PROVISION OF TRANSVERSE AND LONGITUDINAL TRANSPORT SERVICES ON THE VOLTA LAKE IN THE KRACHI CATCHMENT AREA

By

JOSHUA KWAME ADDAE

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DECLARATION

I hereby declare that this submission is my work towards the Master of Science degree and that to the best of my knowledge it contains no material previously published by another person nor material which has been presented for the award of any Degree of the University except where due acknowledgement has been made in the text.

Joshua Kwame Addae (PG7189512) …… …….
(Student name & ID number) Signature Date

Certified by
Prof. K. K. Adarkwa …… …….
(Supervisor's Name) Signature Date

Certified by
Dr. Daniel K. B. Inkoom …… ...…….
(Head of Department) Signature Date

ABSTRACT

Transportation is responsible for personal mobility; provides access to services, jobs, and leisure activities; and it is critical to the delivery of consumer goods. Water based transport is effective because, operating costs of fuel are low and environmental pollution is lower than for corresponding volumes of movement by road, rail or air. A major advantage is that the main infrastructure – the waterway – is often naturally available. Inland water transport on the Volta Lake to Krachi and its surrounding communities is unavoidable on account of peninsula feature. Transport services on the lake are thus important to help the residents in the area to have access to socio economic facilities including education, health delivery services and market centres. It is in this regard that the study sought to examine the provision of transverse and longitudinal transport services on the Volta Lake in the Krachi catchment area.

The study adopted a cross-sectional design with two panels; Krachi and the communities along the lake formed one panel (urban Krachi) and the communities across the lake formed the second panel (rural Krachi). Both questionnaires and interview guides were used to elicit the views of household heads with the ultimate motive of answering the research questions set out in this study. In this study, 214 household heads were sampled together with the Volta Lake Transport Company (VLTC), the Krachi West District Assembly (KWDA), the Krachi West District Health Service as well as the boat and canoe owners associations.

The study revealed that, transport services rendered on the Volta Lake in the study area is divided between the VLTC of the formal sector and the private boat owners of the informal sector. Whereas the transverse transport services (across the lake) are provided solely by the ferry owned by the VLTC, the longitudinal transport services (along the lake) are provided by privately owned boats. The total quantity of fish brought to Kajaji on market days by private boat operators and canoes was estimated at 120,351 kilograms (120.351 tonnes per week) which amounts to 6,258.252 tonnes for the 52 weeks in a year. The value of an average basket of fish was GH₵450.00 on the market which implies that, about GH₵2,578,950.00 accrue as revenue in a year to people engaged in the fishing business in the study area. This contributes significantly to the Gross Domestic Product of the local economy of the study area. It is estimated that, the Volta Lake Transport Company, earns a total of GH₵590,000 in a year for the 118,000 passengers it ferries

across the Volta Lake. This makes the operations of the company viable in terms of the patronage and the revenue that accrues to it.

Access to education, health care services and market centres are hampered as rural residents cover longer distances, spend much time and incur high cost to access these facilities inland. It is thus concluded that, residents of the study area are essentially captive to travel on the lake by boats and small canoes as well as ferries.

Based on these findings, it was recommended that, the VLTC should consider increasing its landing sites to cover more island communities. In addition, the Ghana Health Service in the district should also consider running a mobile health service for island communities. Furthermore, the District Assembly and stakeholders in education like the GETFUND should provide school blocks to make up for the backlog in basic school infrastructure in the district.

Transportation is seen as a means to an end and an end in itself. It thus, suggests that, there is a link between the availability of transport services and levels of poverty. In the near future, a research can be undertaken to investigate the correlation between provision of transport services and the level of poverty in the study area.

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CHAPTER ONE
GENERAL OVERVIEW OF THE STUDY.

1.1 Background to the Study

Transportation is very important in every sphere of life. Animals and human beings from time to time move from one location to another. The traditional viewpoint of transport experts and policy makers is that, transportation systems exist to provide for the safe and efficient movement of people and goods in an environmentally responsible manner (Konstadinos, 2003). Transportation can thus be defined as the movement of goods and people from one place to another.

According to Washington *et al.* (2003), transportation plays an essential role in developed and developing societies. Transportation is responsible for personal mobility; provides access to services, jobs, and leisure activities; and it is critical to the delivery of consumer goods. Regional, state, national, and world economies depend on the efficient and safe functioning of transportation facilities and infrastructure. Transportation can thus be considered as an essential ingredient for everyday living and survival. The significant role that transportation plays in nation building can therefore not be overlooked; hence, the absence of a good transportation network has dire consequences on the development of the area concerned.

Freight transportation encompasses the movement of a wide variety of products, from raw materials to finished goods, from comparatively low value-to-weight commodities such as coal, grain and gravel to high value-to-weight items such as computers and pharmaceuticals. It includes easily perishable items such as fresh fruits and vegetables, a wide range of refrigerated items, and growing number of time sensitive items for on-time delivery is crucial to business success. This freight needs to be moved safely and at responsible cost. It must also be moved in environmentally sound and socially acceptable manner (Konstadinos, 2003).

Water based transport is effective because, operating costs of fuel are low and environmental pollution is lower than for corresponding volumes of movement by road, rail or air. A major advantage is that the main infrastructure – the waterway – is often naturally available, which then has to be "trained", maintained and upgraded. Transport over waterways is especially effective when the source and/or destination are waterfront locations (Narayan and Raghuram, 2005).

The strength of a transportation system lies in its diversity, with each mode having its own system-specific advantages: motor carriers have the ability to provide door-to-door service; water carriers can handle bulk commodities safely at very low cost; and rails can transport a broad range of commodities over long distances. The public good is best served by the most efficient use of transport resources, regardless of mode. However, in today's intermodal systems, we have a cooperative climate because this type of operation requires the coordination of more than one mode. This efficiency and competitiveness of different transportation systems is essential to both economic growth and productivity (Konstadinos, 2003).

Inland water transport (IWT) is a fuel efficient and environment friendly mode of transportation. One of the countries in the world that is richly endowed with navigable waterways; comprising rivers, canals, backwaters and creeks is India. It is estimated that a total of about 14,500 km of the waterways could be used for passenger and cargo movement and about 55 million tonnes of cargo is moved annually by inland water transport in India (Mishra and Hussain, 2012).

It has come to stay as a fact that, inland navigation transport is affordable and supports a competitive economy. Where adequate waterway infrastructure and sufficient water flow is available, inland navigation can satisfy transport demand with operating costs and transport prices lower than those of road or rail transport. Increasing vessel dimensions and using convoys of motor vessels with push barges help to compensate for increases in personnel and fuel costs (Pauli, 2010). The means of transportation available in Ghana include transportation by road, rail, air and water. The most common means of transport is transportation by road but transportation by water has been perceived to be the cheapest.

Transportation on the Volta Lake has become prominent in Ghana since 1965 when river Volta was dammed and became the largest man-made lake in the world. Both cargo and human beings are transported from one stretch of the lake to another. In some instances, the transportation takes place across the lake (transverse transportation) whereas in other instances it is along the lake (longitudinal transportation).

Apart from the Volta Lake Transport Company (VLTC) which is officially mandated to provide efficient and reliable ferry crossing services on the lake (MoT, 2014), there are private boat owners who render transport services on the lake. These boat services have their associated problems as there have been several boat accidents on the Volta Lake

(Agbagba, 2008). These accidents on the lake are a major worry for government and other stakeholders in the area. Efforts have been made to improve safe transport services on the lake. Some of these include provision of life jackets for passengers on the lake and the removal of tree stumps in the lake.

1.2 Problem Statement

Inland water transport (IWT) is an integral component of the overall transport system of every region and one of the most advantageous transport modes. It has the least impact on the environment, the lowest cost for domestic and international transport, enormous capacity reserves and the least energy consumption. IWT plays an important role in providing effective services for the movement of cargo and passengers on rivers, lakes and canals.

The Volta Lake basin spreads across 16 districts located in five different regions including the Krachi West district. These districts have a population with communities whose size are between 400 and 3000 people. Communication networks are poor and social infrastructure, such as health, education and market facilities, are inadequate. However, most of the inhabitants in these communities have no alternative than using the only means of transport (small canoes and boats) in accessing the needed facilities inland. This makes them vulnerable to accidents on the lake (Agbagba, 2008).

However, prior to the creation of the dam in 1965, the old Kete- Krachi (now completely under water) used to be a very important nodal town as well as slave port in the past. From Kete Krachi, a route passed through modern Akorowase, Tappa in Buem, Nkonya, Kpandu, Kpeve, Ho, Adaklu, Ziope, Dzodze, Klikor to Adina, Adafienu and Blekusu. The same route from Kete Krachi passed through Asadame across the Keta Lagoon to Atokor and Keta. Through modern Odonkorkrom, Ho, Adaklu and Agoenyive in Togo, the same Kete Krachi route was connected to the Baguida, Lome, Anecho and Agbome markets. It was through these routes that slaves from Atebubu, Salaga, Kete Krachi and Bimbila, for example, reached the coastal markets of the Volta Region (The Old Kete-Krachi Slave Route, n. d). These routes undoubtedly served the economic needs of the people; thus, it was easy to access markets, educational facilities and health services which are not readily available in Krachi.

Since the inception of the Akosombo dam, the Volta Lake Transport Company (VLTC) has been providing ferry crossing services to the people of Dambai to Krachi, Krachi and

Defour. The Yapei Queen, a ferry owned by the Volta Lake Transport Company (VLTC) passes once a week from Akosombo and makes a brief stopover at Krachi and some other communities including Yeji in the Brong Ahafo region (MoT, 2014). For almost a decade, transportation on the Volta Lake has posed a major challenge to both residents of Krachi and its environs after the only Volta Lake ferry offering crossing services between Krachi and Defour in the Brong Ahafo region was grounded.

Suen and Mitchell, (2000) noted that, accessible transportation is the passport to independent living for everyone and view mobility as having transport services going where and when one wants to travel, being informed about the services; knowing how to use them; being able to use them; and having the means to pay for them.

It is in the light of the above that this study is undertaken to examine the transverse and longitudinal transport services rendered on the lake in Krachi and its surrounding communities, the volume of traffic and freight moved on the lake in the study area and also examine the influence of these transport services on access to markets, education and health delivery services.

1.3 Research Questions

In order to be guided to undertake what this study seeks to achieve, the following questions serve as the guide:

i. What are the freight and passenger transport services rendered along and across the Volta Lake in Krachi and its environs?
ii. What is the volume of traffic and freight that is moved across and along the lake in Krachi and its environs? and
iii. What are the influence of these services on marketing activities, accessibility to health delivery services and education in the area?

The research addressed the questions above with these objectives. The objectives are classified into broad and specific.

1.4 Objectives

1.4.1 Broad objective.

To investigate the longitudinal and transverse transport services on the Volta Lake in Krachi and its environs and the influence of these services on accessibility to marketing activities, health delivery services and education for the development of the study area.

1.4.2 Specific objectives

i. To determine the various freight and passenger transport services rendered on the lake in Krachi and its immediate communities;
ii. To determine the volume of traffic and freight that is moved on the Volta Lake in Krachi and its environs;
iii. To determine the influence of transport services along and across the Volta Lake on access to markets, health delivery services and education in the area; and
iv. To make recommendations on the provision of transport services in the study area to boost socio-economic activities for the development of Krachi specifically, and the entire district at large.

1.5 Overview of the Research Methodology

The study adopted a cross-sectional design with two panels; Krachi and the communities along the lake formed one panel (urban Krachi) and the communities across the lake formed the second panel (rural Krachi). This design helped the researcher to take a snap shot of transport services rendered across and along the lake at a point in time. The main variables measured were transport services and how they facilitate accessibility to market centres, health centres and educational facilities in the area.

Accessibility to the socio-economic activities were measured in terms of distance, time taken, availability of transport facilities and travel cost on the lake. The sample frame for this research comprises all the households in the selected communities for the purposes of this research. The units of enquiry were household heads of the various households that were sampled.

The research made use of both probability and non probability sampling techniques. Simple random sampling was used to select household heads. The random numbers generator was used to generate numbers of houses at random. The non-probability

sampling technique was used to select institutional heads of the various institutions that have the requisite knowledge on the issues that were investigated.

The sample size calculator was used to determine the sample size at 95% Confidence Level. The margin of error is seven percent with a total population of 1,829 households. From the calculation, a total of 177 households were determined as the minimum sample size. However, questionnaires were administered to 214 household heads.

Both qualitative and quantitative data were collected for this research. The data collection techniques employed were questionnaire administration and observation. Questionnaire and interview guide were the tools used for data collection. There were both structured and semi structured questions to which answers were sort from the respondents. The data used in this research were gathered from primary sources as well as secondary sources. The primary data were gathered from the household heads sampled whereas the secondary data were gathered from the Ghana Statistical Service, the Ghana Health Service, the Ghana Education Service of the Krachi West District, the Volta Lake Transport Company and the Department of Feeder Roads.

The data gathered were analysed both qualitatively and quantitatively. The quantitative analysis was done using the Statistical Package for Social Sciences (SPSS V.16.0). Tables and percentages of the data gathered were used to present findings. Cross tabulation (relating one variable to another) was also done to determine relationships between variables.

1.6 Justification of the Study

Allan and Randy (2005) stated that, the institutional purpose of every thesis is to ensure that, the degree holder has made a contribution to the field and to uphold an honored academic tradition. This study would bring to the fore the transport services that are available along and across the Volta Lake in Krachi and its environs. The findings of this research when published would make available by way of knowledge, how these services affect the socio-economic activities in the study area.

The findings would inform policy makers in the Krachi district and other stakeholders on ways to improve transport services on the Volta Lake in the study area to drive home the needed development to better the lot of residents. The research findings would, again,

open further discussions into travel along and across the lake to be undertaken by other researchers in the future.

1.7 Scope of the Study

The geographical scope of the study covers Krachi, Laala and Defour communities which are across the river from Krachi and also, Cement, Jericho, Jerusalem Old Chantae and Old Dobiso which are along the river. These communities that have been selected with the exception of Krachi have neither basic schools, market centres nor health centres.

The study would contextually concentrate on the provision of freight and passenger transport services on the Volta Lake in Krachi and the selected communities. Also, attention was given to the volume of traffic on the lake as well as the volume of freight that is moved across and along the lake in the study area. The influence of the freight and passenger transport services on the lake as well as access to market centres, health delivery services and education was also considered in this study. Finally, the study made recommendations to the District Assembly, government and other non governmental organisations (NGOs) on how to improve transport services across and along the Volta Lake in Krachi and its environs.

1.8 Limitations to the Study

Some limitations were encountered in this research. The distances covered from the various communities to the access points of market, education and health centre were based on estimations or as the "crow flies" distances. This is because of the absence of secondary data on distances on the lake and the inability of the study to measure actual distances from one community to another. However, the distance between Krachi and Defour was given by the VLTC and that, became the benchmark to estimate the other distances giving rise to some level of accuracy in the estimation.

The unwillingness of some respondents to answer questions posed to them by the researcher for fear of leaking their vital information to third parties was another challenge. This difficulty was overcome after they were given the full assurance that the data were purely for academic purposes and therefore their confidentiality was guaranteed.

The unwillingness of some organizations to release relevant documents and information to the researcher also posed a challenge to this study. The necessary rapport was established with authorities in these institutions in the course of the study and this challenge was also

overcome. In effect, all the challenges to this study were surmounted given higher reliability to the findings in this work.

1.9. Organisation of the Study

The study is organized into five chapters. Chapter One consists of the general introduction of the topic under study. It includes the background to the study, the problem statement, research questions and research objectives. The scope of the research, justification of the study and limitations to this study are also discussed in chapter One. Chapter Two focused on the review of relevant literature and the conceptual framework. Chapter Three was on the profile of the study area and the research methodology that was employed to undertake the research. Data presentation, analyses, interpretation and discussions of results are contained in Chapter Four. Finally, Chapter Five presents the key findings from the interpretation and discussion of analyzed data as well as conclusions and recommendations.

CHAPTER TWO
REVIEW OF RELATED LITERATURE ON INLAND WATER TRANSPORTATION.

2.1 Introduction

According to Boote and Beile (2005), a thorough, sophisticated literature review is the foundation and inspiration for substantial, useful research. It is thus important that, researchers ride on the shoulders of scholars in their research. The significance of reviewing relevant literature on the subject matter under consideration cannot be overemphasized. Randolph (2009), indicates that, conducting a literature review is a means of demonstrating an author's knowledge about a particular field of study, including vocabulary, theories, key variables and phenomena, and its methods and history. In his contribution to the reasons for reviewing literature, Hart (1998) outlined the following: distinguishing what has been done from what needs to be done, discovering important variables relevant to the topic, synthesizing and gaining a new perspective, identifying relationships between ideas and practices, establishing the context of the topic or problem, rationalizing the significance of the problem, among others, as the reasons for reviewing literature. It is in the spirit of the above that, this chapter is dedicated to review of relevant materials to enrich subsequent discussions in this research.

2.2 Transportation

According to Washington *et al.* (2003), transportation plays an essential role in developed and developing societies. Transportation is responsible for personal mobility; provides access to services, jobs, and leisure activities; and is integral to the delivery of consumer goods. Regional, state, national, and world economies depend on the efficient and safe functioning of transportation facilities and infrastructure. Transportation can thus be considered as an essential ingredient for everyday living and survival.

Transportation involves the physical movement of goods and people, using particular technologies and following distinctive geographical routes. Impetus for movement comes from land use diversity but actual movement depends on the costs of interaction. Once movement connects places, land uses change and geographic relationships are modified (Rimmer, 1986). The bone of contention has been which influences the other? It has always been hard to distinguish cause and effect. Does transportation initiate economic and social connections between places, or are transport structures the result of pre existing

pressures for interaction? The answer is important for policy analysis. For instance, has settlement of agricultural land in South America's humid tropical lowlands occurred because of government policies to build new roads linking plateau and forest, or did spontaneous pioneers on this new frontier prompt improved transport linkages which then integrated these areas into national economies (Dickinson, 1986). It is indeed the case that the line between the cause and effect is very thin as spelt out in the foregoing. Taylor and Norton (2009) are of the view that, transportation is and transportation does; that is, we can conceive of transportation as an end in itself (is) and as a means to an end (does). With respect to the latter, transportation analysts typically describe the demand for transportation as a "derived demand."

According to Awal (2006), there are three main modes of transportation. These are land, water and air with land transportation being the most common kind of transportation. Land transportation depends mainly on wheeled vehicles, especially automobiles, buses, trains and trucks. Ships and boats are the most important water vehicles. Air transportation depends almost entirely on airplanes.

2.3 Inland Water Transportation

It is always expected that, the consideration to use a specific mode of transportation rather than other modes would vary from one country to another and even for different trip purposes. There are factors that are taken into consideration in the course of selecting one mode of transport and not the other. Cost effectiveness, technical viability, political commitment, among others, are some factors that are taken into consideration in choosing a mode of transport over the other.

Over the past several centuries, important waterborne inland transportation networks have developed along major rivers, including their tributaries, and lakes like the Ganges, Brahmaputra, Narmada, Chang Jiang and Mekong in Asia. It also included the Nile in Africa; the Rhine, Main, Seine, Danube, Elba, Volga and Don in Europe; and the Mississippi and the Great Lakes in North America (Biswas, 1987).

According to MacDonagh-Dumler *et al.* (2003), the North American Great Lakes constitute the largest system of fresh surface water on the face of the earth: over 244,000 square kilometers of surface water; 520,000 square kilometers of drainage area; and a combined volume of nearly 23,000 cubic kilometers. Individually, the five Great Lakes are among the fifteen largest freshwater lakes in the world. With more than 17,000 kilometers

of shoreline, including its thousands of islands, this ecosystem extends some 3,500 kilometers from the westernmost shores of Lake Superior to the Atlantic Ocean. The lakes provide daily drinking water to two-thirds of its 40 million residents. Domestic and commercial uses of lake water consume nearly four trillion liters daily. Water dependent industries - such as heavy manufacturing, agriculture, recreation and tourism, as well as sport and commercial fishing – are all multi-billion dollar a year industries.

Biswas (1987) stated that, inland bodies of water have been used as important corridors of transportation in different parts of the world from prehistoric times. The important ancient civilizations developed along the banks of major rivers like the Nile, Indus, Euphrates and Tigris because water could be used not only for agricultural and drinking purposes but also for transportation of goods and people. As civilization progressed and new technologies were developed, rivers were made navigable and canals were constructed to provide an intricate system of waterway networks through which agricultural, industrial, mineral and energy products could be transported. Many of the centres of industrial activities in Europe during the Industrial Revolution developed along various rivers, since they provided easy availability of water for industrial processes and transportation of raw materials to factories and manufactured goods to customers (Biswas, 1987).

Inland waters were also a precursor to the settlement pattern of some states. For instance, the United States was first settled where there was water for transportation. The Erie Canal was built to open a trade route to the West. Early settlers were rafted down the Allegheny, Ohio, and Mississippi rivers. Canals were built to bring Pennsylvania coal to seaboard markets. Packet boats were an important factor in the settlement of the Middle West and Northwest (Yates, 1963).

