

UNIVERSITY OF GHANA

**CHALLENGES OF WATER SUPPLY IN URBAN GHANA: AN ASSESSMENT
OF THE COPING STRATEGIES IN ADENTAN MUNICIPALITY**

BY

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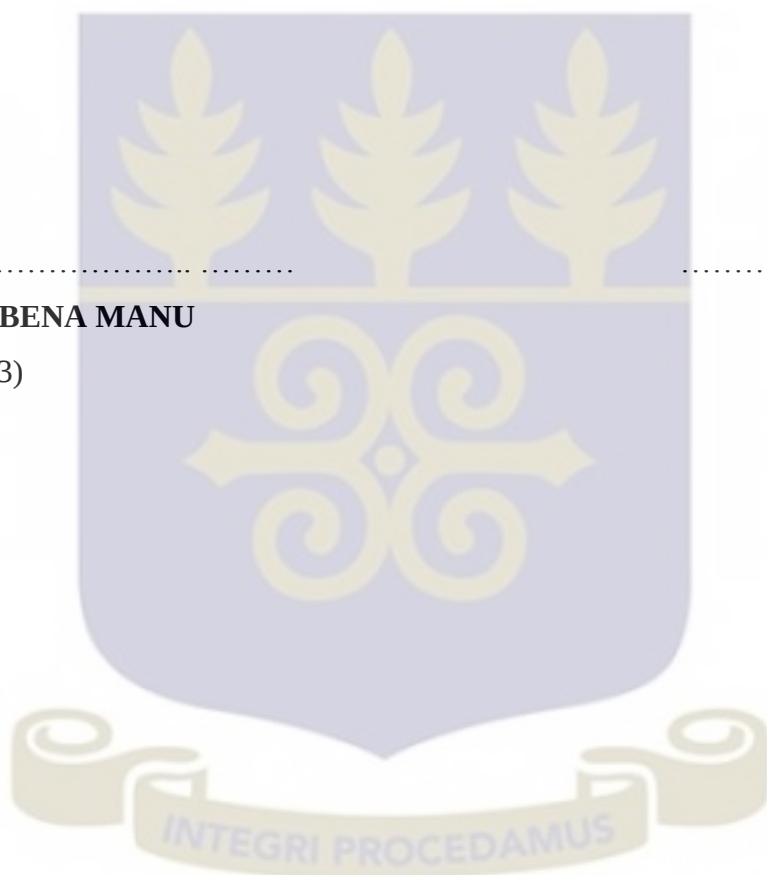
DECLARATION

I do hereby declare that this work is the result of my own research and has not been presented by anyone for any academic award in this or any other institution. All references used in the work have been acknowledged.

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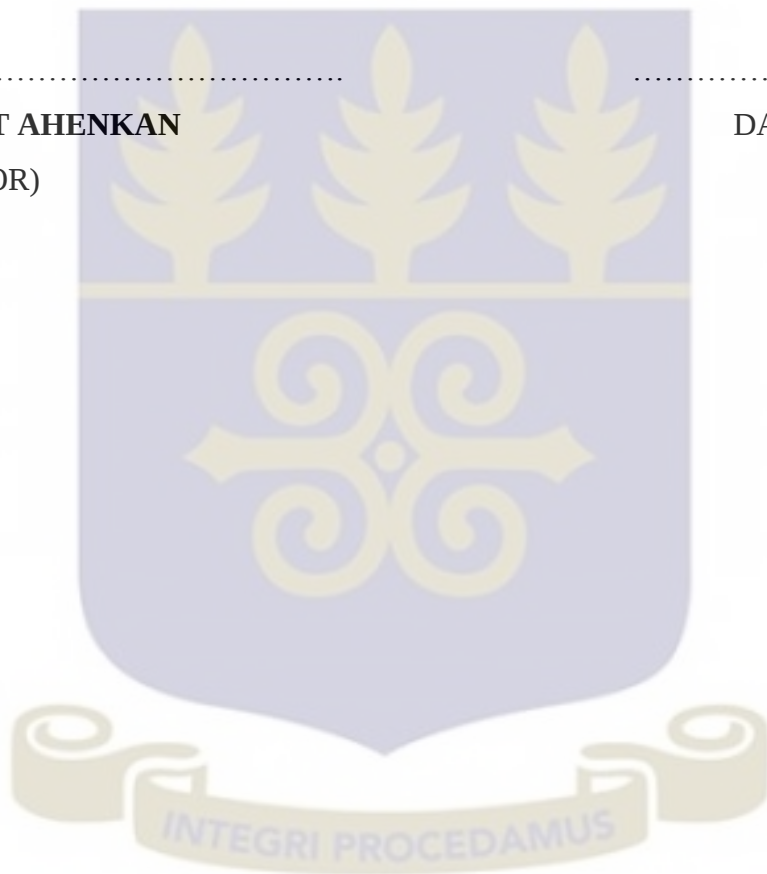


CERTIFICATION

I hereby certify that this thesis was supervised in accordance with procedures laid down by the University.

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DEDICATION

I dedicate this work to the Almighty God for His sufficient grace, love and mercy towards me. Also, to my God given caring Guardians Mr. /Mrs. Manu Yaw Joseph, my Mum, Madam Vida Afia Num and my entire family.



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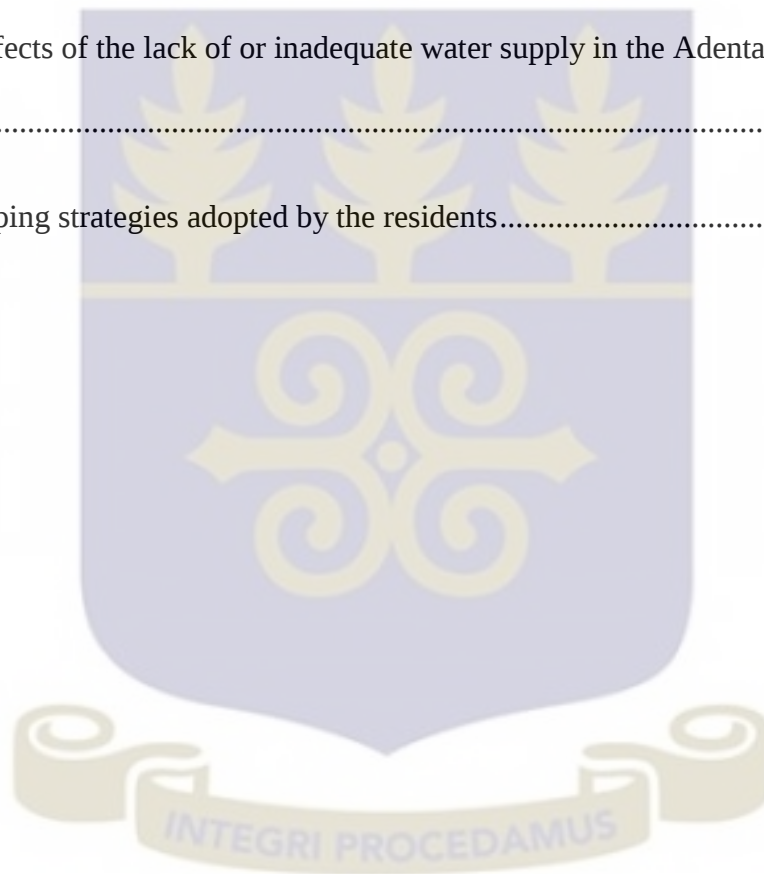
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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AdMA	Adentan Municipal Assembly
GII	Ghana Integrity Initiative
GLSS (6)	Ghana Living Standards Survey round six
GOG	Government of Ghana
GSS	Ghana Statistical Service
GWCL	Ghana Water Company Limited
GWP	Global Water Partnership.
IPCC	Intergovernmental Panel on Climate Change
MDG	Millennium Development Goal
MWRWH	Ministry of Water Resources, Works and Housing
NPM	New Public Management
OECD	Organization for Economic Co-operation and Development
SADC	Southern African Development Community
UN	United Nations
UNDP	United Nations Development Program
UNESCO	United Nations Education Scientific and Cultural Organization
UNICEF	United Nation International Children Emergency Fund
WHO	World Health Organization
WSSCC	Water Supply and Sanitation Collaborative Council
WUP	Water Utility Partnership
WWC	World water Council

ABSTRACT

In most developing countries, it has been recognized that conventional water utilities have fallen short in providing adequate water services to populations especially to urban residents. The little water produced by these water utilities is not evenly distributed. In Ghana, Adentan Municipality is a typical community that is presently faced with inadequate water supply due to the inability of the Ghana Water Company Limited (GWCL) to supply water to the area. Most households in the municipality therefore seek other alternative sources of accessing water. This study examined the challenges of GWCL in providing water to the Municipality, the coping strategies adopted by households and the socio-economic effect on the people. The study design is a case study and the approach is a mixed method. Quantitative data was collected from 200 households while qualitative data was collected from 6 informants from the GWCL (the institution responsible for urban water supply) through an in-depth interview. The study revealed that the major challenges faced by the GWCL are inadequate funds for operation, corruption, politicization of the water sector, unplanned township/community, and frequent electricity power outages among others. Again almost every household adopt a coping strategy mainly alternative means of accessing water other than the GWCL and also by conserving the little water accessed. Among others, the most socio-economic effects the municipality face due to the lack of or inadequate water supply are the risk of drinking untreated water from the open wells/tanks or surface waters, undue exploitation of residents by informal water suppliers. The study recommends provision of adequate and of timely funding to GWCL by the government, total desist of politicians from interfering in the management of the institution, and a law to regulate the activities and prices of the informal water vendors in the Municipality.

CHAPTER ONE

1.1. Introduction

This chapter gives an overview of the topic. It presents the problem statement, objectives and, research questions of the study, the significance of the study, and the scope of the study and organization of the study.

1.2. Background

It is evident that throughout history, mankind's ability to live in harmony with his environment has been dependent upon the accessibility of water. This emanates from the fact that water is a prime natural resource so indispensable that man cannot live without it. It has no substitute. As a result, one of the first global discussions to address global water challenges (the 1977 Mar del Plata Conference) identified water as 'basic need'. It states, "all people, whatever their stage of development and their social and economic conditions, have the right to have access to drinking water in quantities and of a quality equal to their basic needs" (UN, 1977).

Access to quality water equal to a person's basic needs therefore, is a basic fundamental human right that must be recognized in every country (UN, 2010; Gleick, & Palaniappan, 2010). Following this, the United Nations General Assembly acknowledged on 28 July 2010 that clean and safe water especially for drinking purposes is a right indispensable to the complete gratification of any other rights in life. This was subsequently affirmed by the Human Rights Council of the UN at the fifteenth conference in September, 2010 that, "the right to water has its root from the right to an adequate standard of living which is inextricably linked to the right to the highest attainable standard of physical and mental health, as well as to the right to life and human dignity" (UN, 2010).

The health status as well as the happiness of the people in a particular society is weighed by sustainable access to quality water (UNICEF and WHO, 2013). This presupposes that, people irrespective of their status in life cannot survive without access to sufficient water (Crow and Odaba, 2010; Osumanu, 2008). Therefore, consistent and reliable supply of water is crucial to the enhancement of public good in a given society (Cook and Bakker, 2012).

However, inadequate supply of water in developing countries is major pressing problems affecting their economic and social development (Allan, 2011; Chenoweth, 2008). Therefore, Millennium Development Goal seven (MDG 7c) set by United Nations Declaration seeks to halve the percentage of global population who lack adequate supply to water before the end of 2015 (UN, MDG 7c). About 89% of the global population as at 2012 were said to be using an improved source of drinking water. Notwithstanding this massive achievement, about 780 million people were estimated to lack access to water. If the same development continues, the number of the unserved can only be reduced to about 605 million by the end of 2015 (WHO/UNICEF, 2013).

Whereas the supply of water in terms of quality and right quantity may not be a major challenge in many developed countries, the problem is more severe in many cities in the developing world (Cook and Bakker, 2012; Crow and Odaba, 2010; Dijkvan, 2003). In every ten people who live in sub-Saharan Africa, four of them are estimated to be lacking access to proper sources of drinking water. Thus, only about 61% of the entire population in sub-Saharan Africa has access to improved sources of water (WHO/UNICEF, 2013).

The Water Utility Partnership (WUP), an organization that assists in building capacity of sanitation and water supply utilities in Africa, has noted that: “public water services in many African countries have been assigned to a single water authority and the abilities of governments to deliver water adequately have been negatively affected by a number of factors. The urban water systems are characterized by heavy losses both financially and of water itself” (WUP Africa, 2003). In spite of this, Africa is urbanizing in an unprecedented rate as compared to any other region on the globe (ADB, 2006).

Unlike other countries, rainfall in Ghana is not scarce. Many of the rivers therefore flow for a longer period within the year. Some even never dry up at all. About 39.4 billion m³ per year is reported to be the total water available from surface water sources in Ghana (Ministry of Water Resources, Works and Housing (MWRWH), 2007). Ground and surface sources of water are the two major potential water resources in Ghana. The surface water sources are mainly from three river systems that drain Ghana: the Coastal, South Western, and the Volta river systems. Approximately 70% of the land area of Ghana is covered by the lower Volta River system, which is made up of the White, Black and the Red Volta rivers, the Oti River. The South-Western and the Coastal river systems are made up of 22% and 8% respectively of the total land area (MWRWH, 2007).

Notwithstanding the availability of water resources in the country to meet the demand of the population, there are still deficits in coverage especially in the urban centers (Oduro-Kwateng, 2011; Nyarko et al., 2008). Prior to the early 1970's, eighty percent of the population in urban centers in Ghana had reasonable supply of water, the figure dropped to seventy percent in the 1990s and was below sixty percent as at 2007 (Dreschel and Van Rooijen, 2008). Even though there seems to be a clear evident on the street and households

of urban areas of the gap between water demand and supply from the GWCL, the 2013 UNICEF and WHO Joint Monitoring Programme (JMP) report indicates that, Ghana has an overall coverage of 84% which exceeds its MDG target of 78%. However, hidden behind these figures is the struggle especially urban dwellers go through coupled with huge cost in order to get access to water in sufficient quantity and of right quality.

1.3. Problem statement

Undoubtedly, many people particularly in less developed world are currently facing enormous suffering and tragedy because of lack of access to basic water requirement. Still, continuous growth population and the inadequate capacity or efforts of the stakeholders to enhance the supply of water to this growing urbanization confirms that, this challenge is likely to be worse even before it is enhanced (Olajuyigbe, et al., 2012; Allan, 2011). According to the Asian Development Bank (ADB, 2006), many people in less developed countries suffer sicknesses resulting from polluted water supplies.

Drinking is not the only need for water in the household. Equally, there are other important health, social and economic needs of water that requires urgent attention (WHO, 2003). The lack of this attention on the part of governments and other stakeholders responsible for water supply brings some social and economic burden on households. Perhaps, what is worsening the problem is the lack of consensus of the minimum requirement of water per capita per day to meet the health, social and economic wellbeing of the people (Misra and Malhotra, 2011). This difficulty in quantifying this basic requirement emanates partly because the water minimum requirement differs from one culture to another and also differences in climatic condition (García-Valiñas, et al.; 2010).

Many ranges of estimates have been proposed by international organizations and scholars to be the basic water requirements per capita (Gleick, 2004; Batram, 2003; WHO/UNICEF, 2000; Gleick, 1996; Shuval, 1992; Falkenmark and Widstrand, 1992). These figures range between 20 and 4,654 liters per capita per day (l/c/d).

WHO/UNICEF (2000), in their Global Assessment of Water Supply adopted the figure of 20 l/c/d mainly for domestic hygiene purposes. However, the source of the water should be from one of a range of technologies largely considered capable of delivering clean water within one kilometer of a person's household. Gleick (1996) suggested that international agencies and water suppliers adopt "an overall basic water requirement of 50 l/c/d" as a minimum standard to meet four basic needs including drinking, cooking, bathing and sanitation in the house. Shuval (1992) however estimated 68 l/c/d for these purposes. Again, whereas Howard and Batram (2003) suggested that, at 100 l/c/d all domestic health and hygiene needs can be met, Falkenmark and Widstrand (1992) considers the same figure (100l/c/d) for personal use as a rough estimate of the amount of water needed for a minimum acceptable standard in the developing world. The above estimate primarily considers only human consumption and hygiene purposes. However, another look at the components of basic water requirement estimates to include human health, economic and social development will reveal higher estimates (Chenoweth, 2008).

Comparatively, sub-Saharan Africa has the lowest coverage of safe drinking water supply in the world. The number of people depending on 'unimproved' sources (due to concerns over the quality of the water) for drinking purpose has almost doubled over the past twenty years period, from about 44 million to 85 million (WHO/UNICEF, 2013). Improved drinking water according to UNDP includes "those sources that by nature of

their construction or through active intervention, are protected from outside contamination, particularly faecal matter” (UNDP, 2010). Some of these improved sources includes piped water on premises, public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs and rainwater collection (WHO/UNICEF, 2008a).

Again, sub-Saharan Africa countries have generally not been able to provide water to several deprived communities with their public supply systems. As such, many of the citizens are being constrained to buy water at higher prices from informal water suppliers (WHO, 2006). Meanwhile, these groups usually lack the financial strength to address the health effects linked with the drinking of poor quality of water. This phenomenon ought to be of higher concern for governments and international aid organizations in the water sector than it appears currently in Ghana. Thus, the problem of water supply shortage in most parts of urban Ghana needs immediate attention and action in ensuring water supply to all residents (WaterAid, 2008).

Ghana Water Company Limited (GWCL) - the only institution responsible for urban water supply currently meets only about 60 percent of the total water demands (Nyarko et al., 2008; WaterAid, 2008; Adank et al., 2011; JMP, 2013). The daily average capacity of Ghana Water Company Limited (GWCL) is estimated as 551,000m³/day against a daily demand of 939,000m³ (GII, 2011). This creates a deficit of about 388,000m³ per day. As such, maintaining several access points to water sources is one practice through which the urban residents outside the coverage of the GWCL in particular generates water security (Nyarko et al., 2008; Cook and Bakker, 2012).

The inability of the Ghana Water Company Limited to bridge the gap of demand and supply of water in the urban communities therefore is not a mere exaggeration. This is made manifest in the frequent adoption of intermittent method of supplying water to many parts of urban communities. Several other urban areas are denied flow for many days within the week (GII, 2011).

In Ghana, in spite of the effort of the government to address the perennial water scarcity in many parts of the city of Accra, the problem keeps on unfolding and acute water shortage can still be found in areas such as Adenta, Madina and other parts of Accra.

