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PUBLIC PERCEPTION OF GWCL/AVRL WATER SUPPLY SERVICE DELIVERY - CASE STUDY: KUMASI-GHANA

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KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI - GHANA

Public perception of GWCL/AVRL water supply service delivery

Case study: Kumasi-Ghana

By

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CERTIFICATION

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

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DEDICATION

To my one loving & dear mother

VIDA AKUA OFORIWA ASARE

May God richly bless you and grant you long life, ***AMEN!***

Abstract

The research was carried out in the Kumasi metropolis of Ghana to determine the perception of the public on the quality of water supply service delivery under the jurisdiction of Ghana Water Company Limited (GWCL) and Aqua Vitens Rand Limited (AVRL). A survey was carried out in three (3) out of eight (8) GWCL/AVRL districts in the Kumasi metropolis using structured questionnaires. The survey data collection targeted three (3) different income groups (High-income, Middle-income and Low-income) in each of the three (3) districts selected. The study showed that 15% of the customers received water supply within 16 -24 GMT in a day whilst 45% received water supply within 8 – 16 GMT and 40% received water supply within 0-8 GMT in a day. Generally flow of water has improved since AVRL merged with GWCL for operation of the supply of water. The flow was best in the South districts (76%) and worst in the Central district (56%). Overall it was 59% to 41% improved service and deteriorated service respectively. Customers were also satisfied with the quality of water supply service delivery. Many (77%) customers did not have problems with the smell of the water whilst 80% of the customers had no problem with the taste of the water supplied. The major complaints (67%) was with the colour of the water which needs to be looked at. Complaints were mostly made in person (86%). This in terms of DALY (Disability Adjustment Life Years) could amount to several thousands of cedis lost in a year. The attitude of GWCL/AVRL staff to complaints was very poor. Sixty-nine percent (69%) were not satisfied with the response to complaints. However meter readers were generally found to be customer friendly with sixty-two percent (62%) of the customers satisfied with the meter readers. Overall the customers perception on the price of water was relatively high (97%) and an increase in the water tariff may create problems.

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Glossary of Abbreviations

AVRL:	Aqua Vitens Rand Limited
AWWARF:	American Water Works Association Research Foundation
BOOT:	Build Operate Own Transfer
CAP OF WATER:	Ghana National Coalition Against Privatization of Water
CWSA:	Community Water and Sanitation Agency
EPA:	Environmental Protection Agency
GPRS:	Growth and Poverty Reduction Strategy
GWCL:	Ghana Water Company Limited
GWP:	Global Water Partnership
GWSC:	Ghana Water and Sewage Corporation
ISODEC:	Integrated Social Development Centre
KMA:	Kumasi Metropolitan Assembly
LSM:	Living Standard Measurement
PSP:	Private Sector Participation
PURC:	Public Utility Regulatory Commission
UNDP:	United Nations Development Programme
WHO:	World Health Organization
WRC:	Water Resource Commission
WSSCC:	Water Supply and Sanitation Collaborative Council
WTP:	Willingness To Pay
WWC:	World Water Council

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1.0 INTRODUCTION

1.1 Background of study

Water utility customers want adequate and a reasonable quality of water service delivery with environmental protection and public health protection at the lowest reasonable cost (AWWARF, 1998). The quality of water delivered and used for households is an important aspect of domestic water supplies, which influences hygiene and therefore public health (WHO, 2003). Large numbers of households in cities around the developing world do not have access to one of the most basic of human needs–a safe and reliable supply of drinking water. (McKenzie et al, 2009). At the beginning of 2000, at least 1.1 billion people in the world lack access to safe drinking water (UNICEF and WHO, 2000). Stephens, 1996, showed that in Ghana low-income communities that relied on public taps received less water and faced greater shortages than high-income communities in part because of the consumption patterns of the latter. A further problem with intermittent water supply is that households may be forced to store water within or close to the home, thus leading to increasing risks from vector-borne diseases. Zerah (2000) indicates that low-income families in New Delhi are likely to be at greatest risk from poor water supply continuity. Furthermore, as many developing countries are either already experiencing or facing water scarcity and water stress, the need to control consumption of water to conserve resources is also critical (Gleick, 1993). The reform of public water utilities has received increasing attention over the past decade (Schwartz, 2009).

It is therefore, imperative to periodically assess the public perception on the water service delivery in the Kumasi metropolis.

1.2 Problem statement

With respect to the national policy objectives, government undertook major reforms towards the water sector restructuring. A key objective of the policy reform is to involve the private sector in the management of the water systems and to attract private sector capital inflows for the rapid expansion and rehabilitation of the water sector in order to increase accessibility of all Ghanaians to reliable potable water supply. Since the gradual implementation of the reforms water supply in the Kumasi metropolis is overseen under a public-private partnership involving Ghana Water Company Limited-GWCL (Public) and Aqua Vitens Rand Limited-AVRL (Private).

Domestic water supplies are one of the fundamental requirements for human life. Without water, life cannot be sustained beyond a few days and the lack of access to adequate water supplies leads to the spread of disease (WHO, 2002). It is important to note, however, that the rapid growth in urban populations suggests that figures for access in urban areas may reduce over time unless the pace of expansion of coverage is maintained (WHO and UNICEF, 2000).

There have been a lot of complains by some NGO's, just to mention the Integrated Social Development Centre (ISODEC) and Ghana National Coalition Against Privatization of water (CAP OF WATER) about quality of the water supply service delivery to urban areas by the private sector involvement. However the operator (AVRL) claims there have been improvement in the water supply delivery service. **(Avrl-ghana.com)**

This study tries to analyze the problems and perceptions of consumers of the water services delivery rendered by the private sector involvement.

1.3 Justification

It is very necessary that this research is carried out to determine the public or the consumers' perception on water supply services delivery rendered by AVRL to the people of Kumasi. The government of Ghana currently is spending over thirteen million dollars ($13M) as payment to AVRL in service to the five (5) year management contract which expires in 2010. There is therefore the need that their operations of water service delivery be assessed by the service beneficiaries to determine whether the capital being spent has improved or not in the water situation.

1.4 Objectives of the study

The main objective is to assess the public perception of Ghana Water Company Limited (GWCL)/ Aqua Vitens Rand Limited (AVRL) quality of water supply service delivery in the Kumasi metropolis.

1.4.1 Specific Objectives

The specific objectives for this study are to assess:

- Customer perception on the flow reliability (hours) of the water service delivered
- Customer perception on the quality of water delivered
- Customer perception on the Customer Care Services rendered
- Customer perception on their water bill

1.5 Research question

The research question of this study is to find the various perceptions of the residents and consumers about the quality of service delivery by Ghana Water Company Limited / Aqua Vitens Rand Limited (GWCL/AVRL).

1.6 Scope of the work

The study was carried out in the Kumasi metropolitan area which forms the regional capital of the Ashanti Region (Ghana) and also forms the central business centre, commercial and industrial part of the Region. The research focused on the perception of the residents (i.e. consumers connected to GWCL/AVRL water system), in terms of the quality of water services delivery rendered by GWCL/AVRL and will also focus on the existing tariff of the Operator (AVRL). The study was limited to urban areas in developing countries with special emphasis on the Kumasi Metropolitan area. Though some work had been done on the state of water supply in Kumasi, research has not been carried out to find the various perceptions consumers have on the quality of water service delivery to their communities served.

1.7 Organization of reports

This thesis was organized into five main chapters. Chapter one presents the introductory and background information of the study and objectives. Chapters two discusses and review various literatures relevant to this research. Chapter three describes the study area and methodology. Chapter four looks at the data analysis, results and discussions.

Chapter five finalizes the report with the conclusions and recommendations.

1.8 Limitation of the Study

The study was limited in scope to three (3) different (i.e. North, Central, South districts) GWCL/AVRL water supply distribution districts in the Kumasi metropolis, Ashanti Region of Ghana. In each of the district samples were obtained based on the condition of income group (i.e. High, Medium, Low class areas). The income groupings were based on the Kumasi Metropolitan Assembly (KMA) categorisation of housing characteristic. The limitation was a deliberate attempt to make the assignment manageable given the time and resources available to complete it but very importantly not compromising on misrepresentation of results during data sample collection and that ensuring the selected sample size truly reflects on the views of the Kumasi populace served by the Operator (AVRL).

2.0 LITERATURE REVIEW

2.1 Nature of drinking water services

The functioning of the water service providers is considered by examining requirements for technical and operational performance, good governance and financial self-sufficiency.

Description of water supply system

A drinking water supply system usually comprises of a source of water, transmission or transportation of the portable water to community, a network of pipes and appurtenances (valves, bends, meters, reservoirs) known as the distribution systems that convey portable water to the consumers or customers. The source of water is either from a well, field of boreholes or from surface water sources based on conventional treatment methods. The water transmission system is made up of large diameter pipes that convey water from the treatment works or headworks to the community for distribution. The distribution network consists of small to medium sized pipes usually laid along the sides of the streets to allow households to tap using their service lines.

The engineering aspects (hydraulic and engineering design) of water supply aim at the following:

- Water production of acceptable quantity and quality to meet the population.
- Adequate pressures, velocity and acceptable head loss within the network.
- Engineering design to ensure that the potable water is transported efficiently to the community by selected appropriate pipe sizes (diameters) and appropriate

pipe materials.

- Location and design of storage facilities to ensure that there will be adequate water supply during emergency situation break pressure tank in some case depending on the topography.
- Reliable distribution system that ensure good quality of service. Criteria usually include adequate pressures, water quality and reliability of the services.

The exact nature of the water supply system may vary depending on a number of factors such as topography, availability of water resource and its quality. The nature of the water supply system gives rise to peculiar characteristics, which influence how the water system and the sector is organized.

Characteristics of drinking water sector

The drinking water sector exhibits a number of characteristics that influences how water services are organized or should be organized. The drinking water sector is characterized as a natural monopoly, private good, merit good and a basic need. The weighting accorded the various attributes in a particular context governs the way drinking water services are delivered.

Drinking water delivery as a natural monopoly

A natural monopoly occurs when economies of scale available in a production process is so large that the relevant market can best be served at least cost by a single firm (Baldwin et al, 1999). In the case of the drinking water sector, instead of having three drinking water companies laying separate networks where one would do, it may be more efficient to give one firm a monopoly subject to regulation of prices and quality of service. Where a natural monopoly occur, the use of competition may be undesirable. In such

circumstances, the role of Government is required to ensure that the monopoly provider is efficient. In practice, the economies of scale phenomenon that gives rise to "natural monopolies" may affect only one part of a given process indicating that only the part which is a natural monopoly should be regulated and the rest left to the market forces (Baldwin et al, 1999). This is the case for the water supply sector as only some aspects of the service provision may be classified as a natural monopoly namely the retail distribution system (Dijk, 2003). It may therefore be argued that the other aspects of water supply provision, which are not a natural monopoly, could be left to the market. Also, the aspects that exhibit monopoly characteristics could rather be competition for the market rather than competition in the market.

Drinking water as a Public or Private good

The basic criteria for assessing the degree to which a good or service is closer to being public than private pertains to excludability and substractability (World bank, 1993). Substractability occurs where one person's use or consumption of the good or service decreases or substract from its value to others who use the same good or service. For public goods, there is no conventional consumption during use (zero sub tractability), and the goods can continue to provide the same benefits to everyone, as long as there is no congestion. Excludability refers to the situation where the service provider is able to exclude potential users who are not willing to pay for services. When it is impossible or prohibitively expensive to exclude users the service becomes a public good. But when the price potential users can be prevented from benefiting from the service without paying the price, and no alternative way of free riding is available, the service becomes a private good.

For drinking water supply, the levels of service are usually a house connection (in house connection or yard connection) or a standpipe. In the case of excludability, users can easily be excluded for non-payment either through disconnection for house connection or "pay as you fetch" for a standpipe. Water use is also rivalry and hence water supply service could be considered as a private good.

Drinking Water as a Merit good

Even though water supply services exhibit the qualities of a private good, some quantity, a basic quantity of water is required to ensure good public benefit. This basic amount of water needed for basic needs to ensure public health benefit is considered as a merit good because water consumption for basic needs has benefit to society beyond that which accrues to the individuals consuming them (World bank, 1993). A merit good is considered to have some intrinsic values and, which left to individual consumers, may not be consumed at the required levels but when readily available and consumed the long-term effects are positive for the economy and hence deserve pubic sector intervention (Ilori, 2004). This merit good aspect has given water supply the recognition as an essential and a basic service (WSSCC, 2000). The merit good aspect implies universal accessibility, which therefore nullifies the excludability argument and makes the service a public good (Schwartz, 2006).

This merit good nature of water supply service delivery has wide political acceptance and is usually the dominant reasons for government subsidies. It is based on the premise that user fee alone cannot recover the cost of the service and that some consumers especially the poor cannot pay the full cost. In South Africa for instance, $6m^3$ of water per month per household (based on 25 liter per person per day for household size of 6) is

provided at no direct cost to customers (Smith et al, 2005). In Ghana the *"life line"* tariff of monthly domestic consumption between 0-20,000liters cost GH¢ 0.66 per 1000liters and consumption 21,000liters and above cost GH¢ 0.91 per 1000liters providing some subsidy for domestic consumption (GWCL/AVRL).

To achieve this merit good objective of water supply, it is therefore important to aim at improving the targeting of subsidy so as to achieve the social objective with the least cost to budget allocation and economic efficiency (Saleth et al, 2004).

Role of Government in drinking water supply

In the drinking water sector, the primary aim of government intervention is to offset the effects of market failure. Therefore depending on the nature of the market failure government intervention can take many forms. Market failure occurs when markets do not bring about economic efficiency. In the case of the drinking water sector the, possible "market failure" are monopoly, externalities, large-scale investment and merit good characteristics at basic level of consumption (Bartley, 1999).

Government interventions that have responded to the above "market failures" have been varied and changing. In the past direct government provisions of water supply services were very common. However, this is giving way as the consensus from the various meetings, workshops and forum on water supply has led to a shift in Government role from a direct provider of water services to an enabler and regulator of these services (GWP and WWC, 2003). Even though there seems to be consensus on the shift in Government role, there is no "blue print" on the form of government involvement but rather concepts and principles that could guide governments to determine the appropriate intervention based on local circumstance. Appropriate government intervention could be

in the form of financing, facilitating information dissemination, and regulation (Alearts et al, 1993). Other interventions include appropriate policies, procedures, guidelines, laws and regulations.

With respect to ensuring an enabling environment, it is essentially refers to the presence of clear "rules of the game" to stimulate all actors in the water supply sector to contribute effectively in the attainment of the overall water supply goal. An enabling environment is a key pre-requisite for successful delivery of infrastructure including water supply (Alearts et al, 1993, GWP, 2000). An enabling institutional framework should ensure that roles and responsibilities for all stakeholders in the service delivery are assigned and explicitly defined. It should also ensure the presence of appropriate legislation (new or amended) to improve water services to all user groups, ensure that other service providers currently complimenting or competing with the formal service providers know their roles and responsibilities. The relevant policy areas that should be addressed include the achievement of universal coverage, cost recovery, empowering consumers to participate in decision-making concerning the service delivery (Sansom et al, 2004).

Governments have a role in financing the water supply sector especially when user fees cannot recover the water supply cost. This could be the reality given the economic situation in some countries especially in low-income countries. For instance, 78 % of the population in Ghana lives on below $ 2 a day (World Bank, 2006). The merit good aspect of water supply may warrant subsidies but does not justify subsidies across board. Rather subsidies should target at the poor and designed to ensure minimization of inefficient use or wastage in drinking water supply. The government also has the role of regulating the water supply sector primarily because of the inherent monopolistic nature

and merit goods aspects of water supply.

2.2 Water Supply in Africa

Adequate clean water is essential to everyone's survival. Yet, nearly 20% of the world's population does not have ready access to drinking water (Suleymanova, 2002). The large majority of those affected are in developing countries, and the United Nations has identified water use as a priority for international aid. Rapid urbanization throughout the developing world has substantially increased the demand for urban water supply and in most countries the supply of services has not kept pace with this increasing demand. Excessive leakages among other factors have not helped issues leading to serious health and economic implications. Proportionally, Africa has the lowest percentage in terms of access to water and sanitation services. Equitable access to clean water and sanitation can improve livelihoods and reduce poverty. According to the United Nations Development Programme (UNDP) many poor people in developing countries particularly in Africa pay higher prices for water than residents of cities in advanced countries. In cities like Accra, one cubic meter of water may cost as much as three times more than in cities such as New York (www.undp.org).

In Africa, the economic damage done by deficiencies in water supply and sanitation amount to $28 billion per year - more than the continent received in development aid in 2003. If, from now on, enough was invested for Africa to reach the goal of halving the number of people without access to clean water by 2015, the annual damage would drop to around $13 billion, according to the Human Development Report. Its key message is that unfair distribution rather than unavailability of water resources is the main reason for

current grievances (www.undp.org).

The development of Africa's water resources has become one of the key objectives of the Bank's development efforts on the continent. African annual renewable water resources, which are estimated at about 5,400 billion m^3 per year, are considered to be abundant. These water resources are characterized by extreme temporal and spatial variability with over 60 shared water basins dominating the landscape. However, the exploitation of water resources is low with only about 3 percent of the total amount used under managed condition. Africa is therefore faced with the major challenge of achieving significant development of its water resources to ensure sustained economic growth and social wellbeing (www.afdb.org,).

The social cost of Africa's poor exploitation of its water resources is well documented. Currently, about 300 million people in Africa do not have access to safe water and about 313 million have no access to sanitation. Most of Africa's population lives in rural areas (62 percent) and yet access is lowest in the rural areas, at about 47 percent for water and 45 percent for sanitation. Low access to a safe water supply and adequate sanitation is the root cause of many diseases that afflict Africa and a contributory factor to the high infant and maternal mortality rates in many RMCs (www.afdb.org,). The World Health Organization has reported that approximately 50 percent of all Africans suffer from one of 6 water-related diseases (www.who.org).

The Regional Stakeholders' Conference for priority setting about water and sustainable development in Africa took place in Accra in April 2002. The main objective of the conference was to identify the state of Africa's water resources and to find a way to contribute to safeguard it so as to act as one international body to achieve the Millennium

Development Goals of reducing the proportion of Africans without access to water supply and sanitation by 75% by 2015 and by 95% by 2025 (www.who.org).

2.3 Water Supply in Ghana

Ghana's water resources can be grouped into surface and groundwater sources.

Surface water constitutes the dominant source used in the supply of potable drinking. There are three major rivers that make up the available surface water. These are Volta rivers and Oti river which drains about 70% of the total area of Ghana, the south western rivers *(Bia, Tano, Ankobra, Pra)* which covers *22% of* land area *Ghana, and the Coastal* rivers (*Tordzie/Aka, Densu, Ayensu, Ochi-Nakwa and Ochi-Amissah*) which covers 8% of the total area of Ghana (MWH, 1998). Public water supply begun with a pilot piped water system managed by the hydraulic branch of the then Public Works Department (PWD) in Cape Coast in 1928. This agency was responsible for supplying water to both the urban and rural communities. In 1948, a separate Rural Water Development Department was formed to take responsibility for water supply in rural areas. After independence in 1957, the water sector was set up as a Water Supply Division under the ministry of Works and Housing with responsibilities for both urban and rural water supplies.

The supply of potable water has gone through a number of changes over the past 35 years when the Ghana Water and Sewerage Corporation (GWSC) Act 310 (1965) was enacted as a legal utility charged with the responsibility of providing, distributing and managing water supply and sewerage systems for domestics and industrial purposes throughout the country. Over the past two decades, a number of reforms in the water sector were

initiated with the aim of improving management and coordination of the country's water resources and systems. As part of the water sector reform, three new regulatory bodies were established; the Environmental Protection Agency (EPA), Public Utilities Regulatory Commission (PURC) and Water Resources Commission (WRC). Those agencies were formed to be in charge of environmental, tariff and overall resource management issues respectively. On the 1st of July 1999 GWSC was converted into a 100% state owned Limited Liability. Ghana Water and Sewerage Corporation in pursuant to the statutory Corporation Act, 1993 (Act 461) as amended, was converted into a Limited Liability Company under the new name Ghana Water Limited (GWCL). The company's operations were seriously affected by the approval of the 30% tariff increase which was less than half (1/2) of the proposed 76% submitted to the Public Utility Regulatory Commission (www.arch.columbia.edu./studio/spring2003/UP/Accra).

