, Osu Klottey and Ayawaso since they provide a better location of the major transport routes and terminals within the Metropolis. The selected sub-metros are very busy and encapsulate salient spots like the main transit points/terminals at Kwame Nkrumah Circle, Achimota, Kaneshie and the Central Business District at Tudu, which are regional bus terminals and are also among the major city bus terminals in the country where physical mobility of various destinations are embarked and/or conveyed.
1.8 Organisation of the Study

The study covers six chapters which are further divided into sub-themes. Chapter one which is the introduction gives the background of the study, the problem statement, the objectives, the relevant questions pertaining to the study and the significance of the study.

Chapter two reviews related and relevant literature to understand in the broadest perspective, the issue of public transport use. The chapter also reviews the related theories used in the study and the conceptual framework that helps to interpret the study.

Chapter three focuses on the study area and research methods adopted for the study. The background characteristics of the study area, namely the physical, social, transportation and economic features are discussed in this section. The research methods used are explicitly discussed in this section. The mixed method strategy adopted for the study is further explained together with how the data was collected, analysed and interpreted as well as the research limitations.

Chapter four of the study presents the findings from the three selected sub-metros of the study area. The chapter presents this in tandem with the research questions.

Chapter five presents the discussions pertaining to the findings. Also, the chapter discusses the overall mobility and accessibility pattern of residents within the Metropolis.

The final chapter, chapter six, presents a summary of the major findings, conclusions and recommendations of the entire study. It also presents possible areas for future studies.
CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

In this chapter, key terminologies are defined and a general overview of the existing literature regarding the modal choice of public transport, are brought to the fore. Also, empirical studies in the developing regions of the world including Ghana are reviewed. This is intended to help the researcher fully analyse and discuss the results of the study and juxtapose them with previous findings of other researchers. The theoretical overview and conceptual framework are presented at the end to guide the entire research.

2.2 Public Transportation

In defining “public transportation” one must begin with a general understanding of the term “transportation” itself which defies any single specific definition. Rodrigue et al., (2013) define transportation in the widest sense as “the movement of people, goods and information”. This definition broadens the scope of transport to include non-motorised systems such as walking, bicycle and animal drawn. Transport also includes the use of Information Communication Technologies (ICT) that transfer expertise and resources between spatial environments.

Professor Emeritus at the University of Paris, Pierre Merlin intimated that transportation appears to be an economic activity different from others and trades space with time and money. According to Merlin, the purpose of transportation, therefore, is to overcome space, which is shaped by a variety of human and physical constraints such as distance, time, economic power, administrative divisions and topography which confer a friction of distance to any movement (Merlin, 1994, original in French, translation by the author).
According to Rodrigue et al., (2013), the aim of transportation is to transform the geographical attributes of freight, people or information from an origin to a destination, conferring them an added value in the process. However, the ways by which this can be done varies considerably.

The definition of public transportation (also called public transit, public transport, mass transit and urban transit) has been used by authors to refer to many things. However, throughout the literature, public transportation has been generally used to mean a shared passenger transportation service which is available for use by the general public (Pucher et al., 2004; TCRP, 2009; Buehler & Pucher, 2012).

White (2009) defines public transportation to include all modes available to the public, irrespective of ownership. He went further to include taxis, private hire buses, and coaches to the scheduled services of buses, coaches, domestic air and rail operators. Here, the essential idea carried in this definition is that public transport is a mode where the “vehicle” in question is not necessarily owned by the user or used privately (White, 2009). Vuchic (2002) also describes public transport as including systems that are available for use by all persons who pay the established fare. These modes he argues, which operate on fixed routes and with fixed schedule include bus, light rail transit, metro, regional rail among several other systems.

Litmann (2015) describes “Public transit” (also called public transport or mass transit) to comprise of various services that provide mobility to the general public, including buses, trains, ferries, shared taxi, and their variations. Ubbels et al., (2001 p. 73) in their article, *Alternative Ways of Funding Public Transport: A Case Study Assessment*, refers to public transport as “a collective transport system, which is made available, usually against payment, for any person who wishes to use it”. They go on to posit that public transportation
services can be provided at various scale levels and can take different forms. By this definition, they attach a “shared” aspect to the public transport discourse and also for commercial purposes (as it is usually against some payment). The main highlight in Ubbels et al., (2001) definition is the fact that there is an “access”, “sharing” and “revenue”. These three points encapsulate an essential feature of what we mean by “public transport” since it is open to the public, shared and a commitment in monetary terms is given to the operators or owners by customers in order to be conveyed to their destinations while sustaining the operations of the transporting vehicle or service. This definition by Ubbels et al., (2001), is used to refer to public transport in this research.

2.3 The Nexus between Land Use and Transportation

The design of transport facilities such as roads, sidewalks, terminals⁴ etc. impacts on every community’s behaviour since these facilities are the result of land use decisions (SRPC, 2005).

Moreover, the manner in which we utilize our lands (for agriculture, residential, commercial, industrial developments etc.) impacts on the transportation facilities, especially that of public transportation, due to its large population carrying capacity (SRPC, 2005). This land use-transportation relationship or cycle is portrayed by describing the effects of an improved or a well-built road. What happens is that the land along the road becomes more accessible and with this increased accessibility, it makes the land more valuable and attractive to developers. Also, traffic volumes and the number of vehicle driveway increase may result in more congestion and a deterioration of the road’s capacity to efficiently move

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⁴ Terminals refer to designated locations where passengers and goods either originate, terminate or are handled in the transportation process. Terminals are essential and intermediate locations in the conveyance of passengers and goods. They mostly require specific facilities in order to accommodate the traffic they handle (Rodrigue et al, 2013).
people and goods. This reduced efficiency of the road eventually requires roadway capacity improvements that will encourage further development and the start of a whole new cycle.

Figure 2.1: Land use transportation cycle

Source: (Adopted from the US Federal Highway Administration, 1997)

Litmann (2016) catalogues land use features and their characteristics across urban, suburban and rural spheres. These features including roads, parking spaces, sidewalks and building sites are juxtaposed to transport systems of public transit, walking, cycling etc. When these
features and their characteristics are properly planned, it leads to a reduction in congestion, savings on road and parking costs, traffic safety, energy conservation among others.

Within the city of Accra, unlike an agricultural society where the journey to work involves outward movement from a central focus such as a farm or village to surrounding fields, the flow is reversed in an urban or industrial environment. Hence, with the separation of residence and employment, the journey to work has become an important factor influencing the choice of residential location and a preferred modal choice of transport (Oppong, 2000). This has made land use equally important in analysing the use of transportation services especially public transport.

2.4 Modal Choice

The choice of transport mode is very important in transport studies. This is due to the key role played by public transport operations in transport policy which makes more efficient use of road space as compared to private cars. Many studies have been conducted to investigate modal choice, however, no uniform definition of the terminology is given. In many studies, however, definitions can be derived from the type of determinants studied to examine modal choice. From this precedence, three different approaches can be employed in studying modal choice. These are the rationalist approach, the socio-geographical approach and the psychological approach (Hollevoet et al., 2011). Each of these approaches associates its own characteristics in studying modal choice.

The rationalist approach can be viewed as the conventional approach to study modal choice due to its basis on the assumption that travellers take decisions based on utility maximization attained by minimizing travel time and costs. Thus, with available information, individuals will behave in a perfectly rational manner in selecting the alternative with the highest utility.
The socio-geographical approach basically introduces a spatial component into the modal choice decision process and starts from the activity schedule of individuals to explain the modal choice. This approach looks at the demand for travel as a derived demand: where people are assumed to travel in order to carry out activities distributed in space and time and not just for the sake of it. The spatial factor within the modal choice definition is necessitated due to the consideration of space and time into the modal choice decision.

The psychological approach aims at explaining modal choice by studying individual attitudes with respect to the available transport means. Here, an attitudinal approach of intentions and habits are used by psychologists to understand the processes behind travel mode decisions.

Modal choice, therefore, is derived from a complex process that includes both objective and subjective determinants stemming from different disciplines and interrelated to a larger or smaller extent (Gonzalez & Suarez, 2013). One can differentiate between both objectively measured determinants (such as socio-demographic and spatial factors) as well as subjective factors (such as socio-psychological factors like attitudes, perceptions, preferences and habits) determining the perception of the objective ones (Hollevoet et al., 2011). The three approaches help to jointly present a definition of modal choice as “the decision process to choose between different transport alternatives, which is determined by a combination of individual socioeconomic, travel and spatial characteristics, and influenced by socio-psychological factors” (Hollevoet et al., 2011; Witte et al., 2013). Transport alternatives could denote either a single mode or a combination of travel modes be it motorized or non-motorized. It is relevant to note that education, age and occupation are related to income and car ownership. Also, travellers who earn high incomes have higher opportunity costs and time values and hence tend to choose faster transport modes and are more sensitive to travel time improvements (Gonzalez & Suarez, 2013).
2.5 Related Studies on Public Transport

Many studies have been conducted in the public transport sector around the world (Carruthers et al., 2005; Bureau et al., 2011; Fioro et al., 2013; Walters, 2013; Nunez & Palomares, 2014; Cats et al., 2015). These have looked at the use of the service in terms of accessibility, policy, multimodal shares, affordability, performance etc.

In Africa also, public transport studies have focused on urban mobility (Kassahun, 2007), where he observed that there is an increasingly heavy reliance on vehicles with small passenger-carrying capacities, such as private automobiles and minibus taxi, which results in congested junctions, with heavy traffic in Addis Ababa. Within the same city, Abreha (2007) found out that the bus route networks had deficiencies that make equal spatial accessibility of the service difficult. Niyonsenga (2012) also revealed the potential of the public transport in Kigali could serve up to 65% of demand, however, only 37% is addressed. Basorun & Rotowa (2012) discovered that the role of the private sector in the public transport services increased with patronage and recommends it as a major intervention area for a more effective transport operation in Lagos Island city. Otieno & Ngigi (2013) employed GIS in monitoring public transport vehicles in Nairobi to mention a few.

The Ghanaian space has also had a share of public transportation research with studies conducted by Oppong (2000), which looked at urban mobility and accessibility problems within the Accra Metropolitan Area. Agyemang (2009) studied the collapse of the pilot bus rapid transit system (BRT) in Accra through traffic congestion. Poku-Boansi & Adarkwa (2011) identified the cost of vehicles, the cost of providing urban transport services, the demand level, and the number of vehicles available in the study area as key factors that affected the supply of urban transport services within Kumasi (the second largest city in Ghana). Aidoo et al., (2013) found out that overall bus service quality tends to increase
when passengers are satisfied with service components such as consistent fare structure, low crime rate at terminals and an increased traffic safety record of the bus on the Kumasi–Accra route. Poku-Boansi & Adarkwa (2013) again studied the determinants of demand for public transport services in Kumasi. They found that employment status of commuters, trip duration, and population were the key determinants that influence the demand for public transport services in the city. Yobo (2013) looked at the involvement of the state government in setting up and at another point in time interfering in the operations of public transportation in relation to the Metro Mass Transit limited. Ojo et al., (2014) applied the service quality (SERVQUAL) management framework developed by Parasuramum, et al., (1985) to study campus shuttle service among others. They revealed that students use the campus shuttle mainly because of the lower transport fares and for educational reasons.

In relation to the study, a study by Abane in (2011) sampled the four key Metropolitan areas in the country (Accra, Kumasi, Tamale and Sekondi-Takoradi). From the study, the majority of the residents’ trip purposes was to places of work, the market centres, educational institutions and for leisure purposes. Out of 926 respondents interviewed, the results suggested that a lot more people prefer trotros followed by the taxis, which is represented as 71.4% and 15.9% of the total respondents respectively. Their reasons were mainly due to its affordability, availability and accessibility. Similarly, these preferred modes have always been reported in previous studies (Adarkwa, 1991; Abane, 1993a). The study also revealed that the GPRTU transport operators continue to dominate within the intra-urban commuter services.

A second national household transport survey report by the Ministry of Roads and Highways, Ministry of Transport and the Ghana Statistical Service in 2012 revealed that over 60% of residents who go to school and about 55% who visit health facilities, proceed on foot, leaving the remaining to be shared among school bus or trotro for students and
public taxi and trotro for those seeking health facilities. This shows that quite a greater number of residents use the most economical modes of transport so as to save cost.

Amoh-Gyimah & Aidoo in 2013 analysed the mode choice of government employees in the Kumasi Metropolis. The specific employees were from selected institutions such as the Kwame Nkrumah University of Science and Technology (KNUST), the Building and Road Research Institute (CSIR-BRRI) and Kumasi Polytechnic (K-Poly). Others were from the Lands Commission, National Service Secretariat, Electricity Company of Ghana, Department of Urban Roads, and Ghana Highway, all dotted around the heart of the Metropolis. The empirical results show that majority of the formal working staff rely either on private cars or public transport to get to work. In respect to that, the only alternative specific variable, travel time, was most important in determining government employee’s choice of transport mode to work. This was imperative as the time factor for work was supreme in determining output and security of keeping one’s job. Personal characteristics, such as family size, income, educational status, travel distance and marital status were also found to be significant determinants of the choice of transport mode to work by government employees. Also, workers with higher incomes, longer home-to-work distance and higher educational levels were also significantly more likely to use personal means of transport as against public transport.

Another study by Ojo et al., 2014, sought to investigate factors that influence mode choice on the Accra-Takoradi route via the Intercity Bus Service (ISTC). They identified that the main purposes for short distance travel are for commuting while inter-city trips are mainly for pleasure and business. The study found out the major factors that influenced mode choice were based on age, educational qualification and employment status, cleanliness of vehicle, the cost of the trip, luggage space, comfortability, safety and security and speed of vehicle operation. All of these conspire to influence the mode choice of customers, hence the need
for service providers to be committed to providing quality service to attract residents and increase ridership.

2.6 Brief History of the Development of Public Transport in Ghana

The modern public transportation system in Ghana has involved both the formal and informal sectors and have operated and continue to operate transport services within the country. Notable among the transport operators in the informal sector in the 1980s was the King of Kings Limited, whose bus operation, which was heavily patronized, was concentrated mainly on the Odorkor–Accra corridor (Wilson, 2006).

Abane (2013; cited in Ojo et al., 2014) notes that in relation to the volume of intercity passenger movement in Ghana, Ghana Private Road Transport Union (GPRTU) constitutes 70-80%. Other competitors such as Metro Mass Transit Ltd, Intercity State Transport Company (ISTC), Progressive Transport Owners Association (PROTOA), Concerned Drivers Union, VIP, VVIP, and DIPLOMAT are battling for the remaining 20%. They again foresee that GPRTU would still dominate into the near future because it has been able to absorb operators of Ford, VIP, VVIP, and DIPLOMAT by sharing its terminals with them. Though the majority of these terminals are owned by Metropolitans, municipals and districts assemblies, the GPRTU operates it and pays taxes to the government through its local branches.

In attempting to expand and develop public transportation, the country introduced socialist policies and this charted the path for development and establishment of many state-owned transport enterprises. Prominent among such state-owned public transport include STC, OSA, CES and MMT (Yobo, 2013).
2.6.1 State Transport Corporation (STC)

The colonial authority in the Gold Coast (now Ghana) came out with what is now known as ISTC in 1909 as a Government Transport Department to cater for the transport needs of its administration. The rationale was to provide “labour and human carrier” service to cater for the interest of trading and mining companies (Ojo et al., 2014). Through a Legislative Instrument (LI), on March 9, 1965, the transport department was made a corporate body to operate commercial passenger services and was named the State Transport Corporation. In June 1995, the company was incorporated as a limited liability company under Ghana’s Companies Code 1963 (Act 179) under the name; State Transport Company Limited.

The company was tasked to consistently and profitably provide safe, comfortable and reliable road transport and allied service such as haulage. STC was responsible for the provision of inter-urban services, mainly between regional capitals, but also serving other large urban centres as well as some neighbouring cities within the ECOWAS region (Fouracre et al., 1994).

In 1996, STC was put on sale under a divestiture program, as part of Ghana’s overall Economic Recovery Program (ERP). However, Government of Ghana was unable to find any suitable buyer which caused its incessant decline as a result of lack of public investment in the rolling stock and other assets (IBIS, 2005).

In June 2000, the government divested the assets of the company to Vanef Consortium. The company was thus reorganised under a new name; Vanef STC. In 2001, the legal ownership of the transport company was reverted to the state and became known as Intercity STC by the new government. Currently, the company is owned by the Social Security and National
Insurance Trust and Government of Ghana, with 80% and 20% equity subscription respectively\(^5\).

As at January 2015, Intercity STC (ISTC) operated coach services on only six routes internally. These are regular periodic services between Accra and Bolga, Paga, Dormaa Ahenkro and Tarkwa. Mostly fortnightly, the services cater for destinations along routes such as Takoradi and Cape Coast on the Tarkwa route, Sunyani on the Dormaa route and a couple of destinations along the Bolga and Paga routes. The Accra-Tamale route, which enjoys a twice-daily service, is now the company’s internal flagship service, while the Accra-Aflao route enjoys a daily service. ISTC also operates a daily service between Accra and Abidjan in Ivory Coast and a twice-weekly service from Accra to Ouagadougou in Burkina Faso. There are also three services that originate from outside Ghana. These are a thrice-weekly Abidjan-Accra-Cotonou service, a four-time weekly Abidjan-Accra-Lome service and a twice-weekly Abidjan-Zabre (Burkina Faso) service. Plans have also been concluded to start a new international service from Accra to Niamey in Niger and later to Lagos in Nigeria\(^6\).

2.6.2 Omnibus Service Authority (OSA)

OSA has its beginnings in 1927 when the Accra Town Council operated bus services in Accra, Kumasi, Sekondi/Takoradi and Obuasi (Wilson, 2006). Between 1927 to 1969, almost all Municipal Councils operated their own bus services. OSA was formally constituted in 1969 under the then Ministry of Local Government to provide services previously provided by the Municipal Councils (Fouracre et al., 1994). The OSA Decree of 1969 thus officially nationalised all the Municipal and Local Councils bus undertakings.

\(^5\) [http://stc.oyawego.com/about](http://stc.oyawego.com/about) (accessed April 16, 2016)

under a single body – OSA. Thus, OSA was mandated to regulate and provide public transport services in Ghana (IBIS, 2005).

OSA was also tasked with the sole objective of bus service provision in its specified areas and was later transformed into OSA Transport Limited under legislation covering commercialisation of parastatal enterprises. OSA Transport Limited contributed a lot to the Ghanaian society in terms of public transport. OSA operated mainly country-wide urban services (Fouracre et al., 1994). The OSA enjoyed a lot of unfair competitive advantage, tax incentives and other government operating subsidies yet could still not survive the harsh environmental and financial realities of the industry (IBIS, 2005). The asset of OSA was finally liquidated in the 1990s after a long period of neglect (Wilson, 2006).