Access to water has not only become a key factor in choosing where to live, but also the rent rate to pay. The same property will cost less if there is no reliable water supply. It is therefore relatively cheaper for people in low income bracket to live in these relatively cheaper rent areas (WaterAid, 2008).

According to Ghana Integrity Initiative (GII), urban water supply in particular is highly erratic and that between 2 and 43 per cent of consumers of the GWCL are supplied with water just for 3 days or less each week. Many customers especially on higher locations are denied of water because of poor distribution pressures (GII, 2011). In addition, there is a limited supply hour which influences the levels of consumption to differ considerably between 20 and 100 l/h/d instead of the projected average consumption level of 75-150 liters per person per day by the GWCL (GII, 2011).

Water Aid (2008) also revealed that, in Accra and its environs many residential area lack 24 hour flow of water. Approximately, only 25% enjoy a 24-hour supply of water for the

week from the GWCL. About 30% on average enjoys half a day of flow for five days. Another 35% enjoy the flow for only 48 hours each week. The remaining is unserved and therefore has to adopt some informal means of assessing water for their households. Unfortunately, these informal suppliers supply the rest of the unserved people with unsafe alternative water sources sometimes at prices ten times higher than recommended (Larbi, 2005).

Currently, the urban water utility (GWCL) experiences a dire financial condition (UN, 2012). This affects its effective performance hence their inability to serve the entire urban residents.

Adentan Municipality is one of the urban centers that increasingly experience this perennial water problem (Doe, 2007). The Municipality has a total population of 78,215 based on the 2010 Ghana Statistical Service (GSS) Population and Housing Census. There are 34 communities and four electoral areas in the Municipality (AdMA, 2008). Meanwhile, during the 2000 census, there were 18 communities in this area, with a population of 62,715. An estimated population growth rate in the Municipality is 2.6% GSS (2010). Unfortunately, water supply is unable to keep pace with this growth rate in the Municipality.

The poor water supply situation in Adentan Municipality has therefore resulted in various coping strategies by the inhabitants. An understanding of the challenges the GWCL face in supplying water to the Adentan Municipality, the coping strategies adopted by the residents and their associate social and economic effect, the focus of the study, is crucial

to inform policy makers on the ongoing effort to improve the water situation in the Municipality.

1.4. Objective of the study

1.4.1. General objective

The main objective of the study is to examine the water supply challenges of the Adentan Municipality, the socio-economic effects, and the coping strategies adopted by the residents.

1.5. Specific objectives

The specific objectives of the study are:

1. To examine the major challenges of adequate water supply in Adentan Municipality.
2. To examine the socio-economic effects of the water supply shortages in the Municipality.
3. To investigate how the residents in the Adentan Municipality are coping with the problem.

1.6. Research questions

The research questions that will be address are:

1. What are the major challenges of adequate water supply in Adentan Municipality?
2. What are the effects of the water shortages on social and economic development of the residents?
3. What are the coping strategies residents adopt to bridge their gap of demand and supply of adequate water?

1.7. Significance of the study

This study is expected to increase the knowledge and provide up to date information on the challenges of urban water supply in Ghana, the coping strategies urban dwellers adopt to meet the demand and the socio-economic impacts of the water situation on residents. It will also serve as a working document to policy makers and Non-Governmental Organizations in the water sector. The study will further serve as basis for any further investigation, as a valuable material for academic purposes.

1.8. Chapter disposition and organization

The entire thesis is organized into six chapters as follows:

Chapter One covers the general introduction, problem statement, research purpose, objectives, research questions, significance, limitations of the study and the chapter organization of the study. Chapter Two presents a review of some relevant literature on supply of water, coping strategies and socio-economic effects of inadequate water supply. This was followed by the theoretical foundation and the conceptual framework for the study. The methodology constitutes Chapter Three of the thesis. This part include the research approach, design, the scope of the study, population and sample size, sampling technique, data collection instruments, source of data, tools of data management and analysis.

Chapter Four covers data presentation and analysis of the findings. The Fifth Chapter discusses the major findings and also compares the findings with the reviewed literature. Chapter Six comprises of the summary of the research, recommendation and conclusion.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter presents a review of the literature related to the topic. It begins with the global household water supply. This is followed by the description of the nature of household water supply services with specific reference to the water supply systems, and some core features of water that influences government's interference in its production and supply. The next section offers a general definition of access to water and the mechanisms of supplying urban water. This is followed by urban water supply and access in the Ghanaian context. The next section presents some of the challenges of urban water supply in Ghana. The coping strategies adopted and the socio-economic effects on the citizens as a result of the inadequate water supply are also highlighted. The next section highlights on the theoretical foundation on which the study is anchored. Finally, a conceptual framework for the study is developed to guide the research.

2.2. Global household water supply

Globally, most countries are not only facing political and economic challenges but also water crisis. This however has not become the burden of only governments but the citizenry who are denied with the luxury of reliable water supply (Misra and Malhotra, 2011). Notwithstanding the availability of water resources in some countries to the extent that they do not value its worth, there exist a severe scarcity of the water in some regions on the globe. Citizens of these water scarce areas normally resort to daily purchase of water for their households (Misra and Malhotra, 2011). Meanwhile, access to adequate water is a basic need. It's also very important to both human and economic development (UNICEF, 2014; UN, 2010; Shah, 2010).

But unfortunately, water supply is not matching the demand of the people in many parts of the world (Hanjraa and Qureshi, 2010; Rogers, 2008; Chamberlain, 2008). There is severe pressure on the little available water. Multifarious factors account for this pressure. Climatic changes, rapid global population growth, continuous increase in per-capita use of water, pollution of the available water resources among others (Aizebeokhai, 2011; Vörösmarty et al., 2010; Evengard, et al.; Jones et al., 2009).

Meanwhile, global freshwater withdrawals have increased over the last half a century as the demand for water keep rising year by year (Gleick and Palaniappan, 2010). Currently, companies which relies on water for the production of their goods or rendering of services are hugely affected (Ringler, et al, 2010).

But it seems international efforts and resolutions to improve upon water supply in terms of universality of access and adequacy have produced little positive results (Jones et al., 2009). This is because, despite the effort in terms of policies and investments for many decades, several millions of people are still without adequate access to water (Onda et al., 2012; UNESCO, 2009).

One major concern which is making it difficult to achieve global universality of access to water is the existence the regional and national disparities in terms of water availability and supply. Water is not evenly available on the globe. Only nine countries have approximately more than half the global available fresh water (Clarke and King, 2004). Meanwhile, population in these countries is less as compare to regions and countries with little availability of water whose population is also increasing at an unprecedented rate (Grimond, 2010). For instance, while coverage of improved water supply is approximated

about 61% in sub-Saharan Africa, it is about 90% in Latin America and in the Caribbean (WHO/UNICEF JMP, 2013). Also, in the SADC region, out of the region's estimated population of about 260 million, about one hundred million people do not have adequate supply of water (Mushizhi, 2010).

2.3. Nature of household water services

2.3.1. Description of the water supply system

Usually, the water pumped to households through municipal systems is produced from a source of water, transmitted to the final consumers in their households through a network of pipes and appurtenances (reservoirs, valves, bends and meters) well-known as the distribution systems that transfers the water (Brooke, et al., 2013). The source of the water varies. Depending on the treatment system and the technique, the water may either come from a large managed reservoir, surface water, among others. The transmission system on the other hand, consist of a very large pipes through which the water is transferred from the production and treatment center sometimes to other stations for distribution to the various communities (Shannon et al., 2008). The distribution or delivery networks however are through a relatively medium or small size pipes normally laid in the community and to the households' (Brooke, et al., 2013; Shannon et al., 2008).

The engineering aspects that make the production and delivery possible according to Nyarko (2008) are intended to achieve the following:

- ✓ To produce and transmit the required water to a particular geographical area or community.
- ✓ To ensure that the appropriate pipes are laid to enable effective transmission of the water to the final consumers in their households.

- ✓ Design and create suitable contingency storage facilities to cater for emergency situations.
- ✓ Ensuring consistency and reliability of quality water supply.
- ✓ Ensure adequate pressure to aid taps flow irrespective of the location of topography.

Many factors combine to influence to nature of the water supply system and how it is organized. The geographical area especially the topography, the availability of water resource, and the capacity of the institution(s) responsible for the water supply are among the major determinants (Nyarko and Franceys, 2008).

2.3.2. Some features of household water sector

There are many reasons and arguments that support the need to supply water to citizens in their household. Water supply to households' is regarded as a natural monopoly, private or public good, as well as a merit good. The premium attached to a particular feature determines how the water sector is structured and operates in that country.

2.3.3. Household water as a natural monopoly.

Basically, natural monopoly occurs when the production or rendering of a particular good or services is in the hands of a single organization or firm (De Witte and Marques, 2008; Baldwin and Cave, 1999). It is highly undesirable for competition to exist where there is natural monopoly (Grafton and Ward, 2007). The nature and importance of such good or service demands governments' intervention to monopolize its production or delivery for the good of the citizenry. The supply of household water is one of such service. Subject to the regulation of water bills and quality of services, governments in most countries in the developing world have only one agency or institution which produce and supply water

especially to the urban population as in the case Ghana, the Ghana Water Company Limited (Nyarko and Franceys, 2007). In such conditions, it is the duty of the government to consistently provide the necessary funds to ensure effective operation of the monopolized firm. Again, in order to ensure efficiency and effectiveness, governments can partner or delegate some of the non-core aspect to private organization (De Witte and Marques, 2008; Dijk van 2003).

2.3.4. Household Water as Public or Private good

Water can be classified as either a public or private good (Albuquerque and Roaf, 2012). In economics and political economy, rivalry or subs-tractability and excludability are used to determine whether a good is public or private. Public goods are those for which the basis for a public role in its production or delivery is clear as it is practically impossible to exclude one additional consumer without excluding all consumers and the marginal cost of providing for an additional consumer is zero, once the good has been produced (Mason, et al., 2013).

Thus, the principle of excludability and subs-tractability is the basic determinant of assessing the extent to which a good or service is or closer to been a public or private (Gruber, 2011; Sturn, 2010; Ragan et al. 2007). Subs-tractability can only exist in a situation where the value of a good or service can be reduce for one consumer in order to increase the value at the same time to another consumer. Usually, public goods or service uses zero sub-tractability as long as there is no congestion that can affect sustainability of operation (Sturn, 2010). In the case of water however, when provided through piped networks water supply is usually limited and can be considered a private good (Hall and Lobina, 2006). Free tap stands and point sources that can be accessed by anyone unless

they are fenced or protected by force are public goods. Regulation to ensure water supply, quantity, price or quality can also be characterized as a public good (Nyarko and Franceys, 2007).

Excludability on the other hand refers to the situation where the provider of the good or service has the means and mandate to exempt consumers or user who are unable and sometimes unwilling to pay after the good or services is rendered (Oduro-Kwateng, 2011; Nyarko and Franceys, 2007). When it is impossible or too expensive to exclude users the service becomes a public good. But when the price or potential consumers can be prohibited from benefiting from the service without paying the price, and no other way of free riding is available, the service becomes private good (Sturm, 2010; Nyarko and Franceys, 2007)

Still, the public-private good dichotomy framed in an economics viewpoint has an uneasy connection with the general rights-based discourse prevalent in the sector, which argues that, the public sector has a responsibility to ensure all rights-holders have access to safe, acceptable, and affordable water sufficient for personal and domestic uses (Albuquerque and Roaf 2012; World Bank, 2010; UN, 2003). In principle, this is well-matched with the definition of regulatory functions as a public good as long as those functions, assumed by the rights-bearer (usually the state) extend to ensuring that tariffs and other charges remain affordable for all. In practice, however, many people including many poor people are excluded from the official water supply in the first place. This means that whether or not tariffs are regulated makes little practical difference (Harris et al., 2012).

Since the supply of household water is mainly in-house connection or public standpipes (Hall and Lobina, 2006), excludability from access is possible. The providers simply disconnect a house or consumer upon non-payment bills either and through “pay as you fetch” for a standpipes (Nyarko and Franceys, 2007). Water use is also rivalry and hence water supply service could be considered as a private good.

2.3.5. Household Water as a Merit good

The value of water to human life makes it to be considered as a ‘merit good’. According to Ilori (2004), a merit good “has some intrinsic values which left to individual consumers, may not be consumed at the required levels but when readily available and when consumed the long-term effects are positive for the economy and hence deserve public sector intervention” The recognition of water as a merit good intend makes household water supply an important service (WSSCC, 2000). The feature of water as a ‘merit good’ denotes a universal accessibility hence, invalidates the excludability debate by making it a purely public good (Schleich, and Hillenbrand, 2009).

The ultimate reason for government intervention in the water provision through subsidies is the merit nature of water (McCloughlin and Bartley, 2012; Manghee and Poole, 2012). This rests on the argument that, not all citizens can afford the water when it is sold at the market price. As such, social tariff or minimal fees are charged by the water providers in many developing countries to meet the merit good principle (McIntosh, 2003).

2.4. Defining access to water

One of the most debatable issue among scholars and other stakeholders in the water sector mainly donor agencies, NGOs and governments, is how to agree on the definition of what

‘access to water’ is. WHO/UNICEF (2013) Joint Monitoring Programme (JPM) defines access to drinking water as the “proportion of population using an improved drinking-water source”. The opponents of this definition argue that, JMP’s description is too narrow in that it fails to consider the multifaceted nature of the use of water especially from the viewpoint of the final consumers. Kristof (2005) therefore suggested four key concepts that are essential when defining the accessibility of water to the final consumer. These include adequacy, quality, reliability and convenience of the water to the users. Other critics equate access to water to ‘water use’ with the principal notion that, accessibility of water can only be measured by the amount of water usable to the consumers (Kayaga et al., 2009).

In support, Kudat et al. (1993) also opine that some important qualities of water are demanded and not just any water. Thus, different quality water have varied value and purposes to the consumer particularly in their households. For example, the quality of the water for drinking purposes may be very important to the users as compared to the water for washing and cleaning.

Kristof (2005) description of access to water which implies “a reliable source of water, adequately supply to the consumer in good quality, and in a convenient manner” is adopted as a yardstick to measure accessibility of water in this study.

2.5. Urban water: the mechanisms of supply

Urban water supply is usually governed by an institution that is either partly or wholly governed by the state. Though privatization of urban water supply is going on in many countries, the treatment and supply of water holds some form of statutory or legal backing

to make them formal institution and are recognized by the public as such (Marston, 2014; Misra, 2014). A centralized piping network is the typical mode of supply in developed nations, while for developing nations this ‘modern infrastructure ideal’ (Graham and Marvin 2001) has long been an unrealized vision to which the formal sector has desired.

All through the colonial occupation in developing countries there was a motivation towards the development of large-scale state owned piping networks (Swyngedouw, 1995). While this development seemed successful in many of these countries, the post-independence period has been characterized by poor water governance. The newly independent states lacked the political, social, economic and administrative systems needed to develop and manage the water systems (Rogers and Hall, 2003). Therefore, effective delivery and further expansion of these services in these countries have been halted, while cities continued to grow in population (Rogers and Hall 2003; Swyngedouw, 1995). The result is that the public water utilities have limited supply networks which excludes large portions of their communities unserved (Bakker, 2010; Davis, 2005). Guinea provides a perfect example. Following independence Guinea struggled financially and a cut in public water supply followed. By the late 1980s, less than 40% of the urban population in Guinea had access to piped water (Rivera, 1996). Guinea’s response was to privatize the country’s water supply, following the trend of privatization that was spreading throughout the developing world under the period of neoliberal reform (Bakker, 2010; Tecco, 2008; Hall and Lobina, 2006; Parker and Kirkpatrick, 2005; Rivera, 1996).

As water governance and public investment in the maintenance and expansion of failing colonial water systems deteriorated in the developing world (Davis, 2005; Tecco, 2008), development banks and donors promoted privatization, particularly during the late 1980s–

1990s (Rivera 1996; Parker and Kirkpatrick 2005; Hall and Lobina, 2006; Tecco. 2008). Privatization is a contract between the public authority and a private company, through which the company assumes the responsibility for the operation of water system in a country (Hall and Lobina, 2006). Proponents argued that privatization would solve the world's water problems (Bakker 2010), by introducing new methods financing, improving service quality, expanding coverage, improving management, and increasing revenues (Rivera, 1996; Parker and Kirkpatrick, 2005; Bakker, 2010). However, it soon became apparent that the realization of this is founded upon the type of contract entered into. Thus, whether this is a concession, lease, or management contract, all of which are characterized by different levels of responsibility and financial inputs (Hall and Lobina, 2006).

In contrary, the supply of water has become a monopoly developing countries characterized by a single operator who often provides sub-optimal quality and quantity of water services (Tecco, 2008). Consequently, the 'informal' settlements in general remain unserved. In general, only about 40–70% of the populations in most cities in developing countries are supplied with water from their formal institutions responsible for the water supply. The rest access their own waters usually from the informal water suppliers (Ahlers, et al. 2014).

Informal community-based water provision dominates means of water supply in many developing cities where households either purchase water from small-scale vendors (Kooy, 2014; Misra, 2014). While the use of surface water and groundwater is socially embedded in communities, during the privatization phase, neoliberal rationalities created a stigmatism towards informal supply, believing that informal supply was secondary to the

idealized formal supply piped network (Kooy, 2014; Misra, 2014). This stigma have further exacerbated by the definition of safe water under the MDGs, whereby collecting water from carts, tankers or surface waters are not classified as improved means of accessing water (UNDP, 2013). In reality the quality of these sources cannot be guaranteed, hence the general attitude that these water sources do not constitute ‘improved means of supply’.

2.6. Urban water supply in Ghana.

The supply of water in Ghana is structured and broadly divided into two main forms. The urban and community or rural water supply. Ghana Statistical Service (2010) defined a locality with the population that exceeds five thousand as an urban community while less than five thousand is considered as rural. This study is however limited to only urban water supply.

Ghana Water Company Limited (GWCL) is the only institution responsible for urban water supply (National Water Policy, 2007). Although the institution depends on government subventions and Internally Generated Funds (IGFs) in funding their projects, it also receives huge financial support from donor agencies.