There are two distinct management arrangements for the supply of water in Ghana, a separation into urban and rural water supply. Ghana Water Company Limited (GWCL), formally Ghana Water and Sewerage Company (GWSC) is responsible for water supply and has about 80 systems serving a total population of some eight million. Urban water coverage is estimated at 59% and is expected to reach 85% by 2015 (GPRS, 2002-2004) in line with the Millennium Development Goals. Many urban areas face shortfalls in water supply. The urban poor have to pay more than 20 times the tariff for water through secondary and tertiary providers e.g. private vendors such as neighbors. The lifeline (social) tariff of ¢80 per bucket is approved for urban consumers (GWCL, 2004). The GWCL faces considerable challenges including over aged facilities, a growing population, previously low tariffs that affected its ability to generate sufficient revenue

for rehabilitation and expansion and high levels of unaccounted for water (about 52%). Water supply in the rural areas is under the Community Water and Sanitation Agency (CWSA). The principal source of rural water is groundwater in the form of boreholes and other surface water such as rivers and streams. Water coverage in the rural areas is estimated to be 49% (WHO, 2000).

About 4 out of 10 Ghanaian households within the piped areas of the urban sectors are GWCL customers. This rises to 9 out of 10 households among the highest Living Standard Measurement (LSM) groups. The majority of households in piped areas do not have primary access to piped water, most especially the urban poor despite a high preference for GWCL services. The water sources on which the non-piped (mainly the urban poor) rely are more expensive than piped water. These comprise of the many coping strategies that individuals adopt to cope with the unreliable water supply through suppliers by water tankers (National Water Policy, 2005).

The publicly owned Ghana Water Company Limited (GWCL) currently provides urban water supply services in Ghana. The introduction of Private Sector Participation (PSP) in the urban water sector is in place under a five-year management contract. On November 22, 2005, Dutch company Vitens International, and South African water suppliers Rand Water Services Pty, set up a Ghanaian-registered company to manage GWCL. This is only a management contract relating to urban water supply. The Public Utilities Regulatory Commission (PURC) is the economic regulator of the urban water sector in Ghana, responsible for setting water rates, establishing regulatory guidelines and protecting the interests of consumers (www.arch.columbia.edu./studio spring2003/ UP/ Accra).

As part of the water privatization process, Adam Smith Institute (ASI), acting as advisor to PURC has identified the need for comprehensive consumer research to aid the development of regulatory policy and guidelines that will protect the interests of all water consumers, in the near future, following implementation of the PSP (Adam Smith Institute, 2002).

Poor urban development and population growth is the major cause of this situation in the country. As a result, most homes in the urban cities uses water tanks to store water since the taps are not reliable. This condition has led to the evolution of various tanker water supply services. These tankers distribute water to both private and public institutions. Their activities are coordinated by the Tanker Associations and the rate for the private water tankers is determined by the Public Utility Regulatory Commission together with GWCL (www.arch.columbia.edu./studio/spring 2003/UP/Accra).

2.4 Definition of Partnership and Its Components

Murray (2008) defines Partnership as a legal relationship formed by the agreement between two or more individuals or organizations to carry on a business as co-owners. According to Hood (2008) partnership is the collaboration between parties with a shared interest, and partnership arrangements are often put in place to address specific issues or to manage particular projects. Partnerships can only function if there is trust among the partners, as well as mutual accountability and transparency.

All the various forms of partnership have aims and objectives, the activities they engage in, the actors involved, the nature of the relationship, the socio-economic and political context and the outcomes of the partnerships.

McQuaid (1994) stresses the importance of three components in this respect: the mandate, including the aims and objectives of the partnership arrangement; the arrangement within each partnership; and the various outcomes. Table 2.1 show components of partnerships arrangement.

Most urban authorities in both industrialized and developing countries receive their powers and obligations from a central government authority, with allocation of powers and responsibilities to protect the rights of the citizens, to provide services and to serve the common good.

Table 2.1 Components of Partnership Arrangements

COMPONENTS	EXAMPLES
MANDATE	
Aims	Provision of water , visioning, consultations
Range of activities	Transportation ,storage and strategic planning
Scale of intervention	Urban level
ARRANGEMENTS	
Actors involved and excluded	Who does what, how and when
Nature of relationships	Formal or informal
Decision making structure	Organizational structure
Division of tasks	Related to organizational structure
Inputs of various actors	What do different partners bring to the partnership
Financial arrangements	What financial resources are available to the partnership
Monitoring and evaluation	Review of progress made; lessons and replicability
OUTCOMES	What actual benefits (tangible or intangible): value added

Source: adapted from McQuaid R. W (1994)

2.4.1 Types of contracts under PPP & Mode of Assessment of Partnerships

Types of contracts under PPP

While privatising, it is prudent for governments to adopt models that will safeguard local interests. For example, they could decide to do this through management or service contracts, leasing or concession or through BOOT arrangements. The government may also specify the number of systems and the areas they cover in its program private sector participation. They should carefully consider the merits and demerits of the available options and pick that which best suits their situations and safeguards their interest. This is as long as they are attractive to investors and makes financial sense to all parties.

Three main types of contracts may be highlighted: lease, concession and BOOT (Build Own Operate Transfer). Leasing is where a government gives the utility to a private operator for an agreed period of time for an agreed fee. During that time, the maintenance and operational costs are taken up by the private operator while the utility (government) carries out the development of assets including infrastructure.

In concession arrangements, the utility is given to the private operator for an agreed number of years (between 25-30 years) to run the utility under agreed conditions. The investor makes all the investment decisions he/she deems necessary for profitability of the enterprise and in meeting the performance criteria agreed with the government.

BOOT on the other hand is where a private entrepreneur comes in for an agreed period of time between 20-30 years to build a new production facility and within that time expects to recoup his investment costs. He builds, owns and operates the utility and makes all the decisions pertaining to the profitability of the service. The drive is the guarantee to get back what has been invested.

BOOT is a more expensive alternative but is a viable option where the government cannot raise its own financing for the project. Political and economic stability are key factors to this arrangement.

In the case of Ghana, a combination of a lease arrangement for one business package and the inclusion of a BOOT project on the other have been adopted.

Table 2.2: Allocation of key responsibilities under the various options for private sector participation

Option	Asset Ownership	Operations & Maintenance	Capital Investment	Commercial Risk	Duration
Service Contract	Public	Public and Private	Public	Public	1-2 years
Management Contract	Public	Private	Public	Public	3-5 years
Lease	Public	Private	Public	Shared	8-15 years
Concessions	Public	Private	Private	Private	25-30 years
Build, Operate Own contracts (BOO)	Public and Private	Private	Private	Private	20-30 years
Divestiture	Public and Private	Private	Private	Private	Indefinite (may be limited by license)

Source: World Bank, 1997. "Toolkits for Private Participation in Water and Sanitation".

Mode of Assessment of Partnerships.

Partnerships have been discovered as one of the most effective solution to development problems especially in the water sector. It is impossible to identify specific cross cutting value-added indicators (Brinkerhoff, 2002). Apoya (2004), shown that partnership leads to improvement of service delivery in terms of efficiency, effectiveness, equity and financial sustainability. Cointreau-Levine (1994), elaborated the general and specific reasons for involving the private sector.

General reasons to involve the private sector

The following reasons are usually put forward to involve the private sector.

- Government has no money
- Government is not efficient
- Government failed to deliver the service in the past
- Complementary resources
- Complementary expertise

Specific reasons to involve the private sector

- Improve quality of service
- Reduce political interventions
- Reduce number of public sector employee
- Expand service coverage to more customers
- Introduce competition
- Improve operating efficiency
- Required capital funding by injecting private investment capital

2.4.2 Partnership in Urban Water Supply

At least 27 African governments over the last decade who have recognized the need to embark on reforms to address the problems of water services have chosen partnership as the central feature of these reforms. The 'formal private sector' is here understood to refer to private sector corporations, institutions, firms and individuals, operating registered and/or incorporated businesses with official business licenses, and generally modern technology.

According to Pessoa (2007), partnership ranges from each partner shares in the design; contributes a fraction of the financial, managerial and technical resources and partially takes on the risks associated with the project and obtains the benefits expected by each partner, which the project creates. According to Ogunbiyi (2004), several schemes have had a "negative impact on the poor by restricting their access to clean supplies due to high tariffs".

2.4.3 Cost of Water and Subsidies

Tariffs determine the level of revenues that service providers receive from users. They are designed for different purposes, and often contain some elements to address poverty. They can be either at the service provider level or by national (or local) government. More often than not setting tariffs is a political process that is rife with controversy.

Within a sustainable development framework, the need for subsidies to provide services to the poor is understood and widely accepted. It is generally agreed that in poor areas of middle and low income countries, subsidies are necessary to cover basic cost of service provision to the poor consumer. Different types of subsidies achieve different purposes. Some types of subsidies might be better than others, depending on the type of project and the level of data, capacities and resources needed to manage and administer subsidies.

Poor people need and use water for a wide range of essential activities. Deliberately making provisions for these multiple uses of water when designing and managing water supply could greatly reduce poverty, increase gender equity, and improve health at little additional cost (Williams and Carriger, 2006).

Water need is the required water volume based upon a series of pre-set, often qualitative assumptions and values regarding water use e.g. there are accepted values for the volume

of drinking water required by a person per day. The minimum amount of water required to meet basic needs vary depending upon what is included as "basic needs". The figures vary from 20 to 50 liters per person per day (Abrams, 2001).

2.4.4 Willingness to pay

Willingness to pay (WTP) is an expression of the demand for a service, and it is a strong prerequisite for sustainable cost recovery because it is the materialization of users' satisfaction and of their desire to contribute in monitory terms, but it can also be in kind. It is necessary to find out the conditions that affect demand and the desire of people to contribute to the service economically. Direct techniques for the estimation of WTP are based on observation of what people actually do in order to ensure the provision of water services. WTP studies are carried out to understand what level of services people want, why and how much they are willing to pay for it. A useful way to improve willingness to pay is to improve relationship between consumers and the organization managing the water supply. An increased trust and confidence, through better information and communication, can have a positive influence on users' satisfaction and willingness to pay.

2.5 Water Consumption/Use

Today, due to increasing consumption patterns, water is becoming scarce and this scarcity is an emerging threat to the global population. Global consumption of water is doubling every 20 years, more than twice the rate of human population growth (Sampath et al, 2002).

Factors Affecting Water Consumption

Variations in total water consumption of different cities or towns depends upon various factors, which must be thoroughly studied and analyzed fixing per capita consumption for planning design purposes. The following factors are some of the factors affecting domestic water consumption. Technology in use; Climatic conditions; Quality of water supply: Pressure in distribution systems (Garg, 2002).

System of supply: The water may be supplied either continuously for 24 hours of the day, or may be supplied only for periods (intermittent supplies). The second system, i.e. the intermittent supplies, may lead to some saving in water consumption due to losses occurring for lesser time and a more vigilant use of water by consumers. But at many places, the intermittent supplies may not give much saving over the continuous supplies, because of the following reasons: In intermittent supply system, water is generally stored by consumers in tanks, drums, utensils, etc., for non-supply periods. This water is thrown away in some cases even if unutilized as soon as the fresh supply is restored. This increases the wastage and losses considerably. Also people have a general tendency to keep the taps open during non-supply hours, so that they may come to know of it as soon as the supply is restored. Many a times, water goes on flowing unattended even after the supply is restored, thus resulting in wastage of water.

Income level of the consumer: The higher the income level of households the higher they consumer water. This is so because if the income level of the household is high, they can afford water appliances such as washing machine and dish washers. Also they are able to afford houses with facilities such as lawn, WCs, showers, and bathtubs and these facilities use a lot of water.

Intermittent Water Supply

Intermittent water supply may be defined as a piped water supply service that delivers water to users for less than 24 hours in 1 day (McIntosh, 2003). It is a type of service that, although little found in developed countries, is very common in developing countries. Changes in water supply can be effected by growing middle class and its small but very powerful rich group. If they use their influence, but they do not do this because they secure their water supply as individuals through the use of tanks, pumps, etc

Causes of Intermittent Water Supply

The primary cause of intermittent water supply is extending distribution systems beyond their hydraulic capacities to provide 24-hour service. This is usually done at the behest of elected officials (McIntosh, 2003). In Kathmandu, for example, they continue to add 5,000 new connections a year, despite an inadequate distribution system (McIntosh, 2003). Other causes of intermittent supply are a failure to meter completely and accurately and a failure to charge and collect on sufficiently high tariffs. It is often said that there is not enough water for 24-hour supply. This is not valid, because much of the water available is wasted. What is needed is demand management (McIntosh, 2003). Leakage and illegal connections, contributes to intermittent water supply by lowering water pressure in the distribution system. One reason given for designing systems to provide water intermittently is the high cost of pumping for 20-24 hours.

Consequences of Intermittent Water Supply

Households with intermittent water supply must invest extra money in pumping, storing, and treating this resource. Consumers without access to a 24-hour supply tend to use more water than others. Because they are never certain when they will next be served,

they throwaway the surplus "old" water from yesterday to make way for "fresh" new water today (McIntosh, 2003). Intermittent supply causes anxiety, and generally one person from each residence has to devote time to ensuring that water is received when it comes. Valve operators can extract bribes from consumers who wish to ensure that they will receive adequate service. Sometimes females must venture out in the middle of the night to retrieve water from standpipes, which can make them vulnerable to assault.

No water from an intermittent water supply system is safe to drink, because under vacuum conditions foul water can be drawn into the pipes. Certainly hygiene education is important under these conditions, which put at risk people connected to an intermittent supply. Most meters do not register accurately under intermittent supply conditions, raising doubts as to the validity of metering at all. Constant valve manipulation increases the need for more frequent valve maintenance and replacement.

It has been reported in the literature that, once intermittent service becomes the norm, the hours of service continue to decline. The high costs of intermittent supply are paid by the utility, which incurs higher investment and operating costs; the customers, who pay to cope with unsatisfactory service and to protect themselves against unsafe water; and the population as a whole, as the risk of epidemics increases due to the consumption of contaminated water. (Yepes, et al, 2001 cited in McIntosh, 2003)

2.6 Water Demand Management

Managing water supply more efficiently has become a priority, especially in developing countries. Given the high cost of new infrastructure development, the recent emphasis on demand management and the social obligation to provide water services to the urban poor, water providers are faced with an important choice: whether to go the demand

management route or to proceed with new infrastructure development.

Water demand management is defined as the development and implementation of strategies aimed at influencing demand, so as to achieve efficient and sustainable use of a scarce resource (Savenije and van der Zaag, 2002). Water demand management is not necessarily the same as decreasing water demand or water use; in certain situations managing the demand may mean to simulate the demand that had been suppressed. Water demand management is also not necessarily the same as the pricing of water. Water demand management uses technical, legal and economic incentives in combination with awareness raising, information provision and education; in order to achieve more desirable consumption patterns, both in terms of distribution between sectors and quantities consumed, coupled with an increased reliability of supply (Savenije and van der Zaag, 2002).

2.7 Water Conservation

There are many ways that water can be saved. Water consumption can be reduced by 20 - 40% without purchasing expensive equipment or being inconvenienced. Reducing water use can mean substantial savings on water, sewage and energy bills. If septic tank is being used, water reduction can prevent drain field overloads and require less energy for pumping well water. Simple water conservation practices can prolong the life and performance of septic system. Good water use habits are the key to saving water. Many conservation techniques are simple common sense ideas. Other practices may not be so obvious (Audubon International, 2006).

2.8 Mode of Contract

The Ghana Water Company Limited Management Contract

Introduction - Under the Urban Water Project and as part of the reforms in the Urban Water Sector, Ghana Water Company Limited has entered into a Management Contract with a private operator to operate the water supply systems targets set in the contract and is paid a fixed fee for meeting the targets for a period of five years.

The Parties – The Contract is between the Grantor i.e. Ghana Water Company Limited, wholly owned by the Republic of Ghana, on the one hand, and the Successful Bidder, Vitens Rand Water Services B.V., a consortium between Vitens International BV of the Royal Netherlands and Rand Water Services Pty, of South Africa.

The Operator - The Operator, Aqua Vitens Rand Limited, is a limited liability company formed by the Successful Bidder under the laws of Ghana with the sole purpose of fulfilling its obligations and exercising its rights under the Contract.

Operator's Responsibility - covers the management of the following services:

(i) Technical Services

1. Abstraction of raw water
2. Production, transportation, treatment and delivery of piped potable water to customers
3. Repair, replacement and rehabilitation of the Facilities for producing water.

(ii) Commercial Services

1. Management of all customers, including invoicing, collection and metering.
2. Management of new connections, subscriptions and disconnections
3. Identification and removal or regularization of illegal connections

4. Definition and establishment of commercial procedures

GWCL'S Responsibility Includes:

- Management of the urban water supply assets
- Planning and infrastructure development
- Establishment and monitoring of targets for the Operator
- Proposing for the approval of the PURC, adequate tariffs for the urban water sector

WHAT HAPPENS TO GWCL'S STAFF? - Operational Staff of GWCL has been seconded to the Operator on the terms and conditions of their current employment with GWCL. Such seconded staff remains GWCL employees. However, during the term of the Management Contract, it is the Operator who shall assign duties, work location, manage and discipline the seconded staff to accomplish the objectives of the Contract. Staff in the head office will continue to work directly under GWCL management for the monitoring of the operator and the planning and implementation of investment programmes.

2.9 Terms and condition of the contract

2.9.1 Nature of Partnerships

The Management Contract sets out specific standards to be attained by the Contract Operator. It also sets the timelines within which it should study the systems and come out with recommendations, acceptable to the Grantor, for achieving improvements. All international contracts recognize such "study-periods" and the aim is to ensure that contractors do not rush into cosmetic solutions that may turn out to be unsustainable.

A. Treated Water Quality and Pressure:

Within six (6) months from the Commencement Date, the Operator is to produce and maintain water quality, pressure and flow rates at all (i) discharge points from treatment plants for Treated Water ("Headwork's") and (ii) throughout the distribution networks that meet or exceed all relevant standards determined by the Ghana Standards Board and/or the Consumer Charter requirements, and the Drinking Water Safety Plan.

B. Reduction in Non-Revenue Water

(a) Within twelve (12) months of the Commencement Date, the Operator Shall submit to the Grantor for discussion and approval a plan for the systematic measurement and reduction of non-revenue water in the Service Area.

(b) The plan referred to in (a) above will specify how to calculate non-revenue water in the absence of complete metering and determine yearly targets for reduction in non-revenue water in the Service Area of at least five (5) per cent per year and shall propose relevant penalty provisions for failure to meet such yearly targets. It will also include how Operator intends to reduce leakage and illegal connections.

C. Treatment Plant Operations

Within sixty (60) days from the Commencement Date, the Operator will provide the Grantor with the specifications for meters and the required location thereof. Installation of new meters, rehabilitation of old meters and connections shall be payable from the Project funds.

For the Management Contract Period, the Operator shall maintain average daily production, for at least ten (10) months per year, at a level not less than that which was measured when the relevant bulk meter was installed or rehabilitated.

D. Customer Response Plan

Within six (6) months from the Commencement Date, the Operator shall provide a report acceptable to the Grantor that: (i) defines what a "response to customers inquiry" means according to Prudent Industry Practice; (ii) documents average customers response time by the Grantor immediately prior to the Commencement Date; and (iii) outlines a plan to reduce the average customer response time to forty eight (48) hours beginning no later than month twenty-four (24) of this Management Contract.

2.9.2 Guarantees to ensure Compliance with Service Standards and/or Efficiency of the Operator

1. The Operator is obliged to perform the services in accordance with the Service Standard in the Contract, Applicable Law, including environmental legislation and PURC Regulations, prudent industry practice, and the Consumer Charter.
2. Performance Security – The Operator is required to provide a Performance Bond in an amount of $3,000, 000 (three million dollars) to be issued by a reputable bank approved by GWCL. The Performance Security shall guarantee the proper and timely performance of all of the Operator's obligations under the contract. GWCL will draw on this security in the event of a failure of the operator to perform.
3. Monitoring Powers of GWCL

- GWCL is to review and approve or comment on all reports submitted by the Operator on its operations.
- GWCL has right of access during normal working hours to premises, works and sites of the Operator for the purposes of inspection and certification.

- GWCL has the power to reject and cause to be replaced at the expenses of the Operator, any Operator Staff or sub-contractors whose qualifications and/or performance it has cause to be dissatisfied with.
- GWCL has the right to terminate the Contract under certain stated conditions.

4. Financial and Technical Audits – Annual technical and financial audits to measure the Operators performance have been provided for under the contract. Two independent internationally reputed firms – one financial and the other engineering – will be hired for these functions. The firms shall be procured by International Competitive Bidding. It is based on their audit reports that the Operator shall be penalized for under-performing or rewarded with a bonus for exceeding targets.
5. Penalty Reduction

The Operators performance below the Service Standards will result in the decrease of the Base Fee.

6. Incentive Compensation – On the other hand, the Operator will receive Incentive Compensation (Bonus) if it exceeds the targets, set forth in the Contract. The Incentive Compensation will be paid not from the Project funds but from the increased cash flow resulting from the exceptional performance for which it is being given the bonus.