Following the collapse of the Omnibus Services Authority and its operating division OSA Transport Limited, the urban public transport industry in Ghana became deregulated by default. Thus, urban public transport services were basically substituted by private sector provision of paratransit, known locally as trotro (IBIS, 2005). The industry was consolidated by the Ghana Private Road Transport Union (GPRTU), though smaller unions such as the Concern Transport Union and Progressive Transport Owners Association, just to mention a few, have since emerged (Fouracre et al., 1994; IBIS, 2005).

2.6.3 City Express Services (CES)

The City Express Service (CES) was formed by the government in 1981. CES operated as a special department within the Ministry of Transport and Communications at the time. It used Tata buses to provide rural and urban service to the people of Ghana. However, like OSA, CES made only a very insignificant contribution to urban transport in Ghana. Fouracre et al., (1994) pointed out that the urban mileage for CES in January 1992 was below 10%
of the total mileage of commercial vehicles. It was privatised in 2000 due to operational inefficiencies (Afful, 2011; cited in Yobo, 2013 p. 29).

2.6.4 Trotro Operations

Due to the mismanagement, rising financial loss and stiff competition from the private sector, the earlier OSA and CES collapsed and paved the way for private sector transport operations popularly referred to as trotro. “Trotro” is a local Ghanaian expression meaning “three pence”, which was the fare charged for local trips in trucks (known as “mummy trucks”) in GAMA in the late 1950s and 1960s (Abane, 2011). Today, the word loosely refers to all vehicles engaged in commercial transport, including Nissan Urvans, Toyota Hiace minibuses, and the 207 series Mercedes-Benz buses (Agyemang, 2015).

The trotro operators have unionized into very powerful groups, of which the Ghana Private Road Transport Union (GPRTU) by far is the largest (Agyemang 2009). For over two decades, the trotro transport system has had a virtual control over the sector. This is largely because the trotro is readily available, accessible, and above all affordable, as the term trotro indicates (Agyemang, 2015). Also, due to its relatively low carrying capacity of about 12 to 15 passengers, a trotro may not queue for long at terminals but can also opt to collect passengers en-route and not necessarily at specified bus terminals. This affords the passengers to board a trotro en-route and then pay their fare to the conductor, referred to in local parlance simply as the driver’s “mate” (Agyemang 2015). The mate is also responsible for shouting out the destination and route in a bid to attract passengers heading towards such destinations.

A close alternative to the use of trotro presents commuters the option to share taxis, which may charge two or three times the trotro fare (Addo 2002). However, the proliferation of
taxis has contributed to severe traffic congestion and environmental pollution in GAMA (Armstrong-Wright 1987; Fouracre et al. 1994).

2.6.5 Metro Mass Transit (MMT)

In their study of urban public transport conditions in Accra, IBIS (2005) portrayed MMT as a state-linked company charged with urban mass transportation in Ghana. The study found out that the creation of MMT was an attempt to address the constraints in Ghana’s public transport delivery following the demise of the OSA and CES.

The IBIS’s (2005) report revealed that the MMT is owned by the Government of Ghana (55%) and indigenous six financial institutions (45%). These private shareholders are National Investment Bank, State Insurance Company, Agricultural Development Bank, Social Security and National Insurance Trust (SSNIT), Ghana Oil (GOIL) and Prudential Bank limited (Agyemang, 2009). Within the operations of the company, the MMT has had its fleet of buses imported wholly from China, Holland and sometimes parts which are assembled locally. The Ghanaian government received some buses from the Italian government in a bid to increase the service capacity of the company and by the end of 2006, the MMT total fleet had peaked at 677 (Agyemang, 2009). In view of the construction and assembling of the buses locally especially in Kumasi, several indirect jobs were created in the manufacturing sector. Generally, the productivity of the workforce in Ghana increased, since MMT offered fast and reliable transport from home to the workplace.

The MMT carried almost 40 million passengers nationwide from January to October 2007 over 12,000,000 kilometres. MMT buses have carried 36,456,300 passengers nationwide and have given 3,724,644 school children free rides. In addition to its intra-city services, the MMT limited also operates high-frequency trips to short distances, such as between Kinbu and Tema and between Kumasi and Obuasi or Kumasi and Sunyani respectively. This is the
shuttle services run by the company. The MMT offers intermediate and long distance services to link major cities like Accra and Kumasi, Accra and Tamale among others (Agyemang, 2009).

2.7 Theoretical Concepts

The term “theory” is mostly used in various ideas in the humanities and social sciences (Johnston et al., 2000). In its broadest sense, a theory can be understood as a set of statements and propositions used in explaining and interpreting phenomena (Johnston et al., 2000). Crano et al., (2014) state that, “a good theory serves as a fountain of possibilities from which researchers may generate a wealth of hypotheses to be tested via the scientific method”. They emphasize the need for theory in effectively understanding phenomena.

Research conducted in human geography consider the reality associated with the human-environment relationship, both in space and time. These are often multi-faceted and complex in nature, therefore, the need for appropriate contextualization (Crano et al., 2014). This, however, does not take the primary perspective of the concept away but only helps elucidate more on the concept or theory. In this vein, the General Systems Theory is employed in a bid to gain an understanding of the various systems and factors that influence modal choice, the reasons behind the modal choice and the challenges/constraints associated with public transport services within urban area systems.

2.7.1 The General Systems Theory

Throughout the last few decades, the focus of geography has changed to make the concept of systems gain great significance (Rana, 2015). The search for generalizations based on the whole rather than on individual parts is, therefore, a complementary approach of modern science known as systems analysis. Since all systems, be it physical or human or a combination of both, comprise a set of objects and the associations binding these objects
together into some organization, it is not surprising that the method is especially useful in
dealing with functional aggregates (Rana, 2015). Currently, the main focus of scientific
enquiry has shifted away from the study of objects or substances to the study of relationships
and organizations. Since all organizations are known as being mostly complex, systems
analysis demonstrates to be a particularly appropriate framework of study within geography.
The systems approach does not assume a replacement for the analytic method, but rather
adds to an additional line of modern scientific enquiry chosen to break down the barriers
between interdisciplinary enquiries. The system theory thus represents one of the major
current research frontiers in the field geography (Rana, 2015).

The systems theory springs from biology, but it is applicable to many fields of study. System
time attempts to develop scientific principles to aid us in our understanding of dynamic
systems with extremely interrelating parts (Bertalanffy, 1968). Systems theory hinges on
the basic idea that objects in the world are interconnected to one another (Whitchurch &
Constantine, 1993). Over the years, systems theorists have argued that the system needs to
be looked at as a whole rather than as individual units, which can then be put together. As
the theory helps us to analyse complex structures, it is even more useful for geographers,
especially within the transport milieu.

The systems theory also illustrates the aspect of safety as an emergent property that arises
when system components interact, but the components are also affected by the environment
(Leveson, 2004). Similarly, this framework will require inputs from the environment such
as demographic data, weather, the location of terminals or transit points7 etc. which will
give more insight into the use of public transport within the study areas.

7 A transit point refers to a designated intermediate point in a journey where passengers board or alight
from a vehicle. Goods, on the other hand, can be loaded onto or offloaded from vehicles at such points.
Johnston et al., (2000) define a system as “a set of elements organized so that each is either directly or indirectly interdependent on every other, usually in some form of network”. They again posit that every system must have a function, goal and purpose.

According to Harvey (1969), a system is defined as consisting of the following:

i. A set of elements identified with some variable attributes of objects;

ii. A set of relationships between the attributes of objects;

iii. A set of relationships between those attributes of objects and the environment.

The structure of a system is composed essentially of elements and links between elements. Elements themselves are the basic units of systems and it is important to note that the elements of systems are the states or conditions of things, not the things themselves (Harvey, 1969). It is also important to note that when various components of the system function independently and not collectively and in harmony, it will give rise to negative feedbacks leading to inefficiencies in the system (Harvey, 1969). Systems may, however, be embedded in bigger systems, such that an element at one level of analysis may itself be a system at another level of analysis. This encompasses super or supra-systems and subsystems. Therefore systems require redefinition as one moves from one resolution level to another (Harvey, 1969).

It is possible to investigate the structure and behaviour of a system only if the boundaries of that system are first identified. This is the part of the system that separates it from its environment. The boundaries of systems help to demarcate portions that are considered to be part of the system and those not part of the system. A related concept is the idea of an open system and a closed system. An open system is one that receives input from the environment and releases output to the environment while the closed system; on the other hand, is one in which interactions occur only among the system components and not with
the environment (Rana, 2015). The more open a system becomes, the more energy or information will be allowed into and out of it. In some cases, it is not very easy to define boundaries clearly and as such boundaries are imposed in some fashion, and by doing so employ some judgement as to where the system begins and ends (Rana, 2015).

In evaluating subsystems, there have been three general approaches namely the Holist, the Reductionist and the Functionalist approaches. A holist approach seeks to examine the system as a complete functioning entity while a reductionist approach looks downward and examines the subsystems within the system. Lastly, the functionalist approach looks upward from the system to examine the role it plays in the larger system. It is important to note that all the three approaches recognize the presence of subsystems operating within larger systems (Bertalanffy, 1968). The system approach emphasises an overall operational process of a system. A description of such a system involves the specification of inputs, outputs, a model relating to inputs, outputs and system state in time. Thus, one must understand the interaction among various components in explaining phenomena.

The relevance of system theory cannot be overemphasised. In many situations, it provides a scholarly method of evaluating a situation. An even more important characteristic is that it provides a universal approach to all sciences. The system theory helps to analyse complex structures and is even more useful for geographers dealing with phenomena that are highly interconnected such as transport networks. It helps to explain the outcome and deal with complex issues that are interrelated. It also helps us deal with cause-effect relationships better than simple analysis. Given the multivariate nature of geographical problems, systems analysis provides an appealing framework for discussing these problems.

A major area where systems theory has been shown to be useful is the field of transport studies (Larsson et al., 2010). Here, problems in the transport sector can be analysed by
looking at the various subsystems stemming from the route networks, traffic management, traffic infrastructure etc. In appreciating the use of the systems theory, Walonick (1993) states that “rather than being an end in itself, systems theory is a way of looking at things as it provides an internally consistent method of scholarly inquiry that can be applied to all areas of social science”.

For the purpose of building and strengthening academic discourse, the system theory has been criticised as being too complex and in some situations, abstract and vague (Weyer, 1994; cited in Hjørland, & Nicolaisen 2005). Again, in overcoming such critiques, each of the components of the public transport system is looked at specifically before making overall intimations about the system within the study area.

The public transport environment is comprised of various components ranging from the actors, transport vehicle, transport infrastructure and the transport management agencies. Thus, in addressing its use, the systems theory aids in elucidating such relationships among them. To be able to employ the systems theory into this study, three main subsystems are identified. These are land use, transport supply and demand and traffic management (similar to Agyemang, 2009).

Land use basically refers to the function of the land and varies geographically. In rural areas (countryside) land use can include forestry, mining and farming while in urban centres (towns and cities) land use could be housing, factories or industry. Also, land use in urban areas in More Economically Developed Countries (MEDCs) varies from land use in urban areas in Less Economically Developed Countries (LEDCs)\(^8\). Land use within the urban sphere is comprised of two elements: the nature of land use, which connects to the particular activities taking place and the level of spatial build up, which shows intensity and the

\(^8\) [http://www.geography.learnontheinternet.co.uk/topics/landuse.html](http://www.geography.learnontheinternet.co.uk/topics/landuse.html) (accessed on May 3, 2016)
Rodrigue et al., (2013) describe transport supply as the capacity of transportation infrastructure and modes, mainly over a geographically defined transport system and for a specific period of time. They go on to express supply in terms of infrastructure (capacity), services (frequency) and networks (coverage). Transport demand, on the other hand, looks at the quantum of transport infrastructure needed to serve a purpose and may be quantified in full, partial or none at all. Transport demands are expressed in terms of the number of population and the volume of time and space (Rodrigue et al., 2013).

The Transport Research Knowledge Centre (TKRC) defines traffic management as “the planning, monitoring and control of influencing traffic”. According to TKRC, traffic management aims to:

1. Maximise the effectiveness of the existing infrastructure.
2. Ensure reliable and safe operation of transport.
3. Ensure fair allocation of infrastructure space among competing users.
4. Address environmental goals.

Traffic management is, therefore, an essential element in increasing the efficiency and safety of transport networks and operations. For public transport, traffic management helps to manage fleets, driver shift patterns and timetabling (TKRC, 2009). This subsystem is essential in the public transport system because; without traffic management, public transport services become less efficient or non-operational.

Systems thinking explains the environment acting as the wider system under which all the aforementioned subsystems coexist and operate. With the use of the General System Theory,
flows, feedbacks and interrelationships among and between the numerous subsystems are brought to the fore. The theory is necessary for the study as it captures the various actors and factors (e.g. pedestrians, drivers, land use, traffic management, etc.) as one entire system in order to get the full picture of the existing mobility system and the evolving transport needs of residents within the Metropolis.

2.8 Conceptual Framework

In guiding how researchers’ think about a study topic, a conceptual framework is adopted. A conceptual framework embodies a philosophical perspective or a particular way of viewing knowledge that the researcher uses to inform a study (Clark & Creswell, 2014). In conjunction with the use of theory, researchers’ use a conceptual framework drawn from literature to strengthen the quality and rigour of their research. Thus, in identifying the conceptual framework, one gets a clear idea about how the study is being approached (Clark & Creswell, 2014).

The conceptual framework for the study is inspired by the urban transport system by Rodrigue et al., 2013. They recognise the urban environment as being complex and has subsystems that are to be managed in order to realize mobility and accessibility within such environments.

Inspired by the systems thinking, the study adapts the urban transport model by Jean-Paul Rodrigue, Claude Comtois and Brian Slack (2013), which describes accessibility and use of public transport within the urban environment. They posit that the public transport system requires a functioning transport infrastructure such as the vehicles, road network, traffic systems and transport management authorities who are to regulate mobility within the urban setting. Since the study area for the study area comprises of some selected sub-metros of AMA, the model is crafted to cater for mobility within each sub-metro (intra-city) and
mobility across the sub-metros (intra-city). Hence, the intra-urban and inter-urban mobility dimensions are added to aid the study to achieve its objectives. For the purpose of this study, modal choice of transport services in each of the selected sub-metros (intra-city) and within the sub-metros (inter-city) of the Accra Metropolitan area are influenced by various determinants and/or constraints of urban form and socio-demographic variables. These range from the geographic location and landscape, sex, age, education, the occupation of people, which may go a long way to influence their mode choice of transport, be it a private car, taxi, trotro, bus, walking.

A limitation of this conceptual framework lies in the fact that, human beings behave rationally and since the framework assumes this behaviour of humans, some may behave otherwise and hence bring about extreme responses. In going around this limitation, the sampling technique adopted evenly spreads the various respondents to have a better representation of the research responses across the study area. Another limitation of this framework is inherent in the environment in which the research is being carried. The conceptual framework identifies an environment where the system components of transport infrastructure, transport management, etc are functional, however, these are not fully functional in the setting identified. Again, to remedy this lapse, the sampling procedure employed acts as the check to the aforementioned limitations.
Figure 2.2: The Urban Transport System Model

THE URBAN TRANSPORT SYSTEM MODEL

PUBLIC TRANSPORT SYSTEM

Transport infrastructure
- Vehicles
- Road network
- Traffic systems

Transport management:
- Central Government
- Metropolitan Agency
- District Assemblies
- Law enforcers

MOBILITY

Intra-city

Determinants/constraints

Urban Form
- Geographic location
- Geographic landscape

Socio-Demographics
- Sex
- Age
- Education
- Occupation
- Household size

Modal choice
- Private
- Taxi
- Trotro
- Walk
- Bus

Inter-city

Source: (Authors own construct based on Rodrigue et al., 2013)
2.9 Summary

The chapter reviewed existing literature within the field of public transport. This was done in terms of modal choice, accessibility and the land use and transport nexus. The major trends of the existing literature indicate an extensive research into public transport from the global sphere, sub-Saharan Africa and the Ghanaian milieu. Many of such studies focus on monetary benefits and the ancillary effects of public transport services, transport demand and supply. The study draws inspiration from them, in addition to studies relating to modal choice determinants and/or constraints which can promote ridership.

The Systems Theory was examined critically within the concept of movement of people within the various subsystems of the urban sphere. This led to the contextualization of a conceptual framework to guide the study towards exploring and addressing its specific objectives within the selected sub-metros of AMA.
CHAPTER THREE
BACKGROUND OF THE STUDY AREA AND RESEARCH METHODOLOGY

3.1 Introduction
This chapter of the study dwells on the background information of the study area. Major characteristics such as location, education, economy, transportation, climate, and demography are discussed. The chapter also discusses the research philosophy, research design and relevant methodology used, by focusing on sources of data, methods and techniques for data collection, sampling techniques and instruments used for data collection. Lastly, the various challenges encountered in the data collection process and how they were surmounted are thoroughly discussed.

3.2 Background of the study area
The Accra Metropolitan Area is located at 5°33' North and 0°13' West and has since its establishment in 1898, been the regional capital for the Greater Accra Region. The region is 91% urban and draws most nationals from other regions to it for various reasons. Accra is also the national capital of Ghana. The city is bounded to the South by the Gulf of Guinea, to the North by Ga West Municipal, the East by La Dadekotopon Municipal and to the West by Ga South Municipal.

The Accra Metropolitan area is among the twenty (216) Metropolitan, Municipal and District Assemblies (MMDA’s) in Ghana and is a part of the 20 MMDA’s in the Greater Accra Region (GSS, 2012). Similar to all the District Assemblies, the Accra Metropolitan Assembly (AMA) was established by the Local Government Act, 1993, (Act 462) and Legislative Instrument 1615 which also established the six (6) Sub-Metropolitan District
Councils. The structure of the Metropolis discussed within the study is done in consonance with this demarcation.

The Metropolis has a total land area of about 200 sq.km. The boundary of the Metropolis of Accra spans from the southern part (Gulf of Guinea) which is Gbegbeyese to the Mukwe Lagoon stretching from Gbegbeyese to La. It shares an eastward boundary with the Ledzokuku-Krowor Assembly and the northern and western frontiers with Ga East, Ga West, and the Ga South District.\(^9\)

In highlighting the political-administrative bodies within AMA, the idea is to produce a picture where although the provision of road transport infrastructure is mainly the function of the central government, regulation of public transport services at the local level is the sole responsibility of the districts within which the particular transport services are found.