MacDonagh-Dumler *et al.* (2003), also added their voice to how inland waters have informed settlement patterns in North America by indicating that, residing within the political jurisdictions of the eight Great Lakes states and province of Ontario are more than 60 million people with more than half of them located in the Great Lakes drainage basin itself. This in-basin population comprises 20 percent of the U.S. population and 60 percent of the Canadian population. Population growth was nearly 9 percent in the Great Lakes states and over 12 percent in Ontario in the last decade. There are many major cities located on the Great Lakes shorelines, including: Buffalo, Chicago, Cleveland, Detroit, Hamilton, Milwaukee, Toledo, Toronto and Windsor.

Bangladesh is one of the countries that cannot be overlooked when mention is made of inland water transportation. According to Awal (2006), Bangladesh lies at the apex of the Bay of Bengal and has rivers that come down from the surrounding countries and flow through it. Nearly the whole area of the country consists of low and plain lands. Again, about 7 percent of the surface of the country is covered by a dense 24,000-kilometres long network of inland waterways. Awal (2006) also asserted that, Bangladesh has about 9,000 square kilometres of territorial waters with a 720 kilometres long coast line and 20,000 square kilometres of economic resources zone (ERZ) in the sea. Thus, inland water transport has always been a natural and relatively cheap means of transportation in Bangladesh.

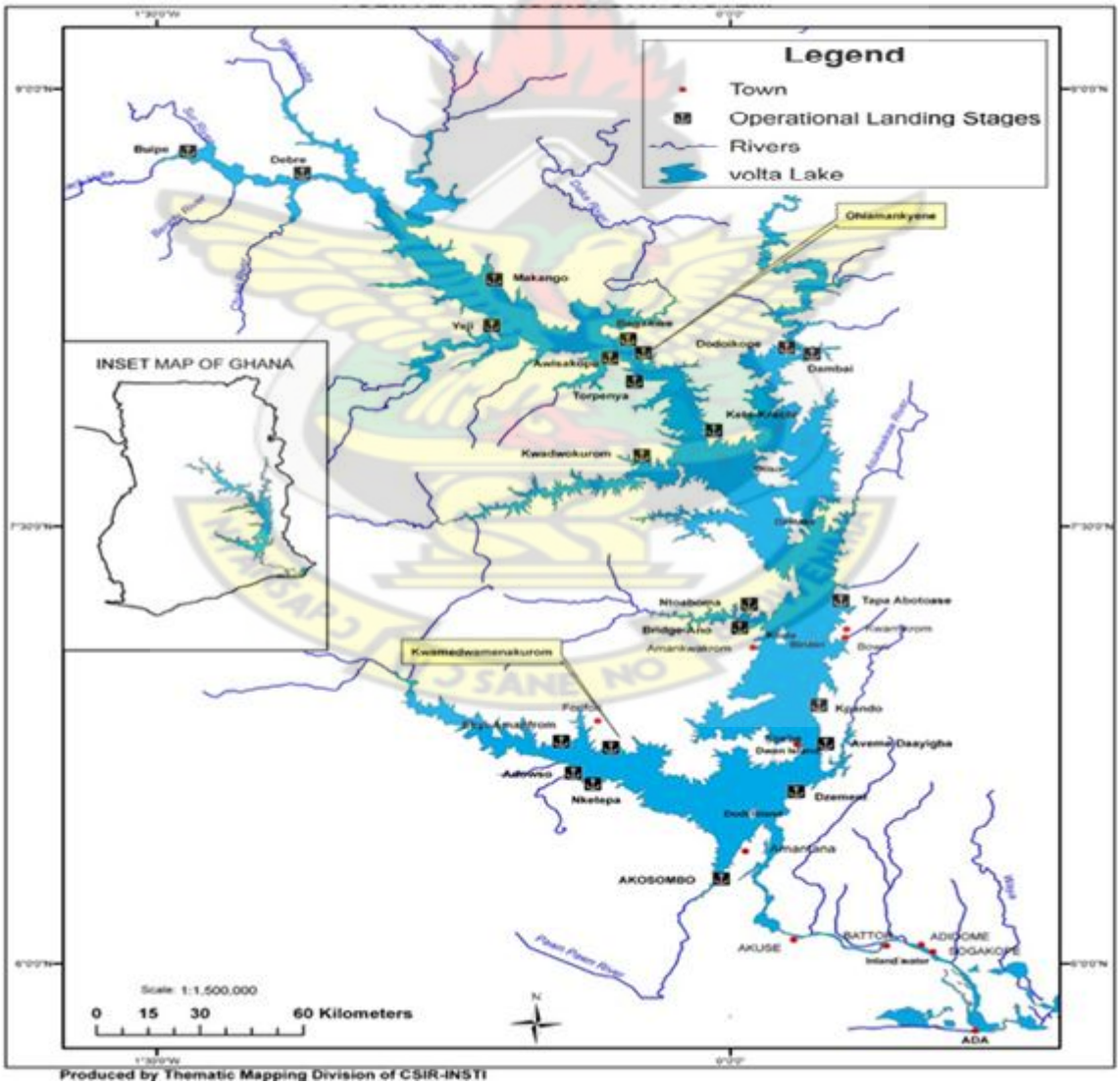
In certain areas of Bangladesh, inland water transport is the only mode of transport. Including the country's unclassified routes, the total length of its waterway (700 rivers) is about 13,000 kilometers. Of this, 8,433 km is navigable by larger vessels in the rainy season (5,968 km of which is classified for navigation) while in the dry season about 4,800 kilometers is navigable (Awal, 2006).

The completion of the Akosombo Dam on the Volta River in Ghana in 1964 resulted in the creation of an immense reservoir (Lake Volta) with a length of 520 kilometers and covering about 8,500 square kilometers or 3.2 percent of Ghana's total land area. A large fishery industry developed upon the creation of the lake which some 300,000 fisher folk depend on for their livelihood (Braimah, 2003). The Volta Lake Transport (VLTC) was incorporated in 1970 to provide north-south water-borne transport for persons and freight on the Volta Lake. The Company operates a fleet of passenger vessels, cargo ships and barges. Pusher tugs with cargo barges constitute pusher trains which can transport 2,300 tonnes of cargo per voyage. It is asserted that, dry cargo, namely: lint cotton, cotton seeds and shea nuts are shipped from the agricultural north to the industrial south for export or for local markets. Additionally, cement, industrial products and general cargo are shipped from south to the north. A pusher tug with tanker barges of 1,440 metre capacity sails regularly to Buipe with fuel (kerosene, diesel and petrol) for markets in the Northern, Upper West, Upper East Regions and the northern parts of Brong Ahafo Region. The passenger/cargo vessel 'MV YAPEI QUEEN' with air-conditioned cabins and restaurant facilities, among others, sails every Monday from Akosombo to Yeji with stops at various intervening ports including Kete Krachi. The vessel returns with agricultural products such as yams, beans, groundnuts, fish and so forth on Thursdays (VLTC, 2014).

The VLTC again provides safe, efficient and reliable ferry-crossing services from Akosombo to Yeji (Brong- Ahafo), Kete-Krachi and Dambai, both in the Volta Region and Adawso in the Eastern Region. The ferries serve as bridges where the Lake has cut across the road network. Without these services, communities around the ferry stations will be cut off from the rest of the country. Both passengers and cargo are transported at the stations (MoT, 2014).

Figure 2.1 shows the various landing sites (communities) across the country (Ghana) where the Volta Lake transport system is available. It is worth mentioning however that, they are not the only communities located along or across the Volta Lake.

Figure 2.1. The Volta Lake Transport System



The foregoing highlights the significant role inland water transportation played in the prehistoric days to date. It shows that, inland water bodies have helped tremendously in the shaping, springing up and development of some major industrial hubs in Europe and other parts of the world. In England, for instance, the use of boats by both the king and queen highlights the acceptability of the comfort and safety associated with inland water transportation. In Ghana, the carriage of heavy and bulky goods from the south to the north is made easier by the use of the lake.

2.4 Prospects of Inland Water Transportation

In 1996, the first United Nations Economic Commission for Europe (UNECE) White Paper on inland navigation highlighted the potential and the advantages of inland navigation in comparison with other land transport modes in Europe. More recent analyses confirm these conclusions and describe inland water transport as a safe, versatile, reliable, economical and environmentally friendly mode of transport with still untapped capacities and potential for growth, while major pan-European road and rail transport and port hinterland corridors are increasingly overloaded and congested.

Burenco *et al.* (2011) opined that, inland water transportation (IWT) is the quietest, safest and least polluting form of transport and that shipping more goods on inland waterways will help to reduce greenhouse gases and traffic congestion. He alluded that statistics available indicate that, in terms of air pollution, accidents, noise and emission of gases that have harmful effects on the environment, inland water transportation offers the best option.

The merits of inland water transportation would be inconclusive if mention is not made of the enormous contribution the great lakes are making to the economic development of North America. According to MacDonagh-Dumler *et al.* (2003), the Great Lakes binational region forms the industrial heartland of North America with total production in 2000 of nearly $2 trillion (USD), which is only exceeded by the Gross Domestic Product of the United States and Japan. The statistics given to buttress this claim has it that, in 2000, Canada derived more than 50 percent of the value of manufacturing shipments from Ontario alone and, in the United States of America, six of the Great Lakes states contributed more than 25 percent to the total manufacturing value added.

Again, MacDonagh-Dumler *et al.* (2003) asserted that, significant industrial growth began in about 1850 and relied upon resource extraction through mining, harvesting timber and

low-cost shipping on the lakes. For example, the huge steel mills of Gary (Indiana), Pittsburgh (Pennsylvania), and Cleveland (Ohio) obtained iron ore from northern Minnesota that was shipped down the lakes. They also asserted that, these same commercial shipping routes carried steel products to Detroit and Chicago for further processing into finished consumer goods, such as automobiles and farm equipment. With this infrastructure in place, the region maintains significant shipping ports that serve large freighters carrying goods and commodities, such as grain, soybeans, coal, iron ore, from both in-basin and out-of-basin areas of the United States of America, Midwest and Canada. These shipments are worth billions of dollars; in addition, the businesses that service this activity generate $3 billion (USD) in yearly business revenue and employ more than 60,000 people. The foregoing indicates the contribution of inland water transportation to development.

In Ghana, a portion of the lake has been dammed which provides electricity for the country. Aside this, there has been a vertically interlinked aluminium industry. Since 1972, there has been a power line into the neighbouring countries of Togo and Benin for which the Volta River Authority (the company that operates the power station) has regularly been selling between l0 to 20 percent of the station's output to these countries in exchange for hard currency. In addition, the wealth of fish in Lake Volta has had a positive impact on the life of Ghana's population who consume fish by providing them with protein. Averages of 40,000 tonnes of fish per year were landed (Schmidt-Kallert, 1990).

Inland navigation can also play an important role in true intermodal transport, which is indicated by the number of intermodal terminal facilities. A large number of these facilities exist along the Rhine. For containers alone, more than 20 intermodal terminals are located between Rheinfelden in Switzerland and Emmerich on the German/Dutch border. Thus, the Rhine averages some three container terminals per 100 kilometres. As it seems impossible to develop reliable data for all intermodal facilities along the Rhine, the density of container terminals may serve as a proxy for the amount of access to intermodal terminal facilities in general (Pauli, 2010).

Besides the opinions elicited in the forgoing, Ishiwatari, (2011) also holds the same view on IWT as being advantageous to other forms of transportation. According to him, IWT, which is a low-cost, energy-efficient, and environmentally friendly mode of transport,

represents an ideal infrastructure in sustainable development. Its energy consumption per tonne/kilometer of transported goods is approximately 17 percent of that of road transport and 50 percent of rail transport. He asserted that, the carbon emissions from IWT are much lower than those of road freight transport and can contribute to promoting a low-carbon society. The external costs (climate change, noise, accidents, and emissions) associated with IWT are the lowest of the major modes of transport. The overall costs of all externalities for bulk transportation using IWT are roughly 83 percent lower than road and roughly 70 percent lower than rail transport. In container transport, IWT costs 78 percent less than road transport and 68 percent less than rail transport (PLANCO Consulting GmbH, 2007).

IWT is considered as a convenient mode of transport in congested cities such as Bangkok and Manila. It is closely associated with tourism, recreation, and community development. Since IWT ensures a high degree of safety, it is a suitable mode for transporting dangerous goods. Also, Ishiwatari (2011) asserted that, IWT is the cheapest among the three modes of transportation, cheaper than road by about 20 percent, and roughly one-sixth of the price of air transportation.

IWT is used for emergency and rehabilitation operations in post-conflict situations. The United Nations World Food Programme relies largely upon IWT to transport emergency food to Juba. Since the peace agreement, internally displaced persons (IDPs) who were evacuated to other areas in Sudan during the conflict are returning to Juba by IWT (Ishiwatari, 2011).

IWT gained recognition as an effective form of transportation in disaster relief and rehabilitation following the Kobe earthquake in 1995. Water transport was extensively utilized for various purposes in Kobe, where major roads and all railway networks were destroyed. The water transport of rescue workers, relief goods, and emergency patients started immediately after the earthquake by utilizing natural banks and damaged facilities (Ishiwatari, 2011).

The indestructible nature of the waterway makes it an option left even when the other modes of transport are destroyed. Whereas the other modes of transport are subject to destruction when a disaster strikes, the waterway becomes the most suitable option to evacuate victims as it happened in Kobe. Inland water transportation thus has an added

advantage of being relied upon in emergency relief cases. Table 2.1 summarizes the advantages of inland water transportation.

Table 2.1 Advantages of Freight Transport on Inland Waterways.

Superior safety	Operates away from populations and traffic: more than 50 times safer than road, more than 5 times safer than rail (in persons killed per tonne-km).
High versatility	Tailor made services suitable for dry/liquid bulky, heavy and dangerous goods, containers and roll on/roll off services.
Good reliability	Few unpredictable traffic constraints due to accidents, ice, floods and low waters in Western and South-Eastern Europe.
Low costs	Considerably cheaper than road and rail main haul services (by 30% to 60%, depending on cargo and distance).
High energy-efficiency	For most bulk transport operations, 3-6 times less fuel consumption than road and up to 2 times less than rail.
Good carbon footprint	For most bulk transport operations, 3-6 times less CO2 emissions than road and up to 2 times less than rail.
Low noise levels	Little noise emissions, mostly away from major populations
Low infrastructure costs	Low investment and maintenance costs
Supply chains and Logistics	Low cost buffer stock and storage capability.
Good transport supervision	Effective tracing and tracking of vessels and cargo (RIS).
No traffic restrictions	No night, weekend and holiday traffic restrictions.
Dedicated transport network	Little interference with passenger traffic.
Untapped spare capacity	20-100% short-term spare capacity on major corridors.

Source: UNECE, (2010).

2.5 Challenges of Inland Water Transportation

Inland water transport, however, is also faced with challenges given its limited speed and sometimes, low and irregular frequency of services. Also certain shortcomings in reliability due to weather and hydrological conditions may occur, depending on geographical location. Infrastructure development and maintenance is]not always at a level that allows for efficient transport operations and the very fragmented industry is often not well integrated into sophisticated door-to-door transport chains and potential

high-value markets, such as the transport of containers and manufactured goods (UNECE, 2010).

The capacity of inland navigation depends on the available water depth. Therefore, long periods of low water levels reduce the capacity of inland navigation. Such a period occurred in 2003 in Europe because of an unusually dry summer, resulting in the lowest water level ever registered at the gauging station of Kaub. The low water level reduced the carrying capacity of large vessels dramatically and large double hull tankers stopped sailing on the middle part of the Rhine. Certain freight forwarders were forced to shift cargo to rail and road. Smaller vessels were transferred from other waterways to the Rhine and partly compensated for the reduced capacity of large vessels (CCNR, cited in Pauli 2010, p. 240). The BundesanstaltfürGewässerkunde (BfG) examined the low water period of 2003 and confirmed the severe capacity reductions during this period. However, it also showed that the total amount of cargo carried on German inland waterways shrank only by 5% in 2003 and inland navigation could catch up again with the other transport modes in 2004 (BfG, cited in Pauli 2010, p. 240).

It appears that the capacity of German inland navigation is fairly stable even in times of extremely long low water period. This is due to the fact that most of the commercially significant waterways in Germany are either canals or regulated rivers, which can maintain stable water levels even in long periods without precipitation. Thus, spare capacity of inland water transport systems may diminish during long periods of low water levels. But only free flowing rivers would be affected, and employment of smaller vessels may assure a certain transport capacity (Pauli, 2010).

As a challenge to IWT, Ishiwatari (2011) indicates that, IWT has been neglected as a mode of transport and does not usually feature prominently in the transport planning strategies of most countries. Only 10 percent of the capacities of large rivers in Europe, such as the Danube, the Seine, or the Rhône, have been developed. The modal share of IWT in the European Union does not exceed 6 percent. In the United States it reaches up to 12 percent of overall freight shipments. Long lengths of navigable waters remain undeveloped as asserted by (Ishiwatari, 2011).

Experts in IWT discussed these issues at sessions of the Water and Transport Theme at the Third World Water Forum in Kyoto in 2003, and they identified economic, environmental, and social issues for this underdevelopment. These issues were poor recognition of the

potential contribution of IWT to resolve a wide range, general lack of basic infrastructure, technology, and financial resources, and failure to integrate IWT within a comprehensive transport system. Other reasons include failure to include IWT within integrated water resource management, insufficient institutional capacity, legal instruments, and policies and inadequate public awareness and little political will for promotion (Ishiwatari, 2011).

Table 2.2 provides, in a concise form, the general list of the main challenges for freight transport on inland waterways. It is well recognized that not all of these issues apply to all rivers and canals as well as to all types of freight transport on inland waterways (UNECE, 2010).

Table 2.2 Challenges of Freight Transport on Inland Waterways

Insufficient network	Persistence of inland waterway bottlenecks and missing links at pan-European level. Investment backlogs.
Deficient maintenance	Inadequate maintenance of infrastructure and inland water fleet.
Seasonality of operation	Traffic shut-down during winter in Northern and Eastern Europe.
Diminishing and ageing fleet	Diminishing and ageing inland fleet of cargo vessels with difficulties to comply with modern market and regulatory requirements.
Segmented industry	Large number of small inland water enterprises (70 to 90% single –vessel operators)
Supply chains and logistics	Deficiencies in integrating inland water transport in global and regional supply chains and logistics processes.
Port-hinterland traffic	Still untapped potential, but perceived "discrimination" of inland water transport in some maritime ports.
Diffused professional image	Lack of knowledge or expertise on inland water transport by shippers, freight forwarders and logistics providers.
Shortage of skilled personnel	Declining attractiveness of inland water labour markets and shortage of skilled personnel, mainly in Western Europe.
Institutional framework	Multi-layered Governmental authorities and organs at local, national, regional and pan-European levels.

Source: UNECE, (2010).

In measuring the contribution of a mode of transport, accessibility to services such as education, market centre and health facilities becomes a bench mark against which the particular mode is measured. Notwithstanding the challenges faced in terms of inland water transportation, it is still a mode of transport that can be relied upon with regards to accessibility.

2.6 Accessibility to Transport Services

According to Suen and Mitchell (2000), accessible transportation is the passport to independent living for everyone. In their view, mobility can be used to refer to having transport services going where and when one wants to travel; being informed about the services; knowing how to use them; being able to use them; and having the means to pay for them. Markovich and Lucas, (2011) define accessibility as the extent to which land-use and transport systems enable (groups of) individuals to reach activities or destinations by means of a (combination of) transport mode(s).

The Social Exclusion Unit (SEU) 2003 report suggests that, transport contributes to social inclusion by providing access to work, education, healthcare, food, shops, social, cultural and sporting activities. The SEU (2003) report concentrates on the accessibility of services and activities. It talks about a service or activity as being accessible if it can be accessed "at reasonable cost, in reasonable time and with reasonable ease". Accessibility thus depends on whether transport exists between the people and the activities in which they wish to partake; on perceptions of reliability and safety of the transport; whether people are physically and financially able to use the transport available; and the distance that they are required to travel to reach services and activities, which is a product of both a person's time horizons and the location of services.

Geurs *et al.*, (2009) argue that, the availability and physical access to transport facilities should be focused on the role of transport in enabling people to participate in various activities, such as employment and learning opportunities, and to make use of local services, such as healthcare, food shops, and recreational and leisure facilities. Level of service (time, cost, and comfort) also determines accessibility of transport mode. The operating hours of transport systems have been criticised for adversely affecting the ability of socially disadvantaged groups to access such important services as: before-and-after school activities, health care facilities, supermarkets and food shops, and employment opportunities (SEU, 2003). With regard to transportation choice/option values, transport facilities are expected to offer people choice of travel mode and route throughout the day--'People's willingness to pay for the continued availability of a transport facility, to preserve the option of using this facility in the future'.

The forgoing suggests that the absence of a good transport system restricts access to activities that enhance people's life chances, such as work, learning, health care, food

shopping, and other key activities and also deprived communities suffer disproportionately from avoidable transportation related deaths.

DETR/TRaC (2000) refers to four ways in which people can be socially excluded by transport from the activities they wish to undertake: spatially – they cannot get there at all; temporally – they cannot get there at the appropriate time; financially – they cannot afford to get there; personally – they lack the mental or physical capabilities to use the available means of mobility.