2.9.3 How the Project Partnership Targets the Poor

The provision of easily accessible potable water is a key component of poverty alleviation in Ghana, as it is every country. For the Urban Water Project, the Government has identified three areas of poverty focus: Access, Affordability and Targeting.

Access: Increasing access to improved water supplies is a major water sector policy objective of the government. Therefore over 75 percent of the Project funds are for civil works and associated engineering. The government has set a Project goal of, at least, 50,000 new household connections, the majority of which will be to low income households and for the provision of standpipes. To complement these efforts, provision has been made in the Management Contract for incentives to the Operator to increase the cubic meters sold at the "life line" portion of the tariff, thereby giving the private operator an incentive to extend service to as many new poor areas as possible.

Affordability: The emphasis on new connections also means that poor households will buy less water from high price vendors. This will significantly lower the cost of water for poor people. The Project is also supporting efforts by the Public Utility Regulatory Commission (PURC) to put in place programmes to ensure that tanker trucks deliver water to consumers at affordable prices.

Targeting: The PURC has defined a programme to ensure better targeting of the poor with affordable delivery of water supply services. PURC's pro-poor programme consists of actions to

(i) Rationalize lifeline tariff to better target poor consumers living in compound houses

(ii) Improve affordable access to water supply for the very poor living in areas served by water vendors; and

(iii) Enhance the quality of tanker service delivery, including rationalizing the cost of service. To realize the pro-poor objectives of the proposed project, the PURC is being supported with World Bank funds to implement its set of pro-poor actions including the setting up of identified pilots in selected cities.

3.0 METHODOLOGY

3.1 Description of Study Area

The Kumasi Metropolis

Kumasi the capital of Ashanti Region is a city in southern central Ghana. Kumasi is approximately 300 miles north of the Equator and 100 miles north of the Gulf of Guinea. With over 1.8 million citizens, the city spans a radius of 18 to 20 miles. Kumasi is the second-largest city in the country.

Kumasi has a semi-humid tropical climate, with a total average annual rainfall of 1340mm. The rainfall distribution is weekly bimodal, with a main peak between March and June, and a secondary peak in September to October. The terrain is moderately dissected (amplitude of relief up to 30m) with slopes commonly of 5 to 15.

Kumasi metropolis has a population of about 1.8 million people, and demand from small private industries has recently increased, making supply inadequate. Demand for water now is about 30 million gallons per day. Current installed capacities of Barekese and Owabi Headwork are 18 million and 3 million gallons respectively. However, the Barekese dam pumps between 11-12 million gallons/day instead of 18 million gallons/day capacity. The reasons for the short fall in water production were due to weak pumps and electricity power cut problems. The Owabi dam faces similar problems but pumps 2 million gallons instead of 3 million gallons capacity. In addition annual average population growth of 3% in Ghana compounds the situation. Rationing has therefore been the best means to manage the shortfall.

In relation to water supply and the divisions done by the GWCL, Kumasi has 8 districts namely:

Central, North, West, North East, South, North West, South East and East.

Central District (Adum)

The localities forming the Central district are: Adum, Ridge, Pine Avenue, Dakojom, Amy Barracks, Kejetia, New Asafo, Dadiesoaba, Bimpeh Hill,Fanti new town, Roman Hill, Bompata, Central Market, Alla Bar, South Zongo, Duako Abrampong, New Amakom, Old Amokom,m, Lobito, Old Asukwa, New Asukwa, and Danyame.

North District

The localities forming the district are: Barekese, Maaban, Adankwame, Aninkrumah, Barekuma, Amanfrom, Nketia, Achiase, Asamang, Ohwim Hwidiem, Hwidiem Hemang, Afrancho, Krobo, Atafua, Tikese, Mpatasie, Abrepo-Kuma, Abrepo-Panin, Abrepo Highways, Anomangye, Bohyen Asuogya, Bohyen, Ampabame, Kropo, New Suame, Old Suame, Kwapra, Kronom, Buoho, Sasa, Boforeyedu, Bomso, Kodie, Akrowa, Aduman, Abuobogya, Aduamoa, New Tafo, Mbrom, Ash Town and CPC .

West District (Bantama)

The localities forming the district are: Bantama, Kwadaso Agric Rd, Kwadaso Sunyani Rd, Kwadaso, North, Ehwimasi, Kwadaso Agric, Agric Nzema, Abruaso, Kromoase, Wamase, Yabi, Diba, Foase, Taabuom, Gyankobaa, Weneso No.1, Afrancho, Bebu, Denkyemuosu, Techiman, Assuoyeboah, Anoo, Kokoso, Adoato, Adumanu, Bohyen, Abrepo Junction, Abrepo Asubonteng, Obronikrom Abrepo, Race Course, North Suntreso, South Suntreso, Kwadaso Estate, Patase Estate, Police Depot, Patase, Atwima Amanfrom, Santase, Anyinam, Kagyase, Ahenema Kokoben, Pakyi No. 1&2, Boforeyedu, Nkruansa, Apemanin, Kotwi, Apere, Fankyenebra, Atasomanso, TUC, Adiembra, Konkromoase, Dakwadwom and Complex.

North-East District (Abuakwa)

The localities forming the district are: East Old Tafo, Tafo Nhyiayeso, Adompom, Moshie Zongo, Yenyawso, New Tafo, Sepe, Sepe Buokrom, Sepe Aprampram, Duase, Kenyase, Buokrom Estate, Asore Nkwanta, Pankrono Estate, Pankrono, Ahwiaa, Atimatim, Adabraka, Medoma, Asennua, Fawade, Banpenase and Atimponya.

South District (Kaase)

The localities forming the district are: Adiebeba, Ahodwo, Nhyiaso, Nhyiaso West, Daban, Payin, Apenaman, Daban New site, Sokoban, Kaase, Ahinsan, Ahinsan Estate, Old Ahinsan, High School, Gyenyaase Town, Gyenyaase New Site, Gyenyaase Kakari Farms, Atonsu S Line, Atonso, Bokro, Atonsu Agogo, Atonsu Edwenease, Atonsu Kuwuit, Chirapatre Town, Chirapatre Estate, Chirapatre Fabi, Ramseyer Area, Kofrom, Dompoase and Aprabo.

North West District

The localities forming the district are: Esaase, Akropong, Dabang, Tabere, Kokobeng, Ntensre, Koforidua, Manhyia, Abuakwa, Maakro, Sepase, Bodwesango, Mim, Aferi, Akrofrom, Nkawie, Yioso, Mpasatie, Agogo, Twedie, Tanaso, New Apatrapa, Old Apatrapa, TTC, IPT, Asuyeboah, Flat, SSNIT Flat.

South East (Ejisu)

The localities forming the district are: Nsenie, Kentinkrono, Boadi, Emina, Kotei Town, Ayeduase, Mad. Catherine, Ayeduase New Site Kotei, Appiadu, Deduako, Donyina, Apemso, Anwomaso, Bebre, Aprade, Fomasua, Kwamo, Ejisu, Baworo, Tikro, Kokoobra, Kokoben and Besease.

East (Abuoabo)

The localities forming the district are: Krofrom, Manhyia, Ash Town, Dichemso, Aboabo, Asawasi, Akwatia Line, North Zongo, Sepe Timpom, Asokore Mampong, Asabi, Dote, Sawaba, Akrom, Adukrom, Ayigya, Ayigya Zongo, Oforikrom, Bomso Anloga and Alabar.

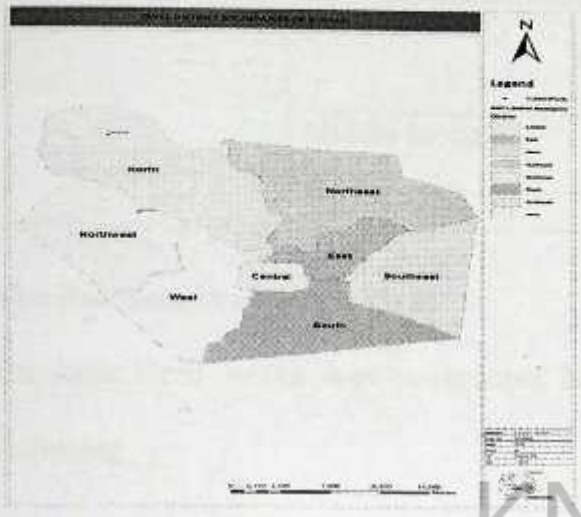
Sources of Water Supply in Kumasi

The main source of water supply in Kumasi is pipe-borne water from the Barekese and Owabi works produced and distributed by GWCL. In absence of a piped water supply outside the urban area, many newly-built private houses are reliant on individual boreholes or hand-dug wells for a domestic water supply. Other methods of water supply can be adopted to help the situation like groundwater abstraction and rainwater harvesting.

Table 3.1: Shows the actual number of customers served by GWCL in Kumasi City

GWCL Districts	Connected Customers
North	13579
North East	6828
North West	5977
South East	2857
South	6756
West	11981
East	8588
Central	6824

Source: GWCL/AVRL Digital (GIS) office, November 2009.



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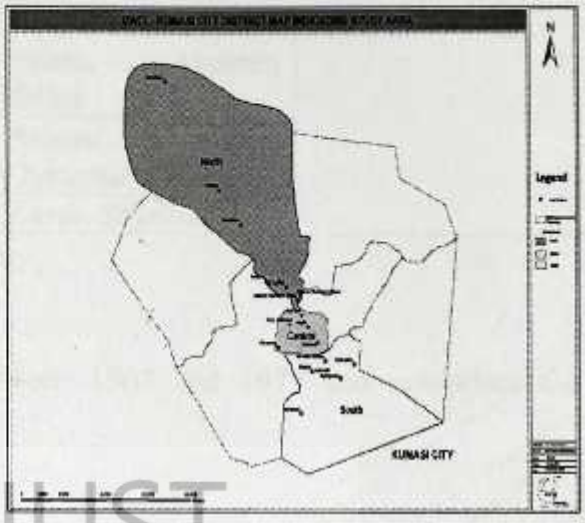


B

Plate 3.1A: Map of study area showing the GWCL/AVRL eight (8) districts

Plate 3.1B: Map of study area showing the selected three (3) districts & sampled towns

For the purpose of this study three (3) districts and some localities were selected. The Figure 3.1B and Table 3.2 below show the information on the selected areas. All information was collected by the use of a questionnaire for the various perceptions of each district. The Table below (Table 3.2) shows the selected areas.

Table 3.2: Selected Areas

District	Condition	Selected Localities/Areas	GWCL/AVRL Connected Customers
North	High Income	New Suame, Old Suame	13579
	Middle Income	Ash Town, Bohyen, Mbrom	
	Low Income	Nketia, Ohwim Hwidiem	
Central	High Income	Danyame, New Asafo, Asokwa	6824
	Middle Income	Dadiesoaba, Duako Abrampong, Asokwa	
	Low Income	South Zongo, Alla Bar	
South	High Income	Gyenyaase New	6756

		Site, Chirapatre Estate, Ahinsan Estate	
	Middle Income	Atonsu S. Line, Gyenyaase Town	
	Low Income	Kassc, Sokoban	

The Barekese Production Plant

Barekese Head works was constructed between 1967 and 1971 and comprises the following

- a dam on River Offin
- pumping station for raw water
- treated water
- treatment works and a
- 900mm (36") transmission pipeline line to Suame distribution center and reservoirs

Water Treatment Process

Raw water is abstracted from the dam at the intake tower and it flows by gravity to the raw water ping station from where it is lifted through a height of thirty five meters to the aerators at the treatment works located 1 km from the dam. At the aerator, the raw water is exposed to the atmosphere by cascading to get rid of some of the odour in the water. The water then flows by gravity through a mixing chamber (after alum has been added) to the three clariflocculators, three suspended matter is flocculated and resettled.

The settled or clarified water then flows to the sand filter and the residual floes are removed for clean water to emerge. Chlorine is then injected to disinfect the water and finally lime is added for pH correction. The water flows into a two million gallon clear water storage reservoir and it - pumped with high lift pumps to Suame distribution

center and reservoir.

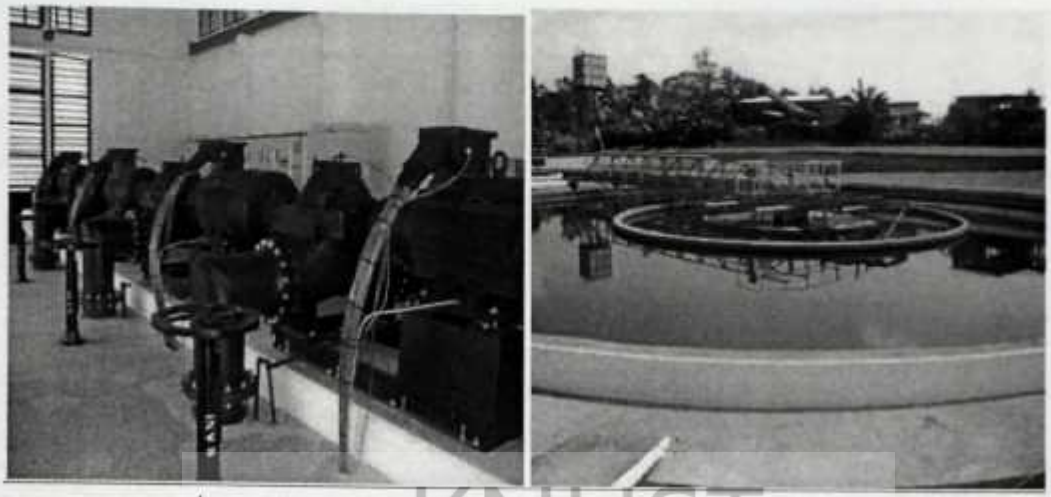
Currently, the Barekese dam pumps between 11-12 million gallons/day instead of 18 million gallons/day capacity. The reasons for the short fall in water production were due to weak pumps and electricity power cut problems. The Owabi dam faces similar problems but pumps 2 million gallons instead of 3 million gallons capacity.

Rehabilitation: Plant Expansion

The last before the present capacity expansion was in 1998 where the plant capacity was increased from 54000m^3/day (12m gallon/day) in 1992 to 82000m^3/day (18m gallon/day). The present capacity expansion is going to further increase production from the current 18m gallons/day to 24m gallons/day. This included undertaking the following major works:

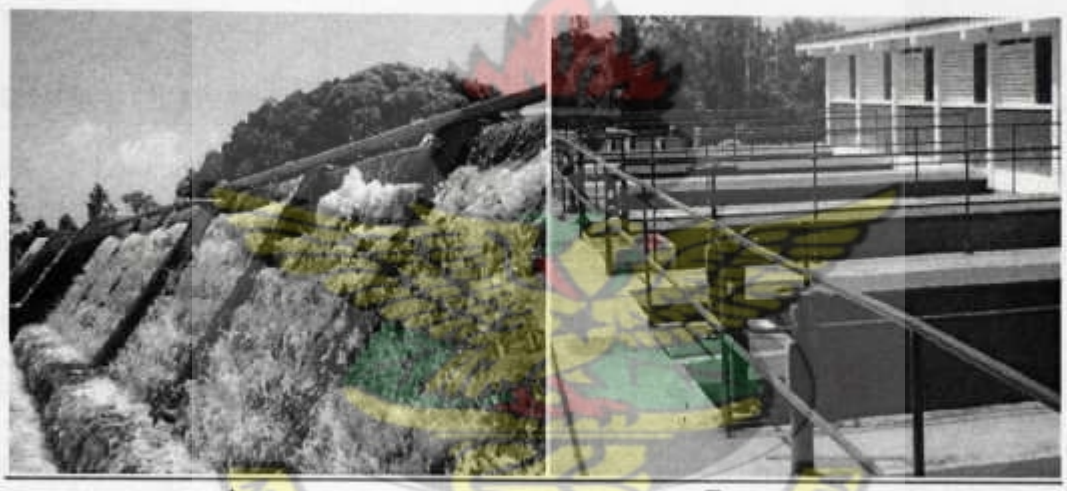
- Replacing/Installing of all four low lift pumping unit
- Construction of additional aerator
- Construction of a third clariflocculator
- Construction of six (6) additional new sand filters
- Replacing/Installation of all four high lift pumping unit
- Construction of a booster station at Achaise

The treatment works currently is not in full production and works is almost done and waiting for commissioning.



A B

Plate 3.2: Newly installed (A) Low lift pump & (B) Clariflocculator

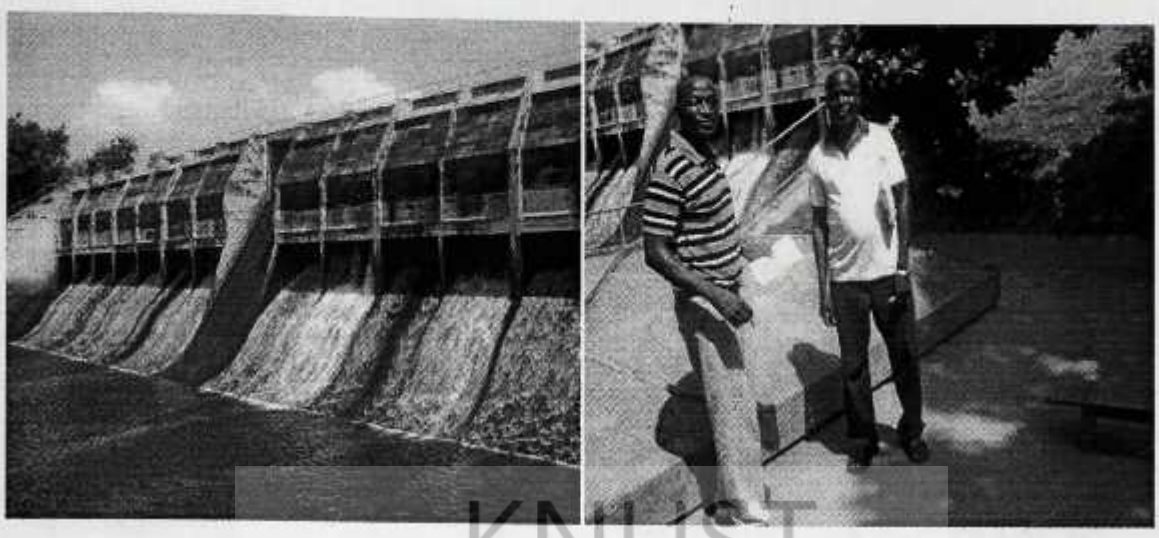


A B

Plate 3.3: Newly constructed (A) Aerator & (B) Sand filters

Impounding Dam Reservoir

There are seasonal problem of aquatic weeds covering the surface of the reservoir (that is between April and October each year) which tend to obstruct the free flow of water through the siphons in dam concrete structure. A floating pipe (boom) was therefore provided across the dam to prevent weeds from choking the siphons. Unfortunately the boom is broken though efforts are being made to re-secure the boom.



A B

Plate 3.4: **(A) The Barekese dam & (B) At dam with Production Supervisor**

Housing

For planning purposes housing in Kumasi has been categorized into four. These are Tenement housing, Indigenous housing, New Government housing, and High-cost housing (Strategic Sanitation Plan-Kumasi, 1993, cited in Saleh, 2002). The respective characteristics of the four categories are presented in the table below.

Table 3.3: **Characteristics of categories of housing in Kumasi**

Parameter	Tenement	Indigenous	New Government	High Cost
Population (%)	22	60	8	10
Population density (per ha)	300-600 persons	80-250 persons	50 persons	10-15 persons
Population density (per house)	4-10 families/40-100 persons	4-10 families/20-50 persons	1-2 families	1.2 families
Description of house	2-3 storey buildings with 20-30 rooms	Single storey buildings with 5-10 rooms and interior compounds	Rows of detached single storey buildings in walled compounds with 2-3 rooms	Detached single family buildings on large plots with 5-8 rooms and outhouse.

Source: Strategic Sanitation Plan-Kumasi, 1993, cited in Saleh, 2002

Tariff

The applicable tariffs to date for Ghana Water Company Limited (GWCL/AVRL) are the rates provided for in the schedule hereto.

Table 3.4: Tariff Effective 1st November 2007 to Date (February, 2010)

Category of Service	Monthly Consumption	Approved Rates in GH ¢/ 1000liters
a. Metered Domestic	0-20	0.66
	21 and above	0.91
b. Commercial/Industrial	Flat Rate	1.10
c. Public Institution/Government Department	Flat Rate	1.10
d. Unmetered Premises	Flat rate per house per month	3.89
e. Premises without connection	Public Stand Pipe per 1000 liters	0.66
f. Special Commercial		2.04
g. Reconnection fee		
i. Domestic		2.88
ii. Commercial/Industrial		9.22

Source: GWCL/AVRL Regional office Kumasi

3.2 Materials and methods

3.2.1 Research design

The research was designed to assess the public perception on the quality of water supply service delivered by GWCL/AVRL in the Kumasi metropolis.