Figure 3.1: Map of Study Area

Source: CERSGIS, 2016
3.2.1 Demographic characteristics

Ideally, the objective of transport is not the provision of infrastructure or the realisation of favourable economic indicators, but the improvement of human lives through efficient access to services. Human beings have basic needs such as food, shelter, education, health and security among others and that all these are dependent on transport, which involves movement which should be geared towards enhancing people’s access to these basic needs. Against this background, there is, therefore, the need to consider the dynamics of population growth, basic demographic characteristics like population size, structure, growth rate and their implications for the use of transport services in the Metropolis.

3.2.2 Population Size and Distribution

The 2010 Population and Housing Census revealed the total population of the Metropolis was 1,665,086. Females constitute 51.9% while the males were 48.1%. The age distribution of the population is highest within the 20-24 age group, representing 12.4% followed by the 25-29 age group (11.5%). The highest proportion in almost all the age groups of the population was constituted by females. In reference to the sex ratio, for every 100 females, there were about 93 males within the Metropolis. Also, the sex ratio of the Metropolis is lower than the national ratio of 95.2 (GSS, 2012). This could be attributed to male mortality being higher than that of females in the Metropolis or male out-migration from the Metropolis.

The total dependency ratio refers to the ratio of persons in the dependent ages to those in the economically productive ages in a population. The age-dependent population of the Metropolis is represented by the age group 0-14 (children) and 65 and above (elderly) in the working-age population (15-64). The total dependency ratio of the Metropolis is 48.5, which is lower than the regional ratio of (53.4). This implies that there are fewer non-working
people being cared for by the working-age population in the Metropolis than in the region (GSS, 2012).

**Table 3.1: Population growth rate of AMA over the years**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>338,396</td>
<td>636,667</td>
<td>969,195</td>
<td>1,658,937</td>
<td>1,665,086</td>
</tr>
<tr>
<td>Population Growth Rate</td>
<td>-</td>
<td>6.32%</td>
<td>7.51%</td>
<td>4.3%</td>
<td>1.66</td>
</tr>
</tbody>
</table>


The population of the Metropolis is ever increasing and with about half a million commuters travelling into the city to undertake professional, administrative, educational, commercial and industrial activities (World Bank, 2010) which thrive on movement, adequate transport provision cannot be overemphasized.

**Table 3.2: Population of selected sub-metros**

<table>
<thead>
<tr>
<th>Sub-metro</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osu Klottey</td>
<td>121,723</td>
<td>58,457</td>
<td>63,266</td>
</tr>
<tr>
<td>Ayawaso</td>
<td>70,667</td>
<td>37,065</td>
<td>33,602</td>
</tr>
<tr>
<td>Okai Koi</td>
<td>121,718</td>
<td>58,592</td>
<td>63,126</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>314,108</strong></td>
<td><strong>154,114</strong></td>
<td><strong>159,994</strong></td>
</tr>
</tbody>
</table>

Source: (PHC, 2010)
3.2.3 Age-Sex Structure

The Metropolis has a youthful population, which is distinct from most developing countries. The highest proportion of residents fall within the 20-24 age group and are followed by those in the 25-29 age group. These high youthful numbers could be attributed to the inflow of migrants to the Metropolis mostly for education and employment purposes. Generally, there are more females than males in almost all the age groups which conform to other districts in the region. This is in line with the fact that more than half of the total population of Ghana is comprised of females (GSS, 2012).

The teeming increasing population of the youth is worth acknowledging in terms of their very physical mobility patterns of either school, work or leisure as compared to the aged population who are less mobile. Since the transport infrastructure is not being increased in tandem with increasing population, traffic congestions and other traffic-related challenges emerge.

3.2.4 Education

The Metropolis boasts of a very large number of education institutions spanning from primary and basic school, junior high schools, senior high school, university and other educational training institutes. There were 120 kindergarten schools, 359 primary schools and 428 junior high schools within the Accra Metropolis alone in the year 2013. Together, these schools hold nearly 170,000 pupils of which about 10,000 are kindergarten pupils.10

It is also to be noted that the premier university is located within the Metropolis in the Ayawaso sub-metro. This institution alone has a capacity of about 40,000 students which implies an extensive use of the transport routes that lead to and fro the institution. Together

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with the other educational institutions, they combine in moving people through a particular route to access the services they provide.

3.2.5 Climate

The Accra Metropolitan area lies in the dry equatorial climatic zone, which is part of the Savannah zone. It experiences a double maxima regime of rainfall. The first season starts in May and ends in the middle of July while the second season begins in the middle of August and ends in October. With an average annual rainfall of about 730mm, the Metropolis receives the lowest amount of rain in the country. The rains usually fall in intensive short storms and give rise to local flooding where drainage channels are clogged. This also causes flooding on the major streets in the Metropolis which also inhibits mobility during such periods.

Within the Metropolis, there is little variation in temperature throughout the year. The mean monthly temperature ranges from 24.7°C in August (the coolest) to 33°C in March (the hottest) with an annual average of 26.8°C (Dickson & Benneh, 2001). Since the Metropolis is close to the equator, the daylight hours are practically uniform throughout the year. Generally, relative humidity is high varying from 65% in the mid-afternoon to 95% at night (Dickson & Benneh, 2001).

The maximum wind speed record in Accra is 107.4 km/hr (58 knots), where 1Knot=1 nautical mile of 1.852 km. Strong winds associated with thunderstorm activity often cause damage to property by removing roofing material11.

During the first rainy season, transport operators tend to modify their operations due to the long incessant rains that fall frequently. This occurs especially to the operators whose cars are not road worthy but still drive them around with non-movable windows, leaking roofs

11 http://ghanalocalassemblies.gov.gh/districts/?r=1&_=3&rlv=climate (accessed on 12 March, 2016)
and non-existent/faulty windscreen wipers. Due to this, the operators either halt their service during rains or face insults from passengers who get soaked from the rains.

Also, the majority of flooding disasters have been recorded during such periods hence anytime dark clouds gather over the sky, most residents get worried and begin to look for transport vehicles in order to get home safely before they are trapped in town. This makes public transport vehicles scarce during such periods as every pedestrian is in a rush for them in order to protect themselves from inclement weather. The transport operators at times take advantage of such situations to charge exorbitant fares in order to make extra money at the expense of the frustrated persons (see Agyemang, 2015).

3.2.6 Economy

The economic hub of the Greater Accra Region and the rest of the country lies within the Accra Metropolis. A number of financial institutions, manufacturing industries, health institutions, oil companies, telecommunication, education, tourism and other important establishments are hosted in the area. The presence of these institutions continues to attract people from all parts of the country and beyond to transact various businesses. Most residents in the city are engaged basically in all the sectors of the economy (primary, secondary and tertiary). They are engaged in occupations such as fishing, farming, trading, construction, manufacturing and services among others (GSS, 2012).

A little above 70% of the population of AMA representing persons 15 years and older are economically active and about 93% of that population are employed. In relation to sex, 69% of females aged 15 years and older were economically active with 93% of them employed. Nearly 72% of the males were economically active and 93% of them were also employed. This posits that unemployment is relatively low in the Metropolis. Both formal and informal kinds of jobs were classified as employment in this category (GSS, 2012).
More males (80%) aged between 15 and 19 years than their female counterparts (76%) were economically not active. This might be due to the fact that more males than females of that age group were engaged in full-time education in the Metropolis (GSS, 2012).

The private informal sector is the main avenue for employment (74%) in the Metropolis, followed by the private formal sector (17%), indicating that the private informal and formal sectors (91%) were the major employers in the Metropolis. In the private informal sector, a higher proportion of females (83%) than males (65%) were employed. This high proportion of working population within the informal sector could be due to inadequate employment opportunities in the formal sector coupled with the fact that some people have low education and professional training which do not meet the requisite qualifications for employment in the formal sector, particularly females (Tanle & Awusabo-Asare, 2007). Moreover, the proportion of males (9.8%) employed in the public sector is higher than that of females (5.9%) and could be attributed to the fact that the general illiteracy level is higher among females than males in Ghana (GSS, 2012).

The economic profile of the Metropolis further connotes a very mobile population engaged in both formal and informal economic activities which thrive on transport, specifically public transport, hence, measures in making public transport effective is key to increased economic outputs and growth.

3.2.7 Traffic and Transportation

The traffic and transportation system in AMA is based mainly on road and rail network. The total road network in the Metropolis is 1800km consisting of 15% arterial, 15% collector and local 70% (AMA, 2013). There is no internal air or water transport system in the Metropolitan area. Kotoka international airport, which also serves domestic flights is the only terminal centre for international transportation. The Metropolitan area has good road
connections with the rest of the country, but rail connection is only to Ashanti and Western regions. Neighbouring countries can only be reached by road, air and sea transport but not rail.

The 1970s and early 1980s saw a decline in traffic volume and use of transportation facilities. The economic recovery programme (ERP) made a concerted effort to halt the decline and restore the network in reasonable working order. Much has been achieved to date on the major road network, but little on the local/access roads.

Most of all the roads in Accra are two-lane single carriageway with a few exceptions. The width of most carriageways on the arterial road network is narrow, and much of the road structure in a saturated soil area has broken up. Lack of maintenance has resulted in a substantial loss of the sealed surface especially on the secondary and local level network.

Taking Accra’s current economic and political status and future growth potential into perspective, an effective multi-modal transportation system, which includes both motorised and non-motorised means of transport, is vital to supporting continued mobility and accessibility, as well as economic development.

Initially, the transport framework throughout present-day Ghana and the city of Accra was laid out by the then British colonial policy (Songsore, 2003). This policy, prioritized transport investments to the development of industrial and port areas especially in the coastal areas of British territories. The road network usually consisted of a major trunk road from the central business district (CBD), leading out of the city to the peripheries, driving development in the industrial and port area (Banjo & Dimitriou, 1983). As a result of this, economic development led to the centripetal and the concentric road network structure of Ghanaian cities, with a concentration of high-density activity at the core, but limited road space which constraints movement within the areas. This road network structure is
illustrated in and around Accra, where a series of radial routes meet at the city’s CBD. The lack of east-west passageways is a major deficit in this structure (Tamakloe, 1993; Addo, 2002).

The current total number of registered vehicles in the country is 1,952,564. This excludes vehicles registered with the security services such as the Ghana Police Service, the Ghana Armed Forces and Prison Service (DVLA, 2016). Though the total number of vehicles is relatively low for the country, it, however, faces serious challenges with traffic management on its roads from the national to the district level.

### 3.2.8 Study Area Routes

The routes along the selected sub-metros are discussed:

**Ayawaso sub-metro:** The area is bounded on the North by the N4 highway passing through the entrance of the University of Ghana, Legon, Airport residential area to Accra new Town and ending at Kokomlemle.

**Okai Koi sub-metro:** The areas around the latter entrance of the George Walker Bush Motorway up to the Lapaz intersection, North Kaneshie and North Industrial area roads.

**Osu Klottey sub-metro:** The area encompasses the Castle roads, Barnes roads, Ministries and the main Osu Routes.

The selected routes in the various sub-metros are very busy and can be the best sphere to study the use of public transport because one can get access to salient spots like the main transit points/terminals at Kwame Nkrumah Circle, Achimota, Kaneshie and the Central Business District at Tudu, which are regional bus terminals and are also among the major city bus terminals in the country where physical mobility of various directions are embarked and/or conveyed.
Figure 3.2: Map of Study Area Routes

Legend
- Settlements
- Roadnetwork
- Study Districts
- AMA Boundary
- Sea

Source: CERSGIS, 2016
3.3 Research methodology

3.3.1 Introduction

This section of the study is concerned with a description of methodological approaches that was applied in the study. A research methodology defines what the activity of research is, how to proceed, how to measure progress, and what constitutes its success (Yin, 2003). There are different methodologies used in various types of research as the term is used to consider the research philosophy, the design of the research, the methods of data collection, and the type of data collected as well as the methods of data analysis. In this segment, an attempt is made to justify the adoption and use of the methodological approaches used in the study.

3.3.2 Philosophical consideration of this research

A very important aspect of research has been in relation to its philosophical consideration. The philosophical worldview of a research forms the fundamental path and gives a general idea of how the world is perceived by a researcher. The problem investigated therein is being guided by this view about the world that the researcher possesses. The worldview or paradigm connotes a general orientation about the world and the nature of research that a researcher holds (Creswell, 2009). A philosophical consideration in a research will follow two broader methodologies known as epistemology and ontology. The epistemological viewpoint of any research concerns itself with questions of what is or what should be regarded as acceptable knowledge (Babbie, 2010). Within this epistemological viewpoint lies two major positions. Positivism—which argues for using the natural science perspective and interpretivism which argues subjective meanings of social action. The ontological viewpoint, on the other hand, represents what exists as people perceive to exist in the world they live in rather than deriving meaning from their own surroundings (Babbie, 2010). These two viewpoints go a long way to defining the path of enquiry that a researcher uses to
investigate the world. A number of philosophical viewpoints widely exist such as Post-positivism, Constructivism and Advocacy/Participatory, however, this study adopts the pragmatism philosophy in line with Creswell’s (2009) argument.

According to Creswell (2009 p. 10), “pragmatism arises out of the actions, situations and consequences rather than the antecedent conditions in post-positivism”. Proponents of this philosophy agree that instead of focusing on the methods, researchers rather emphasize the research problem and use all available approaches to understanding the problem. As a philosophy underpinning mixed method studies, scholars such as Morgan (2007) and Patton (1990) convey its importance in directing attention on the research problem in social science and then using diverse approaches to obtain knowledge about the problem (Creswell, 2009).

The current study seeks to understand the use of public transport within an urban setting. The study takes into consideration the dynamics of the human and urban environment and therefore adopts the concept of land use, transport system and human behaviour as a focus. Also, in understanding the modal split and distance effect on the use of public transport, there is the need to understand the nature of the current transport system and the human behaviour towards the system.

Pragmatism as a philosophical worldview offers a better platform for the study as it allows the use of mixed method techniques and procedures coupled with specific theories and frameworks to unravel the complex issue investigated (Creswell, 2009).

3.3.3 Research Design

Research designs refer to the plans and procedures used in research that cover the decision from wide assumptions to detailed methods of data collection and analysis (Creswell, 2009). The research design should be the constant point of reference and guide throughout the entire research.
The study adopted a descriptive cross-sectional design. In this type of study design, a sample of the target population was selected, and from these individuals, data which reflects what was going on at that point in time was collected to help answer the research questions (Babbie, 2010).

The study adopted the mixed method approach in order to obtain a comprehensive understanding of the issues examined. This approach involves the use of both quantitative and qualitative data sources in order to achieve the objectives set out in this study. A reason for using this approach is to broaden understanding by incorporating both qualitative and quantitative research and also to use one approach to better understand explain or build on the results from the other (Creswell, 2009). According to Creswell et al., (2003), due to the multifaceted nature of problems addressed by social science researchers, the use of either quantitative or qualitative approaches solely is inadequate in addressing this complexity therefore there is more insight to be gained from the combination of both qualitative and quantitative research than either form by itself. Their collective use, therefore, provides an expanded understanding of research problems.

Within the context of the study, the quantitative method helped to identify the modal split and distance to services. This was done using self-administered semi-structured questionnaires to gather responses from the study participants at bus terminals, transit points, homes, schools and in offices. On the other hand, the qualitative method sought to understand the reasons behind decisions that lead to the differing mode choices in the Metropolis.

With regards to the study, the mixed method approach was carried out in an embedded design. The embedded design is a variant of mixed methods approaches in which one data set provides a supportive and secondary role in a study based primarily on the other data
type (Creswell et al., 2003). Researchers often adopt this design when there is a need to include qualitative or quantitative data to answer a research question within a largely quantitative or qualitative study (Creswell, 2006). In using this design, the researcher embeds a qualitative component within a quantitative design. The quantitative aspect was mainly questionnaires geared at situating the socio-demographic characteristics of respondents against the various modes of transport and their movement while the qualitative facet inquired about the motives for their travel behaviour to buttress the quantitative part.

3.3.4 Quantitative Component of the Mixed Method Design

3.3.4.1 Data Sources and Data Collection Methods

The research used both primary and secondary sources of data.

3.3.4.2 Primary Data Sources

Primary data refers to data that has been collected from a first-hand experience (Creswell, 2003). This type of data was collected by the use of semi-structured questionnaires.

3.3.4.3 Questionnaire Surveys

Surveys were made with subjects under varying circumstances. These included taking bus rides, riding in taxis, waiting in line for buses to arrive and sitting in the buses for it to embark on the trip, in the homes, offices and schools within the various sub-metros of the study area. This was aimed at giving a complete glimpse of public transport in the study area. The surveys were carried out with the help of data collectors who were given adequate briefings in order to enable them to conduct the survey efficiently.

Pre-testing of 20 questionnaires was done at the Madina bus terminal in the La-Nkwantanang-Madina Municipal Assembly, a neighbouring area to the selected sub-metros whose respondents have similar socio-demographic characteristics to that of the study area. However, these people were not included in the study. Questionnaires were pre-tested to
help the researcher modify questions which did not answer the research questions and for easy administration of the questionnaire in the study area. Pre-testing of the questionnaire was to also help the researcher achieve the objectives of the study. After pre-testing of the questionnaire, the researcher added the aspect of journey legs and savings to the questionnaire which was initially absent.

Also, distance in terms of kilometres was removed and presented in time frames since most Ghanaians were not familiar with distance measurements, but could easily provide the minutes with which their journeys lasted. Due to the fact that people’s perception of distance is relative and influenced by a lot of factors either objective or subjective (Kent, 2003), the temporal frame was used as a proxy for distance in the study. The study adapted the distance measure of Armstrong-Wright et al., (1987 p. 54) for measurement of the distance to transit points in well served urban areas and low-density areas. He proposed an ideal distance of 0-500m to transit points from home while above 1000m was classified as prolonged and extreme distances that passengers must not undertake ideally. For the study purposes, 0-500m was tied to 0-10 minutes, 501m-1000m was tied to 11-20 minutes and above 1000m was tied to more than 20 minutes respectively. This was necessary to guide respondents in gauging the distances they covered in accessing transport services. These time bands were also used in anticipation of respondents’ behaviour in different transport-wise manners.

The final questionnaires were randomly administered to residents, two hundred and ten in number (210), who use diverse modes of transport within the study area. These cut across respondents from the transit points and terminals, respondents at workplaces and also at homes to have a fair idea of the various uses of public transport. The questionnaire was semi-structured comprising of both close-ended and open-ended questions. The close-ended questions were intended to limit the respondents to some selected options while the open-ended questions allowed respondents to provide their own answers to the questions since a
wide range of answers were expected, after which the researcher arranged and grouped them to give meaning and understanding.