2.6.1 Health Care Accessibility

Access to health care is a crucial element of any health care delivery system because the opportunity to obtain health care exists if there is availability and adequate supply of services (Gulliford *et al*., 2002). Facilitating access to health care therefore contributes to a greater understanding of the performance of health systems within, and between countries. After the launching of the Bamako Initiative in 1988, many African countries have adapted "comprehensive primary health care (PHC) programmes" to solve the health problems of their citizens. Furthermore, the United Nations' Millennium Development Goals of 2000 target improved health care for all (UN, 2000).

Equal access to health care is a challenge to governments all over the world when it comes to minority groups, low income earners and people living in rural communities (Stein, Andersen and Gelberg, 2007). Haile, du Guerny and Stloukal (2000) asserted that, health facilities in Sub-Saharan Africa are concentrated in urban areas, thus making health care accessible to less than 50 percent of the population.

In measuring access to health services, often attention is given to physical accessibility. In the view of Rosero-Bixby, (1993) physical accessibility measures the time and the distance which people must travel from one place (origin) to another (destination) to enjoy a facility. Measuring physical access of individuals and population to health facilities or other public services is crucial in planning the opening of new health facility, evaluating programs impact and understanding changes in fertility and mortality.

Factors that hamper easy access to health care in rural areas of Africa include geographical, economic, attitude of health workers toward patients, administrative and socio-cultural (Blustein and Weitzman, 1995). Similarly, it is argued that, place of

residence negatively affects the health conditions of many people living in developing countries (Fotso, 2007).

The issue of distance as a detriment to people's access to healthcare services has been well documented. Malefetsane (2012) noted that, people in the developing world are the main victims of the extreme spatial disparities between people's homes and healthcare services due to low life standards that make it difficult for many to go to health centres. According to UNICEF, some regions of the world have more dire situations than others, but even within one country there can be broad disparities between city and rural children; for example, women who must walk long distances to fetch household water may not be able to fully attend to their children, which may affect their health and development.

Thousands of children and pregnant women in many Sub-Saharan African countries have succumbed to diseases that are preventable in other countries as a result of the distances they travel to access healthcare services. Studies conducted in Sub-Saharan Africa show that, there is a correlation between high infant mortality rates and long distances to healthcare services. For instance, Schoeps *et al.,* (2011) conducted a study to investigate the relationship between distance to health facilities measured as continuous travel time, and mortality among infants and children younger than five years of age in rural Burkina Faso, an area with low health facility density. Of 24,555 children born between 1993 and 2005 in the Nouna Health and Demographic Surveillance System, 3,426 childhood deaths were recorded as a result of increasing travel time, demonstrating that walking distance was significantly related to both infant and child mortality. The distance covered to a nearest health facility and infant mortality can be said to be positively correlated. That is, the farther the distance, the more likely that higher number of deaths would be recorded.

As noted by Buor (2003), longer travel times and greater distances to health centers in rural areas constituted barriers to repeated visits. It was also found out that, distance is the most important factor that influences the utilization of health services in the Ahafo-Ano south district of Ghana. The effect of travel time on utilization reflects that of distance and utilization. The inadequacies in the access to health facilities have reduced the life expectancy of rural inhabitants and increased infant mortality. In Ghana as a whole, 35 percent of rural households cover a distance of between 1 and 9 miles (1.6-14.4 kilometers) to travel to the nearest hospital. Of the rest, the majority cover more than 9 miles to reach a health facility (GSS, 1993).

Ouma and Herselman (2008) further claim that, when it comes to access to healthcare, the rural population has been viewed as vulnerable because of the poorly developed and fragile health infrastructure, high prevalence rates for chronic illnesses and disabilities, socio-economic hardships, and physical barriers, such as distance, including lack of public transportation. Access to quality care is, therefore, important to eliminating health disparities among people in both urban and rural areas.

According to Ajala *et al.* (2005), the rural people often waste a lot of time getting to the nearest available health care center of which they have to trek long distance on many occasions because they are often faced with the problem of reliable means of transportation. Guagliardo (2004) indicated that, distance from a health care facility is a factor capable of affecting access to health care services. A population's health care level may be affected negatively by the distance to health care facility. Thus, the farther the health facility, the more difficult it is to access it. With respect to health personnel, increase in the number of physicians leads to a corresponding increase in health care accessibility and vice. The nature of the roads and other modes of transport affect transportation of sick people to the health care facilities within the area as well as referred patients to the nearby hospitals. This confirms the importance of absolute space and place in health care accessibility (Adu-Gyamfi and Abane, 2013).

Solomon (2004) asserts that, the use of health facilities in Ghana is still low and assistance in birth delivery proves the insufficient delivery of health care. Whereas 79 percent of births in urban areas are supervised by a medical practitioner, the rural figure is only 33 percent. In some towns and villages in the North, unsupervised delivery is the norm. With regard to the poor, 70 percent of the poor population cites costs as one key reason for non-use of medical services. This includes cost for medicine, treatment and also transport to and from the facility. In addition to this, physical location of health facilities does not meet households' needs, meaning distance is a major obstacle to the rural population. Up to 70 percent of the rural poor needs more than 30 minutes to the next health facility hence the means of transport becomes very significant. In Ghana, there is a higher concentration of medical facilities and personnel in the southern parts and urban areas of the country (Fotso, 2007). The 2010 population and housing census revealed that, 49 percent of Ghana's population live in rural areas (GSS, 2012).

Dye (2012) asserted that, the issue of timeliness is critical in ensuring that people develop an appropriate health-seeking behaviour. In his view, long waiting times to obtain healthcare services can frustrate people and result in negative perceptions of their service providers. It has been discovered that in many countries in Africa, the nurse-patient ratio is highly uneven, which, in turn, forces nurses to serve unfairly large numbers of patients.

Solomon (2004) opined that, in most African countries, the rural population relies on walking as the dominant mode of transport. It becomes difficult to access health care when the centre is not within walking distance. According to the GSS (2008), while about 79 percent of the sick and injured in Accra consult doctors, only about 47 percent in other urban do so. Among the rural localities the proportions range from 40 percent in rural coastal to 20 percent in rural savannah. Furthermore, persons in rural localities are more likely than those in urban localities to consult nurses. About 23 percent of sick persons in rural savannah consult nurses while less than 10 percent do so in urban localities.

Schoeps *et al*., (2011) indicated that, people who are poor live in the rural areas in most countries in the Sub-Saharan region and walk many kilometres to and from healthcare centres. Also, the inaccessibility of roads and erratic transport systems contribute tremendously to sidelining poor, rural people who want to access healthcare services. In a study conducted in Burkina Faso, for patients living a distance of about 6 walking hours from their healthcare facility, an approximately doubled mortality risk was found for people of all ages when compared with people who live closer.

According to Poku-Boansi *et al.* (2010), the ability to access a health facility is dependent not only on the availability of means of transport, but also the transport cost. In their study on combating maternal health care in the Gushegu district, it was established that, the average cost of travel was about GH₵1.5. It was again revealed that, the main means of transport used to the health facilities in the district is by the use of a bicycle but walking is considerably done if the health facility is not far from home. This phenomenon poses a health accessibility challenge since people who are critically ill will not be able to walk to a health facility and may have to endure the discomfort associated with carriage on bicycle especially in the case of pregnant women.

2.6.2 Access to Education.

Transport (1999) asserts that, education creates skills which facilitate higher levels of productivity amongst those who possess them in comparison with those who do not.

Human development and general social progress has been a matter of concern to most generations and has been emphasized in the Millennium Development Goals. However, for the benefits of global development to be durable in the long run, there has to be the requisite human resource capital to sustain this progress. This is why educating young people, the future leaders, is crucial to development globally. The idea of achieving universal primary education is a step in the right direction. However, there are challenges to this noble goal in different parts of the world. The development of the human capital of every society is crucial since it permeates every aspect of human living. A well educated population is an asset to a nation since the level of education is positively linked to productivity.

Hunt (2008) has asserted that, Ghana was well known for its high levels of access to education relative to other West African States in the 1960s. By the mid 1970s growth in participation had stalled and a series of political events including military interference and global recession had derailed attempts to ensure that every Ghanaian child received a full cycle of primary schooling. Moreover long standing differences in access to education between the north and the south remained entrenched and may even have grown despite various initiatives to reduce the gaps in participation. The regime of the first president of Ghana in the 1960s made gains in establishing schools across the country thereby increasing accessibility and making conditions in these schools attractive such as the provision of free meals at school. These conditions might have accounted for the high achievements in terms of access to education in the 1960s.

In a research carried out by Colclough *et al.* (2000) in Guinea and Ethiopia in order to identify information about the constraints affecting the participation and performance of girls and boys in school, particularly in rural areas, it became evident that, an inability to pay the direct costs of schooling was one of the 'most important causes' of non-attendance in both countries, with those dropping out most frequently citing lack of money to pay for school expenses as an important reason for dropping out. The ability to buy exercise books, pens and the necessary clothing for school also influenced whether children could enroll or were withdrawn from the first grade (Rose and Al Samarrai, 2001). Other costs such as registration payments, gaining copies of birth certificates (for registration), textbooks and uniform costs and transport cost to school, were all indirect costs many parents in Guinea found difficult to meet. It can be inferred from this discussion that, the cost associated with education can be a stumbling block to access to education. In

developing countries in general where poverty is well pronounced, sending wards to school becomes an afterthought since parents may not have enough to feed their families. Access to education is impeded regardless of how minute the cost of transport, textbooks or pens may be especially in rural areas.

Research points to distance to school being an important factor in educational access, particularly for rural populations (Boyle et al, 2002). In the research sample in Ethiopia and Guinea, the greater the distance from home to school, the less likely it is that a child will attend' (Colclough *et al.,* 2000). Hidden costs which may include such things as requirements for expensive school uniforms or parent-teacher association levies is also a deterrent to access education. Very poor children would not be able to afford the transport costs to schools farther away (Tooley and Dixon, 2005).

A study in rural Northern India by Gautam and Arjun (2006) indicates that, a one standard deviation reduction in the monetary cost of primary schooling would increase the probability of the average boy's enrollment in school by about 3.3 percentage points. A kilometer reduction in the distance to the closest middle school would cause the probability of the average girl's enrollment in school to increase by 2.7 percentage points while having no significant effect upon a boy's propensity to enroll.

Lavy (1992) found that, costs associated with distance to secondary schools is a significant determinant of enrollments at the primary level. The costs of junior and senior secondary education in Ghana influence enrolment and drop-out rates in primary and need to be taken into account when exploring opportunities to improve access and attendance at primary school level. In the rural areas of Ghana, physical accessibility to educational infrastructure is a major challenge as well. The major cause of drop-outs in primary schools is the distance that children have to walk to reach their schools (I.T. Transport, 1999). As pointed out above, the absence of physical accessibility compels some rural pupils in Ghana to walk long distances to the access point of an educational infrastructure.

A study of Morocco, according to Khandker *et al.* (1994), showed that, the presence of a paved road in the community influences the schooling outcomes of rural children. Thus in the absence of a paved road, 21 percent of rural girls, as compared to 58 percent of rural boys, ever attend school. If a paved road exists, the school participation rate increases to 48 percent for girls and 76 percent for boys.

A study by CARE International (2003) describes distance to school and supply of schools for small settlements as key challenges facing educational access in deprived rural areas in northern Ghana. Access to schooling can also be problematic for fishing communities, with some schools 'inaccessible' and some only reached by canoe (Fentiman, Hall and Bundy, 2001).

Pillon (2003) suggests that in rural communities where schools are a distance away, children might be fostered into another community where there is a school. In rural areas the enrolment rate for children residing without their parents was higher than that of the household heads' own children (which suggests children are fostered in order to attend school).

Lack of transport services and infrastructure can thus contribute to the inability to strengthen human capabilities. Without transportation it would usually be difficult to access education and job opportunities.

In a nutshell, distance, transportation cost and other educational related cost together with the time taken to reach an educational infrastructure are significant determinants of access to education. Farther distances and the associated cost derail educational accessibility especially in the rural areas where income levels are presumed to be low.

2.6.3 Market Centre Accessibility

Market places are designated sites where buyers and sellers meet to exchange goods and services (Schrimper, 2001). Under the "central place theory" by Walter Christaller (1933) as cited by (Hudson, 1976), market centres are central places whose prime function is the provision of a wide variety of goods and services to the dispersed populations within their respective ranges (Hudson, 1976). The range is the maximum spatial distance over which people are prepared to travel to obtain a particular good or service from the central place.

According to Scott (1970), market centres have throughout history been the principal vehicle of commercial exchange and interregional trade. In most countries of the developing world, market centres also serve as focal points of health delivery, local administration, political campaigns, religious programmes, information exchange and innovation, diffusion, and entertainment. These are the political and socio-cultural functions of market centres which affect their spatial structure and organisation, enrich their functional status and distinctively define their importance (Dash, 2005). In most parts

of the developing world, periodic market centres constitute the lifeblood of social and economic activities in their respective catchment areas as they set the rhythm for the movement and convergence of people and goods (Good, 1975). They represent the hub around which the economic and social life of rural areas revolves and they have the potential of stimulating growth and development in their economic regions.

According to IFAD (2003), physical access to markets, distance to markets – and lack of roads to get to them (or roads that are impassable at certain times of the year) – is a central concern for rural communities throughout the developing world. It undermines the ability of producers to buy their inputs and sell their crops; it results in high transportation costs and high transaction costs, both to buyers and sellers; and it leads to uncompetitive, monopsonistic markets. Difficult market access restricts opportunities for income generation. Remoteness increases uncertainty and reduces choice: it results in more-limited marketing opportunities, reduced farm-gate prices and increased input costs.

There are 43 market centres along the Volta Lake. The markets are varied in terms of size and additional functions of centrality that they perform and for that matter, their degree of importance. Majority of the markets along the Volta Lake are of recent origin compared to markets in other parts of the country since they emerged or were established after the formation of the lake in 1964. The market centres facilitate trading activities in the Volta Lake Region whose economy is essentially based on agriculture (Ofori and Asiedu, 2013).

The necessity to exchange locally produced commodities at the market centres has led to the development of road networks which connect the markets to some of the hinterland communities. However with the exception of villages along the main road, the quality of the roads is generally poor. The functioning of the market centres regulates movement of vehicles to production points in the hinterland. Similarly, the movement of boats to communities along the lake is dictated by the organisation of trading activities and functioning of the market centres. Thus, the socio-economic lives of the local people are organised around the market centres as they set the rhythm for the movement of goods and people (Good, 1975). The market centres also attract people, mostly traders, from their complementary urban consuming centres particularly in the southern half of Ghana.

Some parameters for assessing market centres include size of resident population, quality of access road, distance from nearest urban centre and market facilities including bus stop,

water facility and electricity. The functional attributes are the periodicity of market, and social service including education, health, post and telegraph and banking (Dash, 2005).

Generally, the middle belt of Ghana is rural and it is among the least developed parts of the country with low levels of literacy, limited access to health and educational facilities, as well as, safe water sources. The Volta Lake region forms part of the rural savannah which contributes as much as 45.5 percent to national poverty (Ghana Statistical Service, 2000). Dickson and Benneh (1995) noted that, many places lack motorable roads. The Volta Lake therefore provides an important means of transport in the region and the middle belt is noted for the production of a variety of basic food staples including yam, cassava, millet, guinea corn and bean. The lake itself produces as much as 98 percent of the country's freshwater fish (Braimah, 1999). These items attract traders from urban consuming centres in the southern half of the country to the major market centres along the lake.

The numbers of water and overland transport vehicles visiting the market centres on market days are surrogates of levels of market visitation. The water transport vehicles comprise canoes, small boats with low capacity outboard engines and bigger boats fitted with 2–3 usually 40-horse power outboard motors. All the boats are made of wood and the bigger ones carry passengers, ranging between 50-80, as well as all kinds of cargo. The Inland Waterways Division of the Ghana Maritime Authority (GMA) estimates the number of such non-conventional large wooden vessels operating on the lake to be 490 (GMA, 2007). However, this number seems to be woefully underestimated since a cursory observation of the number of wooden boats on market days at just Kajaji market alone is about a quarter of the estimation given by GMA with several other market centres along the lake with several more boats.

According to the Government of Uganda, (2000) the basic factors needed to improve the livelihoods of the poor included: access to markets – proximity, improved transport (including water transport), and passable roads. Produce markets are highly valued but lack of access does not allow the poor an opportunity to obtain reasonable profits from the sale of their produce. Constraints reportedly include: distance to markets and lack of affordable transport; exploitation by middlemen; and lack of market information, especially concerning prices.

It is again opined by IFAD (2003), that the problem of market access may usefully be considered in three dimensions: the physical (the distance of the poor from markets); the political (their inability to influence the terms upon which they participate in the market); and the structural (the lack of market intermediaries). Farmers' inability to market produce means lack of income for production inputs, consumer goods and immediate cash requirements, and prevents asset accumulation. Market access thus influences farmers' production systems: those who live close to better roads and have more frequent and direct contact with the market are willing to produce more systematically for the market, while those with poor market access are forced to produce for domestic consumption.

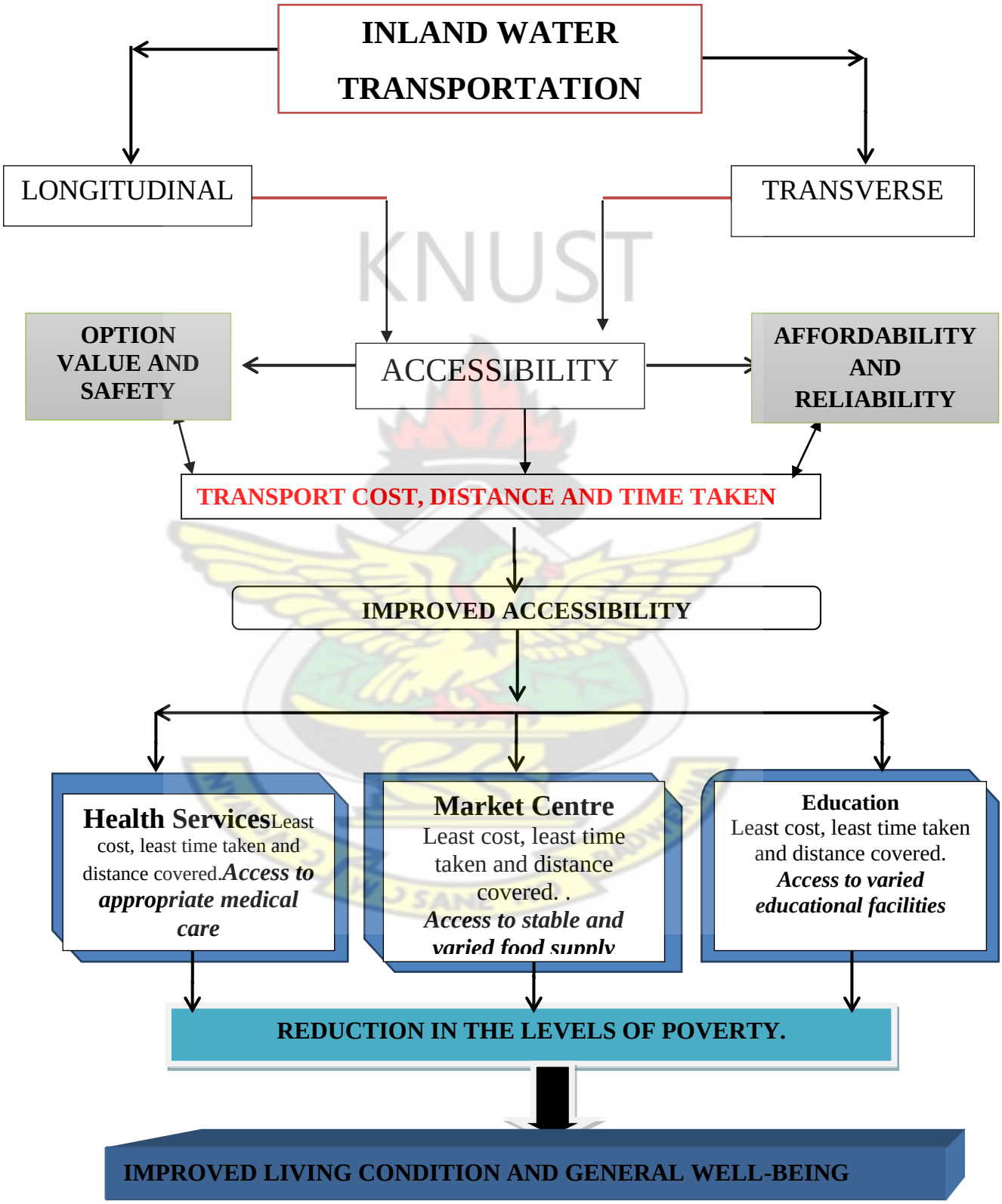
From the foregoing, the communities living across and along the lake whose inhabitants travel on the lake to access market centres are likely to face transportation challenges. An improved inland waterway transportation will lead to reduction in the perennial loss of lives on the lake through boat accidents, increase food production, reduce poverty, improve the standard of people living along the lake basin and opening up all five regions bordering the lake for vibrate economic activities.

2.7 Conceptual Framework

Figure 2.2 is the conceptual framework of inland water transportation as one of the modes of transportation. It is a means of accessing the various social and economic activities. Boats and ferries render transport services on the lake by carrying passengers and goods from one stretch of the lake to the other. Transportation on the lake, either in a transverse or longitudinal manner, has the likelihood of affecting the conditions of people living along and across the lake. The waterway is readily available and indestructible making inland water transportation a mode that does not require maintenance.