3.2.2 Procedure for data collection

The data used for the analysis and conclusion were obtained through desk study, questionnaire administration, interviews and field visits.

Desk Study:

Literature concerning the project was consulted, with the aim understanding the whole process pertaining to public-private partnership of the urban water supplies delivery. Secondary data were also collected from the following places: Ghana Water Company Limited/AVRL, and on the internet.

Table3.5: Structure of data collection

ASPECT OF THE STUDY (OBJECTIVE)	DATA ANALYSIS (INDICATORS)	DATA COLLECTION METHOD
1. Assess the flow reliability	a. Flow reliability b. Satisfaction of flow condition 5 yrs ago c. Satisfaction of flow condition now d. Flow service improvement or deterioration	A survey of a sample size of 270 was used to generate the required qualitative and quantitative data
2. Assess the quality of water delivered	GWCL/AVRL customers were asked to indicate their views (impressions) on the following; a. Taste of water delivered b. Smell of the water delivered c. Colour of the water delivered.	survey of a sample size of 270 was used to generate the required qualitative and quantitative data
3. Assess the consumer care services of the operator	a. Mode of communication of complains and satisfactory response b. Notification to service interruption c. Attitude of GWCL/AVRL meter/bill staff	A survey of a sample size of 270 was used to generate the required qualitative and quantitative data
4. Assess the water bill	Impression about the cost of water (Low, Average, High)	A survey of a sample size of 270 was used to generate the required qualitative and quantitative data

Survey Instrument

The questionnaire explored respondent attitudes and use patterns by eliciting respondent beliefs, opinions, and behaviors' to the quality of water delivery service. Before executing the survey, several survey questions were evaluated by internal and external reviewers to determine whether the wording and responding categories were appropriate for the survey population. In addition, a pilot test was conducted to ensure planning and programming accuracy, effectiveness of interviewer training and ultimately to compensate largely for the expected non-response rate. Approximately 20 interviews were collected for each income group during this piloting phase.

Scaling choices

Response options to all attitudinal questions were offered as a fully anchored 5-point Likert scale (i.e., "Excellent", "Good", "Fair", "Poor", and very Poor"). As many of the questions used different response categories, interviewers read all the response options to respondents for each question. Questionnaire items that inquired about the frequency of actions, events, or behaviors were initially asked as a simple dichotomous question (i.e., "Yes" or "No") to ensure relevancy of the question to the respondent. If the response is affirmative, respondents were then asked to report the frequency of occurrences using "open- ended question".

Respondents' items for categorical questions were developed individually for each question. Items that required categorical response options fell into two general categories based on whether response were read or not read to the respondent. For those questions where the response were read, the respondent was asked to select which category (or categories) best described his or her answer.

Interviewers were trained to use the "other" response category to capture response that were either unanticipated or novel. These responses were collected as an open-ended question response and they were subsequently coded with the other response categories during preparation for data analysis. Interviewers were also trained to code non-responsive answers as "Refused" where appropriate.

Sampling

The aim of sampling is to equate unknown characteristics that may influence variation in the data to preserve the representative of the sample to the target population (Henry, 1990). The preferred method of ensuring the credibility and applicability of the research employed convenient sampling, where every member of a target population has a known, non-zero probability of being included in the sample, (Cochran, 1977).

Descriptions

The sample was drawn from three (3) districts out of the eight (8) districts served by GWCL/AVRL in the Kumasi city. GWCL/AVRL was asked to geographically identify their service area in order to define the sample frame for each income group. Income groups were identified using the Kumasi Metropolitan Assembly (KMA) housing classification categories (Saleh, 2002) and also using service maps and GIS data, depending upon what the utility company had available.

A convenient sample of household was drawn from consumers connected to GWCL/AVRL distribution system to minimize any systematic biases introduced using this particular sampling method. Also, some Commercial and Institutional service category groups who fell in any one of the three (3) districts were interviewed.

Plate 3.5: Some High Income areas where questionnaires was administered

A B

Plate 3.6: Some areas (A) Middle Income area & (B) Low Income where questionnaires was administered

Plate 3.7A: Some Institutions where questionnaires was administered

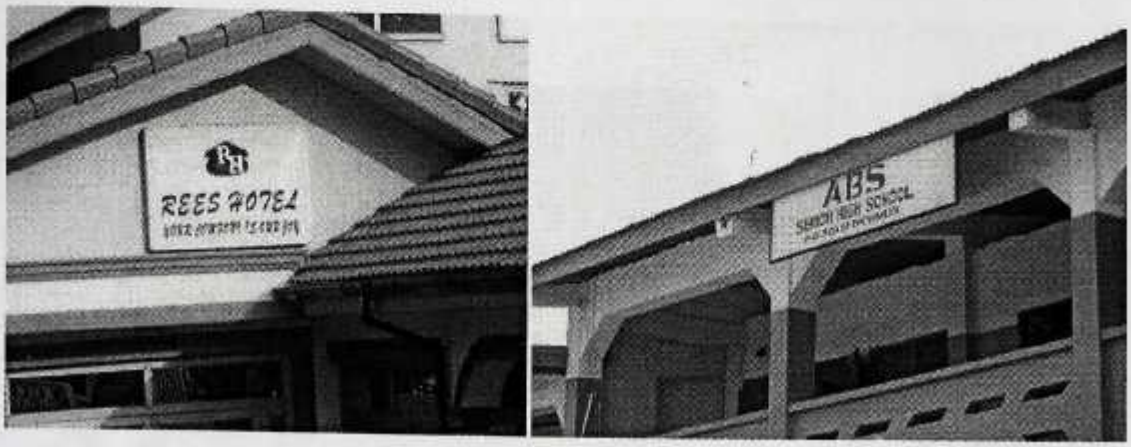


Plate 3.7B: **Some Institutions where questionnaires was administered**

Quota cells & Error estimates

The sampling plan required approximately thirty (30) interviews per each of the three (3) income groups in a particular GWCL/AVRL district and across the selected three (3) GWCL/AVRL districts for a total sample of two hundred and seventy (270), to sufficiently represent the targeted population. Income groups were based on Kumasi Metropolitan Assembly (KMA) housing classification (Saleh, 2002). A sample size of 30 for each income group was determined to be sufficient for the accuracy of the survey results. All 270 sample size was obtained despite the constraints during the fielding period.

The overall sample size was projected to achieve a 95% confidence interval of ± 5%.

Interviewing Respondents

Surveys were administered during mid morning on week days and weekend hours. In the householder survey, the head of the householder or any adult person were preferred to as the respondent to the structured interview. Also, officials interviewed were: Head of Institutions, Some important Heads of GWCL/AVRL sections, some key customers in the commercial centre's that fell within the selected districts in the Kumasi Metropolis.

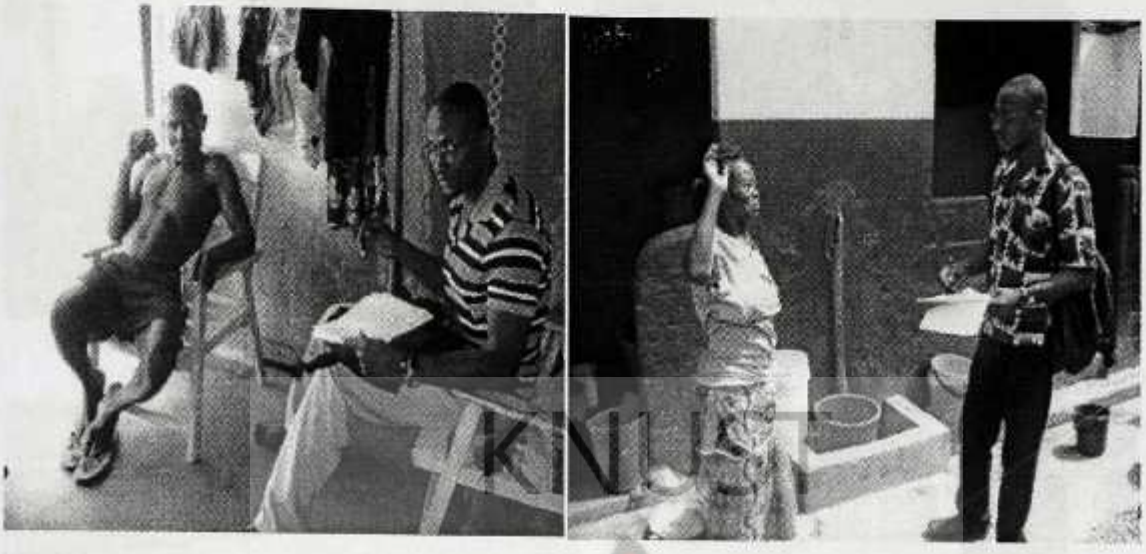
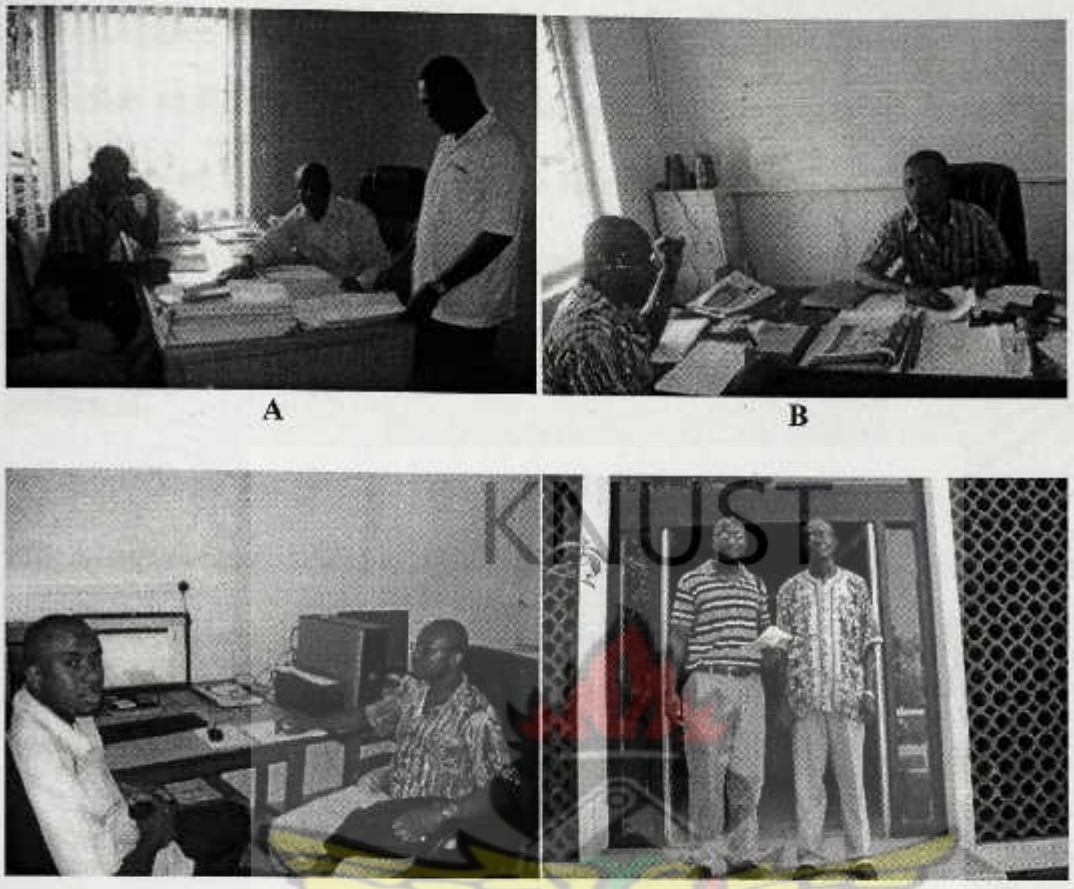


Plate 3.8: An administration with GWCL/AVRL customers

Manager's Survey

In addition to consumer survey, a management survey was also carried out. Survey questions roughly used an open-ended question approach: first set of question focused on tap water quality, the second set focused on utility service. Utility managers were asked to respond to questions from the view point of customers. For example, in the customer survey, customers were asked, "How will you grade the level of flow satisfaction now?" However, a utility manager received the question, "What is your average customer's level of flow satisfaction with overall quality of water in their household?" Survey interviews were carried out on a face-to-face basis and results entered into SPSS and Excel™ for further analysis.



A B

C D

Plate 3.9: **A. Interview with Mr. Ennin & Mr. Bofa (Regional Customer Care Manager and his Deputy). B. Interview with Mr. Asoga Haruna (Regional Communications Manager-PRO). C. Regional GIS Officer. D. Plant manager**

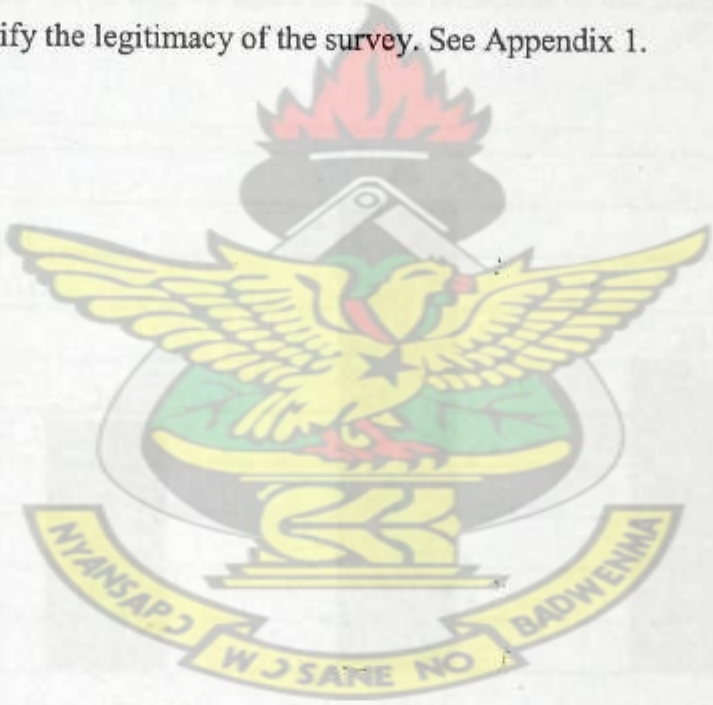
Data Preparation & Analysis

Once an interview was completed, data was entered into statistical program (SPSS) used for data analysis. Open-ended response where respondents could mention an option not listed in the original survey categories were examined and relocated where appropriate. The questionnaire data was coded and entered into SPSS and analysis results exported to Excel™ (2007 version). General statistics (e.g., frequencies, mean, bar charts, and pie charts) were run and chi-squared analysis performed on the various perception variables. For questions where response could categorize using ordinal scale (e.g., 1= Excellent, 2=Good, 3=Fair, 4=Poor, 5=Very Poor), general statistics analysis were used.

Quality Control

Collection and analysis of data was cross-checked throughout the survey. Preliminary testing allowed the survey instrument to be refined in terms of wording and logic flow. After data collection, general statistical tests (frequencies, mean, bar and pie charts) were performed on the inputted coded data (in SPSS environment) and chi-squared analysis performed.

It is worth important to also mention that, interviewers were first and foremost supplied with an introduction letter provided by the Civil Engineering Department for respondents who wanted to verify the legitimacy of the survey. See Appendix 1.



4.0 RESULTS AND DISCUSSIONS

4.1 Respondents Characteristics

4.1.1 Age Distribution

The study analysis found that the demographic distribution revealed 24% of the respondents interviewed were "below 25 years" whilst 46% of the respondents were between the ages "25-40 years" and about and 30% of the respondents were "above 40 years" respectively. This means that the respondent interviewed in the Kumasi metropolis were adults. So, their views may be taken as a true reflection of the water service delivery situation.

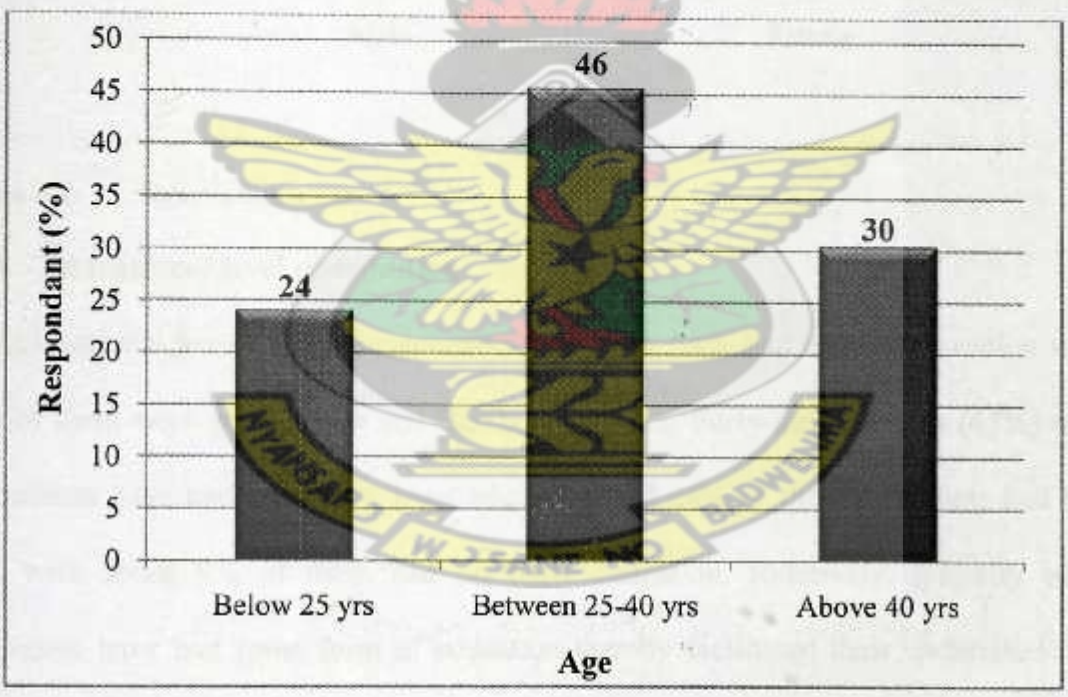


Figure 4.1: Respondents age

4.1.2 Sex Distribution

The Figure 4.2 below shows that 39% were males and 61% were females. Generally females use more water for domestic purposes than men. Based on this development, the

study is believed to reflect a satisfactory perception about water service delivery in the Kumasi city.

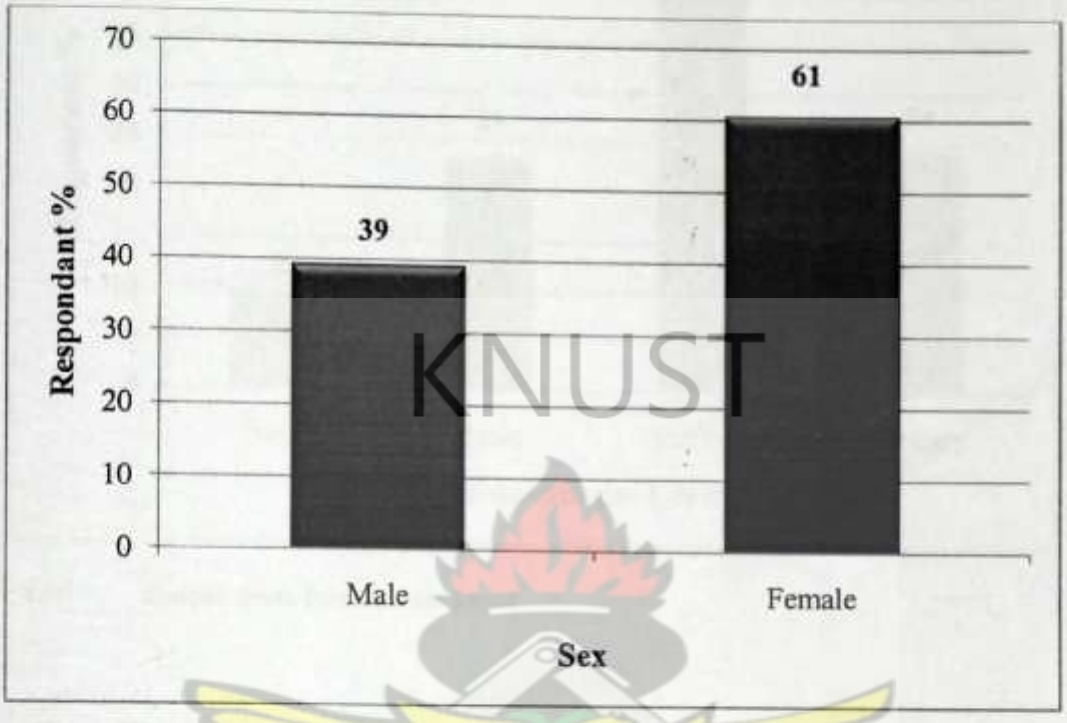


Figure 4.2: Respondents sex

4.1.3 Educational level distribution

The educational levels of the respondents were that, 24% had tertiary education where most of them were government and NGOs employees. Forty-three percent (43%) of the respondents have had secondary level education and 24% of the respondents had basic level with about 9% of them had no basic education. Relatively, majority of the respondent have had some form of education thereby facilitated their understanding of the questions asked on the questionnaire.