Moving forward, great emphasis was attached to the particular times of the day when the sample was taken. This covered both on and off peak hours\textsuperscript{12}. In addition, careful focus was given to the major public transport transit areas such as Kwame Nkrumah Circle, Achimota New Station, Okponglo Transit Point and the Tudu bus terminals.

The quantitative data used in the research was categorized into Revealed Preference (RP) data and Stated Preference (SP) data. In the former, respondents were asked what they actually did while in the latter, respondents were asked what they would have done if they faced the particular situation that the researcher specified (Wardman, 1988).

3.3.4.4 Sampling Technique and Sampling Size

The study covers a general assessment of the use of public transport services across three (3) out of the six (6) sub-metros within the Accra Metropolitan area. These are the Okai Koi, Osu Klottey and Ayawaso sub-metros. The three sub-metros were purposively selected due to the fact that the central business district (CBD) of the city, major transport terminals, major financial, educational and trade institutions are located within these prospective areas. The selected sub-metros, therefore, provide an enabling sphere to study urban mobility since they attract a lot of populations through the various services they provide.

Taking the context in which the research was undertaken and the nature of the research objectives, a total of 210 questionnaires were proportionally administered in each of the 3 sub-metros.

\textsuperscript{12} Peak hours here refers to the time of day where traffic congestion and search for transport vehicles are at its highest. Within the study area, these periods are from 6am-9am and 5pm-8pm during weekdays.
Due to the fact that researchers cannot cover a whole population for their studies, the normal practice is to draw a sample from the target population (Chuan & Penyelidikan, 2006). The sample is defined as a set of respondents selected from a larger population for the purpose of a survey (Salant & Dillman, 1994; cited in Chuan & Penyelidikan, 2006). The main idea of a sample is to save time and money, however, a very cogent step must be taken to make sure that the sample drawn from the population is representative so it allows the researcher to make generalizations from the sample statistics to the population understudied (Maleske, 1995; cited in Chuan & Penyelidikan, 2006).

In this study, the Yamane (1967) sample size calculation was employed as follows:

\[
n = \frac{N}{1 + N(e)^2}
\]

Where:  
- \(n\) = sample size  
- \(N\) = population size (314,108)  
- \(e\) = level of precision (.07)

The sample size was calculated as follows:

\[
n = \frac{314,108}{1 + 314,108(0.7)^2}
\]

\[
n = \frac{314,108}{1539.1} = 204
\]

\[= 204 + 6 = 210 \text{ (in case of non-responses (see Israel, 1992)}
\]

<table>
<thead>
<tr>
<th>Sub-metro</th>
<th>Population</th>
<th>Proportion (%) of 210</th>
<th>Proportional Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ayawaso</td>
<td>70,667</td>
<td>22.4</td>
<td>48</td>
</tr>
<tr>
<td>Osu Klottey</td>
<td>121,723</td>
<td>38.7</td>
<td>81</td>
</tr>
<tr>
<td>Okai Koi</td>
<td>121,718</td>
<td>38.7</td>
<td>81</td>
</tr>
<tr>
<td>Total</td>
<td>314,108</td>
<td>100.0</td>
<td>210</td>
</tr>
</tbody>
</table>

Source: (Authors construct based on PHC, 2010).
At the transit points and terminals, respondents were systematically sampled for the questionnaire surveys. Every 5th person in line waiting for a “loading” vehicle was administered a questionnaire in that light. Respondents who were sampled while taking bus and taxi rides were done purposively. This was done to enable the researcher better administer the questionnaire to the persons sitting closest to him conveniently. Finally, respondents sampled at the workplaces, homes and educational institutions within the selected sub-metros were also done systematically. Here, every 6th household, office and school block was targeted and respondents randomly selected to respond to the questionnaires. These sampling procedures were adopted in order to gather varied responses that would represent the views of people within the study area.

3.3.5 Qualitative Component of the Mixed Method Design

3.3.5.1 In-Depth Interview

According to Boyce & Neale (2006), in-depth interviews provide much more detailed information than what is available through other data collection methods, such as surveys. The intentions behind interviews are to elicit the views and opinions of people who are in charge or experts in particular subjects or fields (Creswell, 2009). Semi-structured interviews were carried out using an interview guide and a recording device to gather various views on modal choice and the general mobility and accessibility within the Metropolis. This was carried out through informal discussions made with Terminal/Station Masters, representatives at the Ministry of Transport, Managers at the DVLA and with pedestrians and other road users moving around the study area. All of the interviews lasted between 12 to 20 minutes. The interview language employed was mainly English, however, respondents who were not fluent or comfortable with English were allowed to express themselves in the local languages of “Twi” and “Ga” which are widely spoken within the study area.
The essence of using this method was to get responses which were absent in the questionnaires that were administered. It was also to investigate the socio-economic aspects of the public transport sector. This aims at knowing the attitudes, inclinations and reflections of the average citizen on the functions of the public transportation system, namely minibuses or trotros, shared taxis, and MMT buses as it exists now which are aimed at providing the social context in which these transport modes operate. Within the semi-structured interviews, the researcher had a list of questions under some themes that were answered by the respondents.

Table 3.4: Population sample for the stakeholders’ interviews conducted

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Position/Status</th>
<th>No. of Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Transport</td>
<td>Director</td>
<td>1</td>
</tr>
<tr>
<td>DVLA</td>
<td>Data manager</td>
<td>1</td>
</tr>
<tr>
<td>Achimota new bus terminal</td>
<td>Station manager</td>
<td>1</td>
</tr>
<tr>
<td>Kaneshie bus terminal</td>
<td>GPRTU chairman</td>
<td>1</td>
</tr>
<tr>
<td>Tudu bus terminal</td>
<td>Assistant station manager</td>
<td>1</td>
</tr>
<tr>
<td>Residents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Private informal workers</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Private formal workers</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Public workers</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>13</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

3.3.6 Data Analysis

1. Quantitative Data Analysis

All the questionnaires were given unique identification (ID) numbers. A data entry template was created in the Statistical Package for Social Sciences (SPSS) version 20 software and pre-coded questionnaires were entered. Initial frequencies were run after data entry and in a
few instances where missing values were observed with some of the variables, the individual questionnaires were retrieved and the necessary corrections effected. This constituted data cleaning.

Descriptive statistics was performed initially. Frequencies, modes, average means and percentages were found for the characteristics of all the variables. The socioeconomic status of the respondents was measured by assessing the respondents’ household size, occupation, the level of income, marital status, age, sex, and educational status. The frequencies and percentages of these categories are presented in the Tables in chapter four. There were missing values in the data which were not included in the analysis.

The use of inferential statistics was also employed in the quantitative analysis. Inferential statistics are used by researchers in their analysis in considering more than one variable and draw inferences or make predictions about the variables for a population (Creswell & Plano-Clark, 2007).

A test of hypothesis was conducted to determine whether a difference of relationship likely exists between the modal choice of residents and their socio-demographic characteristics. The significance level allowed for the test of hypothesis is the ‘p’ value of (0.05%).

Bivariate analysis (chi-square analysis) was used to assess the associations between modal choice and the various socio-demographic characteristics, distance to terminal/transit point and the propensity to alter modal choice, specific delays and their frequency. The independent variable was the social and demographic characteristics while the dependent variable was the mode choice. These are presented in Tables 4.13. The analysis of data collected was organized into their representative categories so as to come up with logical results.
2. Qualitative Data Analysis

In dealing with the qualitative analysis based on the evidence collected from the different sources, more effort was made to carefully understand and interpret the information to use. The recordings of the 193 minutes of 13 in-depth interviews were transcribed into text (Microsoft word) and manually analysed using the grounded theory design. The grounded theory research design refers to a set of systematic, qualitative procedures that researchers use to generate a general explanation for a process, action or interaction among people (Creswell & Plano-Clark, 2007). The explanations here is “grounded in” the experiences and viewpoints of the participants.

Researchers doing qualitative studies build their patterns, categories, and themes from the bottom up. They do this by organizing the data into progressively more abstract components of information. This inductive process shows a back and forth working on the themes until the researchers have established a comprehensive set of themes (Creswell, 2009). Within the above procedure, similar themes on policy, terminal characteristics, income and modal choice were identified and documented and the relevant ideas or quotes grouped beneath the various themes and sub-themes.

3.3.7. Secondary Data Sources

Secondary data, on the other hand, looks at data that is obtained from an already researched document that provides relevant information for another research (Babbie, 2010).

A careful investigation of public transport operations and development in Ghana from the colonial period to the present and beyond the borders of the country were sourced from secondary data mostly obtained from journals, books, newspapers, official documents and electronic materials within the transport milieu. Other secondary data sources were from pertinent institutions such as the Ministry of Transport, Driver, Vehicle and Licensing
Authority (DVLA), Ministry of Roads and Highways, Ghana Highway Authority (responsible for the administration, development and maintenance of trunk roads and related facilities in the country) and the Department of Urban Roads (responsible for administration, development and maintenance of urban roads and related facilities). Others include the Ghana Private Road Transport Union (GPRTU) and the Metro Mass Transit Limited (MMT).

3.4 Ethical Issues
Social science research has long been concerned with ethical issues since its quest to investigate complex issues involve cultural, political and economic phenomena (Freed-Taylor, 1994). There is no doubt that every good research aims at producing results which are not valid alone but also reliable (Mollet, 2011). With the above considerations, an introductory letter was obtained from the Department of Geography and Resource Development explaining the academic intention of the study, which in a way, won the confidence of the respondents to participate effectively in the study. The researcher then conducted the research in accordance with the aims, contents and nature of the study.

3.5 Field Challenges
The sensitive nature of the questionnaire made data collection difficult during the initial phase of the data collection within the terminals. This was partly because most respondents were either on their way to work, school, market or coming from these places and hence could not agree to answer all the questions, especially the one concerning their average earnings. This resulted in delays in the initial phase of the study. Against this backdrop, a section of the questionnaire was dedicated to respondents’ daily, monthly and yearly expenditure on food and water, rent, transport, clothing, electricity and water bills, health and savings. These variables were then collated to produce an average income level of the
respondents (similar to Abane, 2011). Also, souvenirs like University of Ghana pens and exercise books were given out to respondents at the terminals who took their time to fill out the questionnaires to motivate and compensate them altogether.

Getting data from the various transport institutions was a major challenge as some of the institutional data were disaggregated and thus made it very difficult to work with. Going around this challenge, the researcher had to manually calculate and group the data so as to be able to ascertain patterns and enhance trend analysis.

The use of language was also a major challenge as some of the respondents could not speak English but were able to express themselves in the local dialects of “Twi” and “Ga”. The researcher was able to circumvent this challenge as he had some basic education in these two local languages and has also resided in areas where the use of the languages are prevalent. Thus, the researcher was able to understand and translate viewpoints of all respondents effectively to guide the research accordingly.

3.6 Summary

This chapter discussed the background of the study area. This was to provide a general overview of the physical, economic and social environment of the study area. The location, size and demographic characteristics of the study area were discussed. Also, the spatial distributions of the population were also discussed. The various social services and economic background of the Metropolis were also discussed. It also discussed the methodology used in achieving the various objectives set by the study.
CHAPTER FOUR

PRESENTATION OF RESULTS

4.1 Introduction

This chapter presents the results of data obtained from respondents (210) within the three selected sub-metros of the Accra Metropolitan Area during the study. The findings of the study are presented taking into consideration the proposed objectives and hypotheses outlined in the study. This begins with the background and demographic characteristics of respondents, findings on modal choice, influences and reasons for modal choice. The chapter also gives a detailed description of the travel behaviour and its ancillary services available in the Accra Metropolitan Area. It further goes on to examine the various processes and actions that constrain mobility and accessibility within the Metropolis. These are assessed in relation to the various predisposing and enabling factors that influence mobility.

4.2 Background and demographic characteristics of respondents

The major socio-demographic characteristics of respondents such as sex, age, household size, marital status, educational level, occupation and income level are discussed in table 4.1 to table 4.7.
Table 4.1: Sex of respondents.

<table>
<thead>
<tr>
<th>Socio-demographic variables</th>
<th>Frequency (%)</th>
<th>Study location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso (N=48)</td>
<td>Osu Klottey (N=81)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female (113)</td>
<td>53.8</td>
<td>52.1</td>
</tr>
<tr>
<td>Male (97)</td>
<td>46.2</td>
<td>47.9</td>
</tr>
<tr>
<td>Total (210)</td>
<td>100</td>
<td>22.9</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

More than half of all respondents from each of the three sub-metros are females leaving the males in the minority. There are practically more females than males within the entire study area.

Table 4.2: Age of respondents.

<table>
<thead>
<tr>
<th>Socio-demographic variables</th>
<th>Frequency (%)</th>
<th>Study location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso (N=48)</td>
<td>Osu Klottey (N=81)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-25 (65)</td>
<td>31.0</td>
<td>39.6</td>
</tr>
<tr>
<td>26-35 (111)</td>
<td>52.9</td>
<td>31.3</td>
</tr>
<tr>
<td>36-45 (14)</td>
<td>6.7</td>
<td>16.7</td>
</tr>
<tr>
<td>Above 45 (20)</td>
<td>9.5</td>
<td>12.4</td>
</tr>
<tr>
<td>Total (210)</td>
<td>100</td>
<td>22.9</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

The majority of the respondents were between the ages of 26-35 years. The subsequent age groups above (36-45yrs) and below (15-25yrs) indicate higher numbers proportionally. However, there were no respondents less than 15 years. The mean age of the respondents sampled was 29.8 years with a standard deviation of ±8.2 years. The number of young
respondents was highest in Osu Klottey while that of older respondents was mostly recorded in the Okai Koi Sub-metro.

Table 4.3: Education level of respondents

<table>
<thead>
<tr>
<th>Socio-demographic variables</th>
<th>Frequency (%)</th>
<th>Study location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso (N=48)</td>
<td>Osu Klottey (N=81)</td>
</tr>
<tr>
<td>Level of education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal edu.</td>
<td>(2)</td>
<td>1.0</td>
</tr>
<tr>
<td>Primary/elementary</td>
<td>(26)</td>
<td>12.4</td>
</tr>
<tr>
<td>Secondary school</td>
<td>(92)</td>
<td>43.8</td>
</tr>
<tr>
<td>Tertiary</td>
<td>(90)</td>
<td>42.9</td>
</tr>
<tr>
<td>Total</td>
<td>(210)</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

The educational levels attained by the respondents were generally high as almost all of them had attained some formal education in all three sub-metros. Within this category, secondary and tertiary education levels were the highest attained. Respondents who had reached secondary education level were highest in Ayawaso while Okai Koi recorded the most respondents who had attained tertiary education level.
Table 4.4: Marital Status of respondents.

<table>
<thead>
<tr>
<th>Socio-demographic variables</th>
<th>Frequency (%)</th>
<th>Study location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ayawaso (N=48)</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>67.6</td>
<td>60.4</td>
</tr>
<tr>
<td>Married</td>
<td>31.0</td>
<td>37.5</td>
</tr>
<tr>
<td>Widowed</td>
<td>0.5</td>
<td>0</td>
</tr>
<tr>
<td>Divorced</td>
<td>1.0</td>
<td>(2.1)</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>22.9</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

More than half of the respondents from all sub-metros were single with 31.0% of them being married. A widow within the Okai Koi and 2 divorced persons from the Ayawaso and Osu Klottey sub-metros were also recorded.

Table 4.5: Household size of respondents.

<table>
<thead>
<tr>
<th>Socio-demographic variables</th>
<th>Frequency (%)</th>
<th>Study location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ayawaso (N=48)</td>
</tr>
<tr>
<td>Household size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3</td>
<td>3.8</td>
<td>0</td>
</tr>
<tr>
<td>4-6</td>
<td>51.9</td>
<td>53.6</td>
</tr>
<tr>
<td>7-9</td>
<td>26.2</td>
<td>22.9</td>
</tr>
<tr>
<td>10 and above</td>
<td>18.1</td>
<td>20.8</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>22.9</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

From the total population, 51.9% of the respondents lived with households between 4-6 members representing the highest, while respondents with household sizes of 10 and above recorded the least. Larger family sizes were recorded highest in Okai Koi while smaller family sizes were highest in the Ayawaso sub-metro.
Table 4.6: Occupation of respondents.

<table>
<thead>
<tr>
<th>Socio-demographic variables</th>
<th>Frequency (%)</th>
<th>Study location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso (N=48)</td>
<td>Osu Klottey (N=81)</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formal</td>
<td>(602)</td>
<td>28.6</td>
</tr>
<tr>
<td>Informal</td>
<td>(108)</td>
<td>51.4</td>
</tr>
<tr>
<td>Student</td>
<td>(42)</td>
<td>20.0</td>
</tr>
<tr>
<td>Total</td>
<td>(210)</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

The various occupations of respondents were categorized into formal, informal and student in order to aid substantive analysis of the data. The study revealed that 51.4% of respondents were employed in the informal sector. These jobs, inter alia, ranged from traders, shopkeepers, sales attendants, seamstresses and tailors, electricians, food vendors and the like. Most residents are engaged in informal jobs as compared to the formal ones. The formal sector employed 28.6% of the respondents. They served in the capacities of civil servants, bankers, teachers, nurses, pharmacists, accountants, secretaries and office clerks. The remaining 20.0% were students mainly at the tertiary and secondary level who were schooling full time and hence were not engaged in active work. There are more workers within the Okai Koi sub-metro and also more students within the Osu Klottey sub-metro than the other sub-metros.
Table 4.7: Average income of respondents.

<table>
<thead>
<tr>
<th>Socio-demographic variables</th>
<th>Frequency (%)</th>
<th>Study location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso (N=48)</td>
<td>Osu Klottey (N=81)</td>
</tr>
<tr>
<td><strong>Average monthly income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GHC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300 and below</td>
<td>1.4</td>
<td>2.1</td>
</tr>
<tr>
<td>301-600</td>
<td>38.1</td>
<td>39.6</td>
</tr>
<tr>
<td>601-1000</td>
<td>35.7</td>
<td>29.2</td>
</tr>
<tr>
<td>1001-2000</td>
<td>21.4</td>
<td>27.1</td>
</tr>
<tr>
<td>Above 2000</td>
<td>3.3</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100</td>
<td>22.9</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

Out of all the respondents whose incomes were recorded, a majority of them were earning between GH¢300- GH¢1000 representing (38.1+35.7) 73.8% of the total respondents. A proportion of 21.4% of respondents had an average income within the GH¢1001- GH¢2000 range while 3.3% of respondents also earned incomes above GH¢2000. The least recorded income range was for respondents earning GH¢300 and below. This represented 1.4% of the total population. Residents of Okai Koi were earning the highest income while workers in the Ayawaso sub-metro earned the least incomes.