The cost of travel, the time taken to travel and the distance covered to reach a social amenity measures the accessibility of the means of transport. Just like all other transport services, option value, safety, reliability and affordability are the benchmarks for assessing how efficient a transport mode is in advancing the course of the populace who live around. Accessibility is enhanced when the cost incurred on a transport system is considerably low, least time is required to travel and a reasonable distance is to be covered. People would then be able to use the transport system to access market centres, educational facilities and healthcare services.

Figure 2.2.Conceptual Framework for the Provision of Longitudinal and Transverse Inland Water Transportation.



Source: Author's Own Construct, 2014.

The trickle down effect of an improved access to transportation is a reduction in the levels of poverty as majority of people are able to reach markets for variety of food stuffs, meet their health needs and also develop their human capital. This undoubtedly would lead to an improvement in the general well-being of people and a fulfilling society in general.

2.8 Summary

Inland water transportation (IWT) is one of the modes of transportation which is very important in facilitating every sphere of life. The means to satisfy an end is always important since it determines the time to spend, the distance to be covered, the cost to be incurred as well as its associated reliability.

The Great Lakes in North America largely impact the daily lives of those living within their catchment area. It serves as the source of the drinking water apart from the basic function of facilitating travel from one place to another. The Great Lakes also influence the siting of industries. Significant industrial growth began around 1850 and relied upon resource extraction through mining, harvesting timber and low-cost shipping on the lakes. These industrial activities translated into huge sums of earnings and shipments are worth billions of dollars. In addition, the services rendered to businesses operating along these lakes are worth billions of (USD) and thousands of people are employed by this service sector.

The advantages of inland water transportation are enormous. The exclusive indestructible nature of IWT during conflicts affords a country an escape by way of evacuation during wars and conflicts. Also, inland water transportation is highly versatile, low cost and energy efficient in terms of operation. It also has low infrastructure cost compared with the other modes of transport.

Access to market centres is always necessary since this is where most basic commodities are available. Markets perform the traditional functions of bringing buyers and services to interact with each other through trading. Thus, accessibility to market centres aid access to agricultural produce as well as providing access to other social and political services. In the developing world, periodic market centres are the platforms for social interactions between and among people. Market centres also serve their basic function as the economic grounds for the exchange of goods and services for nourishing the populace.

Health centre accessibility enables the sick to have access to health care on time. A good transport system has the capability to avert deaths in times of emergency. A good transport system has the potency to avert deaths during emergencies because patients would be able to reach the nearest health facility at a reasonable time for treatment. Healthcare accessibility is also dependent on the means of transport available and the transport cost incurred but higher transport costs adversely affect access to healthcare. Consequently, improvement in rural transport infrastructure is essential in increasing access to healthcare. IWT has, among other advantages, cost effectiveness and hence suitable in terms of health centre accessibility when it is properly managed.

The manpower development of any society is paramount to attaining an enlightened citizenry to aid productivity in an economy. Education is therefore very important as it serves as the backbone for any society charting the course of development. In the rural areas of Ghana, physical accessibility to educational infrastructure has been identified as a major challenge militating against the goal of achieving universal basic education for all. The distance that children have to walk to reach their schools is a major disincentive to basic education and in most cases the cause of drop-outs in basic schools. The distance to the nearest educational institution, the mode of transport available, the cost associated with such a mode and the issue of reliability greatly affect peoples' access to education.

Finally, the role of transportation as a means to an end cannot be overemphasized. The mode of transport is vital to assessing a transport system's affordability, reliability and safety. The availability of a transport system, transport cost, time taken and distance covered are also important in determining the efficiency and effectiveness of every mode of transport. People get closer and patronise social and economic infrastructure (market centres, educational facilities and healthcare services) when access is improved by way of readily available means of transport at lower cost; least time spent and distance covered to access points. This would culminate into reduction in poverty levels and ultimately lead to improvement in general well-being.

CHAPTER THREE
PROFILE OF STUDY AREA AND RESEARCH METHODOLOGY

3.1 Introduction

This chapter is devoted to a brief overview of the profile of the study area as well as the research methodology of the study. The brief profile gives an overview of the location of the study area, the various modes of transportation and the conditions of these modes of transport. Health, education and market centre accessibility were discussed to portray the state of transport services and how it affects access to social and economic goods. The research methodology describes and justifies the methods and processes that were used to collect data in order to answer the research questions. This section includes the research design employed, the sampling method applied in this research, the sources of data, unit of analyses, methods of data collection and the methods of data analyses and presentation.

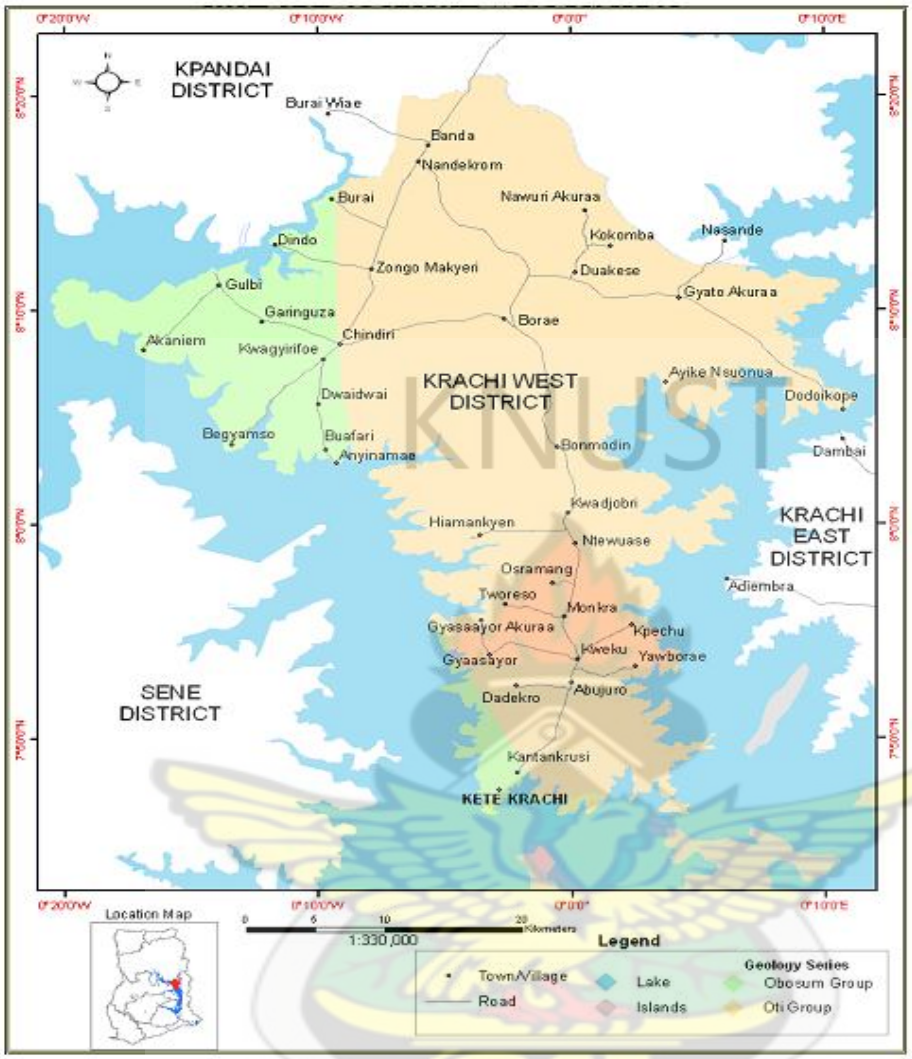
3.2 Profile of Study Area.

3.2.1Location and Size and Population

The Krachi West District is located at the north western corner of the Volta Region and lies between longitude 00° 25′ W and 00° 20′ E and latitude 7° 40′N and 8° 25′N. It shares boundaries with Krachi East District to the south, Kpandai and East Gonja Districts (Northern Region) to the east, Sene District of the Brong Ahafo Region to the north and the Volta Lake to the west (see figure 3.1). The district covers a total land area of 4,169 square kilometres out of which about 37 percent is covered by water (KWDA, 2012).

According to GSS (2012), the population of Krachi West District is 122,105 with males totaling 62,019(50.8 percent) and females totaling 60,086(49.2 percent). With a population growth rate of 2.5 percent, the district's population is projected to currently stand at 134,315. The district's growth rate of 2.5 percent is higher than the regional growth rate of 2.2 percent but lower than the national growth rate of 2.7 percent.

Figure 3.1 Road Map of Krachi West District.



Source: World Vision International, Krachi Area Development Project, 2012.

3.2.2. The District Economy, Roads, Education and Health.

The economy of the Krachi West District is dominated by the agricultural sector with the commerce and industrial sectors being the least developed. Agriculture alone accounts for about 70 percent of the labour force while commerce/service and industry account for 21 percent and nine (9) percent respectively.

Road network in the district is deplorable and its poor condition usually deteriorates during the rainy season. The Kete-Krachi – Dambai and Kete-Krachi –Banda trunk roads became virtually unmotorable after the rains. The story of feeder roads in the district is not different. The district is more or less a peninsula and so water transport becomes an

inevitable form of transport in the district. The principal crossing points are Kete- Krachi – Defour (Sene District) and Dodoikope – Dambai (see Figure 3.1). Large volumes of fish, foodstuff, passengers, and animals, among others, are transported to other parts of the country by commercial boats and ferry (KWDA, 2012).

On education, the District has 19 Kindergarten Schools, 109 Primary Schools, 32 Junior High Schools, one Technical and Vocational Institute, one Midwifery Training School and two Senior High Schools. According to the KWDA (2012), supervision of these 150 basic schools is extremely difficult and sometimes impossible. This is because, the District Education Office has inadequate number of transportation facilities for all duties and the only outboard motor for circuit supervisors is grounded. The difficulty in supervising these basic schools can also be attributed to poor road network in the district and the island communities can only be accessed by outboard motor. The Assembly asserted that, for effective teaching and learning, the district requires additional school blocks for 77 Kindergartens, 74 Primary Schools and 10 Junior High School.

With respect to health, the district has one Government Hospital, five (5) health centres, two (2) mission clinics, 18 maternal and child health/family planning (MCH/FP) clinics and two (2) private clinics which are defunct. Traditional healers and traditional birth attendants (TBAs) play an immense role in the health delivery system in the district. Therefore, there is a blend of the modern and traditional medical systems in health delivery in the Krachi West District.

3.3 Research Methodology

According to Kothari (2003), research is defined as the pursuit of truth with the help of a study, observation, comparison and experiment; that is, a systematic method of finding solutions to a research problem identified. Therefore, the process of research is a systematic method which involves the identification of the research problem through to analyses of data and conclusion on key findings. Research methodology is inclusive of the research methods and it takes into account the overall approach to the research process spanning from definition to selection of the appropriate research method and analysis of data and drawing conclusions from the analysis.

3.4 Research Design

The study adopted a cross-sectional design with two panels; Krachi and the communities along the lake would form one panel (urban Krachi) and the communities across the lake

would form the second panel (rural Krachi). This design helped the researcher to take a snap shot of transport services rendered across and along the lake at a point in time. This again helped the researcher to examine transportation in the study area and how it facilitates accessibility.

3.5 Variables of the Study

Black and Champion (1976) define a variable as, 'rational units of analysis that can assume any one of a number of designated sets of values'. The main variables that were measured are transport services and how they facilitate accessibility to market centres, health centres and educational facilities in the area. Accessibility is defined as the ability to reach, use or visit; access provides people with the opportunity to satisfy their subsistence, social and economic needs and facilitates employment opportunities.

Accessibility to the socio-economic activities was measured in terms of distance, time taken, availability of transport facilities and travel cost on the lake. Some other indicators measured are the volume of passenger and freight traffic that is moved on the lake in the study area. These variables helped to address the research questions posed in this study.

3.6 Criteria for Selecting the Study Areas

Prior to creation of the Akosombo dam in 1964, a major road passed through towns like Chantae from the Northern Region to Accra, the national capital. Oral history has it that, residents of Chantae, Bunda and Kete township do make a return journey to Accra. The journey begins at 5:00a.m and by 2:00p.m travelers are back to Krachi. However, with the advent of the lake, transportation to and from the Krachi area has been disrupted. This area is therefore selected to research into how the transport needs of residents within the Krachi catchment area are being served in their quest to access market centres, health centres and educational facilities.

The communities selected are either along the lake or across the lake towards the Krachi township. With Krachi as the major hub of social and economic activities in the area, how do the residents in nearby communities transport themselves to access facilities in the town? How long and how much does it cost them to travel to these locations? Are transport services readily available to serve these people? How do they move their produce to market centres in the area and how do the transport services in the area aid their quest to

access health care. These questions of concern have informed the selection of the research area in order to answer them.

3.7 The Concept of Population, Sample Frame and Unit of Analysis

3.7.1 Population

Shao (1999) defines population as the complete set of subjects that can be studied: people, objects, animals, plants, organizations from which a sample may be obtained. A population can thus be taken as all people or items with the characteristic one wishes to understand. In this regard, the population for this research covers all the selected communities that are along and across the Volta Lake in the study area.

3.7.2 Sample Frame/Unit of Analysis

A sample frame refers to a list that includes every member of the population from which a sample is to be selected. In most cases the population and sample frame are not identical because it is often impossible to draw a sample directly from population. As such this frame is often constructed by a researcher for the purpose of his study (Kothari 2004). The sample frame for this research comprised all the households in the selected communities for the purposes of this research.

Kumekpor (2002) asserts that, the units of analysis in any investigation is used to refer to the actual empirical units, objects and occurrences which must be observed or measured in order to study a particular phenomenon. The units of enquiry were household heads of the various households that were sampled. It was expected that, these household heads have knowledge about the issues that pertain to the family ranging from household welfare through to household travel patterns.

3.8 Sampling

It is usually difficult to make direct observations of every individual in the population as a way of studying that population. Instead, researchers collect data from a subset of the individuals (a sample) and use those observations to make inferences about the entire population (Zickmund, 1991).

For this reason, the research made use of both probability and non probability sampling techniques. The probability sampling techniques allows for every unit within the population to have an equal chance of selection into the sample whereas the non probability does not give equal chance of selection.

Simple random sampling was used to select household heads. The random numbers generator was used to determine houses to be included in the sample. The first and the last house number in each community were entered into the random number generator to produce the houses to be sampled. The household heads that were subsequently sampled were from the houses whose numbers were arrived at by the use of the random numbers generator. This method of applying the simple random sampling strategy gives equal opportunity for each household to be represented in the sample. In houses where there are more than one household head, one of any of the household available was taken since the house selection was done at random.

The non-probability sampling technique was used to select institutional heads of the various institutions that have the requisite knowledge on the issues investigated in their area of work. In this respect, the Krachi West District Education Service, the Krachi West District Assembly, the Department of Feeder Roads in the district, the Volta Lake Transport Company, and the Health Directorate of the District Health Service were purposively sampled. The boat and canoe owners association, and the committee in charge of the market were also among those purposively sampled. The research elicited vital information concerning issues of transportation as they affect access to education, market centres and health delivery services.

3.8.1 Sample Size Determination

The sample size calculator was used to determine the sample size at 95 percent Confidence Level and seven percent margin of error with a population of 1,829 households. From the calculation, a total of 177 households were determined as the minimum sample size.

Table 3.1. Sample Size Distribution by Communities.

Community	Population	Total Households	Sample
Cement	400	39	10
Jericho	117	31	8
Jerusalem	232	26	7
Old Dobiso	386	33	8
Old Chantae	463	41	10
Laala	253	28	7
Defour	238	40	10
Kete	82,105	1,591	154
Total	**84,094**	**1,829**	**214**

Source: Author's construct with data from the 2010 Population and Housing Census.

3.8.2 Distribution of Sample Size Among Study Communities

After the sample size was determined using the households as the sample frame, the communities were clustered into urban Krachi (Kete community) and rural Krachi (Cement, Old Chantae, Old Dobiso, Jericho, Jerusalem, Laala and Defour). The total number of households in each cluster was divided by the total number of households in both clusters multiplied by the sample size. The rural Krachi communities had a share of 23 households to be sampled which is the least number of households that can be sampled. The researcher however, sampled 25 percent of the total number of households in each rural island community to scale up the representation in these communities. This brought the sample size of this research to 214 households from the minimum sample size of 177.

3.9 Data Collection Techniques and Instruments

Both qualitative and quantitative data were collected for the purposes of this research. The data collection technique employed was questionnaire administration and observation. Questionnaires and interview guides were the tools used for data collection. There were both structured and semi structured questions to which answers were sought from the respondents. The data used in the research were gathered from primary sources as well as secondary sources.

3.9.1 Primary Data Collection

The primary data were gathered from the sample to which the questionnaires were administered. A series of questions were asked by the researcher for the respondents to answer. The aim was to elicit information about their demographic characteristics, their travel patterns and travel needs, time taken to travel from one location to another on the lake and by land as well as the challenges that confront them in their efforts to access health care services, educational facilities and market centres. All of these data were gathered through the administration of a questionnaire (For example of the questionnaire, see Appendix 3.1). Data were also gathered from the boat and canoe owners association to ascertain their mode of operation and how the operations of members are regulated in order to curtail avoidable accidents on the lake (See Appendix 3.2). The market committee of the Kajaji market was another primary data gathering point to collect data on the major commodities to the centre as well as their major sources of origin (See Appendix 3.3 for a sample of the questionnaire).

3.9.2 Secondary Data Collection

The secondary data were gathered from the Ghana Statistical Service, the Ghana Health Service, Ghana Education Service of the Krachi West District, the Volta Lake Transport Company and the Department of Feeder Roads. The population and the household size of the communities under study were gathered from the Ghana Statistical Service whereas information such as the doctor-patient ratio in the district and the nurse-patient ratio was gathered from the Ghana Health Service in the district to help measure access to health services in the selected communities and the district at large (see Appendix 3.4). the number of basic schools in the study as well as the general educational infrastructure in the district were gathered from the Ghana Education Service of the Krachi West District (see Appendix 3.5) The transport fares and charges for passenger and freight respectively were gathered from the Volta Lake Transport Company (see Appendix 3.6), the Department of Feeder Roads provided information on the nature and condition of roads to the various landing sites in the district (see Appendix 3.7). The Krachi West District Assembly also gave information on the role in providing oversight responsibility on the operations of transport service providers in the district as well as the provision of socio economic infrastructure (see Appendix 3.8).

Table 3.2: Summary of Data Sources and Collection Tools

Objectives	Data Required	Data Sources	Data Collection Tools
To determine the various freight and passenger transport services rendered on the lake in Krachi and its immediate communities.	Passenger and freight transport services operating on the lake.	The Volta Lake Transport Company (VLTC) and Boat Owners Association.	Interview guide Personal observation
To determine the volume of passenger and freight that is moved on the Volta Lake in Krachi and its environs.	Volume of passenger and freight traffic that is moved on the Volta Lake in Krachi and its environs.	The Volta Lake Transport Company (VLTC) Boat owners association	Interview guide Take inventory
To determine the influence of transport services along and across the Volta Lake on access to markets, health delivery services and education in the area.	Distance covered to: • Market • Basic school • Health centre Time taken to: • Market • Basic school • Health centre Transport cost incurred to: • Health centre	Household heads	Household Questionnaire

Source: Author's Construct, 2014

3.10 Data Analysis and Presentation

Data analysis involves arranging, organising, examining, recombing the evidence to address the propositions and objectives of the study. Data analysis can also be regarded as a practice whereby raw data are ordered and organized in order to extract useful information geared towards achieving the objectives of the study. The data gathered was analysed qualitatively using the Statistical Package for Social Sciences (SPSS V.16.0). Tables, charts, and percentages were used to present data. Cross tabulation (relating one variable to another) was also done to determine relationships between variables.

The discussions of the results from the analysed data are presented in the next chapter (Chapter Four). Chapter Four contains the outcome of the study in line with the study objectives of this research. In Chapter Four also, the relationships between the means of transport, distance covered and time taken to access the various social amenities were established.

CHAPTER FOUR
ANALYSES OF TRANSPORT SERVICES ON THE VOLTA LAKE IN THE KRACHI CATCHMENT AREA.

4.1Introduction

Following the understanding of different viewpoints on transportation, taking into consideration the major modes of transport, especially inland water transportation, and the design of methodology to undertake the research, data were collected from the field and analysed. This chapter presents and discusses the analyses and research findings of the study.

The analysis of the field data was done both qualitatively and quantitatively. The qualitative analysis established the freight and passenger transport services rendered on the Volta Lake and their related challenges. The quantitative analysis was done to estimate the volume of freight that is moved annually and how transport services along and across the Volta Lake influence economic activities, marketing activities, health delivery services and education within the study area.

4.2 An Overview of the Means of Transport Services in Krachi

As noted by Washington *et al.* (2003), transportation is an essential element of everyday life in both the developing and developed societies of the world. It is responsible for personal mobility, access to services, jobs and leisure activities. Thus, it is an integral part in the delivery of consumer goods and services.

The Volta Lake Transport Company (VLTC) provides safe, efficient and reliable ferry-crossing services at Yeji (Brong- Ahafo), Kete-Krachi and Dambai, both in the Volta Region and Adawso in the Eastern region. The ferries serve as bridges where the Lake has cut across the road network. Without these services, communities around the ferry stations will be cut off from the rest of the country. Both passengers and cargo are transported at the stations (MoT, 2014).