2.7. Access to water in urban Ghana.

Current reports on water in Ghana reveal that, there is much improvement in accessing safe water is in Ghana. In spite of this enormous progress, Ghana Water Company Limited (GWCL) currently meets only about 60% of the demand of urban and peri-urban residents (WHO/UNICEF, 2013; Nyarko, et al., 2008; WaterAid, 2008). Rapid development coupled with an increase in population and insufficient funding is cited as some of the

reasons why GWCL is unable to meet the water demand. As such most urban settlements are not connecting to the national grid. Also, production of the water is unable to match the daily demand. Therefore, there is always a daily supply deficit. Consequently, GWCL mostly implement a water rationing schedule which directs water flows to certain parts of the city on selected days (Adank, et al., 2011). This is done to ensure the water is equitably shared to the various communities as schedule. Some areas are reported to receive water supplies once a week or not at all, while other areas may be serviced as often as seven days a week (Government of Ghana, 2007; Stoler et al., 2012; Morinville, 2012). Notwithstanding this rationing schedule, even scheduled water services are reported to be intermittent as the water may flow for a mere few hours or only during the night (Nyarko, et al., 2008). Even though both higher and lower-income households are affected by the unreliable water flow, the former can often afford the purchase and installation of polytanks to store water. The urban poor rely more heavily on informal vendors, community standpipes and surface water sources, storing in smaller containers and procuring water on a daily basis (Songsore, 2008; Ainuson, 2010). GWCL recognizes this economic status disparity. To solve this, GWCL through the Public Utility Regulatory Commission (PURC) has implemented a lifeline tariff policy which is designed to offer a basic amount of water at a lower cost to lower-income households through a two-block tariffs system (PURC, 2010). However, these lower-income households still face problems of accessing water from the municipal networks. The case study site-Adentan Municipality is an instance of a peri-urban area where many of the low-income population do not have direct access of water from the GWCL network (Stoler et al., 2012a; Adank et al., 2011).

2.8. Challenges facing water supply

There are a number of reasons why many urban residents lack adequate water supply. These challenges range from political, economic, technical, social and environmental, administrative.

2.8.1. Political and administrative Challenges

In Ghana like in most African countries, the provision of clean and safe drinking water to all citizens is the responsibility of the government. A strong political will of governments is needed to make this effective. However, this political will is often missing in most of these countries (UN, 2006). This makes it difficult for the institutions responsible for supplying water to the people to operate effectively (Cross and Morel, 2005). Governments show keen interest in the water sector mostly during an election year. Again, the excessive interference by governments and politicians in the water industry basically for political expediencies (Addo, 2010; Bathsheba, 2011) is worrisome. Short-term policies and tariff setting are influenced by politicians (Bohman, 2010; Doe, 2007).

In Ghana, there is also a clear demonstration of political influences in the appointment as well as in the determination of the tenure of office of the Chief Executive Officer and Board members of the GWCL (Addo, 2010). The President has the power to appoint the Chief Executive Officer of the GWCL (Nyarko and Franceys, 2003; Constitution of Ghana, 1992). While the details of these consultations remain obscure, usually political party sympathizers are appointed to position (Hirvi and Whitfield, 2015). As such, the appointed Managers prefer making decisions to follow the status quo instead of being innovative in solving the challenges that confronts the company. The water institutions lack permanent Managing Directors (MD) (Doe, 2007). This insecurity of office repels

competent people to accept employment opportunities the GWCL. The position is usually filled by ‘acting’ office holders (Nyarko, 2007).

2.8.2. Economic challenges.

Production and supply of portable water is a capital intensive business which requires huge capital investment (Fuest and Haffner, 2007). There is no substitute for funding the water sector if sustainably supply of portable water is needed. Governments have to show commitment in funding the water sector on timely manner. However, in many developing countries, in addition to inflation and exchange-rate losses caused by the depreciation of the local currencies, the governments lacks adequate financial commitment in funding as well as developing and implementing proper water policies (WaterAid, 2013). This emanates as a result of the weak economic situation of these countries which impedes the effective development of the water sector (UN, 2010). In Ghana, government depends much on donor agencies in funding the water sector. For instance, in 2014 budget statement, out of the amount of GHC 531,389,023 allocated to the water sector, about 82 percent (GHC435, 647,085) was projected to come from donor partners (Government of Ghana budget, 2014). Meanwhile, this donor funding has been mired in undue delays which hinders the effectiveness and efficiency of implementing the water projects.

Yet, the cost of the necessary materials and equipment (the pipes, valves, fittings, service reservoirs, booster stations, meters, etc.) are very high (Omotayo, 2014). This leads to inadequate networking which denies most people access portable water through the network system of the GWCL.

While the water sector experiences these financial difficulties, the sector is plague with corruption cases in various levels. Van Rooijen (2008) points out that corruption is a key

challenge hindering the effective operation of water agencies in Ghana. High level official use materials and equipment of the agencies and either sell them to households or take bribe before connecting households into the national grid of which the monies does not go into the coffers of the institution. Revenue collectors also take bribes from customer and under-report the actual monthly consumption level. Some technicians of the company (GWCL) also tamper with water meters and aid illegal connections into houses for a fee (Van Rooijen, 2008). For example, in 2006 over 50 employees of the GWCL were arrested as responsible for the establishing of over 1,000 illegal connections (Transparency International, 2008). Again, participants from different sector organizations in a workshop organized by Water Integrity Network (WIN) in April 2010 did an Annotated Water Integrity Scan in Ghana and established that accountability and anti-corruption regulation in urban water supply projects is only partly applied giving an integrity score of respectively 58% and 45% (WIN, 2010).

2.8.3. Social and environmental challenges

Most developing countries are rapidly urbanizing at a higher rate and Ghana is no exception. For instance, in a study by Doe (2007) in North Teshie, an overwhelming majority (81%) of the respondents attributed the major challenge of the water shortage in the area to the fast expansion of the township, which the few old existing pipelines cannot support. As a consequence, demand for water in urban areas keeps increasing in geometric progressions while extension of pipeline networks to the new settlements increases in a stepwise arithmetic progression (Omotayo, 2014). This continues development means the need for construction and expansion of more social amenities such roads and houses to these centers. However, sometimes in the course of the construction, already laid pipelines, maker post, chambers among others are damaged. It therefore becomes a

difficult task in locating the displaced meter posts (Jegede, 2012). Similarly, monitoring operation becomes a herculean task when some of the undamaged pipelines lie completely under roads. Again, since the provision of water is viewed as a social obligation of only governments and water agencies (UN, 2010), cases such as pipe bursts in pipelines for instance, is not realized as the responsibility of the consumers. Thus pipe bursts before flow meters located within consumers' residences may not be reported (Jegede, 2012).

Moreover, there are many illegal connections to water distribution pipelines and networks in many African cities that are not reported by neighbours of these perpetrators of which Ghana is not an exception (Hirvi, and Whitfield, 2015; Adombire, 2009). Usually some of these illegal connection agents go to the extent of installing centrifugal pumps to draw water from main distribution pipelines into their reservoirs and resell to the public (Omotayo, 2014). Some of these illegal connections are partly done with the help of some of the workers of the water company. They are bribed by customers and relatives to enable them to draw water from the pipes of GWCL without being metered (Hirvi, and Whitfield, 2015).

Over the years, some customers of GWCL refused to redeem their monthly water bills as a demonstration against a service they perceived as inadequate, which happened because of the absence of proper enforcement mechanisms (Adombire, 2007).

In addition, several environmental factors affect efficient and effective production and supply of water to some urban settlements (Nortcliff, et al., 2008). Thus, water utility operation managers are usually faced with the challenge of meeting environmental emergencies such as rainfall and flood, erosion, drought, bush fires etc. Usually, rainfall

resulting in flooding and eroding of urban centers can cause damages to many connecting pipelines including breakages, disconnection, silting of chambers, flotation, destruction of sign posts, among others (Omotayo, 2014). Regular production and supplying of adequate water to the consumers becomes problematic merely because some of the affected systems may have to be partly or completely closed down in order to be repaired, flushed, disinfect, and even reconnected (Adombire, 2009).

In the same vein, during drought the level of the water reduces. Water rationing to serve different sections of the communities becomes the only option to water agencies. The effect of this is back syphon-age of dirty and unhealthy waters from the surrounding to communities not served or having low pressures (Walker, et al., 1991). Water Engineers finds it difficult in implementing the necessary diversions to curb the sufferings of the affected population. Again, during this period bush fires can touch and destroy unplasticized Polyvinyl Chloride (uPVC), Polyvinyl Chloride (PVC) and High-Density Polyethylene (HDPE) pipelines that are not fully concealed underground (Omotayo, 2014).

2.8.4. Technical Challenges.

Technical challenges in the production and supply adequate portable drinking water cannot be underestimated. According to UN-HABITAT (2006), competent and skilled labour force is a sine qua non to ensure proper design, construction and operations, detect and repair pipe leakages and to replace old pipelines. The design, construction and operational faults of many water network systems mainly occurs due to erroneous assumptions, poor and inaccurate statistics, errors in computing inputs and unfortunate field variations during construction works (Speight, 2008).

Most workforces in the water sector in most African countries unfortunately lack the requisite technical know-how to operate in the sector (Ainuson, 2010). Recently, this labour gap is worsening in many sub-Saharan African because training and developing a team of skilled labour force is a difficult task as it demands time to recruit and properly equip them through training. By the time they have acquired appropriate technical knowledge and skills, some of them may be old and less agile or near to their retirement age. Some may even retire or join new employments. Hence, there is always a concern of not getting qualified personnel to man the water agencies (Omotayo, 2014; Ainuson, 2010). In addition, inappropriate technological adoption in the water sector in developing countries is a major concern. For instance in Africa, as-built drawings are repeatedly misplaced quickly after operations commence, pipelines tracing and an apt modification usually becomes problematic. Likewise, the high dependency of most booster stations to rely on electric power from national grids in order to operate, high lift and booster pumps without no contingency plan makes water production and supply erratic (Speight, 2008). Since power is also erratic in most of these developing countries (Addo, 2010), there is always delays in operations.

Again, frequent burst of old or aging pipelines in most African cities is a growing concern. The quality and the strength of the structural and hydraulic pipeline networks reduce over time. Continuous corrosion of steel and galvanised iron pipelines weakens the life span of the pipes causing burst whilst they are still in use (Omotayo, 2014). Equally, encrustation in cast iron and Asbestos Cement (AC) pipelines leads to head-loss causing higher hoop stresses which results in severe and frequent pipe bursts particularly where booster pumps are involved (Speight, 2008). Also, there is frequent discharge of the water because of the reduction in internal diameters of the pipes (Olotu, et al., 2014). In the United Kingdom

for example, about 22% of treated water is unable reach the final consumer in their household because of burst and leakage of pipelines (MacDonald, 2007), but in Ghana, it is as high as about 50% (PURC, 2010). Moreover, not only does the technical deficiencies cause recurrent pipe bursts, waste of treated water, increase in the cost of repairs and maintenance, traffic hold ups or diversions and reinstatement of roads before, during and after pipeline repairs, it has an effect to back syphon of dirty and contaminated waters which effect correlates negatively on the qualities of water supplied to the consumers (Olotu, et al., 2014).

2.9. Defining coping strategy.

There is no universally accepted definition among scholars of what a coping strategy is. It basically refers to the temporary mechanisms or action of responses to in minimizing extreme situations such as water shortages, famine, natural disasters among others in order to respond to the immediate needs but which when persist have a negative effect on the general wellbeing of the people in a long-run (Few, 2003; Kelly and Adgger, 2000). Water coping mechanism occurs where there is lack of prompt measures to curb the recurrent water shortages or where there is a total lack of access to a reliable supply source of water. In the case of lack of or inadequate access to household water, there are two major coping strategies adopted namely, autonomous and a planned coping mechanisms (Few, 2003). Autonomous coping strategy refers “to the responses implemented by households in the context of perceived or real water insecurity without intervention and/or co-ordination by regional or national and development partners” (Bates, et al., 2008). On the other hand, the planned coping mechanism are adopted by the residents when they are asked to cope with the situation because of changes in the policies or organizational

restructuring which is purposely done to bring a lasting solution to the problem (Adeniji-Oloukoi, et al., 2013).

Many common coping strategies are adopted in water stress areas. Some of these includes reuse of water, rainwater harvesting, and dependence on hand dug of wells, supply from tanker operators and buying from neighbours (Aizebeokhai, 2011; Obeng, et al, 2010). A particular coping strategy or strategies adopted by households is /are context specific. It usually depends on the social and economic status of the residents as well as the availability of water resources, technical support and the capacity to sustain the strategy (Ashton, 2002).

2.10. Some common coping strategies adopted by households and their effects

2.10.1. Purchasing of water from water venders

Water vending is not a recent phenomenon in the world. It is as old as society and trade. Usually it can be formal or informal (WHO/UNICEF, 2000). The vending of the water is referred to as formal when those engage in it are licensed or registered formally to operate and their source of water is publicly recognized as good. On the other hand, informal vendors are those who acquire their water from varied sources including treated and untreated sources. They use different methods and means. Examples include, tanker trucks, trolleys and carts among others (Nauges and Whittington, 2010; WHO/UNICEF, 2000). In this study however, water vending denotes all forms of water provision for fees apart from the formal agency.

In any international survey on access to water, households who purchase their water from a vendor are always categorized as lacking access to an improved water supply, along with

those who access water from an unimproved sources such as hand dug wells, surface-water sources, etc.(WHO/UNICEF, 2013). However, it is still dominant in many parts of urban vicinities in Africa.

The major advantage of water vending by the informal is that, it gives an opportunity to households which are not connected to the official piped systems and are also unable to afford immediate connection fees as well as save huge amount of monies to pay monthly water bills to purchase small quantities of water on a daily basis depending on what they can afford (Olajuyigbe, et al., 2012; Ishaku, et al., 2010). In spite of these benefits, the widespread informal water vending in various urban communities echoes the lack of capacity for the formal water providers to supply adequate and reliable water to the people.

In addition, the unchecked vending of water in urban centers is a serious threat to the health and social being of the population as the quality of the water supplied cannot be guaranteed (Wutich and Ragsdale, 2008). Vended water to households has had a bearing on the frequent outbreaks of water borne diseases in most African countries (Obeng, et al., 2010; WHO, 2006). This is because these waters are not treated in the households before consumption. In Ghana for example, the country's 2011 Multiple Indicator Cluster Survey (MICS) report indicates that, less than 8% of Ghanaians treat drinking water before using.

Unfortunately, most urban residents particularly in sub-Saharan Africa and other regions with poor or no access to water are mostly left with the choice to purchase water from these informal vendors (Persson, 2002),

2.10.2. Rainwater Harvesting

Harvesting of rainwater is one of the common means of accessing water by urban residents during rainy seasons. It refers to the means of accumulating and storing of rainwater for use, before it gets to the aquifers. The water is collected from the roofs of houses and tents (Geerts, 2009). It is a temporal source of drinking water for some households in urban cities. It is also use for washing clothes and utensils, cooking, as well as other usual uses of water in the house. It is usually beneficial to the poor household for who finds it difficult to purchase water daily. For some households, rainwater may be the only available or economical water source for some number of days for the entire household to depend on.

In Ghana, the most common method of harvesting rainwater is the collection with a simple container or barrels at the edge of the roof (Ahmed et al., 2011). As such, the roofing material determines the quantity and quality of the water that is collected. Rainwater collected from roofs build with aluminum may be of good quality compared to the water harvested through asbestos cement sheets, tiles, roofs with metallic paint or other coatings (Buor, 2004). The later source can affect the quality of the water or coloured it. To improve quality of the water, there must be a regular cleaning of the roofs to remove dirt (Gould, 1992). Since there is currently no policy on rainwater harvesting in Ghana, households are not sensitized on how to properly collect rainwater that will posed less risk for its consumption (Buor, 2004). Many people do not filter it before drinking. Meanwhile, dirt, bacterial and other contaminants are washed from to rooftops by the rain into the container used to collection of the water (Ahmed et al., 2011). This increases waterborne diseases in the country.

2.10.3. Intermittent water supply and Household Water Storage

Storing of water in households has increasingly become the only fastest method of getting water for future use. This is because; water providers have resorted to supplying the water intermittently to the consumers (Vairavamoorthy, 2010; Hardoy, et al. 2001). The various zones are supplied with a fraction of the available amount of the water for a fixed period of time usually less than 24 hours as in the case of some parts of urban Ghana. Consumers are therefore forced by the nature of the supply to use over-sized household water facilities such as storage tanks, barrels, gallons or other means to cope with service intermittency (Criminisiet al. 2009) with the aim of storing as much water as possible when supply resumes. In addition, those households without connection to the municipal grid and therefore buy their waters from the informal water venders also store their waters in a similar manner for household use.

Apart from the economic burden of acquiring water storage devices, there are health implications (Wright, et al., 2005; Mintz, et al., 1995) whenever the water is not stored in a clean and safe environment. Unsafe water storage facilities contribute highly to waterborne disease. Whereas there is much literature on household water treatment and storage that address household water quality issues, most of these scholars' emphases on the treatment of these storage devises. However, a few focus more specifically on household water storage independent of treatment storage (Wright, et al., 2005; Jensen, et al. 2002). For instance, in their 57 field-based studies conducted in developing countries including Ghana using coliform bacteria as the indicator bacteria, where water was transported from a source (both improved and unimproved) and stored in the home, Wright, et al.,(2005) concludes that roughly half of the studies analyzed show a significant deterioration in water quality after collection and storage, and none show a significant

improvement in microbiological water quality after collection and storage. The analysis indicated that the deterioration in water quality is proportionally greater in cases where the source water was uncontaminated.

Again, most of the researchers study the recontamination of water by humans, through poor hygiene practices (Melissa, et al., 2013; Mcgranahan, et al., 2006). However, one study conducted in Jordan examined microbial regrowth in storage tanks that occurred without human contact (Evison and Sunna 2001). In this study, four storage tanks were disinfected and installed on the roof of a laboratory building in Amman, Jordan. The tanks were filled and emptied every four or seven days in a pattern consistent with average household use. Over the course of 10 months, the study finds increased microbiological contamination (measured by heterotrophic plate counts) in the stored water even in the absence of human contact with the water. Although a coliform bacterium is not detected, the increase in heterotrophic plate counts (HPC) indicates that microbial activity increases with longer storage time and higher temperatures (Evison and Sunna 2001).

2.10.4. Households' wastewater reuse

Reusing of household wastewater is rapidly becoming one of the developing trends of managing water in the house especially in areas with poor access. It has become a more rational choice for many households in balancing water deficiencies as a result of the inadequate water supply. Levine and Takashi (2004:7) defines "reused, recycled or reclaimed water as water that is used more than one time before it passes back into the natural water cycle". These include water from kitchen sinks, bathroom showers, bathtubs, dishwashers and laundry. Hence, reusing of water is the recycle of wastewater for useful

purposes including, washing cars, mop up tiles, toilet flushing, watering vegetables among others.

Globally, the increase in water reuse is due to number of reasons including rising water demands, inadequate water resources, and regulatory and political influences (Awad, 2007). Increasing households' demand for water coupled with the limited water supply causes the need for most households to adopt reusing of the little they have (Arias, 2009).