4.3 Observed trip patterns in the Accra Metropolis

4.3.1 Purpose of trips undertaken by respondents

The study initially wanted to find out from the residents at the terminals and transit points the purpose of the journeys they were embarking on. The results are categorized from table 4.8 to 4.13.
Table 4.8: Purpose of journey

<table>
<thead>
<tr>
<th>Journey purpose</th>
<th>Study location</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso</td>
<td>Osu Klottey</td>
<td>Okai Koi</td>
<td></td>
</tr>
<tr>
<td>N (%)</td>
<td>N (%)</td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td>Work</td>
<td>27</td>
<td>55</td>
<td>41</td>
<td>56.3</td>
</tr>
<tr>
<td>School</td>
<td>10</td>
<td>16</td>
<td>7</td>
<td>20.8</td>
</tr>
<tr>
<td>Market/shop</td>
<td>5</td>
<td>6</td>
<td>22</td>
<td>10.4</td>
</tr>
<tr>
<td>Church/Mosque</td>
<td>6</td>
<td>4</td>
<td>11</td>
<td>10.5</td>
</tr>
<tr>
<td>Total (210)</td>
<td>48</td>
<td>81</td>
<td>81</td>
<td>22.9</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

The trip pattern of the study area determines the direction of movement of the residents. Most evident from the three sub-metros is the journey to workplaces representing more than half of total trips. This is mostly with the working population which has been identified earlier as having a high frequency. The purposes of other trips taken by the subjects indicated that there were 3 predominant destinations; workplaces, educational institutions and markets/shops. Osu Klottey had the highest number of work trips while the least count of work trips was recorded in the Ayawaso sub-metro. Also, market/shop related trips were highest in Okai Koi as against the other sub-metros.

4.3.2 Main mode of travel

The study sought to find out the main modes of travel that residents opted for. From the responses, some major modes were outlined and categorized under the following.
Table 4.9: Main transport modes used by respondents.

<table>
<thead>
<tr>
<th>Mode choice</th>
<th>Study location</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso</td>
<td>Osu Klottey</td>
<td>Okai Koi</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td>Private car</td>
<td>19 39.6</td>
<td>4 4.9</td>
<td>23 28.4</td>
<td></td>
</tr>
<tr>
<td>Taxi</td>
<td>9 18.8</td>
<td>12 14.8</td>
<td>10 12.3</td>
<td></td>
</tr>
<tr>
<td>Trotro</td>
<td>20 41.7</td>
<td>57 70.4</td>
<td>41 50.6</td>
<td></td>
</tr>
<tr>
<td>Walking</td>
<td>0 0.0</td>
<td>8 9.9</td>
<td>7 8.6</td>
<td></td>
</tr>
<tr>
<td>Total (210)</td>
<td>48 22.9</td>
<td>81 38.5</td>
<td>81 38.5</td>
<td></td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

The study indicates that more than half of the total population resorted to taking trotros on their way to work/school. Residents who use private cars or join private cars or taxis to work/school were the second majority altogether. However only a few of the respondents had to walk to their offices or schools, this they attributed to the very short distance between their homes and their offices and schools. Trotro and taxi users were the highest within the Osu Klottey sub-metro while the Ayawaso sub-metro recorded the most use of private vehicles.

4.3.3 Transport mode used by family members

The study as part of its aim of identifying the modal choice sought to know the preferred mode of transport that the family of each respondent resorted to. This will help to make some generalizations about the modal pattern of the Metropolis.
Table 4.10: Main mode of transport of family members.

<table>
<thead>
<tr>
<th>Mode choice</th>
<th>Ayawaso</th>
<th>Osu Klottey</th>
<th>Okai Koi</th>
</tr>
</thead>
<tbody>
<tr>
<td>N (%)</td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td>Private car</td>
<td>31 64.6</td>
<td>29 35.8</td>
<td>33 40.7</td>
</tr>
<tr>
<td>Taxi</td>
<td>1 2.1</td>
<td>8 9.9</td>
<td>9 11.1</td>
</tr>
<tr>
<td>Trotro</td>
<td>15 31.3</td>
<td>44 54.3</td>
<td>37 45.7</td>
</tr>
<tr>
<td>Walking</td>
<td>1 2.1</td>
<td>0 0.0</td>
<td>0 0.0</td>
</tr>
<tr>
<td>Total (208)</td>
<td>48 23</td>
<td>81 39</td>
<td>79 38</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

Table 4.10 shows that a majority of respondents’ family members largely resort to trotros and private cars as their main mode of transport. The remaining respondents revealed that their families resort to taxis and walking. This shows that more than half of the population in the Metropolis resort to public transport as their mode of transport as against private modes. Private car and taxi users among respondents’ family members were highest in the Okai Koi sub-metro with Osu Klottey recording the highest in terms of trotro use.

4.3.4 Use of public transport in general

The study sought to know whether residents’ patronised public transport in general either within or outside of the Metropolis.

Table 4.11: Use of public transport services generally

<table>
<thead>
<tr>
<th>Mode choice</th>
<th>Ayawaso</th>
<th>Osu Klottey</th>
<th>Okai Koi</th>
</tr>
</thead>
<tbody>
<tr>
<td>N (%)</td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>38 86.4</td>
<td>65 80.2</td>
<td>49 62.0</td>
</tr>
<tr>
<td>No</td>
<td>6 13.6</td>
<td>16 19.8</td>
<td>30 38.0</td>
</tr>
<tr>
<td>Total (204)</td>
<td>44 21.6</td>
<td>81 39.7</td>
<td>79 38.7</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.
Table 4.11 shows that about 75% of respondents in the three sub-metros resort to the use of public transport for trips made within the Metropolis. The rest of the respondents indicated that they did not patronise public transport services for trips they embark on within the Metropolis. This is a reflection of the total number of people that asserted to using public transport as their main mode of transport in table 4.9. Osu Klottey recorded the most patronage of public transport services while Ayawaso recorded the least patronage.

### 4.3.5 Frequency of using public transport

The study also sought to find out the frequency with which residents patronised public transport services within the Metropolis. This is aimed at understanding the nature of transport operations, the average cost that residents spend on transport and finally the travel pattern of respondents.

<table>
<thead>
<tr>
<th>Number of trips per week</th>
<th>Study location</th>
<th>Ayawaso</th>
<th>Osu Klottey</th>
<th>Okai Koi</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>(%)</td>
<td>N</td>
<td>(%)</td>
</tr>
<tr>
<td>2 trips</td>
<td>6</td>
<td>17.6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4 trips</td>
<td>1</td>
<td>2.9</td>
<td>5</td>
<td>7.7</td>
</tr>
<tr>
<td>6 trips</td>
<td>4</td>
<td>11.8</td>
<td>8</td>
<td>12.3</td>
</tr>
<tr>
<td>8 trips</td>
<td>10</td>
<td>29.4</td>
<td>17</td>
<td>26.2</td>
</tr>
<tr>
<td>10 trips and above</td>
<td>13</td>
<td>38.2</td>
<td>35</td>
<td>53.8</td>
</tr>
<tr>
<td><strong>Total (146)</strong></td>
<td>34</td>
<td>23.2</td>
<td>65</td>
<td>44.5</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

Table 4.12 reveals a generally high patronage of public transport services within the Metropolis. Almost half of the total respondents patronise public transport services in excess of 10 times and above within a week. However, about 8% of the total respondents averagely use the service on two occasions within a week. Osu Klottey observed the most number of
public transport trips per week followed by Okai Koi and the Ayawaso sub-metros. This depicts a very high mobility of residents within the Metropolis as people ought to move from one place to another, be it to work/school/market in order to access the services they require.
4.3.6 Associations between respondents’ characteristics and modal choice of transport services.

Table 4.13: Associations between respondents’ characteristics and modal choice of transport services.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mode of transport</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Private N=(46)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Taxi N=(31)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trotro N=(118)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Walking N=(15)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\chi^2$</td>
<td></td>
</tr>
<tr>
<td>N=210</td>
<td>$\chi^2$</td>
<td></td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-25</td>
<td>8(17.4)</td>
<td>10(32.3)</td>
</tr>
<tr>
<td></td>
<td><strong>(P.Value=0.000)</strong></td>
<td></td>
</tr>
<tr>
<td>26-35</td>
<td>19(41.3)</td>
<td>18(58.1)</td>
</tr>
<tr>
<td>36-45</td>
<td>8(17.4)</td>
<td>1(3.2)</td>
</tr>
<tr>
<td>45 and above</td>
<td>11(23.9)</td>
<td>2(5.9)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No/Basic Edu.</td>
<td>0(0.0)</td>
<td>8(25.8)</td>
</tr>
<tr>
<td></td>
<td><strong>(P= 0.000)</strong></td>
<td></td>
</tr>
<tr>
<td>Secondary Edu.</td>
<td>17(37.0)</td>
<td>11(35.5)</td>
</tr>
<tr>
<td>Tertiary Edu.</td>
<td>29(63.0)</td>
<td>12(38.7)</td>
</tr>
<tr>
<td><strong>Household size</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>12(24.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>(I (p= 0.01 ))</strong></td>
<td></td>
</tr>
<tr>
<td>Large</td>
<td>37(75.5)</td>
<td>14(41.2)</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formal</td>
<td>34(73.9)</td>
<td>4(12.9)</td>
</tr>
<tr>
<td>Informal</td>
<td>6(13.0)</td>
<td>17(54.8)</td>
</tr>
<tr>
<td>Student</td>
<td>6(13.0)</td>
<td>10(32.3)</td>
</tr>
<tr>
<td><strong>Monthly income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low income</td>
<td>2(4.3)</td>
<td>7(22.6)</td>
</tr>
<tr>
<td></td>
<td><strong>(I (p= 0.000)</strong></td>
<td></td>
</tr>
<tr>
<td>Middle income</td>
<td>15(32.6)</td>
<td>20(64.5)</td>
</tr>
<tr>
<td>High income</td>
<td>29(63.0)</td>
<td>4(12.9)</td>
</tr>
<tr>
<td><strong>Source: Fieldwork, 2016.</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
From Table 4.13, a chi-square analysis was done to determine the associations between respondent’s socio-demographic characteristics with their modal choice.

Private car usage was observed to be highest among respondents of the age group 26-35 years. Persons aged 36 and above did not record any patronage of walking as a main mode of travel. The chi-square tests show a significance of (p= 0.000) among the transport modes and the age groups. This means that transport use increases with age hence the older populations resort to various modes of transport other than walking as indicated in the table.

Regarding private car usage among the respondents, (63.0%) had attained tertiary education status, while no count was observed for respondents with no formal education. The use of taxi was also dominated by respondents who had attained tertiary education status (38.7%) while residents with no education were the least users of taxis (25.8%). The association also showed statistical significance (p=0.000) implying that the higher the level of education of residents, the greater the need for transport services. The results further indicate that 79% of educated persons patronised transport services within the Metropolis as compared to the remaining 21% that either had basic/no education.

Household sizes of 1-4 (small) and 5 and above (large) were analysed in relation to mode choice. Private car users were highest among large household sizes (75.5%). Patronage of taxi services was highest among the small household sizes. The use of trotros and walking were the highest among large household sizes. The association was significant (p=0.01) meaning that larger households were more likely to resort to transport services than families with smaller households.

The respondents who engaged in informal occupations were the highest in the patronage of taxi (52.9%), trotro services (59.9%) and walking (100.0%). However, respondents who were working in the formal sector observed the highest usage in private vehicles (73.5%).
Similar to the occupation status of residents is the average monthly income. Low income constituted GH¢500 and below, middle-income was from GH¢501-1000 and high income was classified as above GH¢1000. Private car usage was observed at the highest among respondents with a high-income level (61.2%) while the low-income earners were the least users of private cars (4.1%). Patronage of taxi services was highest among respondents with middle-income level (64.7%) with high-income earners being the least users of taxis (11.8%). Usage of trotro services was also highest among middle-income earners (72.5%) and was least among the low-income earners (7.0%). Walking as a main mode of transport was highest among the low-income level workers (46.7%) while high-income earners were least likely to walk to their destinations within the Metropolis.

Associations among modal choice and occupation and average monthly income were both significant (p=0.000) meaning that the more income residents receive, the more they patronise transport services up to the private car level and the lesser the incomes of residents the more they patronize the most economical means of transport including walking.

The study thus rejects the null hypothesis that resident’s socio-demographic characteristics have no significant relationship with their alternate mode of transport.

4.4 Determinants of transport modal choice among respondents.

4.4.1 Reasons for general mode choice

The study sought to find out among respondents, what the driving force for choosing each particular mode of transport was. Among the many responses given, they were categorized as follows.
Table 4.14: Reasons for mode choice in general

<table>
<thead>
<tr>
<th>Reasons for mode choice</th>
<th>Study location</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso</td>
<td>Osu Klottey</td>
<td>Okai Koi</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td>Economical</td>
<td>15</td>
<td>55</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31.3</td>
<td>67.9</td>
<td>50.6</td>
<td></td>
</tr>
<tr>
<td>Flexibility</td>
<td>9</td>
<td>4</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18.8</td>
<td>4.9</td>
<td>7.4</td>
<td></td>
</tr>
<tr>
<td>Proximity</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.4</td>
<td>4.9</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Lack of alternative</td>
<td>9</td>
<td>6</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18.8</td>
<td>7.4</td>
<td>3.7</td>
<td></td>
</tr>
<tr>
<td>Quickest means</td>
<td>5</td>
<td>12</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.4</td>
<td>14.8</td>
<td>14.8</td>
<td></td>
</tr>
<tr>
<td>Safety/Personal security</td>
<td>5</td>
<td>0</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.4</td>
<td>0.0</td>
<td>21.0</td>
<td></td>
</tr>
<tr>
<td><strong>Total (210)</strong></td>
<td><strong>48</strong></td>
<td><strong>81</strong></td>
<td><strong>81</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>22.9</strong></td>
<td><strong>38.5</strong></td>
<td><strong>38.5</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

Table 4.14 shows the various reasons that explain why residents use their particular mode of transport. A greater proportion of the respondents chooses their mode of transport mainly due to its economic advantage as compared to the others. Few other respondents indicated that they choose their modes due to no alternative modes at the terminals and also for safety and security reasons. Another small fraction of respondents indicated they choose transport services that consider the time factor and avoid delays. For economic and time-bound reasons, Osu Klottey recorded the highest number of transport users while Okai Koi had the highest count in terms of safety and personal security of residents. Ayawaso also recorded the highest for reasons of flexibility and nearness to transport services.

4.4.2 Reasons for taking public transport

The study explains the reasons why residents specifically take public transport. These responses were identified and categorized as follows.
Table 4.15: Reasons for choosing public transport

<table>
<thead>
<tr>
<th>Reasons for choosing public transport</th>
<th>Study location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Economical</td>
<td>23</td>
</tr>
<tr>
<td>Flexibility</td>
<td>0</td>
</tr>
<tr>
<td>Proximity</td>
<td>4</td>
</tr>
<tr>
<td>Lack of alternative</td>
<td>6</td>
</tr>
<tr>
<td>Safety/Personal security</td>
<td>1</td>
</tr>
<tr>
<td>Total (148)</td>
<td>34</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

Table 4.15 generally reveals that the main reason why residents opt for public transport is due to its inexpensive nature. One woman intimated that:

“I cannot afford a private vehicle due to my insufficient income, hence I have to resort to taking trotro and taxi at times when my goods arrive at the market. It is very affordable and I have no option than taking it since I also get it on almost every corner of our roads” (42-year-old trader at Kaneshie, individual interview).

In confirmation with the trader’s remarks, a preponderance of the total respondents agreed with the trader's claims. However, some few respondents indicated that their homes were closer to transit points and that was a factor for their patronage of the public transport service. The remaining respondents indicated that travelling in groups was more secure hence they chose to use public transport services for safety reasons. Osu Klottey dominated in all reasons for taking public transport as compared to the other sub-metros.

4.4.3 Reasons that will cause respondents to change their current mode of transport

The study wanted to find out reasons that will make respondents change their current mode of transport services.
Table 4.16: Reasons for changing the current mode of transport

<table>
<thead>
<tr>
<th>Reason</th>
<th>Study location</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso</td>
<td>Osu Klottey</td>
<td>Okai Koi</td>
<td></td>
</tr>
<tr>
<td>Increased income</td>
<td>15</td>
<td>55</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31.3</td>
<td>67.9</td>
<td>50.6</td>
<td></td>
</tr>
<tr>
<td>Mechanical breakdown</td>
<td>9</td>
<td>4</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18.8</td>
<td>4.9</td>
<td>7.4</td>
<td></td>
</tr>
<tr>
<td>Unknown locations</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.4</td>
<td>4.9</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Time factor</td>
<td>9</td>
<td>6</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18.8</td>
<td>7.4</td>
<td>3.7</td>
<td></td>
</tr>
<tr>
<td>Emergency cases</td>
<td>5</td>
<td>12</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.4</td>
<td>14.8</td>
<td>14.8</td>
<td></td>
</tr>
<tr>
<td>Safety/Personal security</td>
<td>5</td>
<td>0</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.4</td>
<td>0.0</td>
<td>21.0</td>
<td></td>
</tr>
<tr>
<td><strong>Total (210)</strong></td>
<td><strong>48</strong></td>
<td><strong>81</strong></td>
<td><strong>81</strong></td>
<td><strong>38.5</strong></td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

Table 4.16 shows the various reasons that cause residents to change their current mode of transport in general. Since the majority of respondents resorted to public transport initially mainly due to its economic factor, a predominant number of the total population indicated that when they get an increased income they might own a car and eventually change their mode of transport. Another group indicated that when their initial mode of transport develops a mechanical issue, they would opt for a different mode of transport while other respondents running late for appointments would not hesitate in changing their mode to meet the appointment. Only a couple of respondents revealed they would change their mode of transport in emergency situations and due to security and safety issues. Residents within Ayawaso recorded the highest counts in reference to changing their transport mode when they did not know the location they are headed and for reasons of timeliness.
Table 4.17: Reasons for shifting from a general mode of transport to public transport

<table>
<thead>
<tr>
<th>Reason</th>
<th>Ayawaso</th>
<th></th>
<th>Osu Klottey</th>
<th></th>
<th>Okai Koi</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>(%)</td>
<td>N</td>
<td>(%)</td>
<td>N</td>
<td>(%)</td>
</tr>
<tr>
<td>Budget constraints</td>
<td>15</td>
<td>35.3</td>
<td>30</td>
<td>50.8</td>
<td>26</td>
<td>43.3</td>
</tr>
<tr>
<td>Mechanical breakdown</td>
<td>9</td>
<td>20</td>
<td>7</td>
<td>11.8</td>
<td>8</td>
<td>13.3</td>
</tr>
<tr>
<td>Unknown locations</td>
<td>4</td>
<td>8.8</td>
<td>4</td>
<td>6.7</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Time factor</td>
<td>7</td>
<td>15.5</td>
<td>6</td>
<td>10.2</td>
<td>5</td>
<td>8.3</td>
</tr>
<tr>
<td>Emergency cases</td>
<td>4</td>
<td>8.8</td>
<td>9</td>
<td>15.2</td>
<td>10</td>
<td>16.6</td>
</tr>
<tr>
<td>Comfortability</td>
<td>5</td>
<td>11.1</td>
<td>0</td>
<td>0.0</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>No need</td>
<td>1</td>
<td>2.2</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Total (164)</strong></td>
<td>45</td>
<td>27.4</td>
<td>59</td>
<td>35.9</td>
<td>60</td>
<td>36.5</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

From table 4.17, the largest proportion of respondents indicated that they would opt for public transport due to constraints they may have with their budget. Moreover, due to mechanical breakdowns and timeliness, a smaller proportion of residents would change their mode of transport to public transport. A respondent intimated that:

“Sometimes my car gets faulty in the middle of my journey to work so I have to park it by the roadside and get a taxi to work. If my car did not break down, there would be no need for me to pick the taxi” (31-year-old Banker at Tesano, individual interview).