Agbagba (2008) noted that, the Volta Lake basin spreads across 16 districts located in five (5) different regions including the Krachi West district. Communication networks in most communities along the lake are poor and social infrastructure, such as health, education and market facilities, are inadequate. Consequently most of the inhabitants in these communities have no alternative than to use the only means of transport (small canoes and

boats) in accessing the needed facilities inland. It is estimated that, 1200 and 60 canoes and boats respectively operate on the Volta Lake in the district of the study (KWDA, 2014). These figures seem to be underestimated especially the number of canoes taking into account, the numerous island communities of which fishing is the only source of their livelihood.

Krachi is also accessible by road. The total stretch of road network in the district is 120 kilometres, out of this stretch, 20 kilometres are tarred and it covers the roads within the district capital and some few kilometres outside the township while 10 kilometres of the stretch is under construction. According to the data gathered, 30 kilometres of the entire stretch is in good condition, 20 kilometres in fair condition and the remaining 70 kilometres of the road is in poor or deplorable state (DFR, 2014). The types of vehicles that ply the roads in the area are mostly benz buses with few mini buses. There are few taxies as well whose operations are only within the Krachi township. There is also a metro mass transit transport service available to people who travel to Accra on daily basis. The nature of the roads in an area, to a greater extent, determines the vehicle types that ply the roads.

Table 4.1 shows the major means of transport owned by respondents in urban and rural Krachi. The common means of transport are the bicycles and the motorbikes, followed by canoe propelled by paddles and outboard motors, cars and speed boats. In general, 48.7 and 16.9 percent of the households own bicycles and motorbikes respectively with only 0.6 percent owning both motorbikes and cars in urban Krachi (refer to Table 4.1). The ownership of motorbikes and bicycles dominate in urban Krachi because, there are roads and footpaths that link one community to another hence the use of these modes are possible. However, canoes either propelled by paddles or outboard motors constitute the major means of transport (73.3 percent) owned by the rural folks. As noted by Dickson and Benneh (1995), the rural parts of the Volta Lake lack motorable roads. As such, most of these households depend on the Volta Lake as their mode of transport in accessing the much needed basic services and the means of travelling on the lake is by the use of canoes and boats.

The pattern of the means of transport ownership reveals that, the mode of transport available in an area determines the means of transport that is most likely to be owned. Whereas majority of residents of urban Krachi own bicycles and motorbikes because of

the availability of motorable roads within the town, their rural counterparts own canoes propelled by paddles and outboard motors since the water way is the readily mode of transport available.

Table 4.1. Ownership of the Means of Transport Used by the Household Heads

Means of transport	Urban		Rural	
	Frequency	%	Frequency	%
No Means of Transport	27	17.5	3	5.0
Canoe Propelled By Paddles	3	1.9	27	45.0
Canoe Propelled by Outboard Motor	3	1.9	17	28.3
Speed Boats	2	1.3	1	1.7
Bicycles	75	48.7	7	11.7
Motor Bike	26	16.9	1	1.7
Vehicle	7	4.5	0	0
Minibus	4	2.6	0	0
Motor Bike and Bicycles	4	2.6	0	0
Canoe and Bicycle	2	1.3	4	6.7
Motorbike and Car	1	0.6	0	0
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

4.3 Trip Length and Volume of Traffic Across and Along the Lake in the Krachi Catchment Area.

The trip length from Krachi to Defour on the lake is 56 kilometres (VLTC, 2014), whereas that of Laala to Defour is estimated at 30 kilometres and to Krachi is 25 kilometres-this constitutes the travel across the lake (Transverse). The journey from Old Chantae, Jericho, Jerusalem, Old Dobiso and Cement to either Krachi or Defour constitutes the travel along the lake (Longitudinal). The trip length from Old Chantae and Jericho to Defour is both estimated at 180 kilometres and to Krachi is estimated at 130 kilometres. On the other hand, the trip lengths from Old Dobiso and Jerusalem to Defour are estimated at 185 and 183 respectively. Also, the trip length from Old Dobiso and Jerusalem to Krachi is estimated at 135 and 133 kilometres respectively. The journeys from Cement to Krachi and Cement to Defour are estimated to have trip lengths of 110 and 160 kilometres respectively.

In order estimate the volume of traffic along and across the lake in the study area, a total count of traffic on the lake was done on two separate market days and non market days. The count took place on the 18th and 25th June, 2014 between 7:00 a.m and 5:30 p.m, both days were market days at Kajaji and the non-market days count took place on the 27thand

28th June, 2014 between the same hours. The services rendered on the lake can be categorised into formal and informal services.

a) Formal Services

In order to determine the volume of traffic on the lake in the study area on market days at Kajaji, an average was determined from a count of the total number of boats and canoes that used the lake to transport goods and passengers on two different market days. The average number of these canoes and boats on a market day that operates on the lake is 16 and 31 respectively. Of the 16 canoes, seven (7) were fitted with outboard motors while the remaining was propelled by paddles. These boats and canoes arrived at the shore of the lake at different times depending on the island community they were coming from and as a result, there were no collisions of these boats and canoes on the lake. The time of departure for all these boats and canoes also depends on the distance to be covered. Whereas boats and canoes from farther distances started leaving by 2:00 p.m to their various communities, those from nearby places left to their communities by 4:00 p.m on the market days. These different times of arrival and departure have greatly reduced the possibility of any collision on the lake. There are no night services on the lake hence anybody or vehicle that reaches the riverbank after 4:00 p.m must wait overnight to access crossing services the following morning.

In terms of the frequency of travel, the ferry crosses twice in a day; once in the morning and another in the afternoon. This brings the total number of trips in a week to 14, in effect, 756 trips are made on the lake in a year by the ferry.

According to the VLTC (2014), the ferry that crosses from Krachi to Defour has a passenger capacity of 400 persons and a cargo capacity of 160 metric tonnes per trip. The VLTC also owns a silver boat which has a passenger capacity of 45 people. It is used to carry passengers across the lake just as the ferry does. The silver boat is only operational on the lake if the numbers of passengers are few and there is no cargo to be transported or the ferry is faulty.

On a non-market day in the study area, it is only the ferry that renders crossing services for both goods and passengers. It leaves Krachi by 8:00 a.m and reaches Defour (across the lake) by 8:50 a.m. It then returns by 10:00 a.m to Krachi. The second trip from Krachi again starts at 2:00 p.m and by 4:30 p.m, the ferry is back to Krachi and that ends the ferry

services for the day. Also, during a non-market day, the ferry carries an average of 150 passengers per trip across the lake. This implies 300 passengers are ferried across the lake in a day and this brings to a total of 1800 passengers per the six (6) non market days within the week and 97,200 passengers in a year. At the time of this study, the ferry charged a fare of GH₵5.00 per passenger. This implied the VLTC makes estimated total revenue of GH₵486,000 on the six (6) non-market days a year excluding cargo charges.

However, the volume of traffic on the lake was quite different on a market day at Kajaji which is five (5) kilometres away from the shore of the lake at Defour. The market usually has traders from far and near places converging at the Kajaji market in the evening of Wednesday for actual buying and selling to commence on the dawn of Thursday. The ferry renders the usual two trips per day on Wednesday but leaves very early on Thursday; it takes off by 7:00 a.m from Krachi and lands at Defour in 45 minutes (7:45 a.m). This is to help traders to the Kajaji market to be able to meet their market timelines. The ferry carries about 200 passengers per trip on market days across the lake. For both trips of the day, about 400 passengers are ferried across the lake making a total of 20,800 passengers per the 52 weeks in a year. Therefore, GH₵104,000 can be realised as total revenue on market days. This brings to a total of GH₵590,000 in a year (market days plus non market days) for the 118,000 passengers it ferries across the Volta Lake.

On the part of the island dwellers, the boats are the only means of transport to them on the lake and those who may not be able to afford the transport cost depend on their canoes to transport themselves and their goods to the market centre. The boat services are available only on market days from the island communities, but there are instances where these boats are hired to travel to social functions such as funerals.This also seems to support the assertion by Good (1975) which states that, the trip cycle of boats to communities along the lake is dictated by the organisation of trading activities and functioning of the market centres. Thus, the socio-economic lives of the local people are organised around the market centres as they set the rhythm for the movement of goods and people.

4.4 The Volume of Freight Transported Across and Along the Lake in the Study Area.

Since the Volta Lake created, it has been a major mode for the transportation of freight and passengers along and across it. The Volta Lake Transport Company (VLTC) was incorporated in 1970 to provide north-south water-borne transport for persons and freight

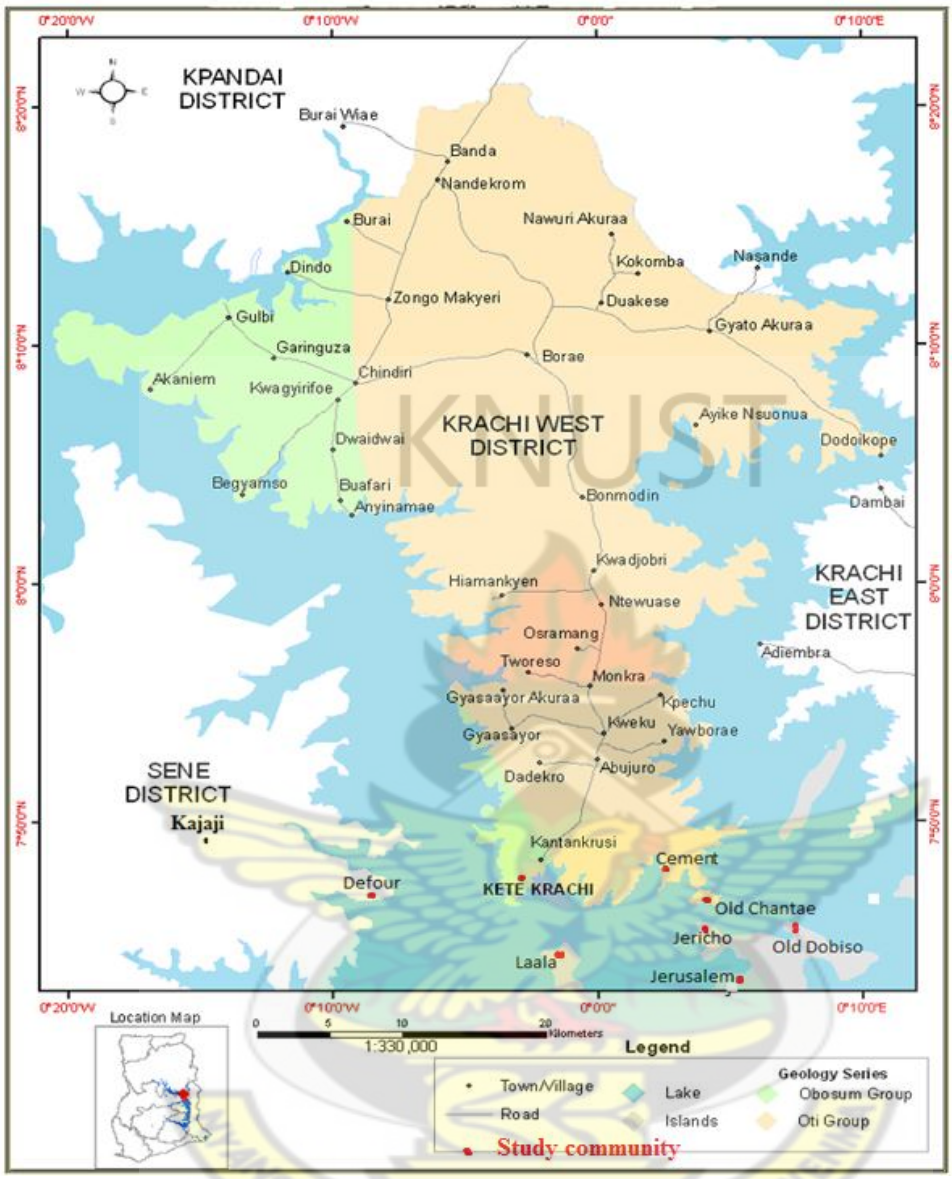
on the Volta Lake. The Company operates a fleet of passenger vessels, cargo ships and barges. Pusher tugs with cargo barges constitute pusher trains which can transport 2,300 metric tonnes of cargo per voyage (MoT, 2014).

According to the field data gathered from the VLTC, the ferry that crosses from Krachi to Defour has a passenger capacity of 400 persons and a cargo capacity of 160 metric tonnes per trip. The ferry on the average ferries between 150 and 200 passengers per trip across the lake from Krachi to Defour. During these same trips, the ferry also carries on the average 70 metric tonnes, 40 metric tonnes, and 20 metric tonnes of yams, cereals/grains, and fish respectively in a week. There are other products such as wood products and general merchandise which constitute 100 metric tonnes and 70 metric tonnes respectively which are also carried across the lake per week. This implies a total of 300 metric tonnes of cargo are transported across the lake per week by the ferry which amounts to 16,200 metric tonnes of cargo in a year. The ferry also renders crossing services for vehicles from Krachi to Defour and vice versa. This constitutes the formal sector and all the services rendered in this perspective are across the lake.

b) Informal Services

In addition to the ferry services on the lake, private boat operators are also into the business of carrying freight and passengers from small island communities where ferry services are not available to major markets along the lake such as Dambai market centre, the Krachi market centre and Abotoasi market centre.

Figure 4.1: Road Map of Krachi West District Showing the Study Communities



Source: Adapted and Modified from World Vision International, Krachi Area Development Project, 2012.

In comparison of the two means of transport on the lake, the ferry (Fig. 4.2a) and the boats and canoes (Fig. 4.2b) also represent the formal and informal sectors respectively.

Figure 4.2 Means of Transport Available on the Lake.

Fig. 4.2a Ferry

Fig 4.2b Boats and canoes

Source: Field Survey, May 2014.

Figure 4.3. Loads of smoked fish in transit to the Kajaji market after they were transported on the lake.

Source: Field Survey, May 2014.

This study measured the volume of fish that is transported across and along the lake to a specific location (Kajaji market). Only fish was chosen because it is the major product transported on the lake since a greater percentage of household heads are engaged in fishing as their prime occupation. To measure the volume of fish transported to the Kajaji market centre, a physical count of the total number of baskets of fish transported to the shore of the lake was done on two separate market days. An average of 5,731 baskets of fish were counted on the two separate market days. These baskets of fish are transported from Old Chantae, Jericho, Jerusalem, Old Dobiso, Cement and Laala in boats. Though the weights of the baskets of fish vary according to their sizes, an average basket of smoked fish as shown in Figure 4.3 measured 21 kilogrammes. Therefore, the total quantity of fish brought to Kajaji on market days is estimated at 120,351 kilogrammes (120.351 tonnes) per week. Since there are 52 weeks in a year, this translates to 6,258.252 tonnes a year. The fish is usually bought by market women from Kumasi, Ejura and other parts of the Ashanti and Brong Ahafo regions.

The value of an average basket of fish is GH₵450.00 on the market which implies that, about GH₵2,578,950.00 accrue as revenue in a year to people engaged in the fishing business in the study area. This contributes significantly to the Gross Domestic Product of the local economy.

4.5 Accessibility to Social Services in terms of Cost, Time Taken and Distance Covered.

Markovich and Lucas (2011) view accessibility as the extent to which land-use and transport systems enable individuals or group of people to reach their destinations by the means of, or a combination of, transport mode(s). Accessibility depends on whether transport exists between the people and the activities in which they participate.

In addition to the above, DETR/TRaC (2000) provided four ways in which transport can socially exclude people from their activities they wish to undertake. Thus, spatially – they cannot get there at all, temporally – they cannot get there at the appropriate time, financially – they cannot afford to get there and personally – they lack the mental or physical capabilities to use the available means of mobility. Agbagba (2008) noted that, communication networks in and around the Volta Lake are poor and social infrastructure, such as health, education and market facilities in the communities are inadequate.

4.5.1 Accessibility in Terms of Distance (kilometres) Covered by Wards of Household Heads to Access Primary Education.

In rural areas of Ghana, physical accessibility to educational infrastructure is a major challenge and the major cause of drop-outs in primary schools (Transport, 1999). Again, research points out that distance to school is an important factor in educational access, particularly for rural populations (Boyle *et al.*, 2002). In a research carried out in Ethiopia and Guinea, it was found out that, the longer the distance from home to school, the less likely it is that a child will attend school (Colclough *et al.*, 2000).

As shown in Table 4.2, in rural Krachi, the longest distance that an individual must travel to access primary school is 3.1-3.5 kilometres, while between 0.1-0.5 kilometres is the shortest distance one needs to cover to access primary school. Overall, 55 percent of wards of the households in the rural areas cover between 1.0 to 2.0 kilometres to access primary school. The distance covered to access primary school in rural Krachi reflects the fact that, there are primary schools in four (4) out of the six (6) rural communities from which data were collected. With the exception of Jericho and Jerusalem, all the communities sampled have primary schools; hence, shorter distances are covered to primary schools. The percentage of pupils to primary school decreases as the distance to the nearest primary school increases. This seems to support the research results in Ethiopia and Guinea by (Colclough *et al.*, 2000).

On the other hand, 57.8 percent of wards of respondents travel between 0.1 to 1.5 kilometres to access primary school with only 1.9 percent travelling beyond 3.1 kilometres in urban Krachi. This reflects the concentration of primary schools within Krachi urban. There are 11 primary schools within Krachi town making primary schools accessible within shorter distances. The policy implication is that, the basic school infrastructure in rural Krachi must increased and hence bringing education closer to the door steps of the rural folks to reduce the distance pupils cover to access primary education. The non-applicable figures in Table 4.2 represent household heads to which the question on distance covered to access primary school was not applicable because they did not have wards in primary school.

Table 4.2: Distance Covered by Wards of Household Heads to Access Primary School

Distance(Kilometres)	Urban		Rural	
	Frequency	%	Frequency	%
0.1-0.5	41	26.6	9	15.0
0.6-1.0	38	24.7	10	16.7
1.1-1.5	10	6.5	8	13.3
1.6-2.0	6	3.9	6	10.0
2.1-2.5	8	5.2	4	6.7
2.6-3.0	4	2.6	6	10.0
3.1-3.5	2	1.3	5	8.3
3.6-4.0	1	0.6	0	0
4.1 and above	0	0	0	0
Non Applicable	44	28.6	12	20.0
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

4.5.2 Means of Transport to Access Primary School by Wards of Household Heads

Lack of transport services and infrastructure can impede human resource development. Without a means of transportation, it would usually be difficult to access education and other services. Pillon (2003) suggested that, in rural communities where schools are a distant away, children might be fostered into another community where there is a school. Access to schooling can also be problematic for fishing communities, with some schools 'inaccessible' and some only reached by canoe (Fentiman, Hall and Bundy, 2001).

In terms of means of access to primary school, the study found out that, 51.7 percent of wards of the households in rural Krachi used the canoe as their means of transport to school. This comes with inconveniences to the pupils as they compete over the same canoe

with their parents who also need it for their fishing activities. Pupils at times would have to wait on parents to return from their fishing activity before they are carried across the lake to attend school. This in most cases results in pupils getting to school late.

In the urban areas, however, 51.3 percent of wards of the households walk to access primary school and 9.1 percent use the vehicle to get their wards to school (see Table 4.3). Pupils in urban Krachi do much walking because the schools are within walking distances. Comparatively, 26.7 percent of wards of households walk to school in rural Krachi while it is 51.3 percent in urban Krachi. Again, 51.7 percent use the canoe to access primary education in the rural areas but none of the wards in urban Krachi use canoe as their means of transport to access primary education as depicted in Table 4.3.

Table 4.3: Means of Transport Used by Wards of Household Heads Access Primary School

Means of Transport	Urban		Rural	
	Frequency	%	Frequency	%
Walking	79	51.3	16	26.7
Vehicle	14	9.1	0	0
Canoe	0	0	31	51.7
Bicycle	11	7.1	1	1.7
Motor	6	3.9	0	0
Non Applicable	44	28.6	12	20.0
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

4.5.3. Means of Transport and Distance Covered by Wards of Household Heads to Access Primary School

The means of transport to access primary school in urban Krachi is predominantly walking with a percentage of 71.8. In urban Krachi, 68 percent of the children walk a distance between 0.1 and1.0 kilometres to access primary school. Urban Krachi abounds in schools infrastructure hence the walking and the shorter distances covered to access primary school (see Table 4.4). On the other hand, canoe is the predominant means of transport used to access primary school in rural Krachi. It constitutes 64.6 percent and it is used to travel various distances on the lake from the least distance of 0.1 kilometres to 3.5 kilometres (see Table 4.5). Some of the rural communities lack educational infrastructure and even in cases where the physical infrastructural facility exists, other logistics such as the absence of resident teachers in these communities compel some of the rural children to travel at various distances to access primary school.