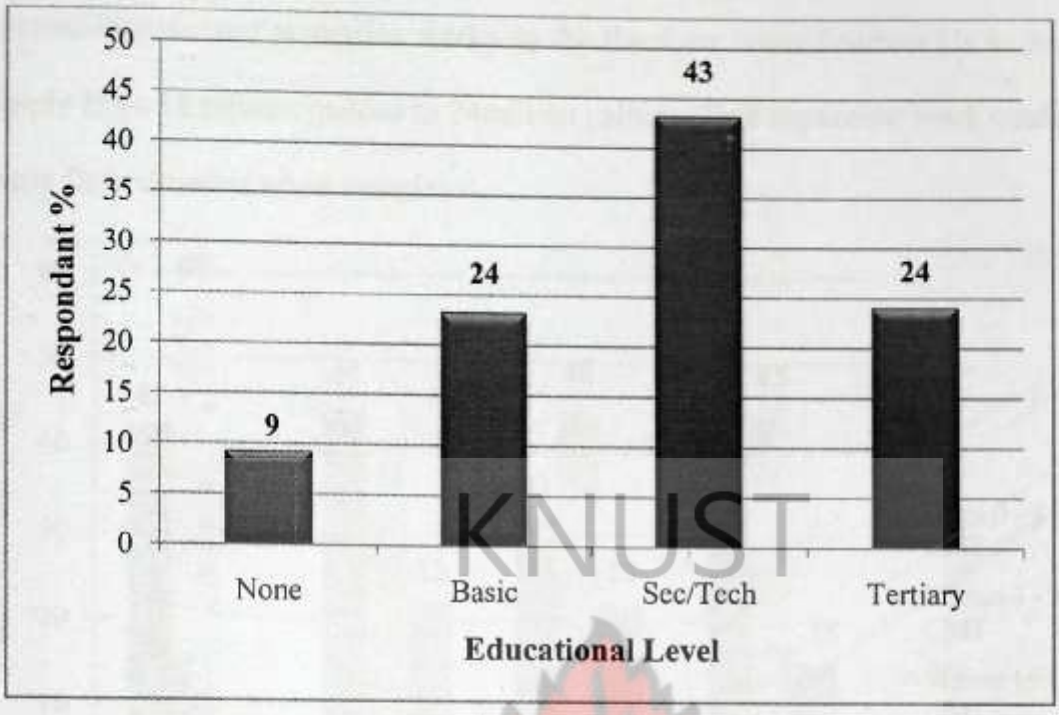


Figure 4.3: **Respondents Educational Level**

4.2 Flow Condition

4.2.1 Consumer Perception on water flow Condition (Reliability)

Three main rations were made. This was the morning flows (0 - 8 GMT), the afternoon flows (8 - 16 GMT) and the night flows (16 – 24 GMT). The study revealed that 15% of the respondent receive water supply within 16 - 24 GMT in a day whilst 45% received water supply within 8 – 16 GMT and 40% also received water supply within 0 - 8 GMT in a day. Intermittent flows in the supply chain of water could be attributed to the demand exceeding supply. Thereby some customers in their water delivery have to be rationed. For example, Barekese and Owabi currently have a supply capacity of 18 million and 3 million gallons in a day respectively but are supplying less than 11-12 million and 2 million gallons a day respectively. Additionally, more new connections are added to GWCL/AVRL network per year thereby worsening the situation. Currently there is an on

going rehabilitation and expansion works on the Barekase water headwork's to increase the supply from 18 million gallons to 24million gallons. This expansion work could ease the water flow situation when completed.

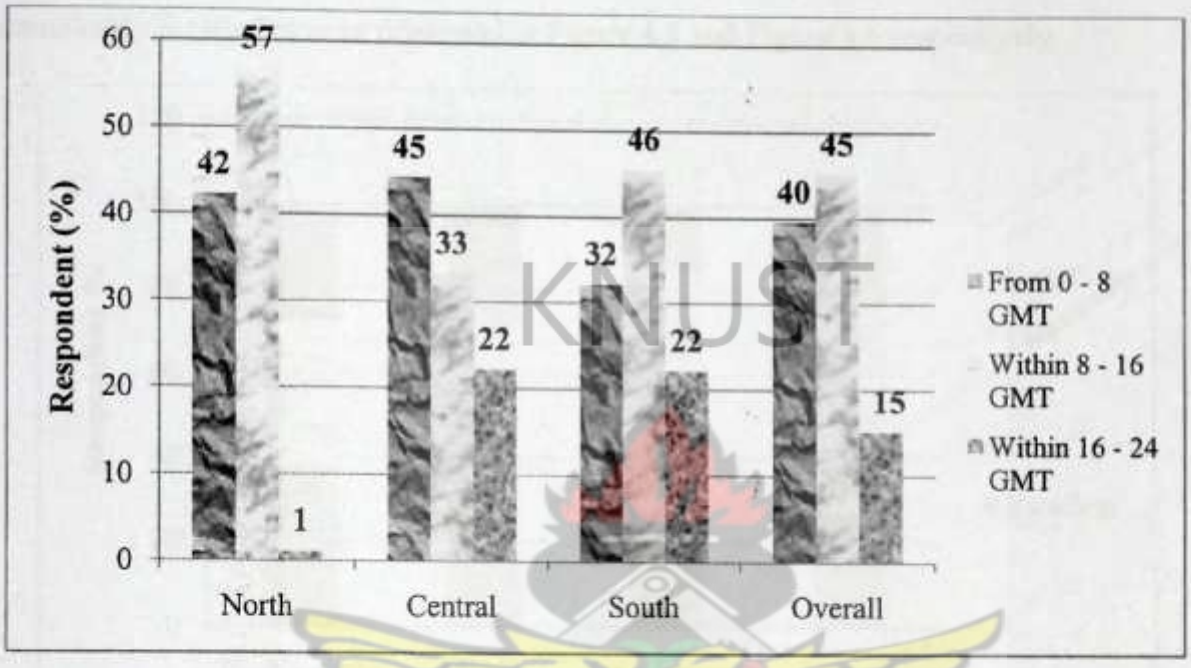


Figure 4.4: Hours of flow in a day

4.2.2 Customer perception about the GWCL/AVRL flow Satisfaction (satisfaction 5 years ago & satisfaction now)

This part wanted to assess customers' perception on their satisfaction of the flow situation.

GWCL/AVRL consumers were asked questions "How will you grade the level of flow satisfaction of water delivery 5 years ago" and "How will you grade the level of flow satisfaction of water delivery now" in 5 point grading system (e.g., "1. Excellent", "2. Good", 3. Fair, "4. Poor", 5. Very Poor"). The study confirmed that the benefits of the GWCL/AVRL participation (Public-Private partnership) had yielded some desirable results through the three income groups. From Figure 4.5a and Figure 4.5b, consumers were satisfied (Excellent, Good) with the recent service delivery with perception from

38% to 72%, 32% to 34%, 46% to 76% in the high, middle and low income group respectively. Also, the customers believed that the satisfaction of GWCL/AVRL water service delivery 5 years ago was abysmal and the satisfaction had changed and risen remarkably for the better as presented in Figure 4.5 and Figure 4.6 respectively.

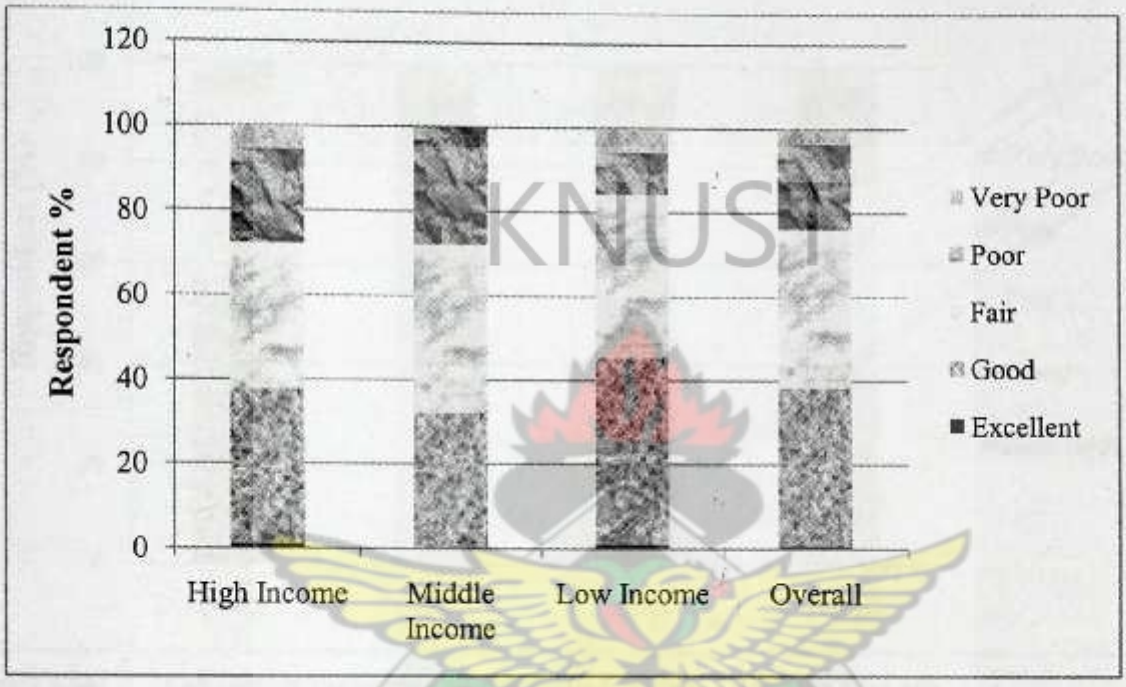


Figure 4.5a: Consumers Perception on satisfaction of Flow Condition 5 yrs ago

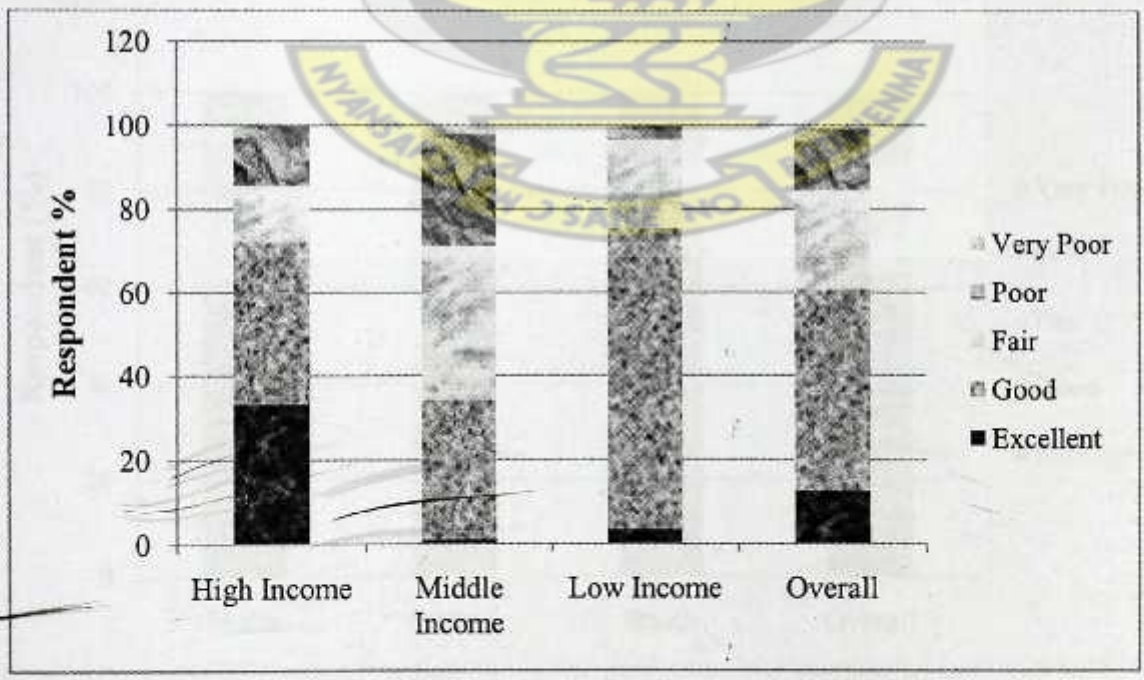


Figure 4.5b: Consumers Perception on satisfaction of Flow Condition now

From figure 4.6a and figure 4.6b similar trend of and increase in satisfaction of water flow after AVRL came and merge with GWCL water supply operations. This analysis is based on regional interpretation.

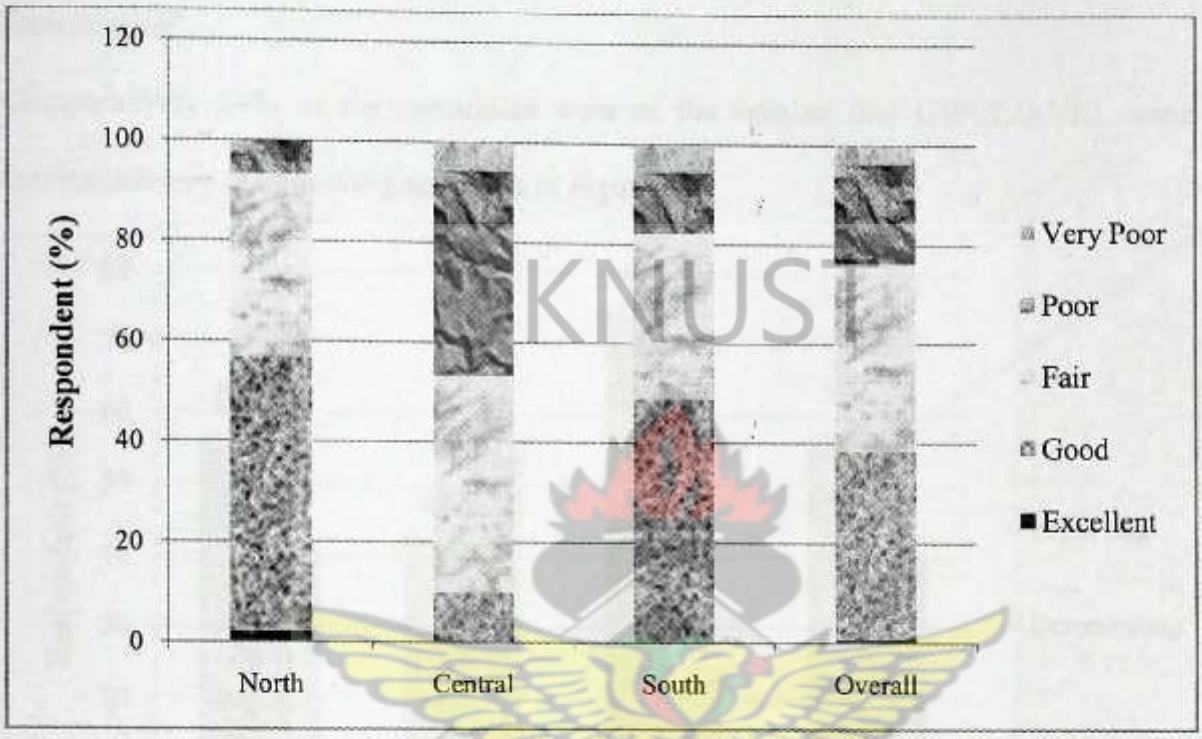


Figure 4.6a: Consumers Perception on satisfaction of Flow Condition 5yrs ago

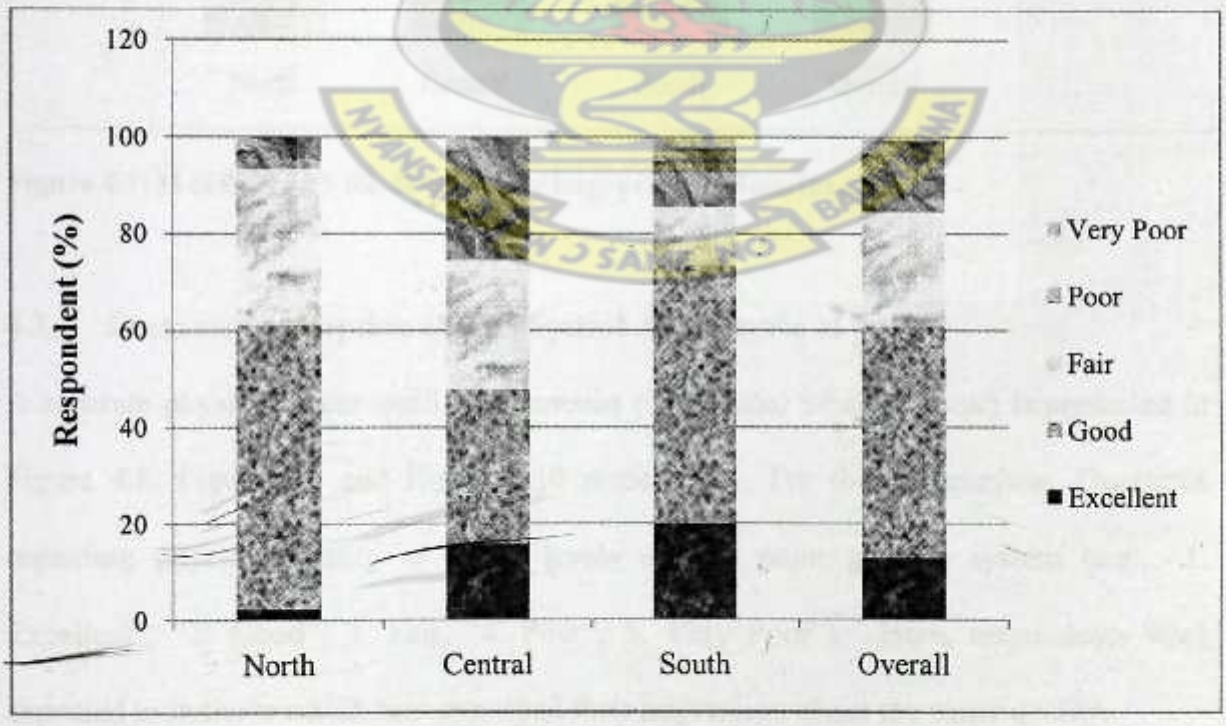


Figure 4.6b: Consumers Perception on satisfaction of Flow Condition now

4.2.3 Customer perception about flow service improvement (i. e. service improving or deteriorating)

Customers were asked "In your opinion, is the GWCL/AVRL flow service improving or deteriorating".

Comparatively 59% of the consumers were of the opinion that GWCL/AVRL water service delivery is improving as shown in Figure 4.7.

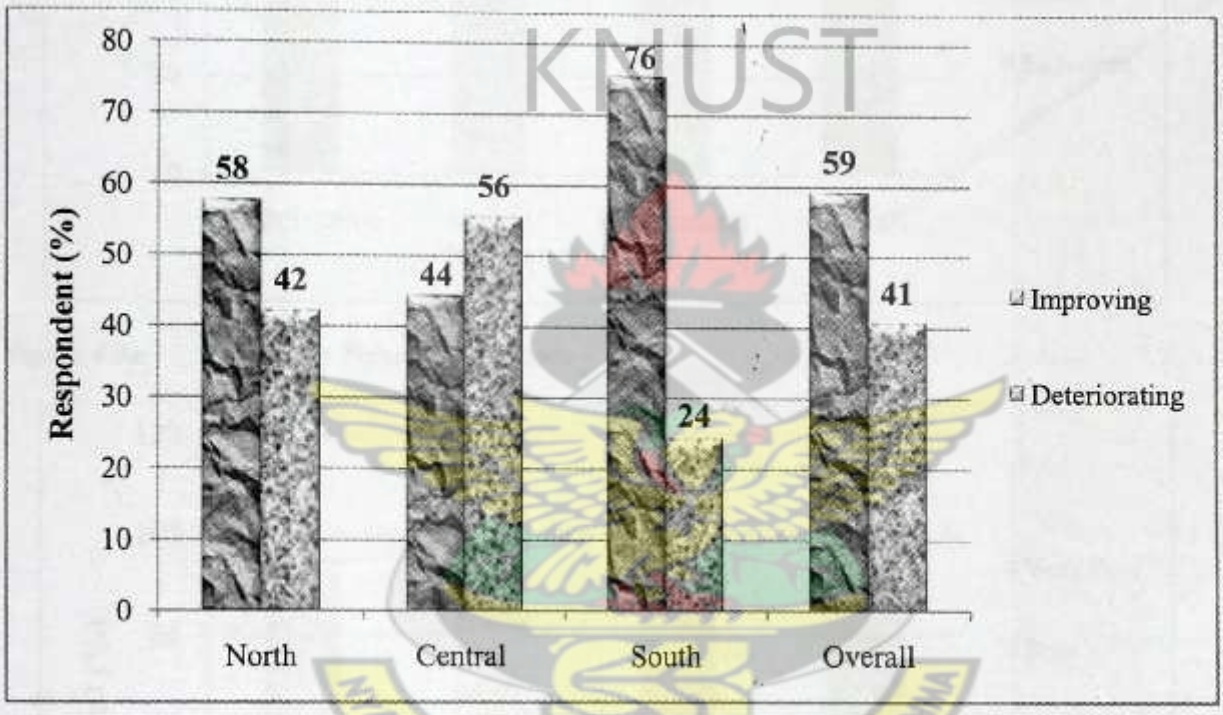


Figure 4.7: Is GWCL/AVRL flow service improving or deteriorating

4.3 Customer perception about Physical Appearance of water

A separate physical water quality parameters (i.e., Taste, Smell, Colour) is presented in Figure 4.8, Figure 4.9 and Figure 4.10 respectively. For this comparison, Questions regarding physical quality of water levels used 5 point grading system (e.g., "1. Excellent", "2. Good", 3. Fair, "4. Poor", 5. Very Poor"). Here, respondents were expected to indicate which best described their impression about the water quality.