The remaining respondents pointed out that they would change their mode to public transport when they do not know the location of their destination trips while the least of the respondents see no need to change their mode of transport to public transport irrespective of the aforementioned factors.

Another respondent revealed that:
“I only use public transport when I don’t really know a particular place I am going to for the first time to familiarize myself with the routes. After the first time, I use my personal car onwards” (33-year-old accountant at Shiashie, individual interview).

4.4.4 Associations among Mode choice

In trying to establish the possibility of a relationship between the modal choice of residents and its associated reasons, the data was subjected to a chi-square analysis. Table 4.18 displays the associations.

Table 4.18: Cross-tabulations of the various reasons for using transport modes by the main modal choice.

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Mode of transport</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Private car</td>
<td>Taxi</td>
</tr>
<tr>
<td>Economical</td>
<td>Count</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>3.6%</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Count</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>47.4%</td>
</tr>
<tr>
<td>Proximity</td>
<td>Count</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>18.2%</td>
</tr>
<tr>
<td>Lack of alternative</td>
<td>Count</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>16.7%</td>
</tr>
<tr>
<td>Quickest Way</td>
<td>Count</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>27.6%</td>
</tr>
<tr>
<td>Safety/personal Security</td>
<td>Count</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>90.9%</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

The above table shows that there is a significant relationship between the various reasons of travel and the actual modes of travel. Private cars were mostly patronised due to the safety and security it offered residents. Taxis were mostly patronised by residents due to the
quickest way it took them to their destinations. Trotros were mostly used primarily because of its economical rates. Walking was mostly patronised due to the proximity of the residence of residents to their destinations of work or school. For other reasons of lack of alternative, residents had no choice than to board trotros for their movements within the Metropolis.

Table 4.19: Results of Chi-square tests for the various reasons for mode choice

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>251.013</td>
<td>15</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>233.593</td>
<td>15</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td>211.981</td>
<td>15</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>87.595</td>
<td>1</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>210</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.4.5 Monthly expenditure on transport in relation to food and water, rent, utility and health.

In trying to compare the cost of travel (in monetary terms) with basic needs such as food, water, electricity, rent and health, the data was analysed as follows:

Table 4.20: Average expenditure of residents

<table>
<thead>
<tr>
<th>Expenditure</th>
<th>Food</th>
<th>Utility</th>
<th>Clothing</th>
<th>Health</th>
<th>Rent</th>
<th>Transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>GH¢</td>
<td>GH¢</td>
<td>GH¢</td>
<td>GH¢</td>
<td>GH¢</td>
<td>GH¢</td>
<td>GH¢</td>
</tr>
<tr>
<td>N Valid</td>
<td>123</td>
<td>82</td>
<td>106</td>
<td>60</td>
<td>79</td>
<td>123</td>
</tr>
<tr>
<td>Missing</td>
<td>87</td>
<td>128</td>
<td>104</td>
<td>150</td>
<td>131</td>
<td>97</td>
</tr>
<tr>
<td>Mean</td>
<td>380.41</td>
<td>98.9</td>
<td>113.49</td>
<td>33.67</td>
<td>91.90</td>
<td>203.17</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016
The table above displays the mean expenditure of respondents in the Accra Metropolis. The average expenditure on food is GH¢ 380.41, the highest among the other basic needs. This is followed by the cost of transport (GH¢203.17) with clothing and rent having GH¢113.49 and GH¢91.90 respectively. The least expenditure of respondents was on their health.

4.4.6 Means of arrival to terminal/transit point

The study intended to know the various means that residents use in reaching terminals or transit points from home/work in a bid to understand influences on modal choice.

<table>
<thead>
<tr>
<th>Table 4.21: Means of arrival to the terminal/transit point</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reason</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Walking</td>
</tr>
<tr>
<td>Taxi</td>
</tr>
<tr>
<td>Trotro</td>
</tr>
<tr>
<td>Private car</td>
</tr>
<tr>
<td><strong>Total (206)</strong></td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

From the study, the majority of respondents resort to walking to the terminals/transit points across all three sub-metros, while those that drop off from private cars or trotros followed in line. However, no respondent from the Osu Klottey sub-metro resorted to private car in a bid to reach terminals or transit points. A respondent intimated that:

“These days, the trotro drivers stop at virtually any part of the road be it a bus stop or not, so all I have to do is to walk from my community to the main road and wait as one of the trotros will stop exactly at where I stand for me to board the vehicle. I know that where I board the trotro is not right, but the way the bus stops are located, you will need to walk for
long before reaching so I just board one anywhere by the roadside” (A 24-year-old airtime dealer in Odorkor, individual interview).

4.4.7 Distance to terminal

The study again sought to find out the relative distance residents travelled from their homes or workplaces in reaching terminals or transit points, where they can access transport services.

Table 4.22: Distance to terminal or transit point

<table>
<thead>
<tr>
<th>Time duration</th>
<th>Study location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso</td>
</tr>
<tr>
<td></td>
<td>N (%)</td>
</tr>
<tr>
<td>Less than 5 mins</td>
<td>24 50.4</td>
</tr>
<tr>
<td>5-10 mins</td>
<td>17 35.4</td>
</tr>
<tr>
<td>11-20 mins</td>
<td>2 4.2</td>
</tr>
<tr>
<td>21-30 mins</td>
<td>2 4.2</td>
</tr>
<tr>
<td>More than 30 mins</td>
<td>5 6.3</td>
</tr>
<tr>
<td>Total (206)</td>
<td>48 23.3</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016

Table 4.22 shows the average trip duration of respondents to a terminal or transit point from homes and places of work/school. Over 80% of total respondents took less than 10 minutes to reach terminals with the remaining percent of respondents getting to their terminals after 20 minutes. Since a preponderance of residents uses less than 10 minutes to reach terminals, it suggests that there are quite a number of terminals and transit points dotted all over the Metropolis even though the siting of such terminals are not always demarcated and easily identified.

Drawing inspiration from Armstrong-Wright et. al., (1987)’s measurement, 83% of respondents journeyed between 0-500m in order to reach terminals or transit points. The
remaining 6.8% and 10.1% travelled between 501-1000m and more than 1000m in order to get to terminals and transit points respectively.

4.4.8 Associations of mode choice and distance to services

After obtaining the various distances residents travelled to access transport services, the study wanted to find out how the distance to services influenced their choice of transport mode.

Table 4.23: Associations of mode choice and distance to services

<table>
<thead>
<tr>
<th>Distance</th>
<th>Mode of transport</th>
<th>Total</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Private car</td>
<td>Taxi</td>
<td>Trotro</td>
</tr>
<tr>
<td>Less than 5 mins</td>
<td>Count</td>
<td>17</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>20.5%</td>
<td>32.5%</td>
</tr>
<tr>
<td>5-10 mins</td>
<td>Count</td>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>22.7%</td>
<td>2.3%</td>
</tr>
<tr>
<td>11-20 mins</td>
<td>Count</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>21-30</td>
<td>Count</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>22.2%</td>
<td>22.2%</td>
</tr>
<tr>
<td>More than 30 mins</td>
<td>Count</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>25.0%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016. (x statistic =1.992) (P.Value=0.000)

Table 4.23 displays a cross-tabulation of the distance residents journeyed to transit points/terminals and mode choice. It was evident that residents who journeyed less than 10 minutes were more likely to either join a trotro or a private car than a taxi, while residents whose journeys lasted more than 10 minutes were more likely to take trotro or continue walking to their preferred destination other than going by private car and taxi.
4.4.9 Willingness to change transport mode due to the distance to terminal or transit point.

The study again sought to find out from resident whether they would be willing to alter their primary mode of transport mainly due to the distance it takes them to get to the terminal or transit point from home.

Table 4.24: Short distance influence on mode choice

<table>
<thead>
<tr>
<th>Response</th>
<th>Study location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso</td>
</tr>
<tr>
<td>N (%)</td>
<td>N (%)</td>
</tr>
<tr>
<td>Yes</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>25.5</td>
</tr>
<tr>
<td>No</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>75.5</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>23.3</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

The majority of the residents in Table 4.24 indicated that since the distance to terminals and transit points were mostly less than 10 minutes, there was no need to opt for a different mode of transport. The rest of the respondents were however prepared to change their mode upon arrival at the terminals. A respondent then made an assertion that:

“I usually leave home early for work and as I use less than 10 minutes to reach the transit point, I will simply sit in a loading taxi to get full before it sets off so there will be no need to take a trotro that will not go straight to my destination” (A 26-year-old secretary in Achimota, individual interview)

Table 4.25: Long distance influence on mode choice

<table>
<thead>
<tr>
<th>Response</th>
<th>Study location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso</td>
</tr>
<tr>
<td>N (%)</td>
<td>N (%)</td>
</tr>
<tr>
<td>Yes</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>75.5</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>25.5</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>23.3</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.
Table 4.25 shows the willingness of residents to opt for an alternative mode of transport if their distance to the terminal from home was longer. The slightly greater response was in support of resorting to another mode of transport to save time since they had already spent some time in getting there. However, the other proportion of the respondents were not willing to change their mode mainly due to the cost implications and other factors that may have fixated them on their choice of mode no matter the circumstances.

4.4.10 Waiting times at terminals or transit points

The study wanted to find out the various positions that residents are placed in at the terminals and transit points and their behaviour towards such situations.

Table 4.26: Self-reported waiting times at the bus terminal or transit point.

<table>
<thead>
<tr>
<th>Time duration</th>
<th>Ayawaso</th>
<th>Study location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>(%)</td>
</tr>
<tr>
<td>0-10 mins</td>
<td>36</td>
<td>75</td>
</tr>
<tr>
<td>11-20 mins</td>
<td>11</td>
<td>22.9</td>
</tr>
<tr>
<td>21-30 mins</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Total (202)</td>
<td>48</td>
<td>23.7</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

Table 4.26 shows the reported waiting times at the bus terminals. The results indicate that the greater proportion of respondents spend less than 10 minutes in waiting for a vehicle while very few respondents indicated that they spend between 21-30 minutes waiting for vehicles to board at terminals.
Table 4.27: Average reported waiting time after boarding.

<table>
<thead>
<tr>
<th>Time duration</th>
<th>Study location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso</td>
</tr>
<tr>
<td></td>
<td>N (%)</td>
</tr>
<tr>
<td>0-5 mins</td>
<td>37 77%</td>
</tr>
<tr>
<td>6-10 mins</td>
<td>7 14.6%</td>
</tr>
<tr>
<td>11-20 mins</td>
<td>3 6.3%</td>
</tr>
<tr>
<td>More than 20 mins</td>
<td>1 2.1%</td>
</tr>
<tr>
<td>Total (202)</td>
<td>48 23.7%</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

Table 4.27 shows the duration period respondents have to wait in a vehicle before setting off from the terminal or transit point. An overwhelming proportion of respondents wait for less than 5 minutes in vehicles they board before it takes off. However, a smaller fraction of the respondents claims they spend more than 20 minutes in the vehicles before it sets off. These were mainly on weekends and distances that span across another Metropolis where there are not ready passengers unlike on weekdays and journey to the city centres, markets and the like.

Table 4.28: Longer waiting time influence on modal choice.

<table>
<thead>
<tr>
<th>Response</th>
<th>Study location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso</td>
</tr>
<tr>
<td></td>
<td>N (%)</td>
</tr>
<tr>
<td>Yes</td>
<td>17 35.4%</td>
</tr>
<tr>
<td>No</td>
<td>31 64.6%</td>
</tr>
<tr>
<td>Total (202)</td>
<td>48 23.7%</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.

Table 4.28 shows the willingness of respondents to resort to a different mode of transport if their waiting time in the vehicle was longer. Respondents from the Ayawaso and Osu
Klottey sub-metros who had already settled in a car wouldn’t want to step out to get an alternative no matter the duration of waiting time. The other group of respondents from the Okai Koi sub-metro did not think it wise to keep waiting for the vehicle to move hence they would get an alternative mode of transport in order to reach their destinations on time.

4.4.11 Test of relationship between distance to terminal and willingness to change mode

The study sought to find out whether some relationship exists between the length of distances that respondents embark on to the terminals or transit point and the mode of transport that they use upon arrival. Distance here was coded as 1= less than 10 minutes and 2=more than 10 minutes.

Table 4.29 shows a cross-tabulation of distance to the terminal and the willingness to alter mode choice of transport. From the table, the chi-square analysis revealed that there is no association between the respondents who journey shorter distances to the terminal and their willingness to change mode their mode of transport (P. Value= 0.532). This implies that residents after embarking on short journeys to the terminal/transit points do not see the need to opt for an alternative mode other than their main mode of transport.

Table 4.29: Crosstab of short distance to terminal and willingness to change mode

<table>
<thead>
<tr>
<th>Will you resort to a Different mode if your Distance to the terminal Was shorter</th>
<th>Distance to terminal/transit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less than 10 mins</td>
<td>More than 10 mins</td>
</tr>
<tr>
<td>Will you resort to a Different mode if your Distance to the terminal Was shorter</td>
<td>Yes Count Percentage</td>
<td>32 (15.5%)</td>
</tr>
<tr>
<td>No Count Percentage</td>
<td>139 (67.5%)</td>
<td>30 (14.6%)</td>
</tr>
<tr>
<td>Total</td>
<td>Count Percentage</td>
<td>171 (83.0%)</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016. ($\chi^2$=0.620) P.Value=0.534
Table 4.30 also shows a cross-tabulation of a longer distance to the terminal and the willingness to alter mode choice of transport. From the table, the chi-square analysis revealed that there is a significant relationship between respondents who journey longer distances to the terminal and their willingness to change their mode of transport (P. Value=0.000). This indicates that residents after embarking on long trips to the terminal/transit points are more likely to opt for an alternative mode of transport other than their main mode of transport.

Table 4.30: Crosstab of long distance to terminal and willingness to change mode

<table>
<thead>
<tr>
<th>Will you resort to a Different mode if your Distance to the terminal Was longer</th>
<th>Distance to terminal/transit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>97 (47.1%)</td>
<td>129 (62.6%)</td>
</tr>
<tr>
<td>No</td>
<td>74 (35.9%)</td>
<td>77 (37.4%)</td>
</tr>
<tr>
<td>Total</td>
<td>171 (83.0%)</td>
<td>206 (100.0%)</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016. \( \chi^2 = 3.857 \) P.Value=0.000

4.5. Challenges associated with urban transport services.

4.5.1 Delays during the journey to destinations.

The study as part of examining the mobility and accessibility pattern of residents inquired about the delays residents encountered and the types and frequency of such delays.

Table 4.31: Travel delays.

<table>
<thead>
<tr>
<th>Response</th>
<th>Study location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Yes</td>
<td>42</td>
</tr>
<tr>
<td>No</td>
<td>6</td>
</tr>
<tr>
<td>Total (210)</td>
<td>48</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016.
Table 4.31 shows the experience of residents who encounter delays on their ways to their destinations. Almost all the respondents encounter some sort of delays in reaching their destinations. This was affirmed by 96.2% of the total respondents leaving only 3.8% responding in the negative.

4.5.2 The frequency of delays to trip makers’ destination.

Regarding residents who encounter delays on routes to their destinations, the study sought to find out how often these delays were encountered.

<table>
<thead>
<tr>
<th>Response</th>
<th>Study location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ayawaso</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Always</td>
<td>7</td>
</tr>
<tr>
<td>Sometimes</td>
<td>35</td>
</tr>
<tr>
<td>Rarely</td>
<td>0</td>
</tr>
<tr>
<td>Total (202)</td>
<td>42</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2016

Out of those who admitted to encountering delays on their ways to their destinations, Table 4.32 shows that 35.1% and 63.9% percent of them come across delays always and sometimes respectively. The remaining 1.2 percent indicated they encountered delays rarely en-route to their destinations. This reflects a very constrained mobility status within the Metropolis as almost every journey is bedevilled with some form of delay.

4.5.3 Mobility and accessibility pattern of the Metropolis.

In attempting to analyse the patterns of movement of residents within the Metropolis, the study among other interviews sought to identify the occurrence of delays and its frequency, the temporal availability and non-availability of transport services and finally understand the perception of residents regarding the best mode of travel within the Metropolis.
Figure 4.1: Types of delays and their ranks

Figure 4.1 displays the causes of delays and the degrees to which residents encounter them on their way to their destinations. More than half of the residents indicated that they frequently encounter vehicular traffic delays while 38.6% claimed they encountered it sometimes. Delays caused by bad roads were rarely encountered by residents within the Metropolis. However, 30.3% of respondents claimed they sometimes faced delays caused by bad roads. Also, 68.6% of residents rarely came across delays caused by mechanical problems as against 15.5% experiencing them sometimes. A representative from the DVLA indicated that they make sure that all registered cars are mechanically fit for the road before clearing them for commercial purposes. He intimated:

“We have laws concerning the state of vehicles that should be registered for use, hence before any commercial vehicle begins its operations they come for their registration plates from our office. Our officials then check their cars thoroughly to make sure its roadworthy before they can start operating” (A 53-year-old manager at DVLA, 37 office, individual interview).
This assertion may explain the low encounter of vehicular breakdowns by residents. Delays caused by the drivers or conductors in the case of trotros were experienced rarely by respondents. This is represented by 58.7 percent of responses. The remaining proportion revealed they experienced this type of delay as well.