Table 4.4 Means of Transport and Distances Covered to Access Primary School (Urban Krachi)

Means of transport to primary school		Distance covered (km) to access primary school								Total
		0.1-0.5	0.6-1.0	1.1-1.5	1.6-2.0	2.1-2.5	2.6-3.0	3.1-3.5	3.6-4.0	
Walking	Count	35	33	7	2	0	1	0	1	79
	% of Total	44.3	41.8	8.8	2.5	0	1.3	0	1.3	100
Vehicle	Count	2	3	2	3	3	1	0	0	14
	% of Total	14.3	21.4	14.3	21.4	21.4	7.1	0	0	100
Bicycle	Count	2	2	1	1	3	2	0	0	11
	% of Total	18.2	18.2	9.1	9.1	27.3	18.2	0	0	100
Motor	Count	2	0	0	0	2	0	2	0	6
	% of Total	33.3	0	0	0	33.3	0	33.3	0	100
Total	Count	41	38	10	6	8	4	2	1	110
	% of Total	37.3	34.5	9.1	5.5	7.3	3.6	1.8	0.9	100

Source: Field Survey, May 2014.

Table 4.5 Means of Transport to Primary School and Distances (km) Covered to Access Primary School (Rural Krachi)

Means of transport to primary school		Distance covered to access primary school							Total
		0.1-0.5	0.6-1.0	1.1-1.5	1.6-2.0	2.1-2.5	2.6-3.0	3.1-3.5	
Walking	Count	7	7	2	0	0	0	0	16
	% of Total	43.8	43.8	12.5	0	0	0	0	100
Canoe	Count	2	3	5	6	4	6	5	31
	% of Total	6.5	9.7	16.1	19.4	12.9	19.4	16.1	100
Bicycle	Count	0	0	1	0	0	0	0	1
	% of Total	0	0	100	0	0	0	0	100
Total	Count	9	10	8	6	4	6	5	48
	% of Total	18.8	20.8	16.7	12.5	8.3	12.5	10.4	100

Source: Field Survey, May 2014.

4.5.4 Time (Minutes) Taken by Wards of Household Heads to Access Primary School

According to the District Directorate of the Krachi West District Education Service, there are 11 primary schools and six Junior High Schools in urban Krachi whereas in all the island communities, there are six primary schools without a Junior High School (JHS). When the physical structure is made available, the time taken to the service point is also another factor in measuring accessibility.

In a SEU (2003) report, accessibility of services and activities can be seen in terms of the time it takes and the ease with which one can access the service. In the urban area of the Krachi district, the least time taken to access primary school is up to 10 minutes while the longest time taken is 61 minutes and above. On the average, 21.4 percent of the wards of households in urban Krachi spend between 31-40 minutes in their quest to access primary school whereas it is 5.0 percent of wards of households in rural Krachi. In rural Krachi, 26.7 percent of the respondents spend 41-50 minutes to access primary school (see Table 4.6). This implies that, a greater percentage of the rural populace spend more time to access primary school than in urban Krachi.

Table 4.6 Time (Minutes) Taken by Wards of Household Heads to Access Primary School

Time (Minutes)	Urban		Rural	
	Frequency	%	Frequency	%
0-10	9	5.8	2	3.3
11-20	18	11.7	9	15
21-30	21	13.6	6	10
31-40	33	21.4	3	5
41-50	13	8.4	16	26.7
51-60	11	7.1	3	5
61 and above	5	3.2	9	15
* Non Applicable*	44	28.6	12	20
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

4.5.5. Means of Transport to Primary School and Time Taken to Access Primary School by Wards of Household Heads

As discussed earlier, walking is the most means of transport used to access primary school in urban Krachi where 35.4 percent of pupils spend 31-40 minutes by walking to access primary school, 30.0 percent spend 31-40 minutes using walking, car, bicycle and

motorbike to access primary. Walking accounts for 71.8 percent of the various times taken to access primary school in urban Krachi as depicted in Table 4.7.

On the other hand, 64.6 percent of pupils use canoes to access primary school and 33.3 percent of them spend between 41-50 minutes to access primary school. Majority of the rural pupils (18.8 percent) spend more than 61 minutes travelling on the lake by using the canoe to access primary school (see Table 4.8). In the case of those who spend more than 61 minutes on the lake, they are pupils who live in rooms rented for them by their parents in urban Krachi or live with relatives. They leave their villages early morning on Mondays and return on Fridays after school.

Comparatively, the pupils in rural Krachi spend more time using canoe to transport themselves to school than their urban colleagues and whose main means of transport is walking to access primary school. The reason is the fact that, primary schools are within walking distances in urban Krachi whereas in rural Krachi, primary schools are far apart in some cases, they are located in communities where access is made possible by the use of canoes on the lake.

Table 4.7.Means of Transport to Primary School and Time Taken to Access Primary School by Wards of Household Heads (Urban Krachi)

Means of transport to primary school		Time taken to access primary school							Total
		0-10	11-20	21-30	31-40	41-50	51-60	61 and above	
Walking	Count	7	10	14	28	13	6	1	79
	% of Total	8.9	12.7	17.7	35.4	16.5	7.6	1.3	100
Car	Count	1	3	4	3	0	2	1	14
	% of Total	7.1	21.4	28.6	21.4	0	14.3	7.1	100
Bicycle	Count	1	3	1	1	0	3	2	11
	% of Total	9.1	27.3	9.1	9.1	0	27.3	18.2	100
Motor	Count	0	2	2	1	0	0	1	6
	% of Total	0	33.3	33.3	16.7	0	0	16.7	100
Total	Count	9	18	21	33	13	11	5	110
	% of Total	8.2	16.4	19.1	30.0	11.8	10.0	4.5	100

Source: Field Survey, May 2014

Table 4.8.Means of Transport to Primary School and Time Taken to Access Primary School by Wards of Household Heads (Rural Krachi)

Means of transport to primary school		Time taken to access primary school							Total
		0-10	11-20	21-30	31-40	41-50	51-60	60 and above	
Walking	Count	0	5	1	2	6	2	0	16
	% of Total	0	31.3	6.3	12.5	37.5	12.5	0	100
Canoe	Count	2	4	4	1	10	1	9	31
	% of Total	6.5	12.9	12.9	3.2	32.3	3.2	29.0	100
Bicycle	Count	0	0	1	0	0	0	0	1
	% of Total	0	0	100	0	0	0	0	100
Total	Count	2	9	6	3	16	3	9	48
	% of Total	4.2	18.8	12.5	6.3	33.3	6.3	18.8	100

Source: Field Survey, May 2014

4.5.6. Means of Transport to Access Junior High School (JHS) by Wards of Household Heads

As depicted by Table 4.9, the majority (47.4 percent) of the wards of households walk to school in the urban Krachi while 11.7 percent of wards of households walk to access Junior High School in rural Krachi. In terms of using the Volta Lake, 26.7 percent of wards of respondents use the canoe to access Junior High School in the rural area while no ward in urban Krachi uses the canoe.

Table 4.9. Means of Transport to Access Junior High School (JHS) by Wards of Household Heads

Means of Transport	**Urban**		**Rural**	
	Frequency	**%**	**Frequency**	**%**
Walking	73	47.4	7	11.7
Canoe	0	0	16	26.7
Bicycle	14	9.1	5	8.3
Missing	67	43.5	32	53.3
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

4.5.7 Distance (Kilometres) Covered to Access Junior High School by Wards of Household Heads

A study by CARE International (2003) describes distance to school for small settlements as key challenges facing educational access in deprived rural areas in northern Ghana. As discussed earlier; I.T Transport (1999) also asserted that, distance is a major cause of school dropout in basic schools. It implies that, the farther a school infrastructure, the more likelihood of it being a disincentive to education.

From Table 4.10, 25.3 percent of wards of the households in urban Krachi cover a distance of 0.1-0.5 kilometres to access Junior High School with only 4.5 percent of wards of the households covering 1.6-2.0 kilometres. Rural Krachi has 18.3 percent of wards of the households covering a distance of 0.6-1.0 kilometres to access Junior High School. The distance covered in the rural Krachi by the majority of the households is higher than in urban Krachi. This is because of the presence of more Junior High Schools in urban Krachi than in rural Krachi. For instance, Defour JHS serves other villages like Laala which do not have JHS and access is made possible by means of a canoe.

Table 4.10 Distances (Kilometres) Covered to Access Junior High School by Wards of Household Heads

Distance(Kilometres)	Urban		Rural	
	Frequency	%	Frequency	%
0.1-0.5	39	25.3	4	6.7
0.6-1.0	21	13.6	11	18.3
1.1-1.5	11	7.1	3	5
1.6-2.0	7	4.5	2	3.3
2.1-2.5	3	1.9	2	3.3
2.6-3.0	4	2.6	3	5
3.1-3.5	1	0.6	3	5
3.6-4.0	1	0.6	0	0
4.1 and above	0	0	0	0
Non Applicable	67	43.5	32	53.3
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

4.5.8. Means of Transport to JHS and Distance (km) Covered to Access JHS by Wards of Household Heads

From Table 4.11, it is observed that, 83.9 percent of pupils in urban Krachi walk between distances of 0.1 to 4.0 kilometres to access JHS and much of the distance covered is between 0.1-0.5 kilometres. Also, 44.8 percent of the pupils in JHS cover a distance between 0.1-0.5 kilometres to access JHS.

In rural Krachi, the canoe still features as the major means of transport to access JHS, 57.1 percent of pupils use it to travel various distances. Majority of rural pupils (39.3 percent) cover a distance of 0.6-1.0 kilometres using walking, canoe and bicycle to access JHS (see Table 4.12). The distance covered to access JHS in rural Krachi is more compared with the distance covered in urban Krachi for the same reasons elicited earlier in this study.

Table 4.11 Means of Transport to JHS and Distances (km) Covered to Access JHS by Wards of Household Heads (Urban Krachi)

Means of transport to JHS		Distance covered to access JHS								Total
		0.1-0.5	0.6-1.0	1.1-1.5	1.6-2.0	2.1-2.5	2.6-3.0	3.1-3.5	3.6-4.0	
Walking	Count	37	18	9	3	2	2	1	1	73
	% of Total	50.7	24.7	12.3	4.1	2.7	2.7	1.4	1.4	100
Bicycle	Count	2	3	2	4	1	2	0	0	14
	% of Total	14.3	21.4	14.3	28.6	7.1	14.3	0	0	100
Total	Count	39	21	11	7	3	4	1	1	87
	% of Total	44.8	24.1	12.6	8.0	3.4	4.6	1.1	1.1	100

Source: Field Survey, May 2014.

Table 4.12. Means of Transport to JHS and Distances(km) Covered to Access JHS by Wards of Household Heads (Urban Krachi)

Means of transport to JHS		Distance covered to access JHS							Total
		0.1-0.5	0.6-1.0	1.1-1.5	1.6-2.0	2.1-2.5	2.6-3.0	3.1-3.5	
Walking	Count	1	5	0	1	0	0	0	7
	% of Total	14.3	71.4	0	14.3	0	0	0	100
Canoe	Count	1	5	1	1	2	3	3	16
	% of Total	6.3	31.3	6.3	6.3	12.5	18.8	18.8	100
Bicycle	Count	2	1	2	0	0	0	0	5
	% of Total	40.0	20.0	40.0	0	0	0	0	100
Total	Count	4	11	3	2	2	3	3	28
	% of Total	14.3	39.3	10.7	7.1	7.2	10.7	10.7	100

Source: Field Survey, May 2014.

4.5.9. Time (Minutes) Taken to Access Junior High School by Wards of Household Heads

As illustrated in Table 4.13, the ability of pupils in rural Krachi to access Junior High School will be hampered by the distance they need to cover compared to pupils in urban Krachi. For instance, 18.3 percent of wards of households need to spend between 51-60 minutes to access Junior High School in rural Krachi while in the urban Krachi only 10 percent of households' wards spent between 41-50 minutes to access Junior High School. The least time taken to access Junior High School in rural Krachi is 11-20 minutes whereas it is less than10 minutes (with a percentage of 1.4) in urban Krachi.

Table 4.13 Time (Minutes) Taken to Access Junior High School by Wards of Household Heads

Time (Minutes)	Urban		Rural	
	Frequency	%	Frequency	%
0-10	3	1.4		
11-20	6	2.8	3	5.0
21-30	14	6.5	0	0
31-40	11	5.1	3	5.0
41-50	24	11.2	6	10.0
51-60	16	7.5	11	18.3
61 and above	13	6.1	5	8.3
Non Applicable	67	31.3	32	53.3
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

Whereas in urban Krachi the time and distance taken to access basic education reflects the gap between place of residence and the civic centre where almost all those infrastructural facilities are clustered, rural Krachi has pockets of scattered communities distant from each other most of whom do not have this basic school infrastructure. This situation also accounted for the means of transport to access basic education in rural Krachi since some of the communities which have the basic infrastructure especially (JHS) are only accessible by means of a canoe or boat services.

4.5.10. Means of Transport to JHS and Time Taken (minutes) to Access JHS by Wards of Household Heads

In urban Krachi, 28.8 percent of pupils spend 41-50 minutes walking to access JHS, 50.2 percent of pupils spend 41-50 minutes by either walking or using bicycle to access JHS. However, 39.3 percent of rural pupils spend 51-60 minutes to access JHS walking, or using canoe or bicycle. The predominant means of transport to access JHS is the use of

canoe which constitutes 57.1 percent of usage among pupils in rural Krachi. This crosstabulation confirms the earlier findings that, rural pupils in JHS spend more time to access school and the use of canoe is the predominant means of transport (see Table 4.14 and 4.15).

Table 4.14 Means of Transport to JHS and Time Taken (Minutes) to Access JHS by Wards of Household Heads (Urban Krachi)

Means of transport to access JHS		Time taken to access JHS							Total
		0-10	11-20	21-30	31-40	41-50	51-60	61 and above	
Walking	Count	3	4	13	11	21	12	9	73
	% of Total	4.1	5.5	17.8	15.0	28.8	16.4	12.3	100
Bicycle	Count	0	2	1	0	3	4	4	14
	% of Total	0	14.3	7.1	0	21.4	28.6	28.6	100
Total	Count	3	6	14	11	24	16	13	87
	% of Total	3.4	8.2	16.1	12.6	32.9	18.4	14.9	100

Source: Field Survey, May 2014.

Table 4.15 Means of Transport to JHS and Time Taken (Minutes) to Access JHS by Wards of Household Heads

(Rural Krachi)

Means of transport to JHS		Time taken to access JHS					Total
		11-20	31-40	41-50	51-60	61 and above	
Walking	Count	1	1	4	1	0	7
	% of Total	14.3	14.3	57.1	14.3	0	100
Canoe	Count	2	1	1	10	2	16
	% of Total	12.5	6.3	6.3	62.5	12.5	100
Bicycle	Count	0	1	1	0	3	5
	% of Total	0	20.0	20.0	0	60.0	100
Total	Count	3	3	6	11	5	28
	% of Total	10.7	10.7	21.4	39.3	17.9	100

Source: Field Survey, May 2014.

4.5.11 Type of Health Facility Accessed

According to Gulliford *et al.* (2002), access to health care is a vital element of any health care delivery system because the opportunity to acquire health care exists if there is availability and adequate supply of services. That is, transport services serve as the link between peoples' residence and health care facilities.

In urban Krachi, the major type of health facility accessed by households is the hospital (98.7 percent) as depicted in Table 4.16, and 1.3 percent of households visit the clinic. On the other hand, in rural Krachi 83.3 percent of the households' access the main hospital in Krachi and 16.7 percent access the clinic either at Cement or Krachi. Majority of both the urban and rural dwellers visit the hospital because it has all the necessary health care facilities. The clinics are least visited because they are manned by only nurses.

Table 4.16. Type of Health Facility Accessed

Type of health facility	**Urban**		**Rural**	
	Frequency	**%**	**Frequency**	**%**
Hospital	152	98.7	50	83.3
Clinic	2	1.3	10	16.7
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

4.5.12 Name of Health Facility Accessed

In urban Krachi, Krachi District Hospital is the main health facility visited by the respondents (99.4 percent) as indicated in Table 4.17. This is followed by the Madison Natural Clinic (1.3 percent). This is expected as the district hospital is situated within the district capital (Krachi). However, in the rural areas 63.3 percent of respondents visit the Krachi District Hospital, 28.3 percent visit the Adonten Cement clinic while 8.3 percent visit the Madison natural clinic. The higher percentage of the rural Krachi dwellers still visit the Krachi District Hospital. It therefore appears the rural dwellers are not much comfortable to obtain their health needs from the Adonten Cement Clinic which is to serve the health needs of the rural communities. This is because, the clinic has only a nurse manning the facility and she is not always available at the facility as she has to attend meetings at the District hospital and other social gatherings like funerals outside the village.

Table 4.17. Name of Health Facility Accessed

Name of Health Facility	Urban		Rural	
	Frequency	%	Frequency	%
Krachi District Hospital	153	99.4	38	63.3
Madison Natural Clinic	2	1.3	5	8.3
Adonten Cement Clinic	0	0	17	28.3
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

4.5.13 Means of Transport to Access Health Facility

Guagliardo (2004) indicated that, distance from a health care facility is a factor capable of affecting access to health care services. Thus, a population's health care needs can be affected negatively by the distance that they need to cover to access health care facility. The households' access to a health facility is based on their ability to cover the distance.

The study sought to find out the means by which respondents access their health care needs. It was found out that, 38.3 percent of the households use the boat services to access health care services in rural Krachi, 25.0 percent use the canoe and 15.0 percent use the ferry while 13.3 percent walk to the access point of a health facility (see Table 4.18). In urban Krachi, the major means of transport used to access health care services is the taxi (65.6 percent) and this is followed by walking (25.3 percent). Again, none of the households in urban Krachi use the ferry, boat or the canoe to access health care services (see Table 4.18). This is apparently clear because, the major health care facility (Krachi District Hospital) is located in the Krachi township. The use of the means of travel appears to be influenced by the availability or supply of transport vehicles.

Table 4.18. Means of Transport to Access Health Care Services

Means of Transport	Urban		Rural	
	Frequency	%	Frequency	%
Walking	39	25.3	8	13.3
Taxi	101	65.6	0	0
Boat	0	0	23	38.3
Vehicle	2	1.3	5	8.3
Motorbike	4	2.6	0	0
Bicycle	8	5.2	0	0
Canoe	0	0	15	25
Ferry	0	0	9	15
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

4.5.14. Time Spent to Access Health Care Service

Solomon (2004) established that, apart from the cost of medicine, treatment and also transport to and from the facility, the physical location of health facilities might not meet households' needs. Thus, distance is a major obstacle to the rural population's ability to access health care services. Up to 25.0 percent of the rural households spend more than 60 minutes in order to visit the nearest health care facility and 11.7 percent spend up to 10 minutes to access a health facility. However, 39.6 percent and 33.1 percent of households in urban Krachi spend 11-20 and up to 10 minutes respectively to access the nearest health care service, while none of the households spend 61 minutes and above in accessing health care (see Table 4.19). This is because, the District hospital is situated in urban Krachi.

Table 4.19 Time Spent to Access Health Care Facility

Time (Minutes)	Urban		Rural	
	Frequency	%	Frequency	%
0-10	51	33.1	7	11.7
11-20	61	39.6	8	13.3
21-30	11	7.1	11	18.3
31-40	7	4.5	9	15.0
41-50	13	8.4	8	13.3
51-60	11	7.1	2	3.3
61 and above	0	0	15	25.0
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

4.5.15. Means of Transport to Health Centre and Time Taken (Minutes) to Access Health

Taxi services are mostly utilized to access health care in urban Krachi, 94.1 percent spend between less than 10 minutes to 20 minutes using taxi to access health care as shown in Table 4.20. Again, 99.9 percent spend between 11 and 60 minutes by walking to access health care. This seems to support the findings of Poku-Boansi, Ekekpe and Bonney (2010) in a similar work on combating maternal mortality in the Gushegu district of Ghana: the role of rural transportation which opined that, the main means of transport used to the health facilities in the district is by the use of a bicycle but walking is considerably done if the health facility is not far from home.

Boat services are mostly utilized to access health care (38.3 percent) spending between 21 minutes and beyond to access health care. Up to 21.7 percent of rural dwellers spend 61 minutes and above to access health care using boats on the lake (see Table 4.21). Rural dwellers (25 percent) use canoe to access health care spending between 21 minutes and beyond.

Table 4.20. Means of Transport to Health Centre and Time Taken (Minutes) to Access Health (Urban Krachi)

Means of transport to health centre		Time taken to access health						Total
		0-10	11-20	21-30	31-40	41-50	51-60	
Walking	Count	0	4	11	7	10	7	39
	% of Total	0	10.3	28.2	17.9	25.6	17.9	100
Taxi	Count	44	51	0	0	2	4	101
	% of Total	43.6	50.5	0	0	2.0	4.0	100
Vehicle	Count	2	0	0	0	0	0	2
	% of Total	100	0	0	0	0	0	100
Motorbike	Count	3	0	0	0	1	0	4
	% of Total	75.0	0	0	0	25.0	0	100
Bicycle	Count	2	6	0	0	0	0	8
	% of Total	25.0	75.0	0	0	0	0	100
Total	Count	51	61	11	7	13	11	154
	% of Total	33.1	39.6	7.1	4.5	8.4	7.1	100

Source: Field Survey, May 2014.