Inasmuch as there is an economic benefit of wastewater reuse (MacDonald, 2007; Khouzam, 2003), the practice is not void of negative effects particularly in developing countries where many lack the means of using appropriate machines and methods of recycling it. The health effects associated to wastewater reuse in households should be directed in the general context of poor water supply and not in isolation. Inadequate supply of water propels poor households' in urban areas to reuse water (Vörösmarty et al., 2010). Usually, these waters are polluted hence increases the outbreak of diseases and illnesses (WHO, 2008). It is therefore not surprising that majority of the sicknesses suffered by Africans related to poor drinking water. Diarrhea, intestinal worms, schistosomiasis, cholera and trachoma are few examples (Outwater, et al., 2013). This makes government to spend huge sums of money in the health sector in treating these diseases which could have been used in other development projects.

2.11. Socioeconomic impacts of the lack of or inadequate urban water supply

Water is a fundamental and indispensable natural resource. Its scarcity has some serious health and social as well as economic effects on the people in particular and economic development for the countries and human societies at large.

Water supply shortages have a negative bearing on the health of all affected people (Bates et al., 2008; Costello et al., 2009; Haines et al., 2006; Smitt and Wandel, 2006). This is true because the affected communities are being forced to use waters from various unimproved sources which contribute to the high spread of waterborne diseases such as dysentery, typhoid fever, diarrhea and cholera (WHO, 2008). In addition, this dearth of water forces many people to apply various means storing water in their households, which increases the rate of risk of household water contamination and incidents of malaria fever spread by mosquitos (International Meeting on Emerging Diseases and Surveillance (IMED), 2014).

Generally, developed countries do not record these waterborne diseases because of the ability and the conscious means of household's water treatment mechanisms to filter and chlorinate water well unlike in the developing world (Devoto, et al., 2011). While most of this water related diseases are preventable, thousands of people lose their lives around the globe because of these diseases. For instance, diarrhea-related disease alone claims the lives of about 2.2 million people each year in the world (WHO/UNICEF, 2013). Majority of these people are infants and children because of their young immune systems. For instance, in 2008 and 2009 about four thousand people died of only waterborne diseases in Zimbabwe (Manzungu and Chioreso, 2012; Mason, et al., 2013).

In Africa, governments spend huge sums of money in the treatments of waterborne disease. According to the Water Supply and Sanitation Collaborative Council (WSSCC, 2005-2010) report, about 12% of the country's health budget that in Sub-Saharan Africa is projected to the treatment of only diarrhea which is caused consumption of contaminated

water. The burden on healthcare would reduce and a healthier labor force would be enhanced to stimulate economic development and help alleviate poverty if much concern is given to the provision quality water to the people (William, 2011; UN, 2010).

Women and girls bear primary responsibility for water collection, at considerable cost in terms of their time in sub-Saharan Africa. It is estimated that women in these countries spend a combined total of at least about 16 million hours each day collecting drinking water, men spend 6 million hours, and children, 4 million hours (WHO/UNICEF, 2012). This gender disparity in time for water collection exist because women are culturally burdened for the collection, managing, and protecting of water, particularly within the domestic sphere that includes household chores, washing and cooking. Spending of considerable time in search for water by women and girls is perhaps a contributing factor to the decrease in their level of education (World Youth report, 2003).

In urban areas in African, it is common to see women and girls carrying jerry-cans that can weigh about 40 pounds when full for about a kilometer or more each day. This routine activity of carrying heavy loads of water over long distances has health effects including skeletal impairment (UN-Water, 2007). This can cause too much stress to the body which has health implication, several days in health recovery, and decreased physical ability not only for girls to attend school, but also reduces their mentally absorption in class. Again, their decision-making and memory skills become deficient (Roy and Crow, 2004).

The disadvantages of inadequate water supply on women educational attainment are many. The lost number of potential school days and education not only impedes the next generation of women from breaking out of the cycle of uneven opportunities for gainful employment, but also affect the present day women as employers prefer men to women in

their companies for the fear lateness of women to work (UNESCO, 1993). This has an affect their social and economic capital in terms of working and earnings opportunities (UN-Water, 2007). Thus, when access water in households is enhanced, it positively influences women's apportionment of time, level of education, and as a result improves their potential for higher earnings linked with recognized and gainful jobs (Roy and Crow, 2004).

Moreover, the problem of inadequate provision of water on premises in many African urban communities prevents many young children, particularly girls, from attending school. Girls are given the responsibility of not only assisting their mothers in water collection, but again aid with the household chores that are time-intensive because of a lack of adequate water supply. This increases the level of girls dropping out of school in developing countries (UNICEF, 2010).

Inadequate access to water retards economic progress or development. This occurs through decreases in productivity losses as a result of illness and time wasted in collecting water. Readily available water supply empowers women to engage in economic activities and allow girls to have time to attend school (UNDP, 2008). Carrying water from long distances and waiting at water sources waste the energy and time especially of women and children to the detriment of family activities, education and productive work (GWP/WWC, 2003). The sickness and illness resulting from water related diseases have far reaching adverse effects. The victims would have to be taken care of, health care costs paid as well as time lost for productive activities. In Africa, as at 2007 over 24 billion hours per year was estimated lost in caring for those with diarrhea and the absence of water supply and sanitation services results in the loss of productivity amounting to US \$

3.2 billion per year and health care cost of about US \$ 20 billion per year (Marques and Berg, 2011; Nyarko, 2007).

Significant amount of productive time is spent in search of water by those who do not have access to adequate water. In Africa alone, it is estimated that about 40 billion productive hours per year are wasted in search household water because of lack of proper supply (UNICEF, 2013). For example, the fourth round of the Ghana Living Standards Survey (GLSS4) reported that, 1% of Ghanaians spends between 3 and 6 hours per day in search for water. On average, 38 minutes are spent in searching for water for their households in the country (GSS/UNDP, 2009).

2.12. New Public Management (NPM)

New public management (NPM) theory has been rooted both in theory and practice across the globe. Many countries and international institutions have embraced its features as core principles for managing their public sector institutions (Dahida and Daganda, 2013). Armacost (2000) described it as a framework or paradigm through which governments are rationalized and the public sector revamped to strengthen the connections between government and the mechanisms, both in government and civil society that are responsible for how well government works.

The New Public Management (NPM) framework therefore provides a searchlight for the public sector managers in particular and governments in general to search and embrace competitive market inspired solutions to address societal problems (Monteiro, 2002). Thus, NPM stresses on how the governments and public institutional managers could apply or syntheses market and bureaucracy techniques in order to be more proactive in

their delivery of services such as water to their citizens (Lane, 2001). It seeks to substitute the earlier bureaucratic model in public management. This unique approach makes the theory to be regarded as the new universal model in the management as well and the restructuring of public institutions for effectiveness and efficiency (Hood, 1995). Again, since it also highlights on recruiting of the right caliber of workforce into public institutions, the theory offers ‘an all-purpose key to better provision of public services’ (Dahida and Daganda, 2013). Notwithstanding the criticisms of the theory by some scholars, NPM has being able stand the test of time because of it relevant features. Among these include the following:

- Emphasis on making institutions more autonomous and giving administrators’ liberty to operate.
- Creation of competitive environment through the setting of performance goals and targets between and among public organizations
- Adoption of market-oriented elements in the public sector.
- Customer involvement through orientation.
- Emphasis on new methods of high level management accountability in public institutions.

Institutional autonomy. To enhance responsiveness in the rendering of services to citizens has over the years necessitated the reforms of civil service structures in most countries. Departments, agencies and powers of management have been decentralized to lessen the much hierarchy in decision making processes as well as in the delivery of goods and services. To achieve this, much autonomy needs to be given to institutions or agencies to operate effectively without any external dictates (Iancu and Klimovsky, 2008). This institutional independence is very crucial to the theory of New Public Management

because it vest authority to the organizational manager to allocate resources and make decisions to achieve a set targets and objectives (Mathiasen, 1999).

For utility providers such as water, effective delegation of authority and allocation of resources and responsibilities in the organization or agency is vital as it motivates the employees to exercise discretion that could build and encourage initiatives and innovation in the sector. In addition, it provides flexibility in decision making in order to be able to response to the needs of their customers.

Again, one of the core features of NPM is performance or results orientation. The principle of NPM is that, public sector institutions or organization should emphasize more on the performance or output rather than strict adherence to procedures or inputs (Peters and Pierre, 2011; Lindgren and Persson, 2010; Peters, 2010; Bozec, et al, 2004). According to Peters and Pierre (2011), NPM stresses on accountability and transparency in the process of achieving stated objectives or results. Thus, public sector managers and even employees are obliged to honestly account for their actions and inactions to those who entrust them with the responsibilities (Kluvers, 2003). This is done to ensure judicious management and allocation of public resources as well as to curb inefficiency and ineffectiveness (Peters and Pierre, 2011; Kluvers, 2003). The setting and implementation of performance objectives by a system of rewards and punishments energizes workers and managers' to be determined to achieving goals and objectives instead of conforming to rules and procedures (Flynn, 1997).

Performance or result orientation also has a link with accountability within the organization (Schwartz and Dijk, 2003). This is because, it provides an avenue for the

service providers to be held accountable based on their set targets and their actions and inaction which produce their performance of the utility. According to the World Bank (2004), public utility providers would be effective and efficient in the delivery of their mandates if they are granted the necessary authority to exercise managerial and operational discretion over combining of inputs but are held responsible and accountable for the outcome of their decisions.

Moreover, NPM promotes the management of public sector with market-inspired solutions. These market-oriented dimensions include competitive tendering for works, goods and services, outsourcing of non-core responsibilities and result-related salaries among others (Bozec, et al, 2004). Thus, public sector organizations have to adopt some mechanisms in dealing with their internal conditions (Shah, 2007). This feature of the New Public Management in effect means managers of public organization adopt the strategy of entering into relatively short-term contractual agreement with their partners rather than the traditional long term in response to situational difficulties (Lane, 2001). Short-term contracting alternatives such as Public Private Partnership (PPP), outsourcing and leasing sometimes provides better range of opportunities and tools for public organizational managers and government rather than traditional long-term contract that usually involve expertise evolution, adherence to rule of law and organizational dependence (Lane, 2001).

Also, customer involvement through orientation is an important characteristic of the NPM. Public service providers are not only accountable to government, but also to their customers (Peters, 2008; Brewer, 2007). Since the customers are key stakeholders, they need to be involved in the decision making processes and in the activities concerning the services they enjoy (Flynn, 1997). Responding and providing prompt solutions to

customers' needs is an essential mechanism for a successful organization. According to Osborne and Gaebler (1993) entrepreneurial public managers or governments redefine their clients as customers and offer them a choice.

The private sector organization seems to be flourishing as compared to the public sector because the former embrace and practice the features and principles of NPM. The public sector as a whole will be able to achieve efficiency, efficiency and flexibility in the rendering of goods and services only if it imitates the private sector approach of enforcing the core features of NPM in their agencies and departments (Schwartz, 2008). The absence or partial applications of these core features of the NPM in public institutions in Ghana perhaps contributes to the reasons why the Ghana Water Company Limited is confronting challenges of supplying adequate water to urban dwellers in Ghana.

2.13. Conceptual framework for the study

A conceptual framework of a study is a system of concepts, assumptions, expectations, beliefs, and theories that supports and informs the research (Miles & Huberman, 1994; Denscombe, 2003). Miles and Huberman (1994) defined a conceptual framework as a visual or written product, one that explains, either graphically or in narrative form, the main things to be studied- the key factors, concepts, or variables and the presumed relationships among them.

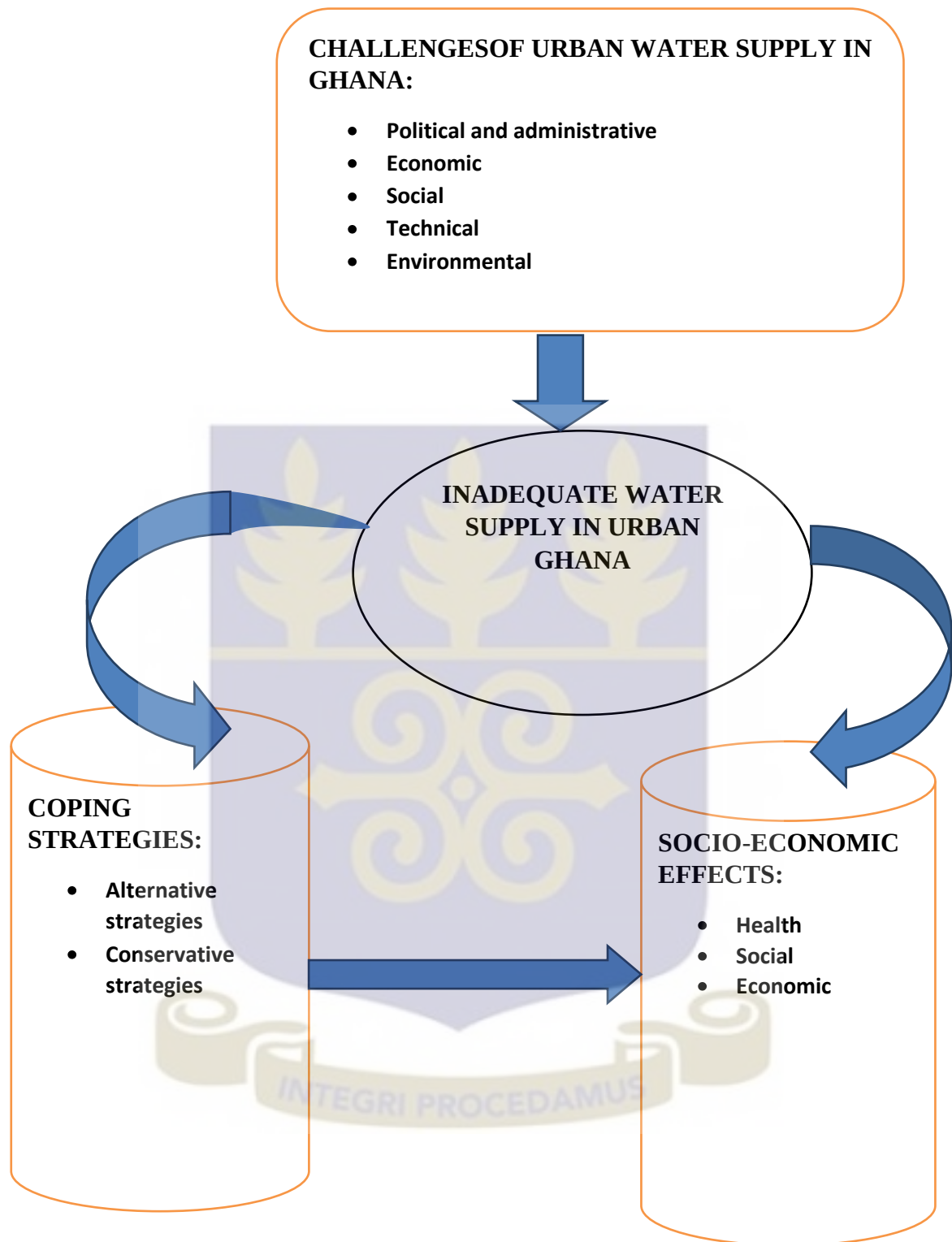


Figure 2.1: Conceptual Framework

The conceptual framework on which the study is anchored presents that, there are political and administrative, economic, social, environmental and technical challenges that leads to the inability of the Ghana Water Company Limited GWCL to supply adequate water in to the Adentan Municipality. As such, the households have adopted some alternative, conservative and other coping strategies. This consequently leads to some health, social and economic impacts on the residents.



CHAPTER THREE

METHODOLOGY

3.1. Introduction

This chapter describes the study approach, design, and the sources of data and how the data collected from field was analyzed. It also covers a brief description of the location of the study.

3.2. Research approach

In order to achieve the objectives of the study, a mixed method approach comprising two complementary methodological approaches-qualitative and quantitative was used. The mixed method approach has been described as using an array of terminologies, such as ‘combination’, ‘integration’, ‘synthesis’, ‘multi-method’ and ‘mixed method’ (Brannen, 2005; Creswell, 2009; Teddlie and Tashakkori, 2009; Pool et al. 2010). The term mixed method has been defined in different ways, but all pointing to the same meaning (Tashakkori and Teddlie, 2003, p.711; Brannen, 2005, p.4; Tashakkori and Creswell, 2007, p.4; Johnson, et al. 2007, p.119-121). One of the most comprehensive definitions is that offered by Brannen (2005, p.4) as follows:

“Mixed method research means adopting a research strategy employing more than one type of research method. The methods may be a mix of qualitative and quantitative methods, a mix of quantitative methods or a mix of qualitative methods... mixed methods research also means working with different types of data. It may also involve using different investigators...”

The practice of designing and conducting a single research study from a multidimensional perspective has been greeted with a significant amount of interest by several researchers over the past two decades and is not just a recent phenomenon (Rees and Bath, 2001; Thurmond, 2001; Pool, et al. 2010). This increasing interest has been explained by the fact that the mixed method approach provides innovation, rich and unbiased data (Teddle and Tashakkori, 2009) that can be interpreted with a high degree of assurance (Brannen, 2005; Thurmond, 2001) with a view to achieving strong internal and external validity and reliability, as well as a comprehensive multi-perspective view (Thurmond, 2001; Perone and Tucker, 2003).

Conducting mixed method research may be challenging as there may be difficulties in adopting this method inasmuch as there are strengths (Rees and Bath, 2001; Johnson and Turner, 2003; Creswell 2009; Teddle and Tashakkori, 2009). However, in this case, it was worth pursuing this research approach since it increased credibility of the findings and added to the robustness of the data.

For the purpose of this study, pragmatism was adopted as a philosophical foundation as this orientation fits well with the aims and objectives of the study. The term 'Pragmatism' is defined as: "a deconstructive paradigm that debunks concepts such as 'truth' and 'reality' and focuses instead on 'what works' as the truth regarding the research questions under investigation. Pragmatism rejects the either/or choices associated with the paradigm wars, advocates for the use of mixed methods in research, and acknowledges that the values of the researcher play a large role in interpretation of results" (Tashakkori and Teddle, 2003, p.713).