Weather-induced delays were also rarely experienced among residents. This is represented by 61.3% of the total respondents. Another 15.5% of respondents indicated they sometimes come across weather-related delays. However, 29.9% of responses revealed that they never experience this type of delay.

4.5.4 Availability and Non-availability of transport services to and from work/school

The research sought to find out from the respondents the time periods when it is quite difficult to get transport services to work/school and back. The responses indicate that it is not easy to find transport services between 7 am and 9 am due to the build-up of traffic on the major roads as most of the workers and students use these routes. About 72.6% of respondents indicated this. However, the remaining 27.4% revealed that it is not easy to get transport between 6 pm and 8 pm as workers would have closed and would be in some rush for vehicles to reach their homes. The rush during these peak hours creates a shortage of supply of the services while others would have been in some traffic congestion constraining the movements of residents.

Regarding the time periods where transport services are easily got, 83.2% of the total respondents pointed out that between 5 am and 7 am, one can effortlessly have access to vehicles since most of the workers will not be on the roads. The remaining 16.8% indicated that between 4 pm and 6 pm, it is also stress-free for persons to get transport services because it is the period before the workers close.
4.5.3 Perception of quickest mode of transport to destination

The study also sought the perception of respondents concerning the quickest mode of transport to reaching their destination. This was to know whether residents aside the many delays were aware of some quick modes of transport within the Metropolis. The responses were skewed towards three modes of transport. About 42.8% of respondents pointed out that the taxi was the quickest mode of transport. This they claimed was mainly due to the fact that the taxi drivers know virtually everywhere in the Metropolis and can easily manoeuvre their way in traffic and use some shortcuts to get you to their destination. Another 34.6% revealed that private cars were the quickest ways of getting to your destinations. This they argued was due to the fact that you control departure and journey routes hence once you own a car you can get to every destination way ahead of time. The remaining 22.6% were confident that the motor bicycle was the quickest mode of arriving at their destination as they could meander their ways through traffic, ride on road shoulders and can also use paths not so wide for cars as well. Due to the current nature of traffic
congestions within the city, residents have also modified their travel behaviour in order to reach their destinations on time.

A student intimated:

“Because of the severe traffic situations in the mornings, I come to school with the motorcycle from the bus stop. I was afraid to ride on it at first, but I am used to it now and I enjoy the speed at which it moves without traffic. I would have been taking the taxi but it is more expensive than the motorcycle” (An 18-year-old SHS student in Adabraka, individual interview).

The perception of traffic and some aspect of cost have conditioned the behaviour of the above respondent to resort to the motorcycle as his primary mode of transport to school.

**Figure 4.3: Perception of travel mode**

![Perception of Travel Mode](http://ugspace.ug.edu.gh)
CHAPTER FIVE

DISCUSSION OF RESULTS

5.1 Introduction

This chapter presents a discussion of the research findings on the use of public transport services among residents in three selected sub-metros of the Accra Metropolitan Area. This is done in line with the objectives and how they compare and contrast with previous studies and the theories employed. The main purpose of this research was to examine the modal choice of residents, assess the factors that influence modal choice and assess the challenges associated with urban transport services.

5.2 Socio-demographic Data

Data was obtained from 210 respondents of which there were practically more females than males within the study area. This confirms the sex distribution of the Accra Metropolis (GSS, 2012). With most respondents falling between the 26-35 age category, the mean age of the respondents sampled was 30 years which depicts a very youthful population which implies a very active and mobile population within the Metropolis. The age structure of the study area corresponds to the youthful distribution of the population of the entire Metropolis (GSS, 2012). Over 99% of respondents had attained some formal education. This high level of education among respondents may be explained by the numerous schools within the Metropolis, especially in the Ayawaso sub-metro, which houses the premier University of Ghana among many other private and public basic, secondary and tertiary institutions. The household size of respondents depicts a relatively small family size among residents in the Metropolis which is a much-urbanized area characterised by smaller family sizes. Many smaller families may opt for more transport services as compared to the larger families who make use of numbers during a single trip. Thus, the average household size of 3.7 persons
within the Metropolis is also reflected in the study (GSS, 2012). A large number of informal workers in the study represent the nature of occupational activities found within the Metropolis influencing more workers to be engaged in informal jobs as compared to formal ones. Informal workers here tend to commute more than formal workers in their respective jobs. The majority of the respondents were earning between GHC300- GHC1000 representing 73.8% of the total respondents. This income range of residents within the Accra Metropolis is relatively low considering the amount of monies they will have to pay for transportation, rent, health, water and electricity tariffs, among others of whose details were also enumerated in the study. The relatively low income of most residents implies a propensity for them to use transport modes that are economical in nature.

5.3 Mode choice

The dominant trip destinations were to workplaces, educational institutions and markets/shops. In the Metropolis currently, the working/operation hours of these establishments are the same. This results in a situation whereby almost all of the residents demand transport services at about the same time or during the same time period, which creates a surge in demand. This mirrors a study by Abane, (2011) which shows the purpose of most trips of respondents from four Metropolitan areas within Ghana as going to places of employment (66%). Following this trip purpose was routes towards markets and schools respectively. The literature suggests that the main purpose of short distance travel is commuting while inter-city or long distance trips were mainly for pleasure and business (Ojo et al., 2014). As such, in examining the modal choice of residents, their trip pattern was obtained before recording their mode choice and its associations.
The study also enquired about residents’ use of public transport services and their frequency of use. More than 70% of respondents indicated they use public transport services, out of which 47.3% patronise the service in excess of 10 trips within a week.

The majority of the respondents and their households resorted to taking trotros mainly, private cars and taxis, however, only a few of the respondents had to walk to their offices or schools, this they attributed to the very short distance between their homes and their offices and schools. This mirrors a World Bank report (2010) which highlighted a breakdown of primary transport mode choice by city residents’ to and from work and shopping. Trotros were significantly the most popular mode of motorised transport, followed by private cars and taxis. The report also revealed that 11% utilize walking as a means of transport, but few individuals opt for biking (be it motorised or non-motorised).

On the other hand, an earlier study by the Accra-based Centre for Cycling Expertise revealed an even higher proportion of pedestrians (34%) and bicyclists (8.4%) (Quarshie, 2004). Another study from Agyemang (2015 p. 29) also revealed that, the dynamism in the operations of trotros in the way they manoeuvre through minor corridors, driving on road shoulders during peak hours and the liberty passengers enjoy in alighting or embarking at any venue of their choice, despite the practice being an illegality, has further popularized the “trotro culture” in the Metropolis. The results, therefore, correspond with previous studies within the country that have always reported the preferred modes of transport as trotros and taxis (Lartey, 1977; Adarkwa, 1991; Abane, 1993a; cited in Abane, 2011).

Extending outside the borders of Ghana, this trend is also similar to a study by Awoyemi et.al., (2013) which indicated that 40% of residents of Ibadan resorted to the Danfo (the yellow Volkswagen minibuses), while 25% opted for private cars/taxis and the remaining using Pace Setter Bus services, Keke Napep (tricycles) and Okada (motorbikes).
Associations of socio-demographic data and mode choice present very significant results. Generally, transport use increased with age hence the older residents resort to various modes of transport other than walking. Regarding education, the higher the educational level attained, the more respondents resorted to transport services with tertiary graduates having the highest use of private cars and taxis. Students were the least category in using all transport services while both formal and informal workers were dominated in the use of transport services. High-income earners were using more of private vehicles and doing the least walking while the middle and low-income earners dominated the use of trotro, taxi and walking.

5.4 Factors which influence modal choice

Factors that influence mode choice have been categorized into three, where the first focuses on the utility maximisation of the individual (rational), the second looks at the spatial component (socio-geographic) and the third (psychological), which examines individual attitudes and habits (Hollevoet et al., 2011). It was evident from the field that majority of respondents opted for the choice of transport mainly due to the economic benefit they derive as compared to the other modes. This reason is very rational to most individuals. Others opted for their transport modes due to their proximity to the terminal or transit point where they board the vehicle and also the timeliness of their travels on that particular mode. These can be categorised under socio-geographic reasons. While the remaining residents chose their mode of transport due to the safety/personal security they are assured of on the mode and the flexibility of using such modes. They can be also considered as psychological reasons.

The affordability nature of the most preferred mode (trotro) is reflected in the study by Abane, (2011), where 45% of residents chose their respective modes in reference to cost.
Narrowing the reasons down to cater for public transport, the results were akin to the former and confirms the earlier findings that the major influence of mode choice has to do with its affordability or profitability nature irrespective of the nature of the vehicle and the compromising aspects of space, timeliness, security etc. The results also resonate a study by Shiftan & Sharaby, (2012) which revealed that fare reduction was a significant factor in attracting transit users as against the increase in fares. A public transport within the study area of Haifa in Israel encouraged travellers to shift from private cars or taxi to buses; created new trips, offering more opportunities for activity participation and increased overall travel options by allowing travellers to choose a better route.

In a bid to ascertain the push factors that will get residents to change their transport mode in general, the field survey obtained interesting results. Increased incomes stand out as a reason for residents to change their mode of transport. Since the majority of them resorted to trotros, they intimated that when their incomes increased they would be able to afford a private car and avoid the former means of transport. Respondents would again change their mode of transport in the case of emergencies and for safety and security reasons since they are very critical considerations and hence are ready to opt for any available transport mode. Other respondents would only change their mode when they do not know the actual location they are headed and hence would need to rely on another transport mode to get there. Cases of mechanical breakdown of vehicles would also cause residents to change their mode of transport.

Limiting the above reasons to satisfy that of public transport also derived analogous results as the same motivation to shift from one transport mode to another, runs throughout changing the mode from an existing transport mode to public transport.
Related issues that could have influenced people’s choice of mode were also raised as a form of cross-checking the reasons provided by the trip makers. Two of them which are of critical importance were the size and state (condition) of the vehicle. Upon further probing, it became clear that high-occupancy buses were not a preferred choice for shorter journeys due to the intermittent stops in alighting and picking up passengers as this causes delays to people en-route to work, school etc. However, these were the best choices for long distant journeys as it provides some comfort and enough leg room for passengers. The physical state of the vehicle was also considered as residents are less likely to opt for rickety, dilapidated vehicles as there is the tendency for them to break down on the journey or being stopped by the police for non-possession of necessary car documents. This they intimated could delay residents who are scheduled for other engagements.

A study by Anin et al., (2013) further buttresses the fact that passenger comfort is key in promoting the use of public transport. This was confirmed by 81% of 500 respondents who used the Kumasi-Accra route. Associations of mode choice and its corresponding reasons were performed in order to understand the particular reasons that drive residents towards specific modes. The results indicate significant relationships among all the variables. For security and safety reasons, the private car was most patronised while trotro was overly patronised due to its affordability.

The average expenditure of residents was also obtained in a bid to compare the cost of travel to the cost of basic needs such as food, health and utilities. The issue of fuel price increment has been very topical in Ghana presently. This increase tends to have consequent increases in transport fares as well as prices of other basic needs. While admitting that transport costs are quite high in relation to some commodities, the respondents singled out prices of food to cost more than what they paid for transport averagely. This revelation may not be entirely
surprising as transport cost affects the cost of these basic needs which is often passed onto consumers, transport being a derived demand (Abane, 2011).

Although people’s ideas have been formed about the huge cost of transport to and from work, the costs of food, clothing and rent are more likely to take larger proportions of their incomes when compared to that of transport. The research debunks the earlier study of Abane (1993) where transport costs occupied a larger proportion of people’s income. However, it confirms a rather recent study by the same researcher in (Abane, 2011) where the expenses on food, rent etc. were much higher than transport alone. This can be attributed to the increasing prices of fuel in the country which automatically increases the prices of other commodities. Another study by Kassahun, (2007) which revealed that residents spend more than half (67%) of their income on food and other activities other than transportation, is in line with the findings of this study.

The study also examines the distance that residents journey to access transport services, waiting times and their effect on their mode choice of transport. It was evident that the majority of respondents resort to walking to the terminals/transit points across all three sub-metros as they are able to get aboard any transport operator virtually anywhere on the road and not at specifically designated transit points or terminals. This confirms a current work of Agyemang, (2015 p. 29) where “most trotros collect passengers en-route and not necessarily at specified bus terminals”. By this action of trotro operators, they become more likely to pick up passengers almost anywhere, be it legal or not, which is most at times against traffic regulations.

Inspired by Armstrong-Wright et al., (1987)’s measurement, the majority of the residents journeyed between 0-500m in order to access terminals or transit points. The other few respondents’ journeyed longer distances in order to reach terminals or transit points. In
finding out the willingness of residents to change their mode of transport due to a longer or shorter distance to the terminals or transit points, rational results were obtained. This was tied to the fact that after a less than 10 minutes journey to the terminal, respondents found no need to opt for a different mode of transport, however after a lengthy trip to the terminal, respondents were more likely to resort to a different mode of transport that would be quick to their destination to offset part of the period they spent getting to the terminal. Others were indifferent as the cost implications granted them no option for a change in transport mode.

Waiting times and their influence on modal choice were also examined in the study. A preponderance of respondents waited less than 10 minutes to board a vehicle and subsequently wait another 0-5 minutes for the vehicle to set off. The literature suggests that the public transport service within the country is dominated by the GPRTU which run on almost every corridor in the Metropolis, hence reducing the times that residents wait to get on their vehicles at the terminals and transit points. A previous study by Stradling et al., (2004) indicates that travellers are particularly sensitive to waiting times, before, after and at interchange points when using the service. This has caused waiting for buses to be a major reason people do not like taking public transport. Hence the longer waiting times drag, the less likely residents patronise the service. Regarding the willingness of respondents to change their transport mode due to longer waiting times, the results correspond with the earlier outcomes as any mode change requires some financial commitments while others who decide to keep waiting are exempted from the extra financial commitment.

5.5 Challenges associated with urban transport services

Urban transport is faced with many challenges that constrain mobility and accessibility hence the study sought to identify these challenges particularly within the three sub-metros of the Accra Metropolis. A greater number of respondents indicated they experience some
form of delays en-route their destinations. This could be attributed to the intensity of movement that goes on within the Metropolis as it is a hub of economic, educational, financial institutions etc. that tries to absorb the populations usually at the same time. These delays were chiefly vehicular traffic congestions, bad roads, mechanical problems, driver/conductor and weather-induced delays. These delays were encountered often by residents and thus reflects a very constrained mobility status within the Metropolis as almost every journey is bedevilled with some form of delay.

Availability and non-availability of transport services within the Metropolis was also examined. For residents, it was difficult to have access to transport services between 7 am and 9 am and between 6 pm to 8 pm due to the build-up of traffic on the major roads and corridors as most of the workers and students use these routes concurrently. However, between the hours of 5 am and 7 am and between 4 pm and 6 pm, residents easily have access to vehicles.

Residents’ perception of the quickest mode of transport to their destination revealed that taxis, private cars and motorcycles were the fastest modes of transport for commuting within the Metropolis. This they argued as having control over both departure, journey routes and speed of movement hence once you hire or own the vehicle of the particular mode, one can get to every destination ahead of time. Similar findings were recorded in Jensen, (1997).

The findings of the study further resonates concepts within the General Systems Theory which was employed. This affirms and elucidates more on the various subsystems of the transport milieu, which merge to promote or constrain mobility within the selected sub-metros. It also aids in explaining the various influences of human behaviour towards travel decision making. Thus, systems thinking within the transport field, goes a long way to enable practitioners appreciate and understand the intricacies of physical mobility in that sphere as depicted in this study.
5.6 Chapter Summary

In a nutshell, the chapter discussed the use of public transport services through modal shares and the various reasons for modal choice. Also, other studies were compared to the present study identifying common and contrasting themes and scopes concerning the accessibility and use of public transport services within urban settings.
CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter presents the summary, conclusions and recommendations of the study. It draws conclusions based on the findings, theoretical and conceptual frameworks that underpinned the focus of the study. It also discusses some recommendations based on the findings of the study. Lastly, it makes reference to other areas for further studies.

6.2 Summary

The main aim of the study was to investigate the use of public transport services by residents in the Accra Metropolitan area. Furthermore, the study sought to explore modal choice, factors that influence the choice of mode and different methods for explaining the choice of mode. Again the study examined the challenges residents face in accessing urban transport and in view of this, it further gives a glimpse of the mobility and accessibility pattern of the Metropolis under study.

The study adopted the embedded mixed method approach in order to gain a comprehensive understanding of the issues examined. A purposive sampling method was employed in selecting the three sub-metros for the study while a simple random sampling procedure was used in soliciting the views and experiences of 210 residents. This was proportionally distributed among the selected sub-metros; Ayawaso=48, Osu Klottey=81, Okai Koi=81. Respondents for the qualitative facet of the research were also selected purposively within the selected areas.

The study revealed the use of mini buses (trotro) as the most dominant mode of transport. The other modes that residents also frequently used were private cars, taxis and walking.
The study also found out the various motives behind the choice of the various modes and paramount among them was that of economic and affordability reasons. This was in relation mainly to the highest preferred mode of transport (trotro). Following this reason was that of time efficiency, hence some of the residents chose their modes in order to get to their destinations on time (taxi). The remaining explained that safety/personal security (private car), flexibility (private car) and lack of alternative transport mode (trotro) were the reasons they resorted to their various modes of travel.

The study also revealed that about 76.5% of the respondents patronised public transport services within the Metropolis out of which more than half utilise the service more than 8 times within a week. This frequency is spread across trotros, taxis and MMT buses mainly. Although income was the main factor that determined the modal choice of residents, mechanical breakdowns, unknown locations, timeliness, comfortability and cases of emergency were also identified as elements that influence people to opt for a particular mode, more specifically public transport.

The study also revealed that the most significant factor that accounts for respondents’ choice of mode trip aside income and occupation were their age (15-25). Most of the people within this age group had attained tertiary or secondary education, which tends to influence greatly, their mode choice of travel.