Table 4.21 Means of Transport to Health Centre and Time Taken to Access Health Care (Rural Krachi)

Means of transport to health centre		Time taken to access health care							Total
		0-10	11-20	21-30	31-40	41-50	51-60	61 and above	
Walking	Count	4	1	0	2	1	0	0	8
	% of Total	50.0	12.5	0	25	12.5	0	0	100
Taxi	Count	3	2	0	0	0	0	0	5
	% of Total	60.0	40.0	0	0	0	0	0	100
Boat	Count	0	0	3	4	3	0	13	23
	% of Total	0	0	13.0	17.4	13.0	0	56.5	100
Vehicle	Count	0	5	0	0	0	0	0	5
	% of Total	0	100	0	0	0	0	0	100
Canoe	Count	0	0	8	3	0	2	2	15
	% of Total	0	0	53.3	20.0	0	13.3	13.3	100
Ferry	Count	0	0	0	0	4	0	0	4
	% of Total	0	0	0	0	100	0	0	100
Total	Count	7	8	11	9	8	2	15	60
	% of Total	11.7	13.3	18.3	15.0	13.3	3.3	25.0	100

Source: Field Survey, May 2014.

4.4.16. Distance (Kilometres) Covered to Access Health Care Facility

According to Blustein and Weitzman (1995), factors such as geographical, economic, attitude of health workers toward patients, administrative and socio-cultural factors affect easy access to health care in rural areas of Africa. Likewise, it has been argued that, places of residence of individuals affect the lives of many people living in developing countries and as a result negatively impact on their health conditions (Fotso, 2007).

As indicated in Table 4.22, in urban Krachi, 94.8 percent of the households cover between 0.1 and 1.0 kilometre in order to access health care services. Consequently, only 1.3 percent of the households cover 2.1-2.5 kilometres to access health care services. This is because, all of the households are within the Krachi township where the major health care facility is located as depicted already in the preceding discussions.

On the other hand, in rural Krachi, 45.0 percent of the households travel more than 4 kilometres along the lake to access health care services and only 11.7 percent cover 0.1-0.5 kilometres to access the nearest health care facility (see Table 4.22).

Table 4.22. Distance (Kilometres) Covered to Access Health Care Facility

Distance (Kilometres)	Urban		Rural	
	Frequency	%	Frequency	%
0.1-0.5	85	55.2	7	11.7
0.6-1.0	61	39.6	6	10.0
1.1-1.5	5	3.2	0	0
1.6-2.0	1	0.6	8	13.3
2.1-2.5	2	1.3	0	0
2.6-3.0	0	0	5	8.3
3.1-3.5	0	0	0	0
3.6-4.0	0	0	7	11.7
4.0 and above	0	0	27	45.0
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

4.5.17. Means of Transport to Health Centre and Distances (km) Covered to Access Health Care

In urban Krachi, 98 percent of the people cover between 0.1 and 2.5 kilometres by the use of a taxi to access health care and taxi services are the most used means of transport to access health care. In total, 55.2 percent of urban dwellers use the various means of transport to cover a distance of 0.1-0.5 kilometres to access health care (see Table 4.23).

On the other hand, 65.2 percent of the rural dwellers go beyond 4.1 kilometres to access health care by the use of boat. In rural Krachi, 99.9 percent use boat services to cover between 1.6 kilometres and beyond to access health care (see Table 4.24). This seems to support the findings that, in Ghana as a whole, 35 percent of rural households cover a distance of between 1 and 9 miles (1.6-14.4 kilometers) to travel to the nearest hospital and of the rest, the majority covers more than 9 miles to reach a health facility (GSS, 1993). The use of boat services to cover longer distances on the lake to access health care is because of the location of the only hospital in the district in urban Krachi. This makes the distance covered by dwellers in urban Krachi shorter to access health care and also enjoy taxi services.

Table 4.23 Means of Transport to Health Centre and Distances (km) Covered to Access Health Care (Urban Krachi)

Means of transport to health centre		Distance covered to access health care					Total
		0.1-0.5	0.6-1.0	1.1-1.5	1.6-2.0	2.1-2.5	
Walking	Count	18.0	18.0	2.0	0	1.0	39
	% of Total	46.2	46.2	5.1	0	2.6	100
Taxi	Count	57.0	39.0	3.0	1.0	1.0	101
	% of Total	56.4	38.6	3.0	1.0	1.0	100
Vehicle	Count	2.0	0	0	0	0	2
	% of Total	100	0	0	0	0	100
Motorbike	Count	2.0	2.0	0	0	0	4
	% of Total	50.0	50.0	0	0	0	100
Bicycle	Count	6.0	2.0	0	0	0	8
	% of Total	75.0	25.0	0	0	0	100
Total	Count	85.0	61.0	5.0	1.0	2.0	154
	% of Total	55.2	39.6	3.2	0.6	1.3	100

Source: Field Survey, May 2014.

Table 4.24 Means of Transport to Health Centre and Distances Covered to Access Health Care (Rural Krachi)

Means of transport to health centre		Distance covered to access health care						Total
		0.1-0.5	0.6-1.0	1.6-2.0	2.6-3.0	3.6-4.0	4.1 and above	
Walking	Count	6.0	2.0	0	0	0	0	8
	% of Total	75.0	25.0	0	0	0	0	100
Taxi	Count	1.0	4.0	0	0	0	0	5
	% of Total	20.0	80.0	0	0	0	0	100
Boat	Count	0	0	3.0	1.0	4.0	15.0	23
	% of Total	0	0	13.0	4.3	17.4	65.2	100
Vehicle	Count	0	0	0	2.0	0	3.0	5
	% of Total	0	0	0	40.0	0	60.0	100
Canoe	Count	0	0	5.0	2.0	3.0	5.0	15
	% of Total	0	0	33.3	13.3	20.0	33.3	100
Ferry	Count	0	0	0	0	0	4.0	4
	% of Total	0	0	0	0	0	100	100
Total	Count	7.0	6.0	8.0	5.0	7.0	27.0	60
	% of Total	11.7	10.0	13.3	8.3	11.7	45.0	100

Source: Field Survey, May 2014.

4.5.18 Market Centre Regularly Accessed

Market places are designated sites where buyers and sellers meet to exchange goods and services. Schrimper (2001) and Scott (1970) noted that, market centres have throughout history been the principal vehicles of commercial exchange and interregional trade. In most countries of the developing world, market centres also serve as focal points of health delivery, local administration, political campaigns, religious programmes, information exchange and innovation diffusion, and entertainment. Thus market centres play an important role in the lives of people especially the rural folks.

Out of the total number of households in urban Krachi, 85.1 percent of them regularly accessed the Krachi market since it is the most proximate while 0.6 percent accessed the Ntewusae market, Saboba market and Abotoasi market respectively. Similarly, 5.2 percent and 4.5 percent of households access the Kajaji market and Borae market respectively while 3.2 percent of the households access the Dambai market (see Table 4.25). In rural Krachi, the Kajaji market is the main market accessed by the households (51.7 percent), this is followed by the Dambai market (25.0 percent), Krachi market (16.7percent) and Abotoasi market (6.7 percent). The pattern of markets visited by the rural dwellers explains their quest to meet with their trading partners from either Kumasi and parts of Brong Ahafo (Kajaji market) or Accra and southern Volta (Dambai and Abotoasi markets).This finding again seems support the assertion by Good, (1975) who opined that,

the market centres also attract people, mostly traders, from their complementary urban consuming centres particularly in the southern half of Ghana.

Table 4.25. Market Centre Regularly Accessed

Name of Market Center	Urban		Rural	
	Frequency	%	Frequency	%
Krachi Market	131	85.1	10	16.7
Borae Market	7	4.5	0	0
Kajaji Market	8	5.2	31	51.7
Dambai Market	5	3.2	15	25.0
Ntewusae Market	1	0.6	0	0
Saboba Market	1	0.6	0	0
Abotoasi Market	1	0.6	4	6.7
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

4.5.19 Means of Transport to Access Market Centre

The study found out how the urban and rural dwellers in Krachi accessed these markets identified in Table 4.25. Out of the total respondents in urban Krachi, 89.1 percent either use vehicles or walk to access market. In terms of the usage of the Volta Lake, only 5.8 percent use the ferry and the vehicle to access market (see Table 4.26). The reason why the majority of the households use vehicles and walking as the means of transport to access the market centres has to do with the main market sited within the Krachi township.

However, in the rural areas, which happen to be the communities along and across the Volta Lake, 35 percent of the households either combine the boat and vehicle, canoe and vehicle or ferry and vehicle to gain access to the market centres. Again, 10.0 percent of the households walk to their various market centres (see Table 4.26).

The combination of a boat and a vehicle, canoe and vehicle or ferry and a vehicle is as a result of the Kajaji market being at a distance (5 kilometres) away from the river bank. Therefore, passengers as well as goods intended for movement to this market centre must be carried in vehicles. Traders moving from urban Krachi to the Dambai market must also combine the services of a vehicle and a boat or a vehicle and a ferry in order to reach the Dambai market because the lake separates the Krachi West from the East.

Table 4.26. Means of Transport to Access Market Centre

Means of Transport	Urban		Rural	
	Frequency	**%**	**Frequency**	**%**
Walking	42	27.2	6	10.0
Vehicle	80	51.9	14	23.3
Boat	1	0.6	13	21.7
Ferry	9	5.8	0	0
Boat and Vehicle	0	0	21	35.0
Canoe and Vehicle	0	0	3	5.0
Motorbike	12	7.8	0	0
Bicycle	1	0.6	0	0
Ferry and Vehicle	9	5.8	3	5.0
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

4.5.20. Distance (Kilometres) Covered to Access Market Centre

As illustrated in Table 4.27, the majority (91.6 percent) of the households in urban Krachi travel a distance between 0.1 and 1.0 kilometre to access their market centres. The shorter distance travelled to access market is because of the presence of a market centre in urban Krachi.

Comparing this to rural Krachi, only 23.3 percent travel 0.1 and 1.0 kilometre to access the nearest market centres. The majority of the households (76.7 percent) travel 4 kilometres and above to access the nearest market centres (see Table 4.22). In rural Krachi, these distances are covered on the lake as compared with urban Krachi. This affects the rural dwellers efforts to access markets as suggested by the Government of Uganda (2000) which stated that, distance to markets and lack of affordable transport constraints the efforts to improve the livelihood of the rural poor. Aside the travel to market and health centres, some rural dwellers also travel on the lake to attend funerals and other church related activities.

Table 4.27. Distances (Kilometres) Covered To Access Market Centres

Distance (Kilometres)	Urban		Rural	
	Frequency	%	Frequency	%
0.1-0.5	77	50.0	6	10.0
0.6-1.0	64	41.6	8	13.3
1.1-1.5	0	0	0	0
1.6-2.0	0	0	0	0
2.1-2.5	0	0	0	0
2.6-3.0	0	0	0	0
3.1-3.5	0	0	0	0
3.6-4.0	2	1.3	0	0
4.0 and above	11	7.1	46	76.7
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

4.5.21. Means of Transport to Market Centre and Distance (km) Covered to Access Market

In urban Krachi, 95.1 percent of the people travel a distance between 0.1 and 1.0 kilometre using vehicle to access market. In all, 50.0 percent of people in urban Krachi cover a distance of 0.1-0.5 using the various means of transport to access market as shown in Table 4.28 However, for those in rural Krachi, 76.7 of them travel beyond 4.1 kilometres to access market by combining both boat and vehicles to access market (see Table 4.29). This is because, most of the residents in rural Krachi patronize the Kajaji market which is about five kilometres away from the river bank at Defour.

Table 4.28 Means of Transport to Market Centre and Distances (km) Covered to Access Market (Urban Krachi)

Means of transport to market centre		Distance covered to access market				Total
		0.1-0.5	0.6-1.0	3.6-4.0	4.1 and above	
Walking	Count	24	18	0	0	42
	% of Total	57.1	42.9	0	0	100
Vehicle	Count	47	29	0	4	80
	% of Total	58.8	36.3	0	5.0	100
Boat	Count	0	0	0	1	1
	% of Total	0	0	0	100	100
Ferry	Count	4	5.	0	0	9
	% of Total	44.4	55.6	0	0	0
Motorbike	Count	0	12	0	0	12
	% of Total	0	100	0	0	100
Bicycle	Count	1	0	0	0	1
	% of Total	100	0	0	0	100
Boat and Vehicle	Count	1	0	2	6	9
	% of Total	11.1	0	22.2	66.7	100
Total	Count	77	64	2	11	154
	% of Total	50.0	41.6	1.3	7.1	100

Source: Field Survey, May 2014.

Table 4.29 Means of Transport to Market Centre and Distance (km) Covered to Access Market (Rural Krachi)

Means of transport to market centre		Distance covered to access market			Total
		0.1-0.5	0.6-1.0	4.1 and above	
Walking	Count	3	3	0	6
	% of Total	50.0	50.0	0	100
Vehicle	Count	3	5	6	14
	% of Total	21.4	35.7	42.9	100
Boat	Count	0	0	13	13
	% of Total	0	0	100	100
Boat And Vehicle	Count	0	0	21	21
	% of Total	0	0	100	100
Canoe and Vehicle	Count	0	0	3	3
	% of Total	0	0	100	100
Ferry and Vehicle	Count	0	0	3	3
	% of Total	0	0	100	100
Total	Count	6	8	46	60
	% of Total	10.0	13.3	76.7	100

Source: Field Survey, May 2014.

4.5.22. Time (Minutes) Taken to Access Market Centres

Level of service such as time, determines accessibility of a transport mode and the operating hours of transport systems have been criticised for adversely affecting the ability of socially disadvantaged groups to access such important services (SEU, 2003). That is, when more time is spent to access a market centre, it adversely affects accessibility. The majority of residents of rural Krachi (25.0) spend beyond 61 minutes to access market. As shown in Table 4.30, the rural communities in Krachi would be socially excluded from accessing their market because of the time it takes them to get there.

A greater percentage of the rural folk spent a lot of time in their quest to access market. This is because of the combination of two modes of transport, namely: on the lake and by land to the frequently visited market. The journey on the lake is quite slow aside the numerous stops at the various small island communities to pick and offload goods and passengers. The transition from the boats to the vehicles for instance, when they are traveling to Kajaji market further increases the time spent to reach their market centre. However, in the urban Krachi, 72.7 percent spend between less than 10 minutes and up to 20 minutes to get to the nearest market center. One of the reasons accounting for these shorter times in the urban areas has to do with the location of the major market within the Krachi township.

Table 4.30 Time (Minutes) Taken to Access Market Centres

Time (Minutes)	Urban		Rural	
	Frequency	%	Frequency	%
0-10	51	33.1	7	11.7
11-20	61	39.6	8	13.3
21-30	11	7.1	11	18.3
31-40	7	4.5	9	15.0
41-50	10	6.5	8	13.3
51-60	11	7.1	2	3.3
61 and above	3	1.9	15	25.0
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

4.5.23 Cost of Travel to Access the Nearest Health Facility

The cost of accessing health care service is one of the fundamental elements in assessing accessibility. As noted by Stein, Andersen and Gelberg (2007), equal access to health care is a challenge to governments all over the world when it comes to minority groups, low

income earners and people living in rural communities. In this study, the focus is on the transport cost incurred to access health care.

As illustrated in Table 4.31, the cost of travelling to access health care in urban Krachi ranges between no cost (*0*for those who walk) to GH₵3.00. Majority of the urban residents (59.7 percent) spend GH₵2.00 to reach the nearest health care facility, while 5.8 percent spend GH₵3.00. However, in rural Krachi, 90.0 percent of the households spend between GH₵2 and GH₵5 as the cost of travelling to access health care.

Table 4.31. Cost of Travel (Ghana Cedis) to the Nearest Health Facility

Cost of Travel (Ghana Cedis)	Urban		Rural	
	Frequency	%	Frequency	%
0	53	34.4	6	10.0
1	0	0	0	0
2	92	59.7	9	15
3	9	5.8	12	20
4	0	0	17	28.3
5	0	0	16	26.7
Total	**154**	**100**	**60**	**100**

Source: Field Survey, May 2014.

4.5.24 Means of Transport to Market Centre and Time Taken (Minutes) to Access Market

People living in urban Krachi (39.6 percent) spend between 11-20 minutes using the various transport services to access a market centre and 51.9 percent of the people spend various times using a vehicle to access market. The majority of people in urban Krachi (27.9 percent) spend 11-20 minutes to access market. On the other hand, the rural Krachi inhabitants (35.0 percent) spend various times using the combined services of a boat and a vehicle to access the market. Majority of the rural folks in Krachi (25.0 percent) spend beyond 61 minutes using the various means of transport to access market with 45.0 percent of them combining more than one means of transport; that is, boat and vehicle, canoe and vehicle or ferry and vehicle. The differences between the times taken to access the market in urban Krachi and rural (see Tables 4.32 and 4.33) Krachi reflects the absence of a market centre in rural Krachi; hence, a lot more time is needed in the quest to access the market.

Table 4.32.Means of Transport to Market Centre and Time Taken (Minutes) to Access Market (Urban Krachi)

Means of transport to market centre		Time taken to access market							Total
		0-10	11-20	21-30	31-40	41-50	51-60	61 and above	
Walking	Count	11	3	9	7	9	3	0	42
	% of Total	26.2	7.1	21.4	16.7	21.4	7.1	0	100
Vehicle	Count	33	43	0	0	1	2	1	80
	% of Total	41.3	53.8	0	0	1.3	2.5	1.3	100
Boat	Count	0	0	0	0	0	0	1	1
	% of Total	0	0	0	0	0	0	100	100
Ferry	Count	5	2	2	0	0	0	0	9
	% of Total	55.6	22.2	22.2	0	0	0	0	100
Motorbike	Count	1	11	0	0	0	0	0	12
	% of Total	8.3	91.7	0	0	0	0	0	100
Bicycle	Count	0	1	0	0	0	0	0	1
	% of Total	0	100	0	0	0	0	0	100
Boat and Vehicle	Count	1	1	0	0	0	6	1	9
	% of Total	11.1	11.1	0	0	0	66.7	11.1	100
Total	Count	51	61	11	7	10	11	3	154
	% of Total	33.1	39.6	7.1	4.5	6.5	7.1	1.9	100

Source: Field Survey, May 2014.

Table 4.33.Means of Transport to Market Centre and Time Taken (Minutes) to Access Market (Rural Krachi)

Means of transport to market centre		Time taken to access market							Total
		0-10	11-20	21-30	31-40	41-50	51-60	61 and above	
Walking	Count	0	1	0	3	2	0	0	6
	% of Total	0	16.7	0	50.0	33.3	0	0	100
Vehicle	Count	4	7	2	1	0	0	0	14
	% of Total	28.6	50.0	14.3	7.1	0	0	0	100
Boat	Count	0	0	4	2	2	0	5	13
	% of Total	0	0	30.8	14.3	15.4	0	38.5	100
Boat and vehicle	Count	3	0	4	3	3	0	8	21
	% of Total	14.3	0	19.0	14.3	14.3	0	38.1	100
Canoe and vehicle	Count	0	0	1		1	0	1	3
	% of Total	0	0	33.3		33.3	0	33.3	100
Ferry and vehicle	Count	0	0	0	0	0	2	1	3
	% of Total	0	0	0	0	0	66.7	33.3	100
Total	Count	7	8	11	9	8	2	15	60
	% of Total	11.7	13.3	18.3	15.0	13.3	3.3	25	100

Source: Field Survey, May 2014.

4.6 Summary of Chapter Findings

In this chapter, the data gathered from the field were analysed and discussed. The trip length and the volume of traffic on the lake in the study area were analysed and it was found out that, the trip length from Krachi to Defour on the lake is 56 kilometres.

The transport services rendered on the Volta Lake in the study area seemed to be divided between the VLTC of the formal sector and the private boat owners of the informal sector. Whereas the transverse transport services (across the lake) are provided solely by the ferry owned by the VLTC, the longitudinal transport services (along the lake) are provided by privately owned boats. In effect, the trip length covered by the boats is higher than that which is covered by the ferry.

The study also found that, a substantial portion of the cargo transported on the lake in the study area is carried by the private boat operators. This is because, ferry services are not available on the lake in most communities in rural Krachi where the chunk of the cargo is found. The private boat operators transport large volumes of fish and other food stuffs and passengers from remote villages in rural Krachi to the market centre. It was estimated that, the volume of fish transported on the lake was about 6,258.252 tonnes per year.

The study revealed that, the distance covered and the time taken to access both primary and Junior High schools in rural Krachi socially excludes them from accessing education because they are not able to get to the education facility on time. However, residents in urban Krachi have a better access to education in terms of the time taken and distance covered to access schools.

With regards to access to health care in urban Krachi, it was found that an appreciable proportion of the residents live within walking distances to health facilities. However, the rural dwellers travel longer distances to access the only hospital in the district which is located in urban Krachi. In effect, the long distances covered, the times taken as well as the cost incurred impede the rural dwellers accessibility to health care.

It was again established from this study that, whereas the residents in urban Krachi use one mode of transport and spend less time to the nearest market centre, majority of the rural folks combine two of the modes of transport and spend much time and cover longer distances to access the nearest market centre which amounts to social exclusion.

Finally, the residents of rural Krachi depend a lot on the lake in their quest to access the basic social amenities of education, health care and markets. There are no means of transport options for the rural dwellers in the study area since in most cases, the only mode of transport to these facilities is by the lake and it is only private boat operators who render transport services to rural dwellers in the study area. In effect, residents of the study area are essentially captive to travel on the lake by boats and small canoes as well as ferries.