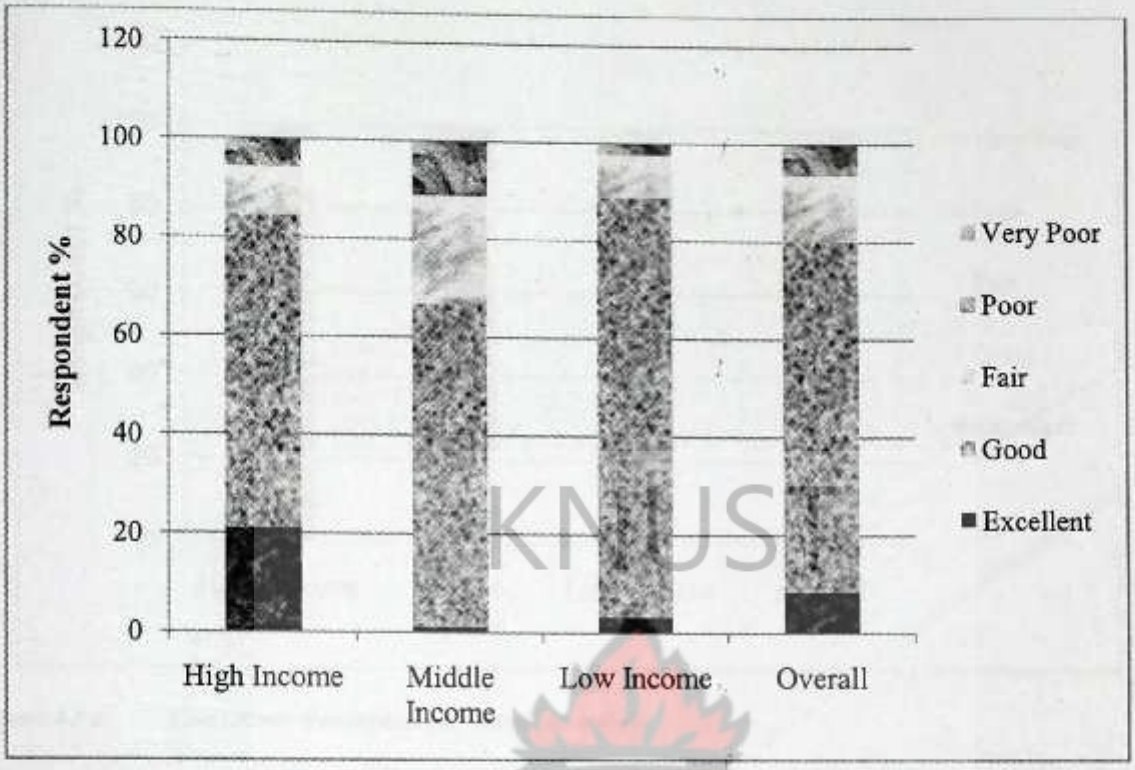


Figure 4.8a: Consumer Perception on Taste

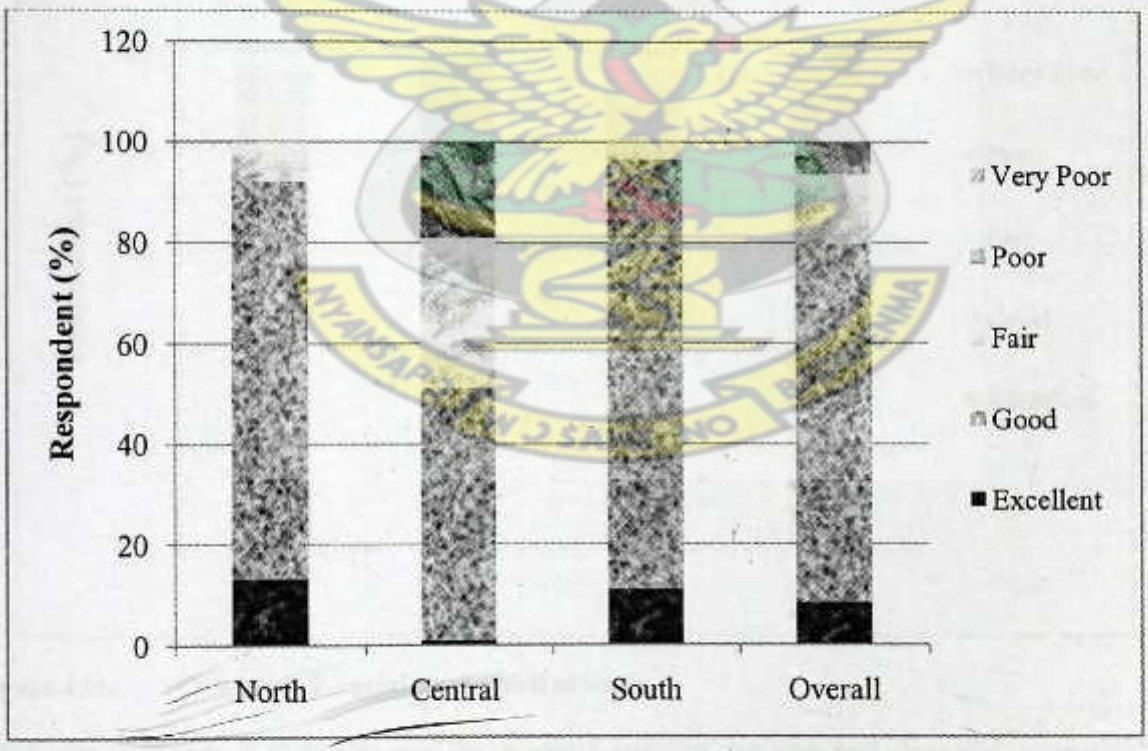


Figure 4.8b: Consumer Perception on Taste

From Figure 4.8 observing the various income groups and districts, majority of consumers were generally satisfied (Excellent, Good) with the taste of the water.

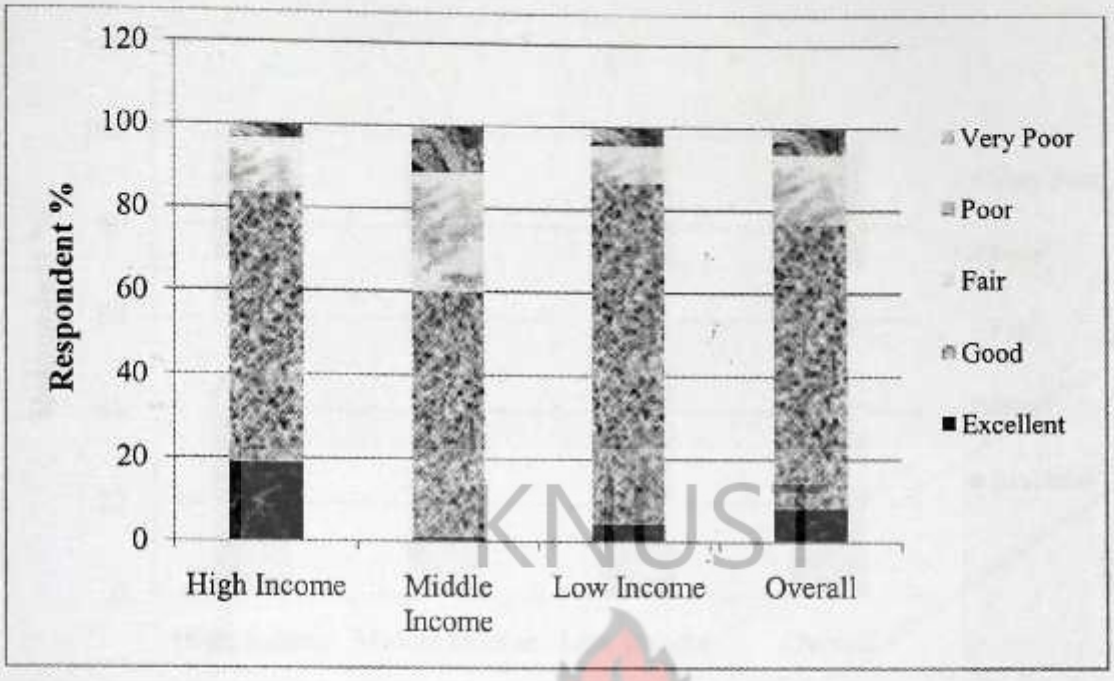


Figure 4.9a: Consumer Perception on Smell of water

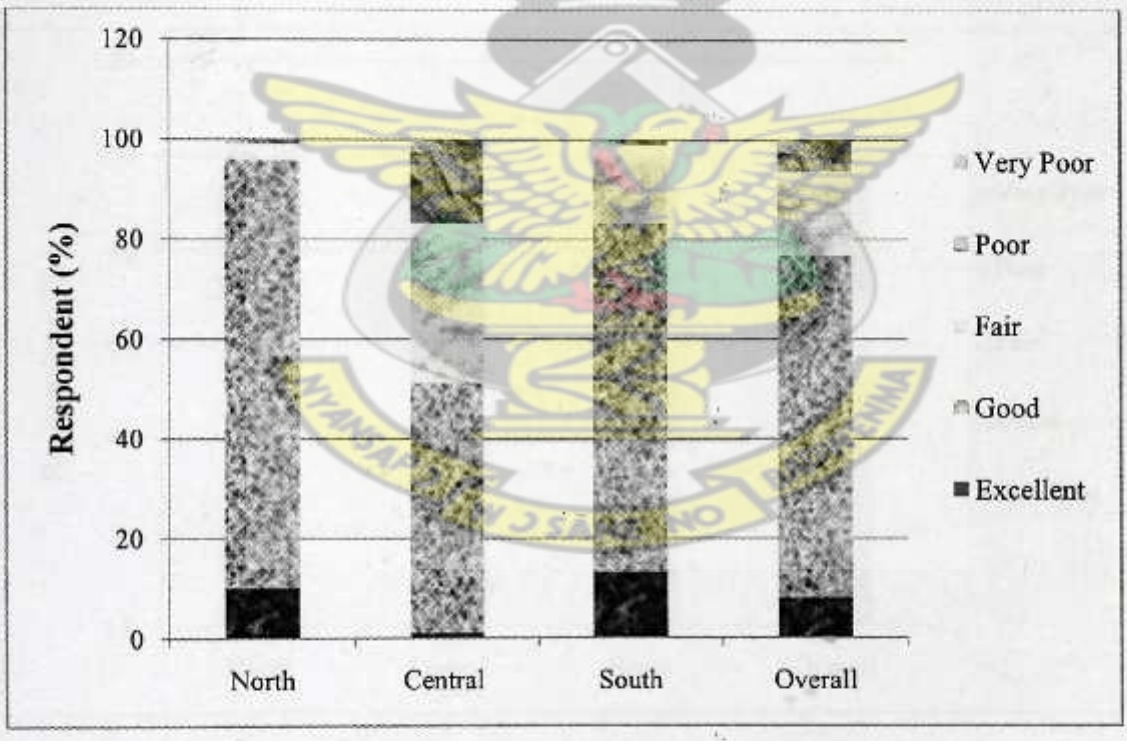


Figure 4.9b: Consumer Perception on Smell of water

Also, from Figure 4.9 observing the various income groups and districts, majority of consumers (83%-high income, 60%-middle income, 87%-low income) were generally satisfied (Excellent, Good) with the smell of the water.

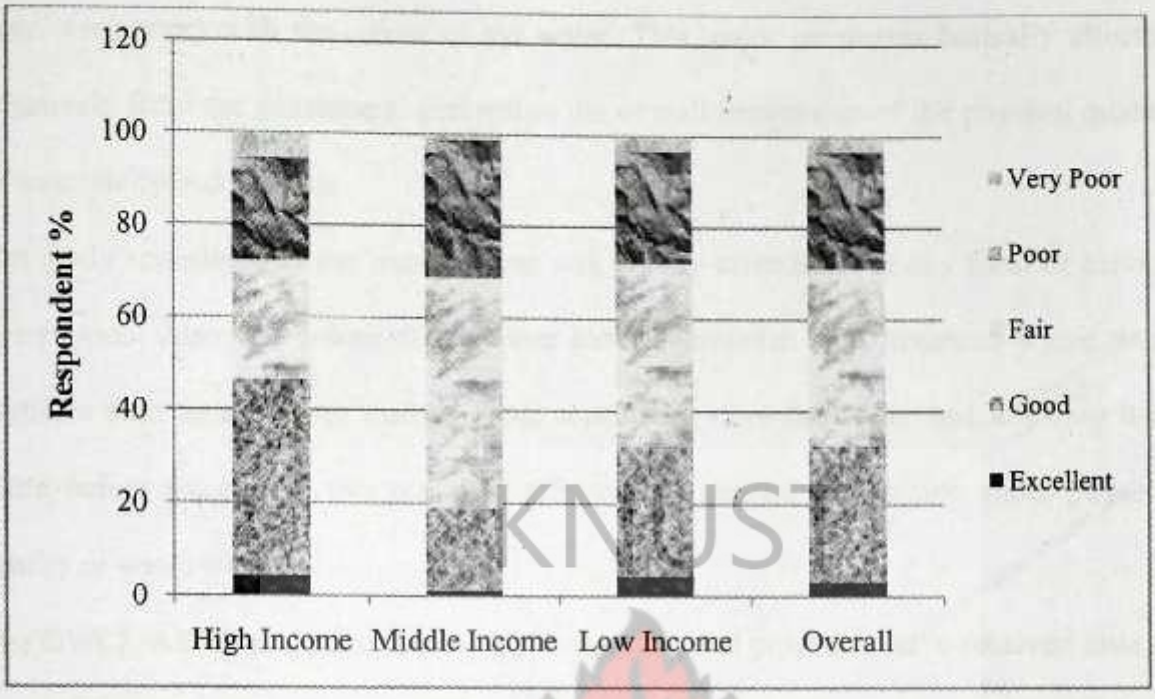


Figure 4.10a: Consumer Perception on Colour of water

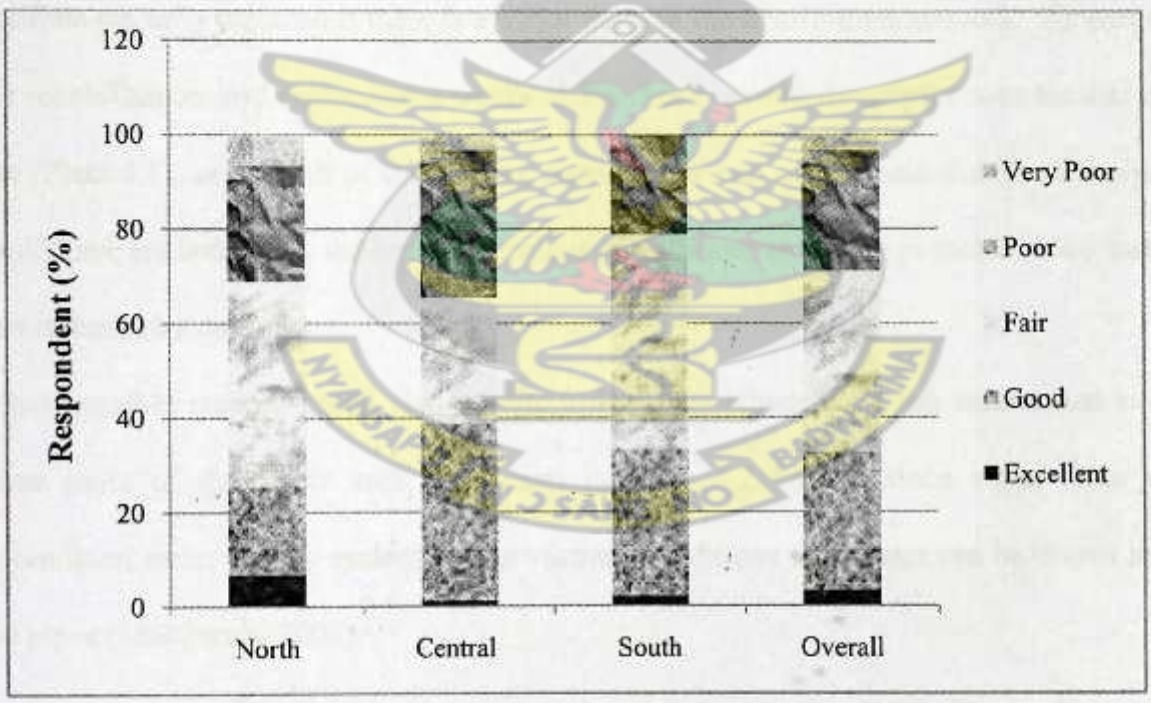


Figure 4.10b: Consumer Perception on Colour of water

Finally, from Figure 4.10 observing the various income groups, comparatively with the other parameters of the physical quality of water, majority of consumers (53%-high income, 81%-middle income,68%-low income of respondents) were not satisfied (fair,

poor, very poor) with the colour of the water. This major parameter basically affected negatively from the consumers' perception the overall impression of the physical quality of water delivered to them.

The study revealed that the water colour was greatly affected after any form of service interruption. Also, the colour of the water looked brownish with instances where tinny particles seen in the water making most consumers store the water and allowing it to settle before usage. For this reason it affected the general satisfaction about physical quality of water was low.

The GWCL/AVRL main distribution pipes are old metal pipes that have received little or no replacement since the construction of the whole water supply system in Kumasi. Portions are only replaced if there is a major burst in the distribution network. As part of the rehabilitation and replacement works at Barekese, an old metal pipe was located on site (Plate 4.1), as a result of this reason, corrosion or rust of the main distribution pipes could have accounted for the brownish colour of the water and tinny particles in the water as witnessed by consumers.

Other possible reasons could also be due to leakages which were left unattended to in some parts of the study area, as shown in Plate 4.2 below, since water from an intermittent water supply system under vacuum conditions foul water can be drawn into the pipes (Malchtosh, 2002).

Plate 4.1: A corroded distribution pipe at Barekese. **Plate 4.2 Leakage in a distribution line at new suame.**

4.4 Customer Perception on Customer Care

4.4.1 Customer Perception on Mode of Communication and Satisfactory Response

It is important to emphasize that, out of the 270 customers interviewed 223 of the customers responded to had made complaints to the Customer Care unit using the available GWCL/AVRL modes. On this basis the analysis was made.

Bureaucratic situation at GWCL/AVRL

A customer of GWCL/AVRL may forward their complaints through the following means:

A. By Phone

B. Personal report to office (Districts or Regional office)

C. Public Utility Regulatory Commission (PURC)

A. ***By Phone:*** Customers may contact the GWCL/AVRL call center on the toll free number (0800 – 40 000). This toll free number connects the caller to a Front office in Accra (Head office). The call center picks details/particulars of

complaints/complainants. Depending on the caller's destination, the respective Regional Back Offices are contacted. The Back Office forwards complain to the Districts office that then moves to assess the nature of the problem. The District office then gives a situational report to the Back Office (at the Regional office) which then forwards the report for approval through the Front Office. The research showed 14% of the GWCL/AVRL customers reported complain through the GWCL/AVRL call center.

B. ***Personal report to office:*** Persons may also report at the Regional or District offices personally. The nature of complain is noted and investigated. Assessment report from the district office is sent to the Regional office who then forwards the report through email messaging to the Head office in Accra for approval. The study showed that 86% of the GWCL/AVRL customers reported their respective complains through the GWCL/AVRL Regional or Districts offices.