As a result, a skillful use of a combination of this mixed technique gave a more comprehensive understanding of the topic (Bryman, 2004). Connelly (2009) also asserts that, a mixed method approach is good since it is based on a pragmatic philosophy that states that, a researcher ought to use an approach or combination of approaches, which would appropriately address research questions (Tashakkori and Teddlie, 2003). Quantitative research collects numerical data in order to explain, predict and or control phenomena of interest and data analysis is mainly statistical (Creswell, 2009). Qualitative research involves the studied use and collection of a variety of empirical materials, case study, personal experience, introspective, life story interview, observational, historical, interactional, and visual texts-that describe routine and problematic moments and meaning in individuals' lives and phenomenon (Pool, et al. 2010). As a result, the research questions are answered with information presented in both narrative and numerical forms (Teddlie and Tashakkori, 2009). Using the mixed methods approach therefore provided strengths that offset the weaknesses of both quantitative and qualitative methods of the research. For instance, it encourages the use of multiple worldviews or paradigms rather than the typical association of certain paradigms for quantitative research and others for qualitative research (Plano- Clark and Creswell, 2011).

3.3. Study design

The design for the research is a case study, focusing on household access to water in the Adentan Municipality. As a research design, case study helps to bring an in-depth understanding to particular phenomena by studying the relationships and processes that define the case (Denscombe, 2003). It is therefore aimed to provide an in-depth and holistic account of the challenges of urban water supply, the effects of inadequate supply on the people in the study area. In order to provide an in-depth account, multi-method data

collection, often referred to as triangulations was adopted. This allows for an understanding of the relationship in a more rounded and complete way (Denscombe, 2003).

The sampled households in the Adentan municipality and Ghana Water Company Ltd (GWCL) were used as the major units of analysis. Determining the unit(s) of analysis in a case study research, helps in measuring or analyzing the problem identified (Yin, 2003).

3.4. The context of the study

The research was conducted in the Adentan Municipality. The Municipality was carved out of Tema Metropolitan Assembly in February 2008 by Legislative Instrument (LI) 1888 of 2007. Adentan Municipality serves as a dormitory town for most people who have migrated from all over the country to seek employment in the service sector, industries and government institutions within the Greater Accra region. The 2010 Population and Housing Census is the first census conducted with Adentan as a municipality by the Ghana Statistical Service (GSS).

The Adentan Municipal area has a population of 78,215 based on the 2010 Housing and Population Census, however this is contested in (AdMA, 2014) as the figure does not reflect the true situation on the ground due to the fact that settlements along the western corridor of the Dodowa road which are part of the municipality was not captured as part of the municipality during the census period by Ghana Statistical Service (GSS).

However, the GSS, 2010 Population and Housing Report reveal that, out of the total population of 78215, 50.3 percent of the population is males and 49.7 percent are females.

Again, 62.5 percent of the population resides in urban areas while 37.5 percent resides in rural areas. The total dependency ratio for urban areas is higher (51.8%) than rural areas (50%). But child dependency ratio and the old dependency ratio for urban areas are higher than rural areas recording 48 percent and 3.8 percent respectively while rural areas recorded 46.7 percent for child dependency ratio and 3.3 percent for old age dependency ratio (GSS, 2010).

3.4.1. Physical Features

Adentan Municipality lies 10 Kilometers to the Northeast of Accra, which is specifically located on latitude 5° 43' North and longitude 0° 09' West. The Municipality has a land area of about 85 square kilometers (33 sqm) (Regional Coordinating Council (RCC), Greater Accra Region, 2013). It shares boundaries with Ashaiman Municipality and Kpong Akatamanso District in the east, La Nkwantanang Municipal Assembly in the west, Oyibi Township (part of the Kpong Akatamanso District) in the north, and Madina a suburb of La Nkwantanang Municipality in the south.

3.4.2. Climate

Generally, temperatures in the Municipality are high throughout the year. The high temperatures warm up the air, which rises to condense which eventually leads to conventional rainfalls in most parts of the Municipality. The warmest period is between the month of March and April. During this period, sometimes temperature rises even up to 32°C during the day and 27°C at night. However, the temperature becomes cooler during the months of May and September. On average, between 27-29°C and 22-24°C temperatures are recorded respectively during the day and at the night. Like other parts of the country, the Municipality experiences two forms of rainy seasons. The first and the

major season start from April to July while the second but minor season is from September to November each year

3.4.3. Water bodies

Adentan abounds in several natural resources; prominent among them are the Nugbete River in Nmaidjor and the Ogbojo stream. In an effort to facilitate farming and agricultural activities, various individuals and institutions over the years have succeeded in constructing dams within the Adentan Municipality. The dams include; Japan Motors Tourist Resort, Faahe Dam at NmaiDjor, Tessa Dam at Adjiringanor , University Farms Dam, Water Body at Amrahia, Water Bodies at Ashieye (AdMA,2013).

3.4.4. Population Size, Household Composition

The household structure by sex indicates that nuclear family constitutes 42.6 percent with nuclear households made up of the head, spouse and children constituting 26.9 percent. Extended family recorded 53.4 percent with extended households made up of the head, spouses, children and heads relatives constituting 20.8 percent confirming the notion that, Ghanaians enjoy living with their families. Households made up of single parent, extended family and non-relative constituted the lowest, recording 2.1 percent.

3.4.5. Health

Currently, Adentan Municipality has a Public Community Clinic at Amanfrom and a CHP Compound at Adjiringanor. There are about 14 private health facilities and one traditional Birth Attendant. These health facilities render services like laboratory, pharmacy, family planning, reproductive and child health and maternal services. However cost of health care

at the private facilities are high and cannot be afforded by most people in the Municipality (AdMA, 2008).

3.4.6. Education

Education serves as the spine of development in every geographical area. Any nation that has human resource base being illiterates suffers greatly in the attempt to develop.

The literacy rates of the municipality is on the average, a little more than a half (54.8%) of the total population are literate in English and Ghanaian language. The percentages of those who are literate in English only (35.9%) is higher than Ghanaian language only with 5.7% (GSS, 2010).

3.4.7. Sanitation

Adentan is one of the few areas in the Greater Accra region that is well kept in terms of sanitation and waste management. However, litterbins could be placed at vantage points for the transient population to drop in waste (ice water sachets) which occasionally litter the surroundings. There is also the need to provide public toilet facilities at lorry stations and markets and to assist inhabitants in slum communities provide domestic latrines. This will help solve the problem of indiscriminate defecation.

3.5. Scope of the study

Given the constraints of time and resources and a particular research agenda, the concepts, theories, actors and spatial coverage of the research have to be clearly defined.

This research is particularly limited to Adentan Municipality in the assessment of water challenges facing urban residents in Ghana and the strategies they adopt to meet their household demand for water as a result of the shortages.

3.6. Source of data

The study was designed to capture both primary and secondary data at the household level, this made the household the logical primary unit of measurement and analysis. This was done through the use administration of semi-structured questionnaires to households in Adentan Municipality. An in-depth interview of key officials at the Adentan Municipal Assembly and GWCL was also conducted. Secondary information were also be collected from scholarly journals, census and survey reports, Ghana News Agency (GNA) reports, as well as other published and unpublished documents.

3.7. Study population /sample size

The entire field data collection covered 206 participants. This includes 200 households' respondents (for the quantitative data) and 6 informants from the GWCL for an in-depth interview for the qualitative data. A total of 12 out of the 34 communities in the Municipality were selected for the field work. These communities seems to be the most affected areas in the municipality. Meanwhile, they jointly constitute about 60 percent of the total population in the municipality (AdMA, 2014). However, since the population size of each geographical area (Communities) is approximately not the same, Probability Proportionate in Size (PPS) was further used. Thus, a highly populated geographical area had larger number of the sampling units. Between 14 and 20 questionnaires were administered in each community. The field data collection lasted for one month of which

quality data was collected for the study. The list of the 12 communities and the number of households that were interviewed are as shown in table below.

Table 3.1: The selected communities in the municipality and the number of households interviewed

Selected communities in the municipality	Number of households interviewed
Ashale Botwe	20
East Adentan	20
Frafraha	18
Nmai Djorn	18
Otinshie	18
Dzornaaman	16
Adjriganor	16
Amarahia	16
Tesaa	15
Ashiyie	15
Dzinayor	14
Obgojo	14
Total	200

3.8. Sampling technique

In each selected community in the Municipality, a systematic random sampling method was used to select the households. This method helped in covering a wide range of area in the selected communities. The selection procedure involved a random start of which every 5th house in each of the communities was selected for the interview. For instance, if the first random start is 5, then the 10th, the 15th, etc. households were interviewed until the selected sample is exhausted. Every adult in any selected household were eligible and made to answer the questions.

The questionnaire administered to the households and the in-depth interviews were supplemented by an informal telephone and email interviews. Whereas key informants at the GWCL have more of telephone and email interviews for extra clarification and data update, the households' informants have more detailed in-depth and informal interviews during the data collection in order to allow them to give additional information and explain certain issues that would not have been covered in the questionnaire. Field observation was carried out to observe what people go through as they search for water. This helped in order to support or disagree with what others say, in order to enrich the research qualitatively.

Purposive sampling technique was used to sample the key personnel from the Ghana Water Company Limited (GWCL). The selection was absolutely based on who was in a position to provide the needed information. Internet search was not left out as part of data collection method. Maps, diagrams, pictures and well documented scholarly articles from the internet were also assessed and used. In addition, annual reports of the Ghana Water

Company and multinational organizations and others related to the provision of water were reviewed

3.9. Data collection instruments

Semi-structured questionnaire were used for the primary data collection in the households. In addition, an interview guide was developed for the in-depth interview with the officials of the GWCL. The key characteristic of the design of the questionnaire was a five-point Likert Scale for the rating of responses. A ranking approach was also used to complement the rating. According to Massey Ratings (2011), 'ranking' is an ordinal number (for example, first, second, and third in order of importance) that indicates the placement of what is being evaluated or judged. On the other hand, 'rating' involves a continuous scale measurement, and therefore should be interpreted on a scale such as the Likert Scale by comparing it with other ratings. While questions on rating focus on comparing different items based on a common scale, ranking questions seek to draw comparisons between different items to one another (Vovici Corporation 2011).

A five-point scale, which is odd-numbered, was preferred, as it provided respondents an option for indecision or neutrality (Markusic, 2009; Chomeya, 2010). The five-point Likert Scale used was bipolar, with extremes at either end (Streiner and Norman, 2003; Trochim, 2006). It was also one-dimensional scaling (Trochim, 2006), since it was an ordered, one-dimensional scale from which respondents were able to choose one option that best aligned with their view. This type of Likert Scale is commonly used. Using this scale allows respondents an opportunity to make a choice, whether at the lower end, middle or upper end of the scale (Likert 1932).

The questionnaire for the households was divided into four main sections- A, B, C and D. Section A covered only the background information of the respondents in the household. Section B covered issues of water supply in the Municipality, major challenges and their socio-economic effects to the residents of the municipality. Section C, covered the adopted coping strategies by residents in accessing water to meet their households demand. Finally, section D covered the recommendations offered by respondents in order to find a lasting solution to the water problem in the Municipality.

The interview guide for the officials at the GWCL was also similar to that of the household. The interview sections were grouped from A to E with the following titles as the headings to the sections: Cost of water, causes of water problems and impacts, trend of water supply to the study area and interventions from government and other institutions for possible solution.

3.10. Pre-Testing of Data Collection Instruments

The data collection process began with an initial pre-testing of the data collection instruments to fine-tune the focus of the study. As an essential element of a good study design (van Teijlingen et al., 2001; van Teijlingen and Hundley 2002), it helped to establish the content validity of the data collection instrument and improved the questions, format and scales designed for the instrument (Creswell 2009). Moreover, the pilot was conducted with a view to identifying any potential weaknesses in the planning process (Gardner et al., 2003). This helped to minimize any risk or uncertainty that might have potentially affected the outcome of the study (Turner, 2004). Using this approach the researcher was able to examine the feasibility of conducting the study on a larger scale (Leon et al., 2010) in the Municipality. Thus, the pre-testing sought to sieve the data

collection tools, including the inclusion and exclusion criteria, the protocols for assessing methodological quality, and the means of extracting data. As a result, the pilot study was however conducted in Ashalley Botwe and Frafraha. Ten of the first drafts of questionnaires were administered. Five in each community. The questionnaires were evaluated based on five criteria as follows: understanding, clarity and ambiguity, style of presentation, readability and length of completion of the questionnaire.

Understanding: eight of the respondents noted that the scoring was easy to do. In fact, three of the respondents even indicated that it was “very easy”. In terms of clarity and ambiguity; seven of the respondents were of the view that the questions were clear and unambiguous while only two felt otherwise. The remaining one failed to decide. The style of presentation was seen by six respondents to be good while 4 were undecided. Therefore the style was maintained in the final designed questionnaire. In terms of readability, eight said the font size was readable. One participant even observed that ‘everything was clear’. Two failed to decide. The length of completion of the pilot questionnaire; contrary to above responses from the respondents’, five respondents expressed concern about the fact that the questionnaire was voluminous and time consuming. With this concern in mind, the number of questions were reduced but not to the detriment of relevancy to the aim and objectives of the research.

In effect, the pre-testing of the questionnaire helped the re-phrasing and re-structuring of unclear and ambiguous questions. Some of the questions were re-arranged to ensure logical ordering of questions and deletion of repeated ones. Moreover, the pre-tested stage helped in the planning for the actual field work and made it less stressful and challenging.

3.11. Data management and analysis

Before the data analysis began, the data from the field was thoroughly cleaned to ensure validation. This was done through critical checking of all questions to ensure that they were appropriately answered by the respondents. The analysis of the data started after cleansing to ensure consistency and completeness of the data.

In analyzing the qualitative aspect of the data obtained from the field interviews, a constant comparative approach was employed. This is done by critically reviewing all information from each informant. Thus taking one piece of data and compare it with all others that may be similar or different in order to develop conceptualizations of the possible relations with the various themes.

The quantitative data on the other hand was analyzed using the Statistical Package for Social Sciences (SPSS), currently referred to as the Statistical Products and Services, version 18. Both descriptive and inferential statistics were employed in answering the research questions and objectives. Descriptive statistics such as frequencies, percentages and cross-tabulations were presented using tables and figures.

3.12. Ethical considerations

In order not to infringe on the emotions, cultural and social rights of respondents, the study endeavored to obtain the respondents consent before the start of the interview, respected the informant's privacy, ensured that information is protected against third parties accessing it, and observed or respected certain cultural values, traditions or taboos. Thus, in an attempt to address any ethical concerns, participants were informed that the data to

be collected would be confidential and anonymous. Informants were also assured that the data was only to be used for academic purposes.

In order to ensure anonymity, the questionnaire was purposely designed to exclude names of respondents. Issues of consent were also addressed. As a result, a letter of introduction was collected from the Department of Public Administration and Health Services Management to the GWCL where data was collected and received and approval note before the commencement of the data collection.

3.13. Field work challenges and lessons learnt

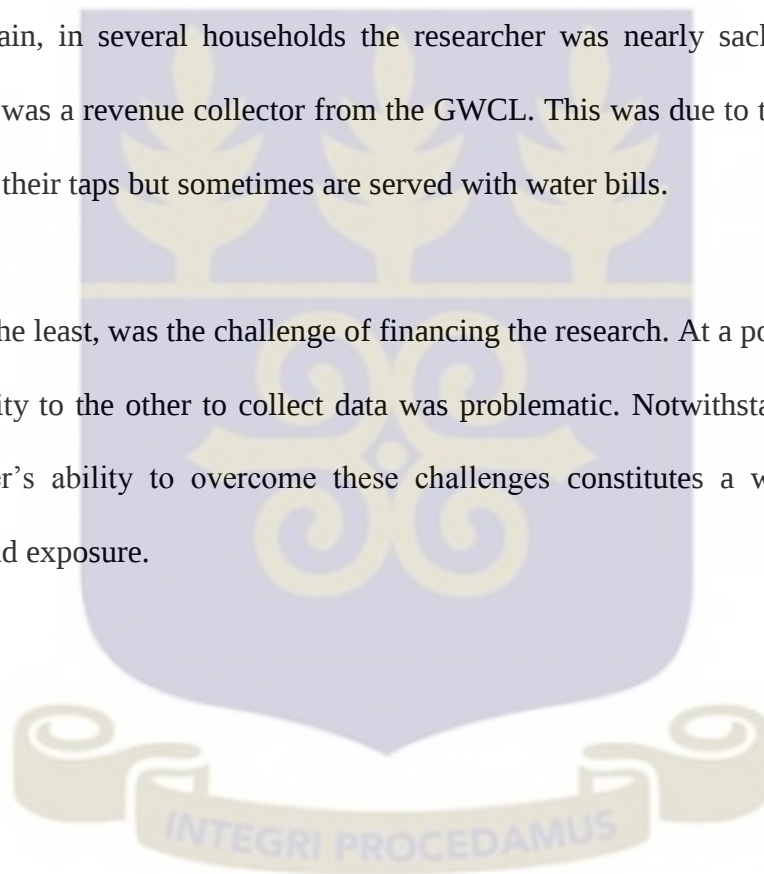
Numerous challenges were encountered in the process of conducting this research work, particularly during the data collection period. This segment discusses some of these challenges, how they were overcome and lessons learnt from them. First data collection started quite late than the originally planned date and was interrupted due to the frequent power outages in the country. For instance, two of the respondents at the GWCL were not able to grant the interview as scheduled due to the high temperature in their offices. The interview was therefore postponed to another week. The researcher used only this opportunity to introduce the subject to them has to return as scheduled. Even on the said date and time, series of phone calls have to be made in order to get one of the interviewers.

In addition, some of the participants interviewed at the start were not willing to respond certain questions, specifically questions related to corruption and political interference in the appointments and recruitments of staffs of the GWCL. While some were afraid to disclose certain important information with the notion that it will be used against them, others pretended not to have the answers at all to the question probed. To handle this

challenge, the researcher had to repeatedly remind them, reassure them and even read over and over the informed consent or the anonymity part of the interview guide to them.

Another challenge encountered during the quantitative data collection in the households was the fact there some of the respondents were illiterates. The researchers therefore have to read and explain the questions before the respondents could make their appropriate choice of answers. This only did not delay the data collection process but was also tiresome. Again, in several households the researcher was nearly sacked because they perceive him was a revenue collector from the GWCL. This was due to the fact that water do flow from their taps but sometimes are served with water bills.

Last but not the least, was the challenge of financing the research. At a point, moving from one community to the other to collect data was problematic. Notwithstanding the above, the researcher's ability to overcome these challenges constitutes a worth of research experience and exposure.



CHAPTER FOUR

DATA ANALYSIS

4.1. Introduction

This chapter presents an analysis of the data that was collected from the field. The chapter is grouped into five sections. The first section provides a brief background of the respondents in terms of their gender, age and occupations. The second section takes a look at water accessibility considerations by the respondents. The third section looks at the challenges and effects of the water problems in the study area whilst the fourth section considers the coping strategies the respondents adopt in order to cope with the perennial water shortages in the Municipality. The final section presents recommendations outlined by the respondents in order to address the water problem in the municipality.