Other related issues that could have influenced people’s choice of mode were also raised as a form of cross-checking the reasons provided by the trip makers. Predominantly among them were the sizes and state (condition) of the vehicles. Again, despite the perception of people about the increasing costs of transport, the costs of food, clothing and rent are more likely to take larger proportions of residents’ income other than transport alone.
The study also compared the distances that residents journeyed to access transport services and its influence on their modal choice. Since people’s perception of distance is unique, relative and influenced by subjective and objective factors (Kent, 2003), the temporal frame was used as a proxy for distance in the study. Inspired by the study of Armstrong-Wright et al., (1987 p. 54), about 83% of respondents travelled between 0-500m in reaching their terminals, while 10.1% travelled over a kilometre in order to reach the terminals.

More than half of the residents embarked on these journeys by foot (61.7%). The remaining journeyed by taxi (18.0%), trotro (10.2%) and private car (10.2%). Since the majority of distances were relatively short, residents rationally walked to these terminal points. Residents were more likely to change their initial mode of transport when their journeys to the terminals are elongated. However, residents will still stick to their initial mode of transport when the trips to their terminals are shorter. Time factor and issues of stress were key among the reasons they would opt for a different mode depending on the length of their distance to terminals and transit points.

The study also examined the challenges associated with accessing urban transport within the Metropolis. Resident’s travels are greatly marred by various types of delays. Chiefly among them are vehicular traffic delays (congestion) followed by bad roads, mechanical breakdown of vehicles and driver/conductor related delays. Weather-induced delays were insignificant from the respondent’s point of view. Residents were also more likely to have stressful access to transport services between 7am-9am and 6pm-8pm. These periods, they indicated were the rush hours where the bulk of residents travelled, which contributes to the build-up of vehicular traffic on the major roads and corridors as most of the workers, students and traders jointly use these routes at these times.
However, residents were more likely to have stress-free access to transport services easily during the periods of 5am-7am and 4pm-6pm. They revealed they could painlessly catch any transport vehicle at these times since most of the workers will not be on the roads, but rather in their homes about to set off or at the offices preparing to close from work hence no traffic or delays are assured.

6.3 Conclusions

The study highlights a current view that public transport services serve the majority of people in the urban areas; especially, the low and middle-income earners, to whom this form of transport is their most affordable means of travelling.

The study reports on the use of public transport services in the Accra Metropolis.

The theories embedded in this thesis have elucidated more in this research and the findings therein. The General System Theory employed gave the study a holistic perspective. The study looked at the human factors, the road environment and the vehicular subsystems. It also highlights relationships between human activities within a space-time context and their various constraints of vehicular traffic, bad roads, mechanical problems that have jointly conspired to restrain accessibility and mobility in the Metropolis. These were examined in accordance with the main objective of the study. The conceptual framework adopted thus guided the entire research approach. However, limited variables for each component were selected due to time and cost and the techniques required for achieving the desired results.

The rationalist, socio-geographical and psychological approaches were instrumental in predicting one’s intentions, attitudes and behaviour of residents when it comes to decision-making about the modal choice of transport services and their travel inclinations.
Clearly, findings from this study suggest that factors like education level, income level, occupation and age other than marital status, household size and sex influence the modal choice of residents within the Metropolis. Per the findings of the research, respondents attributed their motive for mainly opting for their preferred mode of transport as due to financial reasons, timeliness, safety and personal security. Distance to transit and terminals were also determining factors for modal choice. Waiting time at the terminals, time spent in vehicles before they set off and various kinds of delays on the journey to respondents’ destinations all shape residents mode choice and use of the transport services available.

The study is not only applicable to the Accra Metropolitan area but can be replicated in other regional Metropolitan areas where the share and use of public transport services have been incongruous and disorganized.

Interventions aimed at reducing congestion and increasing ridership of public transport services will go a long way to curb the mobility gap experienced by residents in the Metropolis.

6.4 Recommendations

The results of the study have revealed many issues concerning the use of public transport services within the Accra Metropolitan area. Based on the findings of the study, the following recommendations are made.

Transport planners in developing countries need innovative solutions due to the fact that transportation services produce unwanted by-products such as air pollution which leads to global warming, congestions and accidents of which increased mobility contribute a great deal to:
1. Options for change: The current public transport requires rigorous overhauling to address the increasing populations of the Metropolis. In terms of infrastructure, arterial and access routes must be developed to ease up the pressure on the main highways. Also, the construction of flyovers at significant locations will also help manage the situation. In as much as these infrastructures are recommended, their requisite funding for maintenance must be available and the rehabilitation of existing roads so to get the optimum benefit of such initiatives. The study also recommends the development of other modes of transport, particularly rail transport. The first Phase of a Bus Rapid Transit System in the capital city could not achieve its purpose and was collapsed mainly by traffic congestion (see Agyemang, 2009). There is a second phase that was been rolled out officially in November 2016 following a test run in September 2016. Learning from the experiences of the initial phase, this should help curb the defect. Also, the use of Light Rail Transit can be adopted to increase mass mobility in real time spaces. This can be quite expensive but a very necessary alternative to the many motorisation vehicles that get stalled in traffic.

2. Traffic management. The study recommends strict enforcement of existing regulations on parking, vending etc. This will help clear the haphazard behaviour of both vehicle drivers, pedestrians and other road users alike. Also, the designing of bus stops should be properly done to provide an accommodating space for waiting, boarding and alighting of passengers. A very bold decision to be upheld by the transport authorities is the setting of bus priority junctions and lanes. The designated bus lane system of Curitiba, Brazil has chalked many successes along with its BRT system. This could be replicated in the Metropolis after some road expansions and an initial priority lane granted to buses (see Goodman et al., 2005). Furthermore, measures must be put in place to ensure that the traffic light system, for example, is
well calibrated to suit the corridor with the heaviest traffic flow. An Intelligent Transport System must be introduced to be able to track vehicle locations, update passengers on travel times, control traffic signals in a bid to ensure service efficiency and quality.

3. Adoption of the Park & Ride system. Park and ride also known as incentive parking as employed in Bologna, Italy and Oxford, UK refers to a provision where residents who own cars drive to parking lots with public transport connections that allow commuters and other people headed to city centres to leave their vehicles and transfer to a bus or rail system (rapid transit or light rail) for the remainder of the journey. The vehicle is left in the car park during the day and retrieved when the owner returns. Park-and-rides are generally located in the suburbs of Metropolitan areas or on the outer edges of large cities. This can also go a long way to increasing the use of public transport services while enhancing urban mobility and accessibility especially in the Accra Metropolis.

4. Policy. Addressing the travel demands of commuters, therefore, rests on succinct and logical public transport strategies and policies. The drive of such policies should be geared towards the promotion of sustainable high-quality links for people by improving the quality of the informal (private) operators through seminars, workshops and training to benefits the transport system. Funding of these informal sectors through soft loans is key to empower and increase their operations in the Metropolis. This will add meaningfully to the technical capabilities of the operators and lead to more effective public transportation in the Metropolis as well as the city.

5. Road pricing scheme. Results from this study and many others have discovered that there is a relationship between the levels of income of people and their quest or desire to acquire more vehicles if the need be. Pragmatic steps must be put in place
to implement road pricing schemes to curb congestion within the city. The idea of congestion pricing usually involves the use of an electronically-collected toll system to charge drivers more who use the most congested roads at the most congested times but prices can be cheaper at off-peak times. For busy highway corridors, congestion pricing can be used to maintain the free flow of traffic. Cities around the world such as Singapore, Bergen, Oslo, London, Rome are using congestion pricing systems to cut traffic in their urban centres and along heavily-used corridors and as a means to financially support the transportation sector (see Adjavor, 2008). Such an initiative should include the targets of reducing road traffic congestion, road accidents (deaths and injuries) and the more issue of climate change while generating revenue for the construction and maintenance of new and existing roads.

6.5 Areas for further research

The present study focused on the use of public transport in terms of mode choice and accessibility and mobility challenges. There are other possible research topics that could be associated with this study; one of them are described below:

1. There should be additional research to unravel the possibility of public transport operators to offer services to the aged and disabled persons within the urban and rural areas. The outcome would lead to achieving a more accommodating transport system operation within the country and also incorporating the modern technologies to serve every member of the community.
REFERENCES


*Dostupné na: http://www. iva. dk/jni/lifeboat.*


International Association of Public Transport (IAPT), 2008 Report.


Trondheim (Norway) and Accra (Ghana). *Bulletin of the Ghana Geographical Association*, (21), 113-128.


Kent, J. D. (2003). *Using functional distance measures when calibrating journey-to-crime distance decay algorithms* (Doctoral dissertation, Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Master of Natural Sciences in The Interdepartmental Program of Natural Sciences by Joshua David Kent BS, Louisiana State University).


Mollet, J. A. (2011). Ethical issues in social science research in developing countries: useful or symbolic.


Salant, P., Dillman, I., & Don, A. (1994). How to conduct your own survey (No. 300.723 S3.).


Strafford Regional Planning Commission (SRPC), (2005). How to link land use to transport planning, Town Center Plan.


APPENDICES

Appendix A

University of Ghana

Department of Geography & Resource Development

QUESTIONNAIRE FOR A STUDY ON THE USE OF PUBLIC TRANSPORT SERVICES IN THE ACCRA METROPOLIS

This research is being carried out as part of an MPhil degree in the Department of Geography and Resource Development, University of Ghana. The information is collected purely for academic research purposes as stated herein and confidentiality will be strictly observed.

Please tick or write where applicable. Thank you for your anticipated participation.

Name of Interviewer: 

Questionnaire No: 

Date & Time: 

Location : 

Sub-metro:

PART A: MODAL CHOICE OF RESIDENTS WITHIN THE METROPOLIS

1. What is your main mode of travel to work/school?

(i) Private Car [ ]  (ii) Workers/Company Bus [ ]  (iii) Taxi [ ]  (iv) Trotro [ ]  (v) Walk [ ]  (vi) Bicycle [ ]  (vii) Other [ ] Specify

3. Why do you choose this mode of transport?

(i) Economical [ ]  (ii) Flexibility [ ]  (iii) Proximity [ ]  (iv) Lack of alternative [ ]  (v) It is the quickest way [ ]  (vi) Safety/personal security [ ]  (vii) Other [ ] Specify
4. On your way to work/school which transport mode(s) do you take to reach your destination?

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<th>1st Mode</th>
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<th>2nd Mode</th>
<th>Tick</th>
<th>3rd Mode</th>
<th>Tick</th>
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<tbody>
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<td>Taxi</td>
<td></td>
<td>Taxi</td>
<td></td>
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<tr>
<td>Trotro</td>
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<td>Trotro</td>
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<td>Trotro</td>
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<td>Private Car</td>
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<td>Motorbike</td>
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<td>Motorbike</td>
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<tr>
<td>Bicycle</td>
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<td>Walking</td>
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</tbody>
</table>

6. Which transport mode do your family members use?

(i) Private Car [ ] (ii) Workers/Company Bus [ ] (iii) Taxi [ ] (iv) Trotro [ ] (v) Walk [ ] (vi) Bicycle [ ] (vii) Other [ ] Specify ..............................................................

7. How do you usually reach other places besides work/school within the Metropolis?

(i) Private Car [ ] (ii) Workers/Company Bus [ ] (iii) Taxi [ ] (iv) Trotro [ ] (v) Walk [ ] (vi) Bicycle [ ] (vii) Other [ ] Specify ..............................................................

8. Generally, do you use public transport for trips you take within the Metropolis?

(i) Yes (continue) [ ] (ii) No (skip to Q.14) [ ] (iv) Sometimes (continue) [ ]

10. For what purposes do you take public transport within the Metropolis? Tick all that apply
(i) Work [ ]  (ii) School [ ]  (iii) Market/Shop [ ]  (iv) Church/Mosque [ ]  (v) Pleasure [ ]  (vi) Other [ ] Specify ………………………………………………………………………

11. On the average, how often do you take public transport per day and per week?

(i) ……………………………...daily  (ii) ……………………………...weekly

12. Why do you choose taking public transport?

(i) Economical [ ]  (ii) Flexibility [ ]  (iii) Proximity [ ]  (iv) Lack of alternative [ ]  
(v) It’s the quickest way [ ]  (vi) Safety/personal security [ ]  (vii) Other [ ]  Specify ……………………………………………………………………………………………

13. Indicate the type of Public transport you use and how often you use the. Kindly Tick

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<tr>
<th>MODE</th>
<th>FREQUENT</th>
<th>SOMETIMES</th>
<th>RARELY</th>
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<tr>
<td>Taxi</td>
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<td>Trotro</td>
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<td>Motorbike</td>
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<td>Metro Mass</td>
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<tr>
<td>Workers bus</td>
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<tr>
<td>Others Specify</td>
<td></td>
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</table>

14. In your view what will make you change your current mode of transport?

…………………………………………………………………………………………

15. What will make you shift from an alternative mode of transport to public transport?

…………………………………………………………………………………………
16. How long does it take you to get to the terminal/transit point from home?

(i) Less than 5mins [ ]  (ii) 5-10mins [ ]  (iii) 10-20mins [ ]  (iv) 20-30mins [ ]  (v) More than 30mins [ ]

17. By what means did you arrive at the terminal/transit point?

(i) Walking [ ]   (ii) Taxi [ ]    (iii) Private Car [ ]   (iv) Trotro [ ]    (v) Bicycle [ ]
(vi) Motorcycle [ ]   (vii) Other [ ]
Specify………………………………………………………………………

18. Will you resort to a different mode of transport if your distance to the terminal was shorter?

(i) Yes [ ]   (ii) No [ ]   (iii) Maybe [ ]
Kindly give reasons for your answer for Q.18

…………………………………………………………………………………………………………………………

19. Will you resort to a different mode of transport if your distance to the terminal was longer?

(i) Yes [ ]   (ii) No [ ]   (iii) Maybe [ ]   Kindly give reasons for your answer for Q.19

…………………………………………………………………………………………………………………………

20. How long do you usually wait to board a vehicle at the terminal/transit point?

(i) 0-10 mins [ ]  (ii) 11-20mins [ ]  (iii) 21-30mins [ ]  (iv) 31mins-1hr [ ]  (v) more than 1hr [ ]  (vi) Other [ ]
Specify…………………………………………………………………………………………
21. When you board a car, how long do you wait for it to get full before you set off?

(i) No Waiting [ ]    (ii) 0-5mins [ ]    (iii) 6-10 mins [ ]    (iv) 11-20mins [ ]    (v) 21-30mins [ ]    (vi) more than 30mins [ ]    

Specify………………………………………………………………………………………………

22. Will you resort to a different mode of transport if the waiting time was longer?

(i) Yes [ ]    (ii) No [ ]    (iii) Maybe [ ]

Kindly give reasons for your answer for Q.26

PART B: MOBILITY AND ACCESSIBILITY PATTERN IN THE METROPOLIS

23. Do you encounter delays on your way to your destination?  (i) Yes [ ]    (ii) No [ ]

24. If “Yes” how often do you encounter delays on your way to your destination?

(i) Always [ ]    (ii) Sometimes [ ]    (iii) Rarely [ ]    (iv) Other [ ]

Specify…………………………..

25. Kindly rank your Type of delay.  (Please tick)

<table>
<thead>
<tr>
<th>No.</th>
<th>DELAY caused by:</th>
<th>FREQUENT</th>
<th>SOMETIMES</th>
<th>RARELY</th>
<th>NEVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Traffic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Bad Roads</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Mechanical Problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Driver/Conductor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Weather</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Others Specify</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
26. What time of the day is transport not available to and from work/school?

27. At what time of the day do you get transportation to and from work/school easily?

28. In your view what is the quickest mode of getting to your destination? Give reasons

PART C: (SOCIO-ECONOMIC CHARACTERISTICS)

29. Gender of Respondent. (i) Male [ ] (ii) Female [ ]

30. Age of Respondent

31. Educational Status. (i) Primary/Elementary School [ ] (ii) Secondary School Level [ ] (iii) Tertiary Level [ ] No formal education [ ] Other [ ] Specify……………………………………

32. What is your Occupation?

33. Marital Status. (i) Single [ ] (ii) Married [ ] (iii) Widowed [ ] (iv) Separated [ ] (v) Divorced [ ]

34. Household Size. ………………………………………………………………………

35. Average Income (monthly/annual) ……………/Month …………………/Year

General expenditure
<table>
<thead>
<tr>
<th>Average Expenditure on</th>
<th>Daily GH¢</th>
<th>Weekly GH¢</th>
<th>Monthly GH¢</th>
<th>Annual GH¢</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food (daily)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity &amp; Water (monthly)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rent (monthly/annually)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport (daily)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clothing (monthly)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health (annual terms)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Savings (monthly)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

36. Respondents Place of residence………………………………………………………………………………………………………..

37. Do you own a functioning personal car or have access to one?

(i) Yes [ ]     (ii) No   [ ]

38. Do you use the car?          (i) Yes [ ]     (ii) No   [ ]       If Yes, Kindly rank its usage.

(i) Always [ ]     (ii) Sometimes [ ] (iii) Rarely [ ]   (iv) Never [ ]

39. Kindly give reasons for your answer for Q.38

…………………………………………………………………………………………………

Thank you for your time
Appendix B

IN-DEPTH INTERVIEW GUIDE

FOR A STUDY ON THE USE OF PUBLIC TRANSPORT SERVICES IN THE

ACCRA METROPOLIS

This research is being carried out as part of an MPhil degree in the Department of Geography and Resource Development, University of Ghana. The information is collected purely for academic research purposes as stated herein and confidentiality will be strictly observed.

The main objective of the research is to investigate the use of public transportation services by residents in the Accra Metropolis.

Examine the modal choice of residents within the Metropolis

Assess the factors that influence modal choice

Assess the challenges associated with urban transport services within the Metropolis

DVLA STAFF

What are the number of cars registered yearly?

Which of them is for public transport?

Which sub-metro records the highest number of registered vehicles?

Which states are the cars in (road worthy)?

How does DVLA check the use of public transport?
MINISTRY OF TRANSPORT STAFF

What Policies does your institution have in place governing congestion within the Metropolis?

What are the policies on terminal and transit point location and construction within the Metropolis?

What are the plans for future developments of public transport sector within the Metropolis?

GPRTU REPRESENTATIVES

What are the number of public transport operators in the Metropolis currently?

What are their various units and nature of their services?

What are the terminal characteristics and flow of vehicles within the Metropolis?

What is your opinion on the designation of bus stops?

TRANSPORT STATION MASTERS

What are the number of public transport operators in your station currently?

What are their various units and nature of their services?

What are the terminal characteristics and flow of vehicles within the Metropolis?

What is your opinion on the designation of bus stops?

RESIDENTS/PASSENGERS

What is your Travel budget per day and its components?

What informs your Choice of mode of transport?
What is your distance to terminals or transit points and how does it influence your mode choice?

What are some of the constraints to your movement within the Metropolis?