C. ***PURC:*** The PURC ACT (*THE PUBLIC UTILITIES REGULATORY COMMISSION ACT, 1997 Or ACT 538*) is an Act to provide for the establishment of a Public Utilities Regulatory Commission to regulate and oversee the provision of utility services by public utilities to consumers and to provide for related matters.

It could then be emphasized that majority of GWCL/AVRL customers directly make complains about the water service delivery in person by reporting to the Regional or the District offices. The research found out that though the use of telephone for making complain was quick and free of charge, customers showed low patronage because most did not know the toll free number and those who knew also complained about late

response. Also the study results revealed that all the customers interviewed had no knowledge about channeling their complaints through PURC. The study suggests that the PURC could intensive education to create public awareness about their duty as a means of channeling complaints.

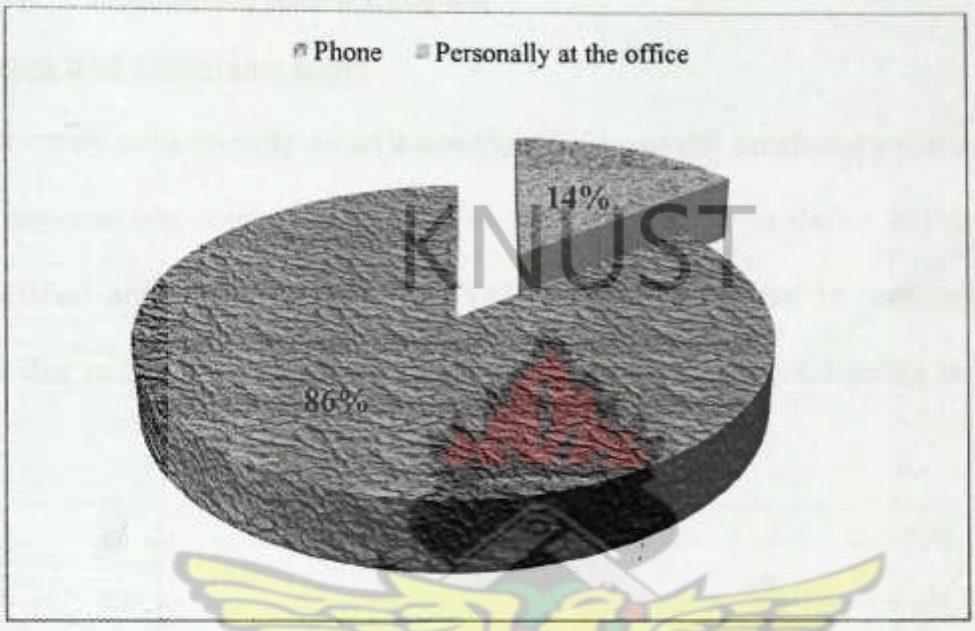


Figure 4.11: Mode of complaint

The Table 4.1 shows the distribution and break down of the responses to the mode of complaint within the three districts.

Table 4.1: Mode of Complaint

DISTRICT	MODES OF COMPLAINT		
	PHONE (%)	PERNALLY AT THE OFFICE (%)	TOTAL (%)
North	6.50	93.50	100.00
Central	19.10	80.90	100.00
South	17.90	82.10	100.00
TOTAL (%)	14.30	85.70	100.00

Out of the total of complaints made by phone Central formed the majors and might be due to their knowledge of the toll free number and was followed by the South and North district respectively.

Figure 4.12: Income group mode of Complaint

Satisfaction with complains made

Customers were subsequently asked a question "Did you get satisfactory response". An average response was determined and the study revealed 69% (as shown in Figure 4.12) are unsatisfied about the way GWCL/AVRL attended/responded to complaints. This could be due to the long delay complaints are channeled before achieving the desired solution.

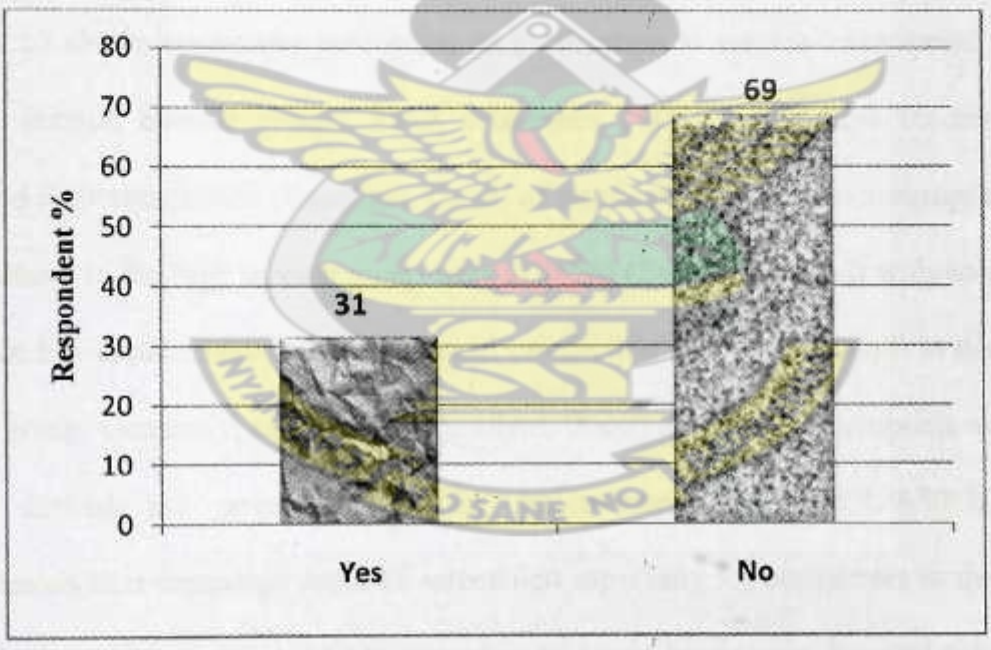


Figure 4.12: Satisfactory response

For further analysis putting emphasis on the various districts, Table 4.1 shows the distribution or break down of the responses for the satisfaction to the complaints using a simple dichotomous ("Yes" and "No") response.

Table 4.2: Satisfactory response

DISTRICT	SATISFACTORY RESPONSE		
	YES (%)	NO (%)	TOTAL (%)
North	28.60	71.40	100.00
Central	10.30	89.70	100.00
South	52.60	47.40	100.00
TOTAL (%)	31.40	68.60	100.00

Appreciable number of GWCL/AVRL customers in the South and North respectively made majority of the total complaints followed by customers in the Central. The least complaints were recorded by GWCL/AVRL customers in the high income group.

4.4.2 Customer Perception on Notification to Service Interruption

Figure 4.13 shows consumers perception on notification to service interruption through out the various income groups. Most consumers (81%) in the low income group expressed their satisfaction (Excellent, Good) of notification to service interruption. 53% of consumers in the high income group were satisfied (Excellent, Good) with notification to service interruption whilst 46% expressed satisfaction (Excellent, Good) in the middle income group. Generally, satisfaction (Excellent, Good) to service interruption was much to be desired but greater room for improvement in GWCL/AVRL public awareness/address campaign could be intensified especially for consumers in the middle and high income group since they expressed much lower impression. It could then be said that public addressing activity goes on better in the low income areas followed by the high income areas and not very better in the middle income area.

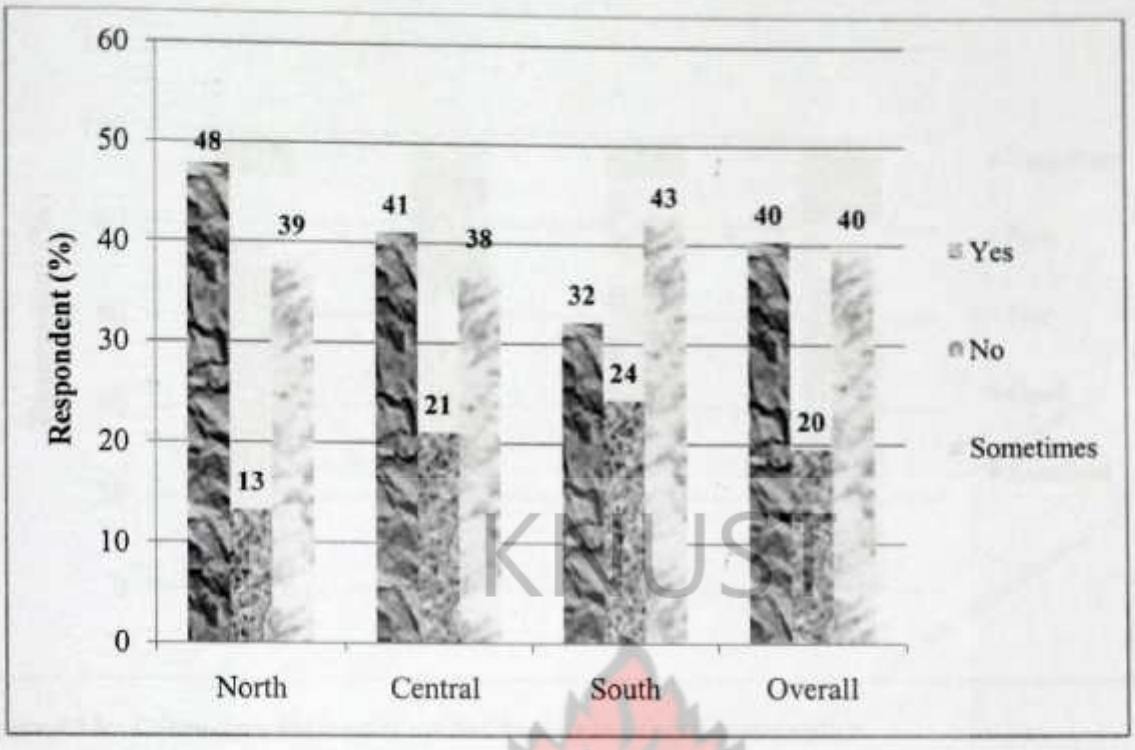


Figure 4.13a: Consumers Perception on Notification to Service Interruption

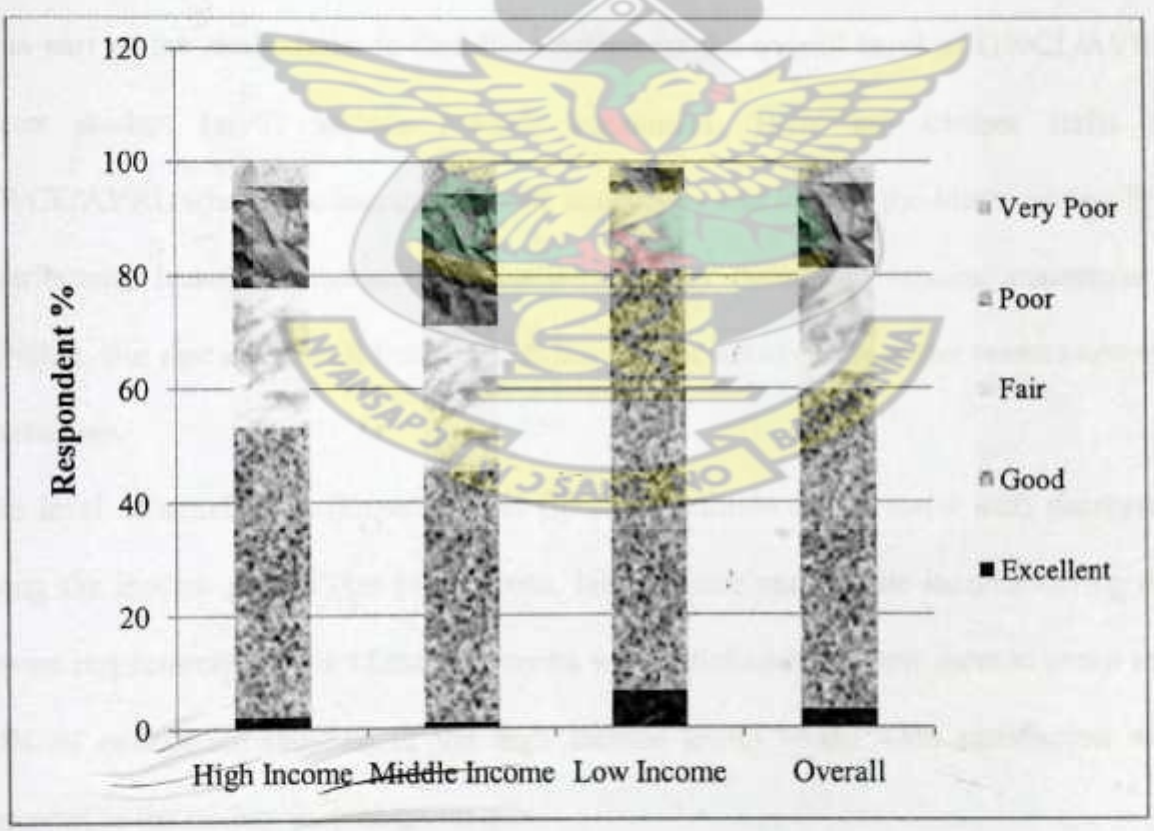


Figure 4.13b: Consumers Perception on Notification to Service Interruption

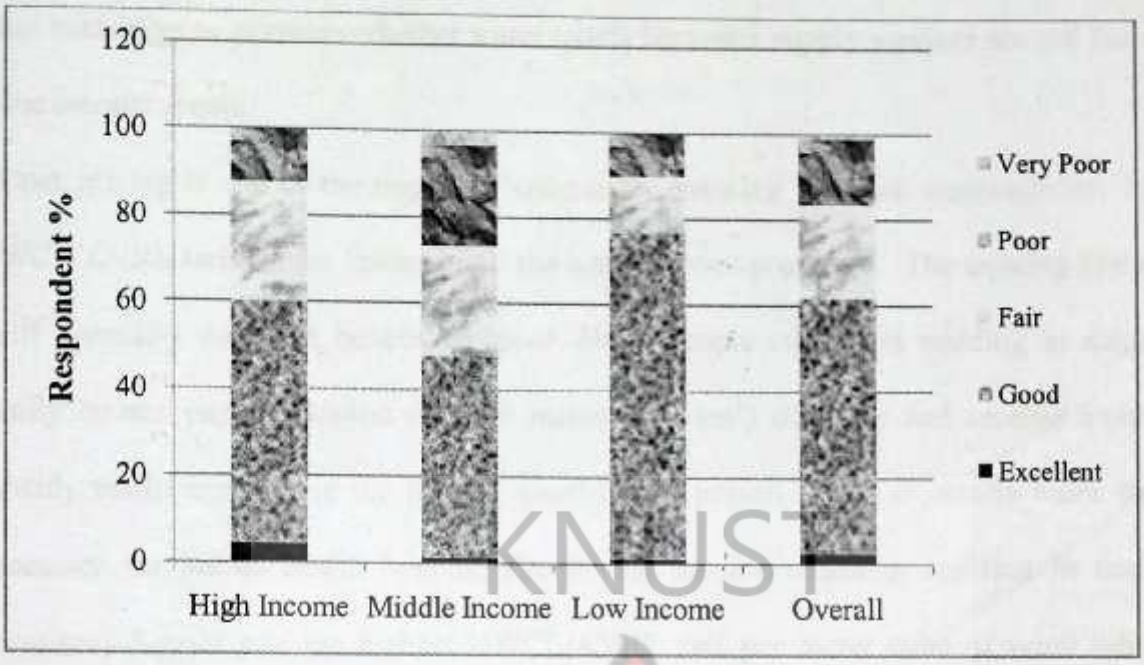


Figure 4.14a: Consumers Perception on the Meter Readers

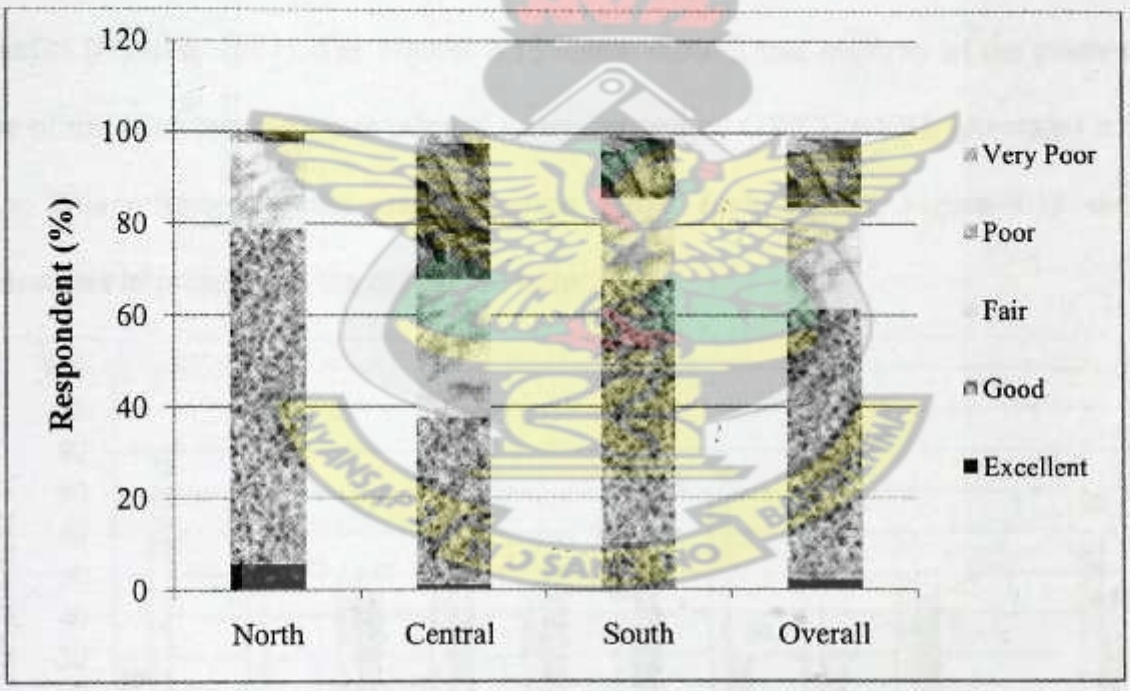


Figure 4.14b: Consumers Perception on the Meter Readers

4.5 Customer perception on the water bill

The study asked question about the impression about the cost of water with 3 point grading system (e.g., High, Average, and Low). The study wanted to use the response

from customers to examine whether water tariffs for water supply services are not fair to some income group.

Water pricing is one of the important criteria for ensuring financial sustainability. The GWCL/AVRL tariff is the lowest of all the water service providers. The existing lifeline tariff generally does not benefit the poor. High-income customers residing in single-family houses pay the lowest rate per meter cube (m^3) of water and receive highest subsidy whilst consuming the highest quantity per person which is clearly more than necessary for public health benefit. The lowest income customer residing in multi-occupancy houses pay the highest GWCL/AVRL rate per meter cube of water whilst consuming the lowest quantity per person, which is just sufficient for the public health benefits (Nyarko, 2007). The Figures 4.15 below showed that majority of the customers was of the view that the water price of water charged by GWCL/AVRL (Average) is not low. This reflected in the income groups across each district. Figure 4.15 shows consumers impression on the cost of the water.