4.2. Socio-demographic information Respondents

A total of 200 respondents participated in the study. Table 4.1 presents the demographic characteristics of the respondents in terms of their gender, the age groupings, educational levels and their occupations. The study was dominated by female respondents that made up to 67% of the total respondents. Similarly, majority of the respondents were aged between 20 to 29 years and this formed over 70% of the total respondents. The average age of the respondents was approximately 41 years.

Over 90% of the respondents had one form of formal education or the other. Whilst some had up to only a junior high school level of education, majority had either received up to a senior high school level or the tertiary level. Majority of the respondents were mainly self-employed and engaged in trading activities whilst some others had engaged in white collar jobs. The section marked “others” as seen in Table 4.1 shows that some of the respondents

had other occupations such as pilots, farmers, nurses and photographers. These formed 5% of the total number of respondents. In terms of the sizes of the households, most of them were numbered above seven. The average household size was approximated to be seven people per household.

Table 4.1: Demographic characteristics of respondents

Variable	Respondents	Percentage (%)
Gender		
Male	66	33
Female	134	67
Age cohorts(in years)		
20-29	48	24
30-39	47	24
40-49	53	27
50-59	41	21
60 and above	11	6
Educational level		
No education	7	4
Primary	9	5
JHS/Middle school	53	27
SHS	63	32
Post-Secondary	30	15
Tertiary	36	18
Occupation		
Non-response	14	7
Business Women	26	13
Skill manual workers	38	19
Civil Servants	10	5
Unemployment	9	5
Trading	72	36
Teaching	16	8
Students	2	1
Retired persons	2	1
Others	11	6

Field data, 2015

4.3. A Situational Analysis of Water Supply in the Adentan Municipality

4.3.1. Water accessibility, payments and the perception of the water supplied to the Municipality.

This section considers the means of assessing potable water by the respondents in their households. The section is grouped into three main subsections. The first subsection looks at details of the respondents with pipe borne water and the distances travelled by respondents in order to assess water. The second section also takes a look into the cost of the water that is borne by the residents on a periodic basis. The third section examines the perception of the water supplied to the area.

4.3.2. Pipe connection and Accessibility of water

In terms of water accessibility, 114 respondents (representing 57%) of the total respondents have pipes connected to their homes by GWCL to help them access pipe borne water in their homes from the municipal grid. The remaining 43% of the respondents do not have pipes connected to their houses. However, even with those that have pipe connected to their houses, water supply has been very erratic. Majority of the respondents reported that water has never flown through their taps ever since they installed the taps. These formed about 56% of the respondents that had pipes installed in their homes to access pipe borne water from the GWCL. On the average water flow through the pipes approximately once a week. This result is consistent with the finding of (Stoler et al., 2012a; Adank et al., 2011) that low-income settlements in urban Ghana do not receive regular water flow from the networks of the GWCL.

Respondents were made to identify the time it takes for water to run through their taps. On the average, water flows through the taps for approximately one hour. Whilst some

respondents claimed that water do not flow from their taps at all, others responded that for them, water flows through their taps for a maximum of 30 minutes. In rare cases, water did flow between five to eight hours. The details are as given in Table 4.2.

In situations where respondents do not have pipes installed in their homes, they had to walk some distances to get alternative sources of water. Most of the respondents had to walk between 100 to 200 metres in order to fetch water. On the average, the respondents were noted to walk a distance of approximately 110 metres to fetch water. Details of the distance travelled by the respondents are as given in Table 4.2.

Table 4.2: Frequency of water flow and duration of flow of water

Variable	Respondents	Percentage (%)
Households with pipe connection		
Yes	144	57
No	86	43
Frequency of water flow		
1-2 days	31	21.52
3-4 days	16	14.04
4-7 days	3	2.63
Not at all	64	56.14
Duration of water flow		
less than 30 minutes	17	14.19
1-3 hours	22	19.3
5-8 hours	11	9.65
Not at all	64	56.14

Field data, 2015

4.3.3. Payments modalities for water

For respondents with pipe borne water connected to their homes, majority of them paid below GHC 50 as their monthly bill payments. On the average water bill payments amounted to approximately GHC 52 per month.

Whilst some respondents buy their daily water on a bucket bases, others buy water from vendors from small trucks holding approximately 400 to 500 gallons of water. The buckets of water hold approximately 4 gallons of water. A bucket of water on average cost 50 pesewas. On the average a household requires approximately more than 9 buckets of water per day. Coupled with this, the respondents stated that a household pays an average of GHC 21 per trip on water especially with those buying water from the tanker operators mean while many pay more than GHC 30.

Perception of the nature and quality of water supplied to the Municipality

While respondents' perception of the nature and quality of water supply produced different results, majority (34%) indicated the water is salty. Related to this was the bad odour of the water (29.5%). Approximately 17% of the respondents indicate that the water contains some particles. Again, while some (5%) reveals the coloured nature of the water, 14% of the total respondents admits that the water was good. This is show in the pie chart below.

What will you say about the quality of the water supplied to your area?

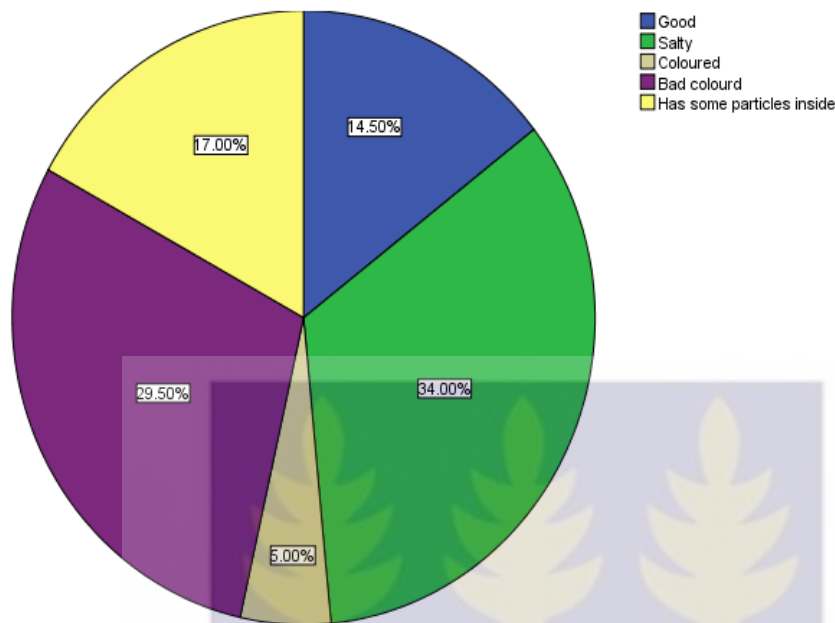


Figure 4.1: Quality of Water Supply

4.4. Major challenges and effects of water the problems in the Municipality

This section outlines the major challenges facing the GWCL in the supply of sufficient water to the study area. The major challenges as are given and perceived by the respondents are given in the table 4.3 below. The section goes on to outlines the potential effects or the problems that are caused as a result of the perennial water shortages within the Adentan Municipality. These are also given as perceived by the respondents.

4.4.1. Challenges of water supply in the Adentan Municipality

There are myriad of challenges or causes of water shortages in urban Ghana. 12 of these challenges were identified from the literature and were subsequently grouped into five major factors namely environmental, technical, political, social and economic factors. Respondents were made to rate the items under these factors on a scale of one to five with

one indicating a lesser severe challenge and five representing a more severe cause of water problem. The scores are then averaged out with the overall average score computed for each item based on the score attained. The average scores are as given in Table 4.3 below:

Table 4.3: Challenges faced by GWCL in the supply of water to households

Item	Mean	Std deviation	Category
Major challenges			
Inadequate funds for operation by GWCL	4.21	1.24	Economic
Corruption in the water sector	3.98	1.32	Economic
Few pipe lines cannot support fast expansion of township	3.28	1.56	Social
Politicization of the water sector	2.69	1.32	Political
Unplanned township/community	2.57	1.25	Environmental
GWCL lack technical expertise to handle the pumps	2.05	1.10	Technical
Electricity power outage problems	2.04	1.35	Technical
Minor challenges			
Illegal connections	1.98	0.98	Social
Tanker owners arranged with GWCL to limit water supply	1.92	0.97	Social
Geographical location of the community	1.89	0.97	Environmental
Frequent broken down of pipe lines	1.83	0.80	Technical
Less committed by GWCL to supply water to the municipality	1.33	0.67	Technical

Field data, 2015.

As shown in Table 4.3, the five most predominant challenges of water supply in urban Ghana according to the household respondents are *inadequate funds for GWCL in their operation, corruption in the water sector, few pipe lines not being able to support fast expansion of the township, excessive politicization of the water sector and unplanned township/community*. However among these, economic factors seem to be the major challenge as perceived by the respondents. This is because respondents ranked inadequate funds of the GWCL for operation with the highest Mean score of 4.21 and the existence of corruption within the water sector (Mean=3.98) receptively as the top two factors causing the inadequate provision of water to urban residents and this happens to fall under economic factors. The inability of few old pipe lines to support fast expansion of the township (Mean=3.28), excessive politicization of the water sector (Mean=2.69) and unplanned township/community (Mean=2.57) respectively as the next in rank of the factors affecting the effective operation of GWCL to deliver water to urban dweller in Ghana.

The least severe causes of the water problems arose from technical issues. For example, the respondent do believe that the less commitment of the staff of the water company to resolve the water shortage problem is not the actual cause of the perennial water shortage in the Adentan Municipality. Also, problems that are related to electricity power outages and frequent breakdown of the pipelines in the Municipality are not perceived by the respondents to be the major causes of the water shortages.

4.5. Effects of the inadequate water supply on the residents

The inadequate water supply in the Adentan Municipality negatively affects the residents. This study listed certain socioeconomic problems of perennial water shortage that were

gathered from the literature on urban cities in developing countries. Respondents were also made to rank these items on a scale of (1-5) as was done in the previous section. This order also depicts the severity of the problem at hand. Details are as given in Table 4.4. The various problems are listed on the table in order of severity with the most severe problem occurring first.

As seen from Table 4.4, most of the problems as listed were seen to be considered severe as perceived by the respondents. This is because the mean values for almost all the items are above 3.0. However, a look at the individual scores for the items shows that the major effect of the perennial shortage is the risk arises from drinking water from untreated water sources (Mean = 4.45) and the undue exploitation by the informal water suppliers or vendors in a bid to provide water for the residents (Mean = 4.37). Respondents also believe that the third most predominant effect is related to the eventual slowdown of commercial and domestic activities due to the presence of the water shortages. Heavy workload of women in the households followed with the mean score of 4.15. The effect that was considered least severe was actually related to the prices of food items that increase as results of the shortage of water.

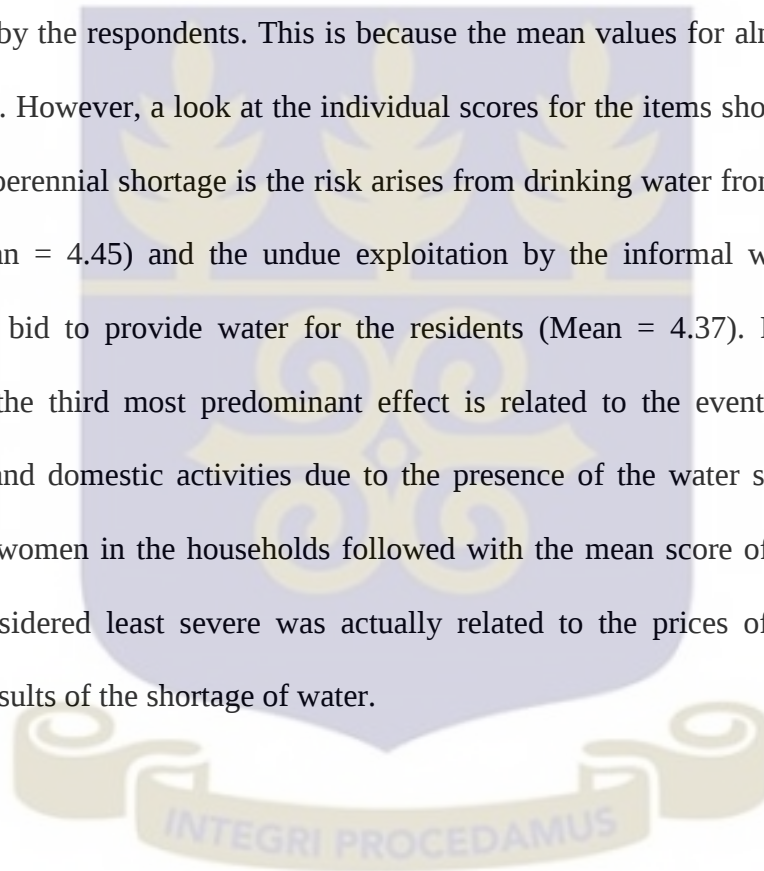


Table 4.4: Effects of the lack of or inadequate water supply in the Adentan Municipality.

Socio-economic effect of the water shortage	Mean score	Std. Deviation	Category of effects
Major effects			
Risk in drinking of untreated water from the open wells/tanks or surface waters	4.46	1.07	Health
Undue exploitation of residents by informal water suppliers	4.37	1.27	Economic
Slowing down of domestics activities	4.24	1.41	Social
Workload of women in the households becomes very heavy	4.15	1.31	Social
Prices of food items increase due to shortage of water	4.01	1.42	Economic
Minor effects			
Children are usually late or absent from school	3.70	1.56	Social
Too much time is wasted in search of water	3.68	1.50	Social
Long queues in fetching water resulting from quarrels	3.38	1.13	Social
Slowdown of commercial activities	2.99	1.36	Economic

Field data, 2015**4.6.1. Conservation strategies.**

A conservation strategy is operationalized in this study as the mechanisms that are employed by households in their bid to preserve water. There were about six conservation strategies that were noted. These conservation strategies are primarily related to reducing water quantities (affirmed by 89% of respondents), rescheduling time for flushing of toilet after use (85%), reduction of water quantity for some household activities (83%), reducing the number of baths per day (69% of respondents) and the use of facilities that take less

water (52% of respondents). The conservation strategies were affirmed by average of 146 respondents representing 73% of the respondents.

4.6.2. Alternative strategies

The alternative strategies are those that are done in a way to find other sources of water rather than water from the network of the Ghana Water Company Limited (GWCL). The study noted seven of these alternative strategies. These alternative strategies were related to the harvesting of rain water during rainy season (94% of respondents), the supply of water by the tanker operators or other third party suppliers (88% of respondents), the use of bottles and sachet water for drinking (81% of respondents), purchasing water from neighbours (62% of respondents), drilling boreholes and wells. These alternative strategies were affirmed by an average of 94 respondents representing 47% of the total respondents.

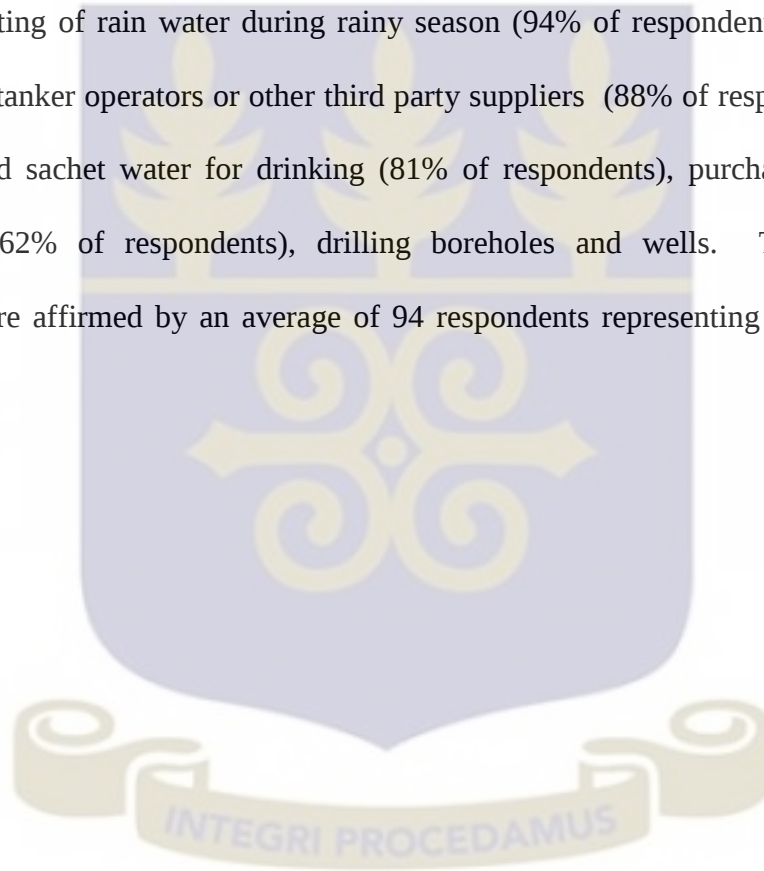


Table 4.5: coping strategies adopted by the residents

Coping strategy	Number of respondents	Percentage of respondents	Strategy category
The harvesting of rainwater for household use	188	94%	Alternative strategy
Reuse of water	178	89%	Conservative strategy
Purchase of water from tanker operators on request with a fee	176	88%	Alternative strategy
Rescheduling time for use and flushing toilet	169	85%	Conservative strategy
Reduction of water quantity use for specific purpose	165	83%	Conservation strategy
Use of bottled and sachet water especially for drinking purpose	139	70%	Alternative strategy
Reducing number of bath taken by household per day	138	69%	Conservation strategy
Purchasing of water from neighbors on daily basis	124	62%	Alternative strategy
Use of other toilet facilities that will not require much water	104	52%	Conservation strategy
Purchase of large water storage tanks for households	65	33%	Alternative strategy
Disallowing external people from purchasing for large quantity of water	56	28%	Conservative strategy
Drilled wells	28	14%	Alternative strategy
Drilled boreholes	6	3%	Alternative strategy

Field data, 2015

Recommendations by the respondents in enhancing the water problem in the Municipality

This section presents certain recommendations put forward by respondents in response to the issues at hand. With reference to the bills, respondents mainly believed that bills must not be increased in a bid to improve water supply services. These were affirmed by over 68% of the respondents. Respondents also believed that the water service sector must be handled by a private institution. This was due to the perceived inefficiencies that are due on the part of the Ghana Water Company Limited. The notion of water privatisation was attested by over 70% of the total respondents.

Other recommendations for improvement were majorly driven towards ensuring competency of the Ghana Water Company Limited (GWCL). Respondents noted that competent people should rather be employed to work in the company and must be based on merit alone. In ensuring competency of the company, the respondents also noted that the company should be effective in their deliveries and also ensure committed spirit in the discharge of their duties. To this a respondent noted:

“The workers of the GWCL must be committed in the delivery of their responsibility.”