CHAPTER FIVE

SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

The analyses and discussions in the preceding chapter resulted in the identification of major findings that are related to the provision of transverse and longitudinal transport services on the Volta Lake in Krachi and its surrounding island communities. Based on the findings, appropriate recommendations to enhance transport services on the lake in the study area have been suggested and conclusion drawn. This entire chapter is thus, dedicated to summary of key findings, recommendations and conclusions.

5.2 Summary of Findings

The summary will focus on the following: the freight and passenger services rendered on the lake, the volume of freight (smoked fish) that is moved annually on the Volta Lake in Krachi and its environs, the influence of transport services along and across the Volta Lake on socio-economic activities: marketing activities, accessibility to health delivery services and basic education in the area.

5.2.1 The Trip Length and Volume of Traffic Across and Along the Lake in the Krachi Catchment Area.

The trip length from Krachi to Defour (as the crow flies) on the lake is about 56 kilometres whereas the distance between Laala and Defour is estimated to be 30 kilometres and to Krachi is 25 kilometres-these constitute the main lines of travel across the lake (Transverse). The journey from Old Chantae, Jericho, Jerusalem, Old Dobiso and Cement to either Krachi or Defour constitutes the travel along the lake (Longitudinal). The trip length from Old Chantae and Jericho to Defour is both estimated at 180 kilometres and to Krachi is estimated at 130 kilometres. On the other hand, the trip lengths from Old Dobiso and Jerusalem to Defour are estimated at 185 and 183 kilometres respectively. Also, the trip length from Old Dobiso and Jerusalem to Krachi is estimated at 135 and 133 kilometres respectively. The journeys from Cement to Krachi and Cement to Defour are estimated to have trip lengths of 110 and 160 kilometres respectively.

The average number of canoes and boats counted on two separate market days were 16 and 31 respectively. Of the 16 canoes, seven were fitted with outboard motors while the remaining were propelled by paddles. These boats and canoes arrive at the shore of the lake and depart at different times depending on the island community they are coming

from and as a result, there has not been any collision of these boats and canoes on the lake. The ferry owned and operated by the VLTC is the only vessel allowed to carry goods and passengers across the lake on non-market days. It makes two trips a day both on market days and non-market days except that, on market days, it starts operations as early as 7:00 a.m which deviates from its normal operating time of 8:00 a.m.

The transport services rendered on the Volta Lake in the study area are divided between the VLTC of the formal sector and the private boat owners of the informal sector. Whereas the transverse transport services (across the lake) are provided solely by the ferry owned by the VLTC, the longitudinal transport services (along the lake) are provided by privately owned boats. In effect, the trip lengths covered by the boats are higher than those covered by the ferry.

5.2.2 The Volume of Freight Transported Along and Across the Lake in the Study Area.

The ferry that crosses from Krachi to Defour has a passenger capacity of 400 persons and a cargo capacity of 160 metric tonnes per trip. The ferry on the average ferries about 150 and 200 passengers per trip on a market and non-market days respectively across the lake from Krachi to Defour. During these same trips, the ferry also carries on the average 70 metric tonnes, 40 metric tonnes, and 20 tonnes metric of yams, cereals/grains, and fish respectively. There are other products such as wood products and general merchandise which constitute 100 metric tonnes and 70 metric tonnes respectively which are also carried across the lake. The ferry also renders crossing services for vehicles from Krachi to Defour and the vice versa.

It was also established from the field data that, the private boat operators render both cargo and passenger services to island dwellers that are not served by the VLTC. The total quantity of fish brought to Kajaji on market days by these private boat operators and canoes was estimated at 120,351 kilograms (120.351 metric tonnes per week) which amounts to 6,258.252 metric tonnes in a year. The value of an average basket of fish was GH₵450.00 on the market which implies that, about GH₵2,578,950.00 accrue as revenue in a year to people engaged in the fishing business in the study area. This contributes significantly to the Gross Domestic Product of the local economy. Again, it was estimated that, the Volta Lake Transport Company, earns about GH₵590,000 in a year for the 118,000 passengers it ferries across the Volta Lake. This makes the operations of the company viable in terms of the patronage and the revenue that accrues to it.

5.2.3 The Influence of Transport Services Along and Across the Volta Lake on Marketing Activities, Accessibility to Health Delivery Services and Education in the Study Area.

In rural Krachi, 45.0 percent of wards of the households in the rural areas cover between 0.1 to 1.5 kilometre to access primary school. On the other hand, 57.8 percent of wards of respondents travel between 0.1 to 1.5 kilometres to access primary school with only 1.9 percent travelling beyond 3.1 kilometres in urban Krachi. This reflects the concentration of primary schools within Krachi urban.

In like manner, 25.3 percent of wards of the households in urban Krachi cover a distance of 0.1-0.5 kilometres to access Junior High School with only 4.5 percent of wards of the households covering 1.6-2.0 kilometres. In rural Krachi, Rural Krachi has 18.3 percent of wards of the households covering a distance of 0.6-1.0 kilometres to access Junior High School. The distance covered in the rural Krachi by the majority of the respondents is higher than in urban Krachi. This explains the differences between physical accessibility as well as longer distance being a disincentive to access to education.

Majority of the rural pupils (18.8 percent) spend more than 61 minutes travelling on the lake by using the canoe to access primary school. In the case of those who spend more than 61 minutes on the lake, they are pupils who live in rooms rented for them by their parents in urban Krachi or live with relatives. They leave their villages early on Monday mornings and return on Friday after school.

With regards to the means of transport to access primary education, it has been established that, 51.7 percent of wards of the households in the rural Krachi use the canoe as their means of transport whereas in the urban Krachi, 51.3 percent of wards of the households walk to access primary school. The majority (47.4 percent) of wards of the households walk to Junior High school in urban Krachi while only 11.7 percent walk to access Junior High School in rural Krachi. In terms of using the Volta Lake, 8.3 percent of wards of the households use the canoe to access Junior High School in rural Krachi while no ward in urban Krachi uses the canoe.

It was also established that, in the urban areas of Krachi, the major type of health facility accessed by the households is the hospital (98.7 percent). On the other hand, in rural

Krachi, 83.3 percent of the households access the main hospital in Krachi and 16.7 percent access clinics.

Taxi services are mostly utilized to access health care in urban Krachi, where 94.1 percent spend between less than 10 minutes to 20 minutes using these means to access health care. Again, 99.9 percent spend between 11 and 60 minutes by walking to access health care. Boat services are mostly utilized to access health care in rural Krachi with 99.9 percent spending between 21 minutes and beyond. Up to 83.6 percent of rural dwellers spend 61 minutes and above to access health care using boats on the lake. Rural dwellers (53.3 percent) use canoe to access health care spending between 21-30 minutes.

In urban Krachi, 94.8 percent of the households cover between 0.1 and 1.0 kilometre in order to access health care services. In rural Krachi 45.0 percent of the households travel more than 4 kilometres along the lake to access health care services and only 11.7 percent cover 0.1-0.5 kilometres to access the nearest health care facility. Most of the distances covered by these rural dwellers are on the Volta Lake.

In terms of the means of transport to market centres, the study found out that, 95.1 percent of the people in urban Krachi travel a distance between 0.1 and 1.0 kilometre using vehicle to access market. In rural Krachi, 76.7 of them travel beyond 4.1 kilometres to access market by combining both boat and vehicles to access market.

For the distance covered to access market centres, it was established that, the majority (91.6 percent) of the households in urban Krachi travel a distance between 0.1 and 1.0 kilometre to access their market centres. The majority of the rural households (76.7 percent) travel 4 kilometres and above to access the nearest market centre.

The majority of residents of rural Krachi (25.0 percent) spend beyond 61 minutes to access market. However, in the urban Krachi, 72.7 percent spend between less than 10 minutes and up to 20 minutes to get to the nearest market center. This is because, Krachi has a market centre within the township whereas there is no market centre in any of the rural communities studied.

5.3 Recommendations and Policy Implications

Policy makers may consider ways to address the transport challenges faced by people living in the rural areas of Krachi in their quest to access health care, education and market

centres. The VLTC may consider increasing its landing sites to cover more island communities in the study area to enable rural dwellers have access to regular transport services. The private boat operators should be given technical support such as training on safety measures on the Volta Lake and a regular inspection of their boats to ensure safety measures are put in place to curtail possible loss of lives on the lake.

The Ghana Health Service in the district should consider running a mobile health service for island communities to ease their challenge in accessing health care. It became evident from the analyses that, the only time health services are taken to the door steps of rural residents in the study area is during national immunizations. A team of medical officers can identify a central location in rural-Krachi where medical services can be made available to rural residents at least on quarterly basis. This would help to make medical services more accessible to rural residents.

There should be concerted efforts on the part of the District Assembly and other stakeholders in education the GETFUND to provide school blocks to make up for the backlog in basic school infrastructure in the district. The Assembly should present proposals to civil society organizations, bilateral and multilateral organizations, embassies, high commissions and other development partners to help in the provision of basic education infrastructure. The District Assembly can also consider putting in place incentive packages such as study scholarships after a period of teaching in the island communities to attract teachers to accept postings to the rural island communities in the district. This would help the rural dwellers to have access to quality education and also curtail the risk involve in travelling on the Volta Lake to access basic schools.

The implementation of the suggested recommendations would enhance the provision of transport services on the lake. It would also, reduce the distances travelled, time taken and cost incurred to access the socio economic facilities in the study area.

5.4 Conclusion

The research established that, the transverse transport services on the lake are provided solely by the ferry owned by the VLTC and the longitudinal transport services by privately owned boats and canoes. About 118, 000 people are ferried across the lake in a year. About 6,258.252 metric tonnes of fish transported on the lake in a year contributes significantly to the GDP of the local economy.

The residents of Krachi depend on the lake in their quest to access the basic socio economic amenities of education, health care and markets. There are no other means or transport options for the rural dwellers in the study area. In most cases, the only mode of transport to these facilities is by the lake and it is only private boat operators who render transport services to rural dwellers in the study area. In effect, residents of the study area are essentially captive to travel on the lake by boats and small canoes as well as ferries.

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APPENDICES

APPENDIX 3.1

PROVISION OF TRANSVERSE AND LONGITUDINAL TRANSPORT SERVICES ON THE VOLTA LAKE IN THE KRACHI CATCHMENT AREA.

HOUSEHOLD QUESTIONNAIRE

Village name …… District ……. Date ……
Sex of Household head..…….. Occupation ……

1. Which means of transport does this household own?

Mode	**Number owned**	**Own use**	**Income generating**
Canoe propelled by paddles			
Canoe propelled by outboard motor			
Speed boats			
Bicycles			
Motor bike			
Vehicle			
Minibus			
Cart			
Wheel barrow			
Others (specify)			

2. How many of the household members are engaged in active employment? Provide details

Name of member	Occupation	Average income per month(GH₵)	Average annual income(GH₵)

3. Are there any children in the household who attend school? Yes No

Primary School.

Name of school	Who goes?		How many days per week?	How long to get there? (mins)	Distance in km	Means of Transport
	Total Boys & Girls Ages	Total & Ages				

Junior High School

Name of school	Who goes?		How many days per week?	How long to get there? (mins)	Distance in km	Means of Transport
	Total Boys Total Girls	& Ages & Ages				

4. (a) Which commercial centre does the household visit regularly?

Commercial centre	Who goes? (M, W,B,G)	Means of transport used	*Purpose			Travel time/cost (mins)	How often do they go?
			1st	2nd	3rd		

*A: to sell produce, B: to buy food, C: to buy household items, D: to buy agric inputs, E: social reasons

(b) Goods Usually Traded (if answer to question 7 is "A")

Name of good	Volume transported	Cost of transport	Means of transport

5. (a) Dispensary/Health Clinic Normally Visited for Treatment by Household

Name of Hosp.	Approx. time taken	Cost of travel	How often visited	Means of transport

(b) Hospital Usually Visited by Household

Name of Hosp.	Approx. time taken	Cost of travel	How often visited	Means of transport

6. Which other places do members of this household visit?

Place/Facility	Who goes	Cost of travel	Means of travel	Purpose	No. of times per week.

7. What are the major challenges faced by the household in its quest to access health care, education and market centres?

……

……

……

APPENDIX 3.2

BOAT/CANOE OWNERS ASSOCIATION

Dear Sir, I am a student of the Kwame Nkrumah University of Science and Technology offering MSc. Development Policy and Planning. As part of the requirement for the award of the degree stated above, I am conducting a research on the topic **"Transverse and Longitudinal Transport Services on the Volta Lake in the Krachi Catchment Area".** I humbly solicit answers to the questions below to help me investigate this research topic only for academic purposes. I promise to keep your responses as confidential and use them only for the intended purpose. Thank you.

Name of association ……

Name of respondent ……

Position ……

1. What is the total membership of the association? ……
2. Is the association registered with the District Assembly? Yes No
3. How many boats and canoes are registered with the association?

Categories	**Number of Boats**	**Number of Canoes**	**Average Size of Boats**	**Passenger Capacity of Boats**	**Volume/Weight of Goods Carried per Boat**
Small					
Medium					
Large					

4. What are the objectives of the association?

   ……

5. Do you have rules that regulate the activities of members? Yes No
6. If yes, what are some of the major rules governing the association?

   ……

7. How are the fares to the various places determined?

   ……

8. How does the association check overloading of boats and safety on the lake?

   ……

9. What challenges do members of the association face in the course of their operations?

APPENDIX 3.3

OVERSEERS OF KAJAJI MARKET (MARKET COMMITTEE CHAIRMAN)

Dear sir, I am a student of the Kwame Nkrumah University of Science and Technology offering MSc. Development Policy and Planning. As part of the requirement for the award of the degree stated above, I am conducting a research on the topic **"Transverse and Longitudinal Transport Services on the Volta Lake in the Krachi Catchment Area".** I humbly solicit answers to the questions below to help me investigate this research topic only for academic purposes. I promise to keep your responses as confidential and use them only for the intended purpose. Thank you.

Name of market ……

Name of the respondent ……

Position ……

1. What are the responsibilities of the committee?

   ……

2. Does the committee take records of the major products traded on this market? Yes No

3. If yes, provide details of major commodities and volumes traded on the market

Name of commodity	Major source(s) (origin of goods to the market)	Mode by which goods are transported	Travel time

4. What facilities does the committee provide to traders in the market?

   ……

5. What are the challenges confronting traders in their efforts to transport their goods to the market?

   ……

   Are there market groups registered with the committee? Yes No

6. If yes, provide details.

Name of market group	**Total membership**

APPENDIX 3.4

GHANA HEALTH SERVICE, KRACHI.

Dear sir, I am a student of the Kwame Nkrumah University of Science and Technology offering MSc. Development Policy and Planning. As part of the requirement for the award of the degree stated above, I am conducting a research on the topic **"Transverse and Longitudinal Transport Services on the Volta Lake in the Krachi Catchment Area".** I humbly solicit answers to the questions below to help me investigate this research topic only for academic purposes. I promise to keep your responses as confidential and use them only for the intended purpose. Thank you.

Name of respondent ……

Position ……

1. Number of health facilities in the district

No. of Hospitals	No. of clinics	No. of maternity homes	No. of registered TBAs	No. of pharmacies & chemical shops

2. Do you run any mobile health delivery services to the island communities? Yes No
3. If yes, what types of services are on offer?

   ……

   ……

Origin of health workers visiting	Destination of health workers	Number of people visiting	Mode of transport used	Frequency of visit	Common ailments reported

4. If no, how do you serve their health needs?

   ……

5. Are you able to transport yourselves to all communities in your catchment? Yes No
6. If no, comment……
7. What is the doctor to patient ratio …… And nurse to patient ratio …… in the district?

APPENDIX 3.5

GHANA EDUCATION SERVICE (DISTRICT DIRECTOR OF EDUCATION)

Dear Sir, I am a student of the **Kwame Nkrumah University of Science and Technology** offering **MSc. Development Policy and Planning.** As part of the requirement for the award of the degree stated above, I am conducting a research on the topic **"Transverse and Longitudinal Transport Services on the Volta Lake in the Krachi Catchment Area".** I humbly solicit answers to the questions below to help me investigate this research topic only for academic purposes. I promise to keep your responses as confidential and use it only for the intended purpose. Thank you.

Name of respondent ……

Position ……

1. How many of these stages of education have these communities in the district?

Name of Community	Nursery/ Kindergarten	Primary School	Junior High School	Senior High School

2. How many pupils are there in the various stages?

Name of Community	Nursery/ Kindergarten	Primary School	Junior High School	Senior High School

3. How many teachers does the school have at the various stages?

Name of Community	Nursery/ Kindergarten	Primary School	Junior High School	Senior High School

4. How does the directorate transport educational materials to island communities?

   ……

5. What are the transportation difficulties faced by the District officers in their efforts to monitor and evaluate inland communities?

   ……

6. What are the major challenges of education delivery to island communities in the district?

   ……

Appendix 3.6

THE VOLTA LAKE TRANSPORT CORPORATION-KRACHI.

Dear sir, I am a student of the Kwame Nkrumah University of Science and Technology offering MSc. Development Policy and Planning. As part of the requirements for the award of the degree stated above, I am conducting a research on the topic **"Transverse and Longitudinal Transport Services on the Volta Lake in the Krachi Catchment Area".** I humbly solicit answers to the questions below to help me investigate this research topic only for academic purposes. I promise to keep your responses as confidential and use them only for the intended purpose. Thank you.

Name of respondent ……

Position ……

1. Whatmajor services do the company provide on the lake?

   ……

2. What is the capacity of the ferry crossing at Krachi?

Condition of ferry	Passenger	Freight

3. What are the major products transported by the ferry across and along the lake?

Products	Volume/Quantities per trip (Across)	Volume/Quantities per trip (Along)
Yams		
Cereals/grains		
Fish		
Fuel		
Wood products		
General goods		

4. What is the trip length, time taken, number of trips per day and amount charged to the major destinations?

FROM	TO	TIME TAKEN	AMOUNT CHARGE	NUMBER OF TRIPS PER DAY
Krachi	Odefour			
Krachi	Ehiamankyene			
Krachi	Grubi			
Krachi	Yeji			
Krachi	Akosombo			

5. How many landing sites has the company

i) Nationwide? ..... ii) Krachi West? …….

6. What are the plans in place to serve the transport needs of those communities without ferry services?

   ……

   ……

7. What measures are in place to regulate informal sector activities of transport providers on the lake?

   ……

8. What are the operational challenges facing the Volta Lake Transport Company in the district?

   ……

   ……

Appendix 3.7

DEPARTMENT OF FEEDER ROADS, KRACHI.

Dear sir, I am a student of the Kwame Nkrumah University of Science and Technology offering MSc. Development Policy and Planning. As part of the requirement for the award of the degree stated above, I am conducting a research on the topic **"Transverse and Longitudinal Transport Services on the Volta Lake in the Krachi Catchment Area".** I humbly solicit answers to the questions below to help me investigate this research topic only for academic purposes. I promise to keep your responses as confidential and use them only for the intended purpose. Thank you.

Name of respondent ……..

Position held …….

1. What is the nature of the road network in the district?

Total stretch of roads in KWD	Length of stretch tarred	Length of stretch not tarred	Length of stretch under construction	Roads in good condition	Roads in fair condition	Roads in poor condition

2. Has any portion of the road within the district been captured for upgrading under the Eastern Corridor Multi-Modal Transport Project (**ECMMTP**)? Yes No
3. If yes, how many kilometers? ……
4. Which communities are the roads suppose to link to each other?

   ……
5. Do the roads link the communities to the landing site? Yes No.
6. Has the project been awarded? Yes No
7. If yes, when are they to be completed? ……..

APPENDIX 3.8

KRACHI WEST DISTRICT ASSEMBLY (THE CO-ORDINATING DIRECTOR)

Dear sir, I am a student of the **Kwame Nkrumah University of Science and Technology** offering **MSc. Development Policy and Planning.** As part of the requirement for the award of the degree stated above, I am conducting a research on the topic **"Transverse and Longitudinal Transport Services on the Volta Lake in the Krachi Catchment Area".** I humbly solicit answers to the questions below to help me investigate this research topic only for academic purposes. I promise to keep your responses as confidential and use them only for the intended purpose. Thank you.

Name of respondent ……

Position ……

1. Does the Assembly have oversight responsibility over boat/canoe operators on the lake? Yes No
2. If yes, how many boat and canoe associations are registered with the Assembly? …
3. How much does it cost each owner to register with the assembly? ……
4. What is the total number of boats and canoes registered with the Assembly? ……
5. Do owners make monthly/yearly payments to the Assembly as charges for their operations? Yes No
6. How much? (if yes to question 5) ……
7. What are the rules for registration/entry?

   ……
8. What facilities/assistance does the Assembly provide to the boat/canoe operators on the lake?

   ……
9. Are there by-laws enacted by the assembly to regulate transport activities on the lake? Yes No
10. If yes, what are some of the laws?

    ……

    ……
11. Does the Assembly fix the amount charge by boat operators on the lake? Yes No
12. If yes, what is the procedure involved in fixing the charges?

    ……

    ……

13. How has the Assembly helped the island communities to meet their education, health and market needs in terms of accessibility to these facilities?

    ……..……

    ……

14. As an Assembly, what difficulty do you face in your efforts to serve the needs of the population with regards to transportation?

    ……..……

    …..……