Secondly others called for the privatisation of the water sector in Ghana. This was as a matter of fact attested by majority of the respondents. Whilst others called for a total privatisation of the water sector, others called for a public private partnership.

Thirdly, recommendations were further based on government interventions. Government interventions were given in the forms of more investment in the water sector. Similarly other respondents called for government to provide municipalities with water reservoirs. Others called for a more regulator scheme. To the point of the regulatory scheme, one respondent noted that:

“There must be a daily monitoring team that is independent of the GWCL to supervise their activities.”

CHAPTER FIVE

DISCUSSION OF THE RESULTS

5.1. Introduction

This chapter focuses on the major findings that have been presented in chapter four above. The discussion is centered on the stated objectives of the study namely, to examine the major challenges of inadequate water supply in Adentan Municipality, to examine the socio-economic impacts of water supply shortages in the Municipality and to investigate how the residents in the Adentan Municipality are coping with the problem. Conscious attempt is being made to juxtapose the finding with the reviewed literature in this study.

5.2. Challenges affecting water supply in Adentan Municipality.

This section discusses the first objective of the study which is to examine the major challenges of adequate water supply in Adentan Municipality. As presented in the earlier chapter, the challenges are broadly grouped under economic, social, political, technical and environmental.

5.2.1. Economic challenges

Several factors combine to either ensure or hinder the effective and efficient delivery of social services to the citizenry of every country. Economic factor(s) is no exception. In this study, 'economic challenge' is operationalized as the financial related forces or resources that affect the Ghana Water Company Limited (GWCL) in their attempt to produce and supply adequate and quality water to Adentan Municipality especially and urban Ghana in general. Under the economic variable, the factors that were considered include *inadequate funds for operation by GWCL and corruption in the water sector*.

Insufficient operational funds makes it difficult for the expansion of pipelines to cope with the fast growing communities within the municipality and also to frequently monitor the already few pipes laid in the Municipality in order to frequently repair and replace broken or obsolete pipes. This is because through government intervention, customers do not pay for realistic price of water they consumed. This reduces the estimated Internally Generated Funds (IGF) for the year. What aggravates the issue is the fact that the subvention from central government as well as funds and assistance from donor partners in most case are delayed. As a result, major planned expansion projects to the municipality are delayed and sometimes halted for many years. To this, an informant states:

“How do we expand projects to ensure water supply, when we don’t have the needed funds to undertake such project? The government and our financial partners don’t release the funds early and sometimes by the time it is being release, the cost of the materials on the market increases because of inflation. At the same time, our customers do not pay realistic prices for the water they consume because the government claims to subsidize it”.

This finding reveals that, the government has a hand in determining the price charge for water consumption. This suggests that, the institution is not entirely autonomous in its decision making processes as proposed by the proponents of the NPM theory. The finding is consistent with World Bank (2004) report that most sub-Saharan countries facing water challenges fails to give the required authority to their institutions responsible of supplying water to exercise managerial and operational discretion over combining of inputs in order to hold them responsible and accountable for the outcome of their decisions.

Related to this is the issue of corruption in the water sector. Some officials of the GWCL connive with customers to either underestimate bills or aid in an illegal means of connecting them to the municipal network for fees that goes into their private pockets.

Even though the some informants of the GWCL do not agree that corruption is among the topmost causes of the inadequate water supply in the Adentan Municipality, a few believe there is some level of corruption in company. To this one of the respondents said:

“Corruption is everywhere. There are corrupt officials in the system but people are afraid to expose them to the public because some of them are big men who knows how to manipulate the system to get what they want”

The household respondents’ also ranked corruption in the company as second to inadequate operational funds as what they perceive as the major challenge affecting water supply in the municipality. There seems to be less internal measures in the company to appropriately tackle corruption because the Company on its own do not have clear laid down procedures of tackling corruption cases.

These economic challenges contribute highly to the retarding of the GWCL to function effectively and efficiently. This affirms the findings UN (2010) that weak economic situation is the major challenge facing the water agencies in the third world countries. It also supports the assertion of WaterAid (2013) that most government lacks the political will to adequately fund the water sector as they rely on donor countries and institution for funds.

5.2.2. Social challenges

Social challenge in this study refers to the challenge that emanates from the physical growth or development of the community. In the context of this study, the social factors considered include, *the rate of expansion of the Municipality as against the laid water pipes and the incidence of illegal connection by the residents to tap water from the national network.*

Households can only access water from the national grid only if they are connected to the network or pipes of the GWCL. It is the responsibility of the house owners and estate builders to have their houses connected to the national grid through the GWCL for a fee. However, some household are unable to pay this initial connection charges. Even though, the Municipality faces intermittent water supply mainly due to insufficient water from the production point, it seems majority of the households especially those in the recent settlements in the Adentan Municipality do not have pipe connection.

This is made evident from the household respondents in the study. Thus, 57% of the total respondents have no pipe connection from the GWCL. This was also confirmed by an informant when he stated:

“In Adentan Municipality we have less than five thousand customers. Our pipes there of course cannot serve the entire population in the municipality. So the rest of the population access water through their own means. If a house is not connected to our network, how will it be possible for the household to access the water even if it is supplied intermittently? He asked”

Interestingly, respondents from the households also ranked the fast expansion of the community as the third major challenge of inadequate water supply. On this challenge, one of informant again opined:

“There is pressure on the few laid pipes as a result of fast population increment partly because of migration into the Municipality”.

Again, the results here is consistent with the study conducted in North Teshie by Doe (2007) where the major challenge to adequate water in the area was attributed to the fast expansion of the community.

In addition, one social challenge identified as affecting adequate water supply in the Adentan Municipality is the illegal connection of some household to tap water from the official network of the GWCL. In support one of the respondents of the GWCL states:

“Yes we do receive illegal connection cases reported by concern and patriotic citizens and sometimes through our monitoring team”.

This act do not only deny those who are legally connected to the grid to access adequate water, but it also increases the operational cost of the GWCL and reduces its expected revenue. This is because, though much water may be produced at a high cost, less revenue will be realized from it. This finding supports the study by Bakker (2010) that, water utilities in many developing are unable to account about 40% of water they produce. In contrast to this view of the official, the respondents from the household perceive illegal connection to water network as minor challenge.

Again, while the respondents perceive a deal between the tanker owners or operators and GWCL to limit water supply and to give monopoly to the tanker operators as a challenge though **minor**, all the officials unanimously denied this assertion. The respondents’ states:

“All these are false allegations and a calculated attempt to tarnish the image of the company”.

5.2.3. Political challenges

‘Political challenges’ in this study refers to the extent to which national body politics affect the operation of the GWCL. Politics it is said is ubiquitous. Thus it is everywhere. However, one is expected to see an institution such as the GWCL to be devoid of party politics and operate or perform its functions in a highly neutral manner. Unfortunately, party politics has found its space in the work of the company. This affect the effectiveness

and efficiency of water supply. This is made manifest in the appointment and recruitment of the employees of the company. Political parties try to lobby for their members to be recruited into the company without regards to their technical expertise. A change of government also means a change in the Board of Directors and some Managers who are the top decision making body of the organization. On this an informant at the GWCL said:

“Me for instance, I was appointed. There is a probability that I will go as soon as there is a change in government. It is because of politics that is why we (GWCL) in most cases are led by acting Managers. The position of the Managing Director is not permanent. They can be called to step-down or proceed on leave at any given time by the appointee”.

Sometimes policies and plans are halted in the process of change of leadership. It is therefore difficult to make and fully implement a long-term policies and plans without delays. This is because every appointed Manager comes with a dream of his own and they try as much as possible to accomplish it within their tenure of office. A respondent at the GWCL bluntly said:

“Sometimes there is a temporal hold-up on projects when new leadership is constituted. They normally ask us to hold on for a while as they get them oriented into the office”

Major infrastructural projects of the GWCL are funded by donor or international partner. These institutions or organizations grant loans and other assistance to countries with political stability. Notwithstanding the fact that Ghana experiences political stability for over a decade, some donor partners still harbor some fears to grant loans to the country especially during an electioneering year. This is because a change of government can affect their contractual agreement they would have started with the previous administration. In support, a respondent at the GWCL affirmed this when he said:

“My brother, many at times, the nature of our politics is such that it scares donor agencies and investors to grant financial supports to the company. Everything in this country is politicize to the extent that some politicians goes a long way to threaten some investors not to invest in our projects for reasons known to them. Investors too don’t want their monies to go waste. Because of this, we hardly receive donor funds during electioneering years”.

5.2.4. Environmental challenges.

Environmental factors cannot be excluded when discussion the major challenges of adequate water supply in Adentan Municipality. The most pressing environmental challenge that hinders the GWCL to effectively supply water to the Adentan Municipality is the unplanned nature of certain parts of the community. In order to supply water from the national grid to the households in the Municipality, underground pipelines must be laid and get them connected to the various household. However, in some parts of Adentan, it is a herculean task to connect households to the main network because the nucleated nature of the houses. Residents also do not want risk collapsing their buildings or fence walls to ease the process of laying the pipes. An informant alluded that:

“There are some places we cannot lay pipes through because of the way the houses are built. Sometimes we have to use longer pipes because we have to connect the pipes through a long processes which if the houses were properly arranged, it will have being a very simple task”.

This claim by the official is substantiated by the household respondents from the Municipality who ranked the *unplanned nature of the township or community* as the fifth major challenge they perceive the GWCL face in supplying water to the Municipality. Another environmental issue that can determine the proper supply and flow or otherwise

of water is the location of the community. While a settlement close to the main supply point receives adequate supply, those far may receive less if the pressure is less. This is the same in Adentan Municipality. Some parts of the Municipality do not experience any flow of water at all because of where they are located. A respondent opined:

“The fact that some receive the water at least for some time means there is a supply. So with the little available water and pressure, the location of the community is a determinant of whether a households in an area will receive supply or otherwise”.

The respondents on the other hand rank the *geographical location of the community or township* as a minor cause of the inadequate supply of water in the Municipality.

5.2.5. Technical challenges

In this study, technical challenges broadly denote the knowledge, machines or methods used in the production and supply water to the Adentan Municipality. GWCL is plagued with many technical challenges. The first major technical challenge identified by the key informant is the power fluctuation in the country. Energy or power is a key component in the production and supplying of water. Lack of or inadequate source of power mean no or less water will be produce and supply. To this a respondent at the GWCL states:

“Sometimes, our technicians are unable to supply the little available water we have produced when there is a sudden power outage. Because the power is needed to pump and to exert pressure on the water for it to be able reach the final consumers”.

Power fluctuation also affects the proper functioning of the machines. Machines and power cables are blown in the process. This increases the operational cost of the company. Again, in the Adentan Municipality, the informants admit that frequent breakdown of

pipes is a minor technical challenge in the supply of water to the municipality. This was supported by one of the informants at the GWCL when he states:

“Though we face challenges in supplying water to the Municipality, the breakdown of pipes unlike other areas is not a major result. Relatively, we receive less complains about pipes breakdown in the Municipality”.

While this is in agreement with the minor rank by the household respondents, the officials unanimously denied the assertion of the GWCL lacking technical expertise to operate in the sector and less commitment to work as contributing challenge in the supply of water to the Adentan Municipality.

5.3. Socio-economic effect of the inadequate water supply on the residents of Adentan Municipality

This section responds to the second objective which is to examine the socio-economic effects of the water supply shortage on the residents of Adentan Municipality. The discussion is centered on this objective based on the analyzed data from the respondents presented in chapter four above and also compared with reviewed literature. The discussion is broadly categorized under three themes namely, health, social and economic.

5.3.1. Health effect on the residents

To live in a healthy life means that one must have access to quality and adequate water supply. The source of water determines its quality. An unimproved source of water is detrimental to the wellbeing of the user. To minimize this, GWCL is mandated to produce and supply quality water to urban residents. However, because of the intermittent supply of water to the Municipality coupled with the fact that many residents who do not have

access to the piped water from the GWCL, many of these households rely on an unknown sources from the informal water vendors. The respondents therefore (with the mean = 4.46) *ranked high risk of drinking of untreated water from the open wells/tanks or surface waters provided by the vendors* as the first major effect. This means majority of the population may be drinking the water they are supplied with by the vendors irrespective of the source. The risk of water borne diseases in the municipality is therefore likely to be high. This finding is consistent with the country's 2011 Multiple Indicator Cluster Survey (MICS) report that, less than 8% of Ghanaians treat drinking water before using. This result is consistent with the hypothesis of Bates et al. (2008) and Costello et al., (2009) that there is a significant relationship between inadequate water supply and the health of the affected people. It also supports the study by WHO (2008) that high spread of waterborne diseases such as dysentery, typhoid fever, diarrhea and cholera are the result of consuming water from unimproved sources in the developing countries. Outwater, et al. (2013) also supports this findings that many of the sicknesses in African countries are water related.

5.3.2. Economic effect of the inadequate water supply on the residents

A household cannot survive for a long period without having access to water. In a water scarce area such as the Adentan Municipality, the source and quantity of the water determines the amount one will pay. Since in the Municipality majority of those even with pipe connection (56.14%) do not receive any supply of water at all, purchasing water from other sources mostly private tanker operators and neighbours (informal suppliers) is the only option. In most cases, the prices of water from these vendors are much higher than if they have a supply from the grid of the GWCL. While the few who are supplied with water by GWCL pay an average monthly bill of GHC 50, a trip of tanker truck of water

on average cost GHC 35 which and average household size of seven use for less than a week. Respondents therefore ranked *undue exploitation of residents by informal water suppliers* as the first major prevailing economic effects of the lack of or inadequate water supply to the residents of Adentan Municipality. The informal water vending business is not regulated. These are individuals who are into the vending for the sole purpose of making profit. They charge prices as they deem fit. This because, most these informal vendors buy the water from different sources and transports it through various means before reselling to the households.

In addition, while *slowing down of commercial activities* was considered as a minor effect, the second major economic effect of the lack of or inadequate water supply by the GWCL to the people of Adentan Municipality is the *high prices of food items*. Food vendors operate to make profit. But since water is a cardinal component of food preparation, the higher the cost of water, the higher the operational cost which also reduces the profit margin of the owner or seller. As such, the rational decision for the food vendors is to shift the additional cost of the water to their final consumers in order to be able to maximize profit and sustain their business. Consequently, this increases the prices of the food items in the Municipality and puts economic burden on the residents.

5.3.3. Social effect of the lack of or inadequate water supply in the municipality

Following the results above, the first ranked social effect of the inadequate water supply in the municipality is the *slowing down of domestic activities*. Reliable and adequate water supply is important in every household. This is because most of the core chores such as cooking, washing of clothes, and general hygiene activities in the household require water. Lack of reliable and convenient means of accessing water for the household delay these activities. This is because one has to spend some time in search for water. When this

happens more productive hours are lost which increases the rate of poverty of the affected households.

Another phenomenon witnessed by the respondents as a major impact of the water situation in the Adentan Municipality is related to gender. *Thus workload of women in the households becomes very heavy.* The burden of the water collection is much on women as compare to men because of power and gender role division in the household. In Ghana, women are mostly seen as responsible for collecting water for the household. Therefore, with no or unreliable access to water supply source, the onus lies on them to search for water by all means for their households. As shown in the analysis above in table 4.1, majority of the respondents (67%) are females. Again, 62% of the respondents buy water from their neighbours on daily basis. This increases the women workload in addition to the other house chores. Those who purchase on daily bases from their neighbours have to be carrying water sometime for distance over 100 meters as shown above from the household respondents results. This can increase the level of stress of women and also exposes them to health risk.

Apart from the two major social effects above, the participants from the household ranked the following: *lateness or absent of children to / from school, too much time is wasted in search of water and long queues in fetching water which results in quarrels* as minor social impacts. This finding is inconsistent with the similar study by Doe (2007) in North Teshie where the majority of the respondents perceived these problems as very severe in the area. The reason of ranking these as minor effects perhaps is because of the long persistent nature of the water situation these issues has become normal for the residents.

5.4. The Coping strategies

This section discusses the coping strategies analyzed in chapter four. Specifically, it seeks to answer the third objective of the study which is to investigate how the residents in the Adentan Municipality are coping with the water scarcity. It is evident from the analysis that all the respondents adopt more than one coping mechanism in their households.

5.4.1. Alternative strategies

As noted earlier in chapter four, the alternative strategies are those means of accessing water by households other than from the grid of the GWCL. These strategies are seen predominant in the Adentan Municipality because of the inability of the GWCL to supply adequate water to the residents. As such, households employ several of these access points to secure water. From the analysis, the most predominant alternative mechanism is the harvesting of rainwater during rainy season. This strategy is cost effective. However, it's unreliable since it is difficult to predict the day and time of a rain. In addition, water from this source is not always of good quality because of dirt from the roof where the water is being collected. The next of rank of the alternative strategy is the purchase of water from tanker operators on request with a fee (176 respondents) representing 88% of the total participants. The advantage of this mechanism is the reliability of delivery to the household. However, the quality of the water served by these vendors is always questionable because of the unhygienic nature of the water source as well as the tanker they use in serving the water. WHO/UNICEF (2012) consider this strategy as an unimproved means of accessing drinking water. Thus, most of these alternative coping strategies pose a health threat to the people. In addition to the health impact, the high charge of these providers because of the unregulated prices puts a burden on the household income. To minimize the drinking of polluted water, many of the respondents buy bottled

and sachet water in their household for drinking purposes. The prices of these waters are also increasing as inflation and other economic variables in the country change. Some households are unable to afford them as the daily drinking water. About 30% of the total respondents do not depend on sachet and bottled waters as drinking waters. This means they are likely to drink water either from their open well or the supply from the tanker operators. While only 33% are able to purchase large water storage tanks to be able to store water in large quantity, only 17% of the total participants use either drilled well or boreholes. The percentage of the respondents using this alternative strategy is less perhaps because of the initial cost of drilling of which might be difficult for the respondent to afford.

5.4.2. The conservative strategies

As indicated in chapter four, conservative strategies are the various means of preserving the little available water in the household through minimizing or controlling the method of usage. In a water scarce environment such as the Adentan Municipality, though conservative strategies have an economic importance, its latent effects can be detrimental to the general wellbeing of the people. The two most common conservative strategies the respondents adopt are the reuse of water (89%) and *the reduction of the quantity of water for specific purpose* (83%) respectively. Before a water is reused, it means it has previously being use for some purpose. The quality of the water will therefore reduce. Thus, it will be polluted. Reusing such water can be unhygienic even though the strategy meant to reduce the economic burden of buying more water. Again, reduction of the quantity of water for some reason suggests that the actual amount of water needed for a particular activity will be lessen. For instance, 69% of the respondents assert they normally reduce the number of times they have to bath per day. This can pose a threat to

personal hygiene which leads to sickness. Notwithstanding the above effects, it is the best strategy the poor and lower-income household adopt so as to ease them of spending much on water at the expense of other equally important needs and wants.



CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATION

6.1. Introduction

The chapter presents a summary of the study findings and offers some useful conclusions and recommendations. It also presents the conclusion of the study. The chapter therefore is divided into three main sections. It begins with the summary of the major findings under each objective of the study. Another section is devoted to the various recommendations for policy makers and analysts in the water sector. The chapter ends with the conclusion of the study.

6.2. Summary of the major findings

The summary of the findings are grouped into three main parts. Each of these parts presents the summary of the findings the research questions.

Challenges of Ghana Water Company Limited (GWCL)

Research objective 1: *To examine the major challenges of inadequate water supply in Adentan Municipality.*

6.2.1. Economic challenges

In as much as there may be several economic challenges facing GWCL, the inadequate fund for operation is the most pressing challenge. Though the company mobilized funds for operation through government subventions and IGFs, the international partners are the major financiers of the major projects of the company. As such, the company has little or no control of the release of these funds. Government subventions also delays. This

challenge is exacerbated by the high increase of inflation in the country as well as the existence of some corrupt officials in the GWCL.

6.2.2. Social challenges

The findings of the study reveals that one of the key challenges to adequate water supply in Adentan Municipality is the fact that the Municipality has expanded over the years faster than the pipes laid to supply the people. Even though many of the households have pipes, the ration of the water is unable to meet the water requirement of the population in their houses. In addition, many areas in the community do not have pipes connected to the network of the GWCL to be able to allow them to access water through the grid. Illegal connection was not seen as a severe challenge in the municipality.

6.2.3. Political challenges

There is also a manifestation of partisan political influence in the appointments and recruitment processes of the staff of the GWCL. Some people are either appointed or recruited into the GWCL base on their political affiliations to a political party. The competency of some recruits therefore is questionable. In addition, the executive power vested in the President to appoint and fire the Managing Director and other managers' makes these offices insecure. Finally, political tension in the country during electioneering year puts some fear on the international agencies and other countries to grant loans to the company to embark of projects.

6.2.4. Environmental challenges

Whereas the geographical location of the Municipality was not considered a major challenge, the nucleated nature of some parts of the community makes it tedious to lay

pipes. To ensure cost effective laying of pipes to this areas some buildings have to be demolished. Huge sums of money will be required to compensate house the affected people.

6.2.5. Technical challenges

The recent frequent power outage in the country is another challenge in ensuring the supply of adequate water to the Adentan Municipality.

Research objective 2: *To examine the socio-economic impacts of water supply shortages in the Municipality*

First, the probability of most of the residents to be infected with water borne diseases such as dysentery, typhoid fever, diarrhea and cholera is very high. This is because majority of the people who are not supplied with water from the GWCL rely on water vendors in getting water for their household use including drinking.

Second, there is high cost of living in the municipality. This emanates from the fact that the cost of water from the informal water vendors is high. Food vendor in particular shift the cost of the water to their customer thereby making the food expensive for the consumers in the municipality.

Research objective 3: *To investigate how the residents in the Adentan Municipality are coping with the problem.*

Households in the municipality employ both alternative and conservative strategies of accessing and managing water. Apart from harvesting rainwater during the rainy season, a high percentage of the respondents purchase water from the informal water vendors such as tanker operators and neighbours. Many households also buy bottled and sachet water for only drinking. Not many of the respondents have large water storage tanks and drill boreholes in their houses.

Again, several strategies are adopted by the households in making judicious use of the little water acquired. Some of these include reducing the quantity of the water for specific purpose, reuse of wastewater and the use for toilet facilities that do not require water in flushing.

6.3. Conclusion

In general, there seems to be an improvement in the provision of urban water in Ghana in recent times. This achievement is being celebrated by governments and institutions responsible for water supply. In spite of this, there are many urban communities without access to water supply. This is evident from the analysis above concerning the water situation in Adentan Municipality. The revelation from this study is an ‘eye-opener’ to the water supply challenges and the effects it poses to the nation at large and households to be specific. To improve if not to eliminate these challenges confronting urban water supply and the socio-economic impacts it brings to the citizenry and the economic development of the country requires a concerted efforts from all stakeholders including the government, civil society organizations and NGOs in the country.

6.4. Recommendation

Based on the findings of the study and suggestions of the respondents, the following recommendations are proposed.

First, in order to ensure regular flow of water for consumption and other uses, it is imperative that the infrastructure of the sector is revamped and should involve some short term and long term measures. To achieve this, the Government and the Management of the GWCL should not only depend much on donor partners but must make a conscious effort of funding the company adequately through timely release of national budgetary

allocations and also from the Consolidated Fund to enable the Company embark on an immediate repair and re-tooling programmes to ensure adequate water supply.

Second, to be able to minimize corruption in the Company, strict disciplinary measures should be put in place so that workers of the Company who compromises with the system for private gains are seriously dealt with. Again, the Management of the GWCL should be made to account for the resources they have been entrusted with including financial management of the Company on regular periods.

Third, in order to ensure that the workers of the GWCL are proactive, politicians must desist from interfering in the management and recruitment processes of the Company. This will give management the leeway to employ competent and skill worker to the GWCL.

Fourth, since the informal water suppliers are playing crucial role in ensuring water supply to the households, it will be imperative for the Ministry of Water Resources Works and Housing and other relevant institutions to regulate this informal water sector in such a way that their sources of water as well as their prices are regulated and monitored to avoid the sale of polluted waters and also to minimize over exploitation.

Lastly, there is still the need for the GWCL to enter into Public Private Partnership (PPP). This will enhance effectiveness and efficiency in the supply of water to the urban residents. By this, the Company will be proactive in generating much IGF for their operation.

6.5. Direction for future research

From the major findings and conclusions, the following recommendations are made for future research:

- A future research to ascertain the best ways of providing apt and long-term solution to the current challenges faced by the GWCL in supplying sufficient water should be conducted.
- Identifying the various coping strategies employed by the households in managing the water supply challenges in the Municipality is not enough. There should be a further research to find out the determinants of choosing a particular coping mechanism in a household.
- Again, there should be a future comparative study to find out the effect of the water shortages across the sub-communities and income groups in the Municipality.
- The data used in analyzing the water situation and its effect in the Adentan Municipality was collected before the commissioning of the Knong water project which is design to supply water to the municipality. As such, there is the need to assess the water situation in the municipality after the commission to find out if there has being an improvement of the water problem in the area and how the people are coping.



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APPENDICES

Department of public Administration and Health Services Management

University of Ghana Business School.

Appendix 1: Questionnaire

Dear respondent,

The purpose of this study is to examine the causes of the perennial water problem, the coping strategies and its social and economic effects on the residents of Adentan Municipality.

Your responses and cooperation will be very much appreciated. The information you will provide shall be used ONLY for academic purposes and shall also be kept confidentially. Thank you.

Section A; Respondent Characteristics: *Please circle the option where appropriate*

1. Sex: (a) Male (b) Female
2. Age: (1) 15 – 19 (2) 20 – 29 (3) 30 – 39 (4) 40– 49 (5) 50 – 59 (6) 60+
3. Marital Status: (1) Single (2) Married (3) Divorced/Separated (4) widowed (5) Other (specify).....
4. What is your highest level of education? (a) No education (b) Primary (c) JHS / Middle (d)SHS/Tech/Vocational (e) Post-Secondary (Tr. Trg/Nursing/Agric) (f) Tertiary (Poly/University)
5. What do you do for a living?
(Occupation).....
6. What is your household size? (How many are you in your household?):
(a) 1 (b) 2 (c) 3 (d) 4 (e) 5 (f) 6 (g) 7 (h) 8 (i) 9 +

Section B: Water supply, challenges and socio-economic effects;

7. Do you have pipe connected to your home? (a) Yes (b) No
8. If **yes**, how many days does your tap flow in a week? (a) 1-2 days (b) 3-4 days (c) 5-7 days
9. How long does water run every day in your house?
(a) >30min (b) 1-3hr (c) 5-8hrs (d) 9-12hrs (e) 13-16hrs (f) 17-20hrs
(g) 21-24hrs
10. If **no**, how far (in metres or kilometres) does it take you to walk to where you draw / fetch water? (a) < 50 m (b) 50 – 100 m (c) 100 -200 m (d) 200-300m (e) over 300m
11. On the average how many buckets (34 cm size/ 4 gallons) of water do you need for your household per day?
(a) 1, (b) 2 , (c) 3, (d) 4, (e) 5 , (g) 6 ,
(h) 7 , (i) 8 , (j) 9 +
12. Is the water you fetch sufficient to meet your household requirements? (1) Yes (2) No
13. If you have pipe connected to your home, how much do you pay as water bill per month?

- (a) > GHC 50 (b) GHC 50-100 (c) GHC100-200 (d) GHC200-300
 (e) GHC300-400 (f) Above GHC 400.
14. If you buy water outside your house, how much do you pay (on the average) for one bucket (34cm size/4 gallons) of water?
15. If you buy water from water vendors on smaller trucks (400-500 gallons), how much do you pay per trip?
16. How much do you think an average urban dweller in Accra should pay for one bucket (34cm size/4 gallons) of water?
17. What will you say about the quality of the water that you drink?
 (a) Good (b) Salty (c) Coloured (d) Bad odour (e) Has some particles inside
 (f) Other (specify).....
18. How severe is the water situation in your area? a. Very severe. b. Moderate c. Not severe d. Don't know
19. Do you think water price per trip is expensive or affordable to you?
 a. **Expensive (b) affordable (c) don't know**
20. Do you think the water supply problem in Adentan Municipality has some socio-economic effects on the residents?
 a. **Yes (b) No, (c) Don't Know**
21. What will you say about the following issues of water supply in your area? **Tick (✓) as appropriate in the columns under: No problem, Minor problem, Don't know, Moderate problem or Severe problem, in the table below.**

	Water issue	No problem	Minor Problem	Don't know	Moderate problem	Severe problem
1	High water prices from water vendors					
2	Slowing down of domestic & commercial activities					
3	Too much time is wasted in search of water					
4	Children usually are either late to or absent from school					
5	Long queues in fetching water, resulting in quarrels					
6	Prices of food items increase due to shortage of water					
7	Work load of women in the households becomes very heavy					
8	Risk in drinking of untreated water from open wells/ tanks or surface waters					
9	Undue exploitation of residents by informal water suppliers.					
	Others :					

22. What do you think are the possible causes of the water problems in your area?

Tick (✓) as appropriate in the columns under: **Not a cause, Minor cause, Don't know, Moderate cause or Severe cause** in the table below:

	Causes of water problem	Not a cause	Minor cause	Don't know	Moderate Cause	Severe cause
	Environmental					
1	Unplanned township/community					
2	Location of the town					
	Technical					
3	GWCL lack technical expertise to handle the pumps					
4	Frequent broken down of pipe lines					
5	Less commitment by GWCL to supply water to the municipality.					
6	Electricity power outage problems					
	Political and Administrative					
7	Politicization of the water sector					
	Social					
8	Tanker owners arranged with the GWCL to limit water supply.					
9	Few pipe lines cannot support fast expansion of the community					
10	Illegal connections					
	Economic					
11	Corruption in the water sector					
12	Inadequate funds for operation					
13	Other(s) (Specify)					

Section C: Coping strategies

23. Which of these coping strategies of accessing water do you use? **Tick (✓) as appropriate, as many as those applied to you.**

1. Reduction of water quantity use for specific purpose { }
2. Reuse of water { }
3. Use of other toilet facilities that will not require much water { }

- | | |
|---|-----|
| 4. Reducing number of bath taken by household per day | { } |
| 5. Disallowing external people from private vendor for large quantity needs | { } |
| 6. Rescheduling time for use and flushing toilet | { } |
| 7. Purchasing of water from private vendors | { } |
| 8. Use of bottled and sachet water especially for drinking purpose | { } |
| 9. Purchase of water storage tanks for households | { } |
| 10. Supply of water tanker by the GWCL on request with a fee | { } |
| 11. Rain water harvesting for household use | { } |
| 12. Drilled wells | { } |
| 13. Drilled boreholes | { } |

Section D; Recommendation:

24. Do you think water bills should be increased in order to improve water supply and Delivery services? (a) Yes (b) No (c) Don't Know
25. Do you accept that water supply and delivery should be handled by a private company?
(a) Yes (b) No (c) Don't Know
26. What do you think can be done to improve water supply and delivery services in the Municipality.....

Thank you

In-depth Interview guide

Dear Sir/Madam,

The purpose of this study is to examine the causes of the perennial water problem, the coping strategies and its social and economic effect on the residents of Adentan Municipality.

Your responses and cooperation will be very much appreciated. The information you will provide shall be used ONLY for academic purposes and shall also be kept confidentially.

Thank you

GWCL:

A: the trend of water supply

1. Which treatment plant supplies water to the Adentan Municipality?
2. How many gallons of water do you currently pump to the Adentan Municipality daily?
3. Given the current population, what do you think is the ideal number of gallons of water to be pumped to the Adentan Municipality on daily basis?
4. Could you kindly state the number of consumers you serve in the Municipality who have pipes in their homes given these ranges? From:
 - A. 2000-2005-----
 - B. 2006-2010-----
 - C. 2011-2014-----

B: The cost and pricing of the water

5. What are some of the major problems you face with tariff collection?
6. Does GWCL receive financial support from the Ghana government?
7. Does GWCL receive financial support from any other organization? Mention them.
8. What should the Public Utility Regulatory Commission (PURC) do to help the GWCL to overcome its problems or improve its services?

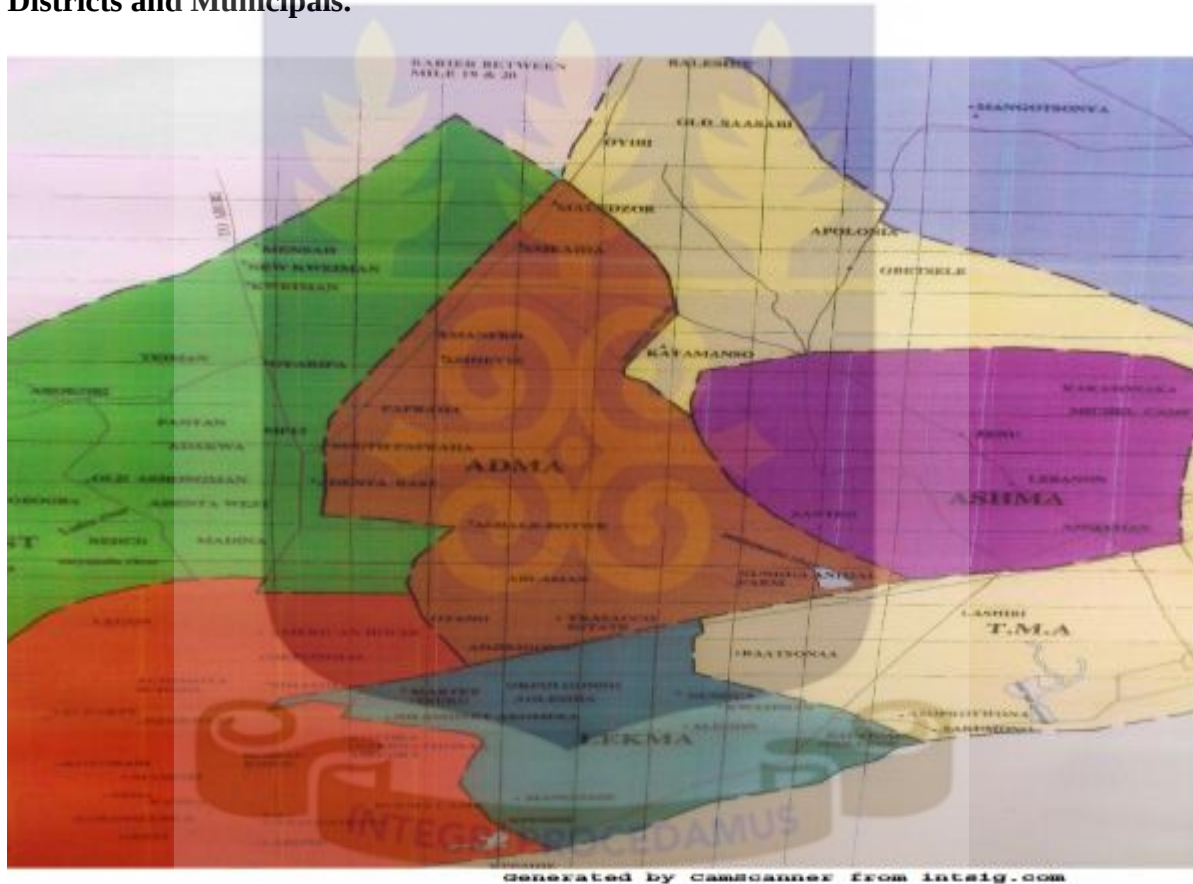
C: Challenges and remedies

9. What are the key challenges facing the water supply system in urban Ghana and specifically the Adentan Municipality?

10. What do you think can be done to overcome water supply problems or to improve water supply services in the urban areas of Ghana?

THANK YOU FOR YOUR ASSISTANCE AND YOUR VALUABLE TIME

Appendix 2: The administrative boundary of Adentan Municipality with adjoining Districts and Municipals.



Source: Regional Coordinating Council, Greater Accra Region (2014).

Appendix 3: Introductory Letter

UG BS
University of Ghana Business School
Regional Chief Manager
GHANA WATER CO. LTD.
25 NOV 2014 9206
P. O. BOX 1840, ACCRA
ACCRA EAST REGION 10th October, 2014

Ref. No. PAHS/26

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

LETTER OF INTRODUCTION

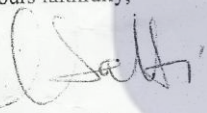
The bearer of this note, Mr. Paul Kwabena Manu is a final year student of the University of Ghana Business School, Legon, undertaking a course leading to the award of Master of Philosophy (MPhil) in Public Administration.

As part of the requirements of the programme, he has chosen to research on the topic:
Challenges of Water Supply in Urban Ghana: An Assessment of the Coping Strategies in Adentan Municipality.

I would be most grateful if you would give him the necessary assistance to facilitate his data collection.

Thanks for your cooperation.

Yours faithfully,


Dr. Albert Ahenkan
Supervisor

② Dr. Ahenkan
PLS assist the bearer
of this letter


INTEGRI PROCEDAMUS

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