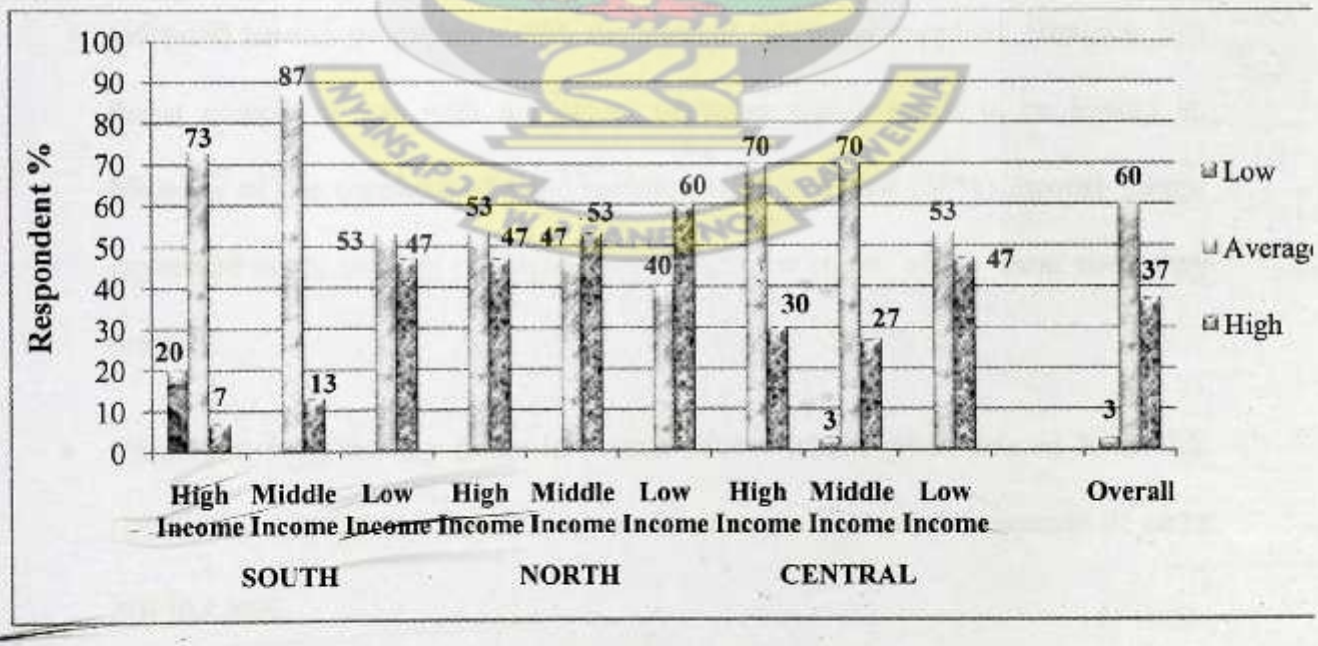


Figure 4.15: Impression about Cost of water

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

The following general conclusions were drawn from the analysis of the results:

- The study showed that about 15% of the customers relied on water supply services within 16 - 24 GMT (night flows) in a day whilst 45% relied on water supply within 8 - 16 GMT (afternoon flows) and 40% relied on water supply services within 0 - 8 GMT (morning flows) in a day.
- Generally flow of water has improved since AVRL merged with GWCL for operation of the supply of water. The flow was best in the South district (76%) and worst in the Central district (56%).
- Overall flow service was 59% to 41% improved service and deteriorated service respectively.
- Customers were satisfied with the quality of water supply delivery. Majority (77%) of the consumers had no problem with the smell of the water and 80% also indicated having no problem with the taste of the water supplied. However, the major complaint was with the colour of water which needs to be looked at. Majority of the consumers in the middle (81%) and low (68%) income groups expressed much concern of dissatisfaction with the colour of the water since they drink it.
- Complaint were mostly made in person (86%) which when related to DALY (Disability Adjustment Life Years) could amount to several thousands of cedis lost in a year.

- The attitude of GWCL/AVRL staff to complaint was very poor with 69% not satisfied with staff's response to complaints.
- Meter readers were generally found to be customer friendly with 62% of the customers satisfied with their services.
- Overall the customers perception on the price of water was relatively high (97%) and an increase in water tariff may cause a scare amongst consumers and may create problem.

5.2 RECOMMENDATIONS

The following general recommendations were drawn from the analysis of the results:

- GWCL/AVRL should investigate in-depth and solve the problem leading to the very poor perception about the quality of water colour delivered especially within the middle and low income group since they mostly consume by drinking.

- GWCL/AVRL could through intensive media campaign/education create public awareness or issue flyers showing their toll free numbers to enable a change in the mode of complain to save cost.

- GWCL/AVRL customer response plan with emphasis on the average customer response time could be investigated and solution found for staffs to respond early to complaints since customers were dissatisfied about GWCL/AVRL response to complaints

- Generally, satisfaction (Excellent, Good) to service interruption was much to be desired but greater room for improvement in GWCL/AVRL public awareness/address campaign could be intensified.

- Further of such research could be carried out in all remaining districts especially in areas where water flowed before AVRL but still relatively have no flows to also obtain their perception. Also further of such research could be conducted and replicated in the other major cities or urban centers (Accra, Tema, and Sekondi-Takoradi) in order to (base on the GWCL/AVRL customers perception) evaluate on a wider scale the nature of the quality of service rendered by GWCL/AVRL in Ghana.

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APPENDIX

APPENDIX 1 - LETTERS

Kwame Nkrumah University of Science and Technology
Kumasi, Ghana, Deparment of Civil Engineering

WATER RESOURCES AND ENVIRONMENTAL SANITATION PROJECT
Netherlands sponsored project in cooperation with UNESCO-IHE, Delf.

Website www.wresp.org

Tel/Fax: +233-51-60235

e-mail: info.@wresp.org

Ref No.: CE: WRESP/IRL.3/442 November 24, 2009

TO WHOM IT MAY CONCERN

Dear Sir,

LETTER OF INTRODUCTION

I write to introduce to you **Mr. Edward Babalola,** a second year student of **MSC Water Supply and Environmental Sanitation** in the Civil Engineering Department of the College of Engineering. His student number is **20064396.**

Mr. Babalola is at his thesis write-up stage and the thesis title is **"Public Perception on water services delivery in Kumasi by Ghana Water Company Limited/Aqua Vitens Rand Limited".** He will need some information from your office for the execution of his research.

Any courtesies that could be accorded him will be highly appreciated.

Thank you.

Yours faithfully

.....

(Dr. G. K. Anornu)

Manager, WRESP

Cc: CED

Kwame Nkrumah University of Science and Technology
Kumasi, Ghana, Department of Civil Engineering

WATER RESOURCES AND ENVIRONMENTAL SANITATION PROJECT
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Website www.wresp.org

Tel/Fax: +233-51-60235

e-mail: info.@wresp.org

Ref No.: CE: WRESP/IRL.3/441

November 24, 2009

THE DIRECTOR
GHANA WATER COMPANY LTD.
KUMASI

Dear Sir,

LETTER OF INTRODUCTION

I write to introduce to you **Mr. Edward Babalola,** a second year student of **MSC Water Supply and Environmental Sanitation** in the Civil Engineering Department of the College of Engineering. His student number is **20064396.**

Mr. Babalola is at his thesis write-up stage and the thesis title is **"Public Perception on water services delivery in Kumasi by Ghana Water Company Limited/Aqua Vitens Rand Limited".** He will need some information from your office for the execution of his research.

- General information about GWCL's activities
- Information on the distribution networks and areas served
- Information on the contractual arrangement between GWCL and AVRL.

Any courtesies that could be accorded him will be highly appreciated.

Thank you.

Yours faithfully

.....

(Dr. G. K. Anornu)

Manager, WRESP

Cc: CED

APPENDIX 2 - QUESTIONNAIRE

RESIDENTS' SURVEY QUESTIONNAIRE

PUBLIC PERCEPTION SURVEY

Date: ..... Districts: ..... Area: .....

Water services delivery from GWCL

Service category: **(a) Domestic (b) Commercial (c) Industrial (d) Institutional (e) Government**

Respondent Age: **(a) Below 25 yrs (b) Between 25- 40 yrs (c) Above 40 yrs**

Sex: *□ Male □Female.*

Educational level of Respondent: ***(a) none (b) Basic (c) Secondary/tech. (d)University/Tertiary***

What is your total household income per month? ..... (Estimate)

Please underline where applicable.

1. ***Do you have access to water?*** **(a)Yes (b) No**
2. ***Is your household connected to GWCL network?*** **(a) Yes (b) No**
3. ***Do you have other source apart from GWCL?*** **(a) Yes (b) No**
4. ***If yes, what is the source?***

(a) Well/Borehole (b) Rainwater (c) Streams/Lake (d) Private providers.

5. ***How many days in week do you get water?*** .....
6. ***Is your account metered?*** **(a)Yes (b) No**
7. ***Is meter read regularly?*** **(a)Yes (b) No**
8. ***Are Bills received regularly?*** **(a) Yes (b) No**
9. ***How many hours in a day do you receive water?***

(a) Less than 8 (b) Between 8-16 (c) Between 16-24

10. ***Are you satisfied with GWCL water service?*** **(a) Yes (b) No**
11. ***How will you grade the level of flow satisfaction five (5) years ago?***

(a) Excellent (b) Good (c) Fair (d) Poor (e) Very Poor

12. ***How will you grade the level of flow satisfaction now?***

(a) Excellent (b) Good (c) Fair (d) Poor (e) Very Poor

13. *Are the water services getting better within the last five (5) years?* (a) Yes (b) No

14. *What improvement would you like to see?*

.....

15. *Have you ever made a complaint to GWCL?* (a) Yes (b) No

16. *How are complaints made?*

(a) Phone (b) Personally at the office (c) Write through PURC

17. *Did you get a satisfactory response?* (a)Yes (b) No

18. *How will you grade GWCL's response to a complaint?*

(a) Excellent (b) Good (c) Fair (d) Poor (e) Very Poor

19. *Are you notified before service interruption?*

(a) Yes (b) No (c) Sometimes

20. *What is your impression of GWCL's notification to service interruption?*

(a) Excellent (b) Good (c) Fair (d) Poor (e) Very Poor

21. *What is your impression about the physical water quality?*

- taste? (a) Excellent (b) Good (c) Fair (d) Poor (e) Very Poor

-smell? (a) Excellent (b) Good (c) Fair (d) Poor (e) Very Poor

-colour? (a) Excellent (b) Good (c) Fair (d) Poor (e) Very Poor

22. *What is your impression about the Water Price/Bill?*

(a) Low (b) Average (c) High

23. *Do you know GWCL is in partnership with a private company?*

(a) Yes (b) No

24. *In your opinion,* is *the GWCL's flow services improving or deteriorating?*

(a) Improving (b) Deteriorating

25. *What is your opinion on GWCL's meter/bill staff attitude to customers?*

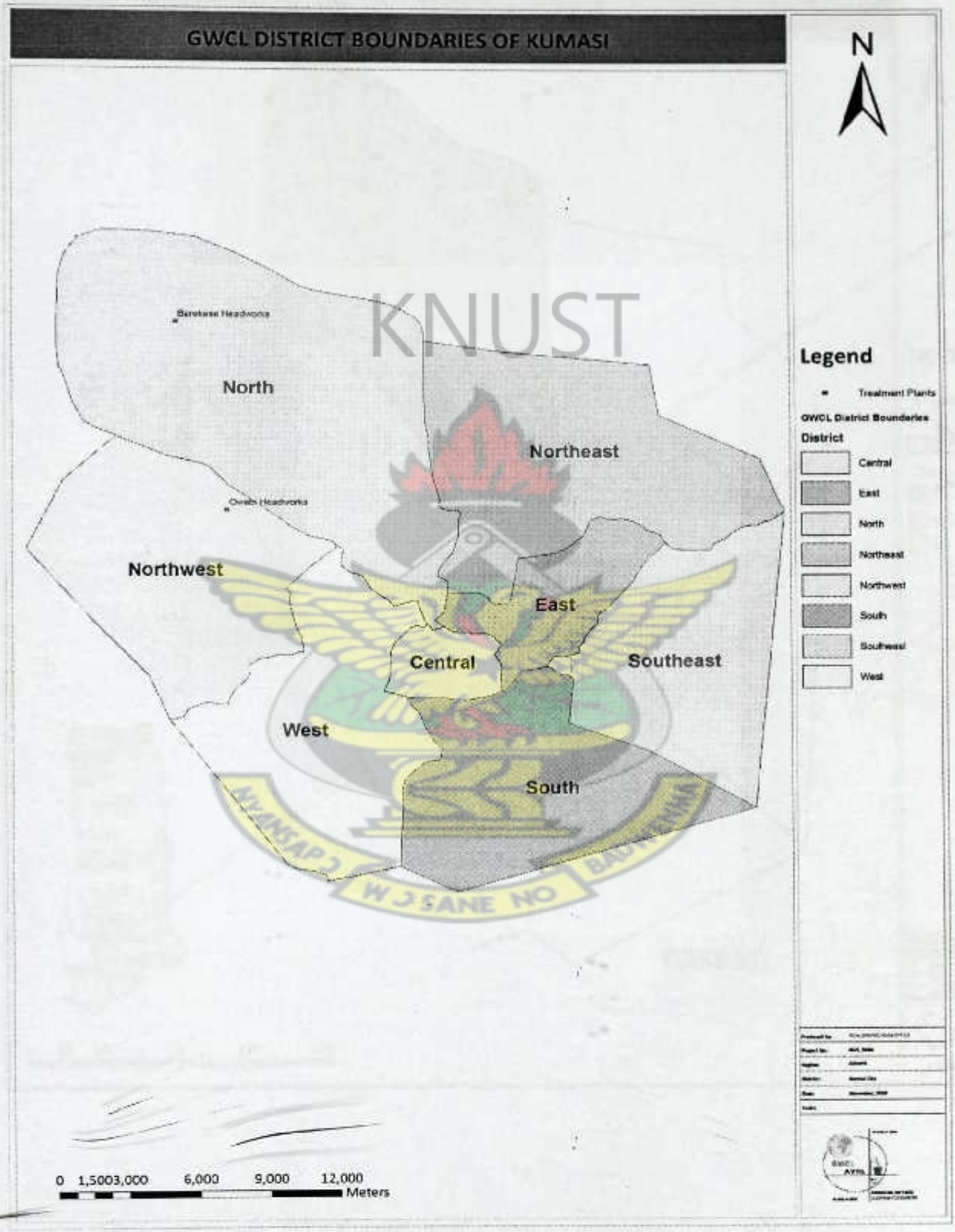
(a) Excellent (b) Good (c) Fair (d) Poor (e) Very Poor

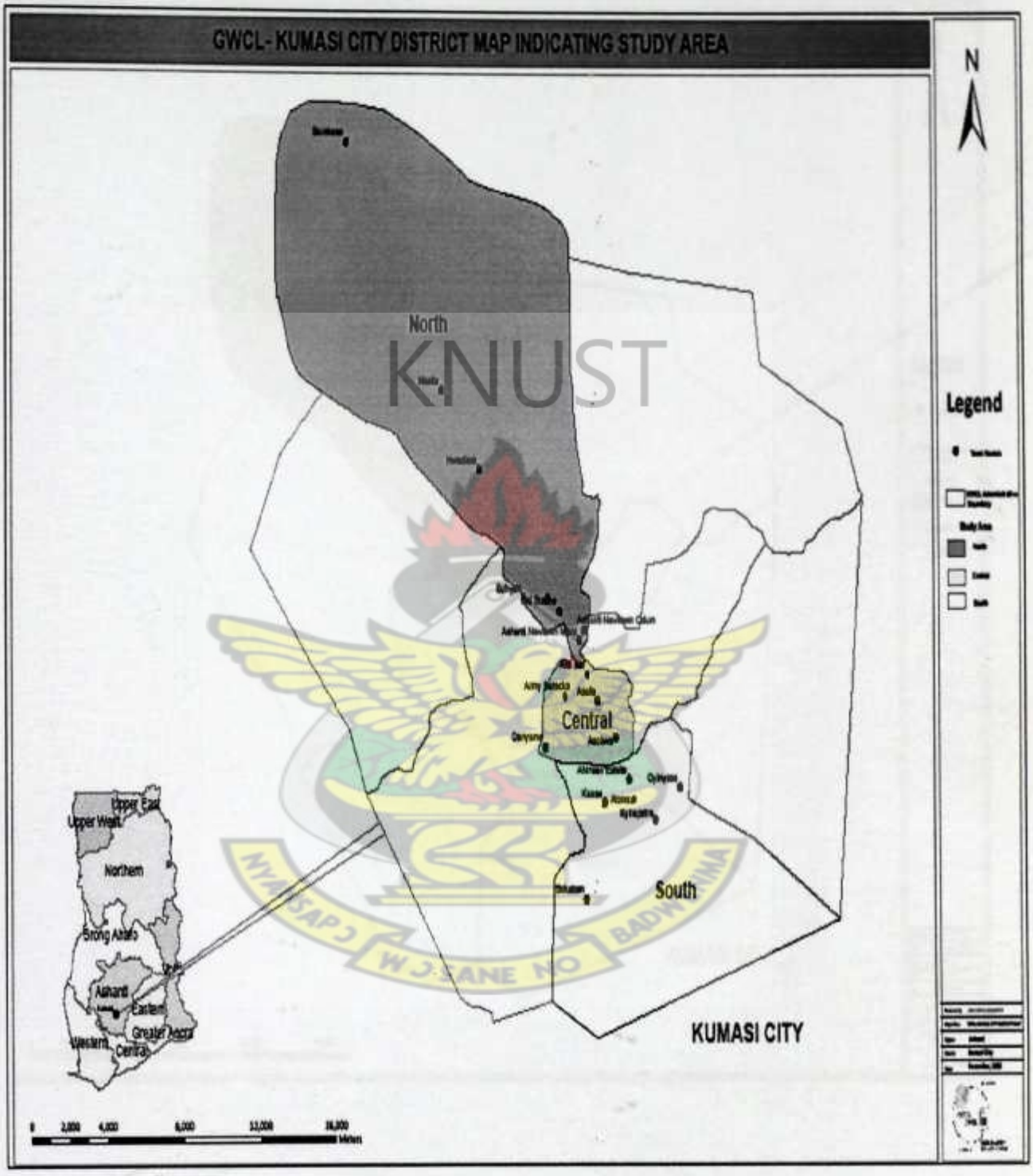
Managers Survey (Checklist)

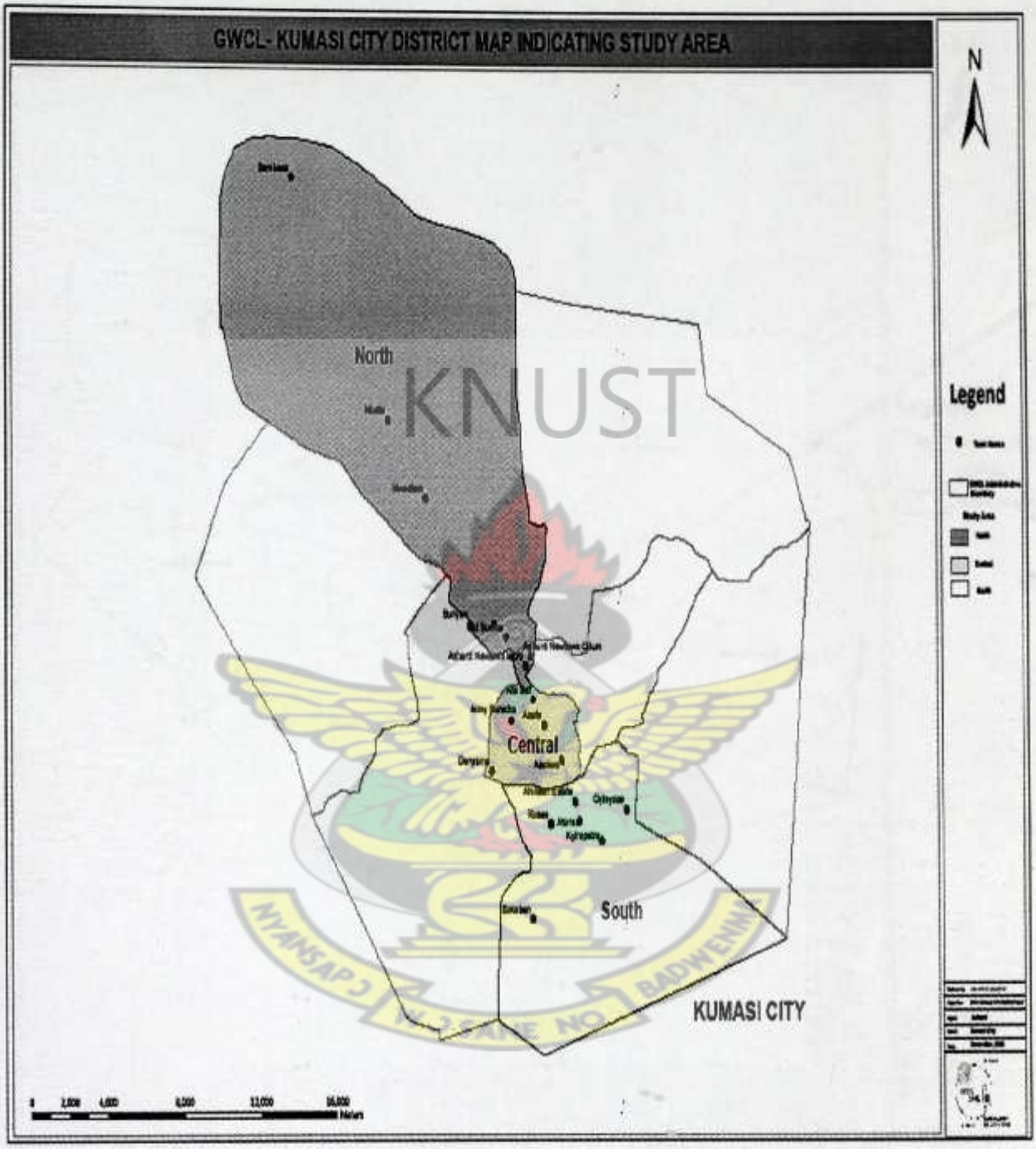
These are questions which guided the researcher in the interview conducted with the managers of the water service delivery.

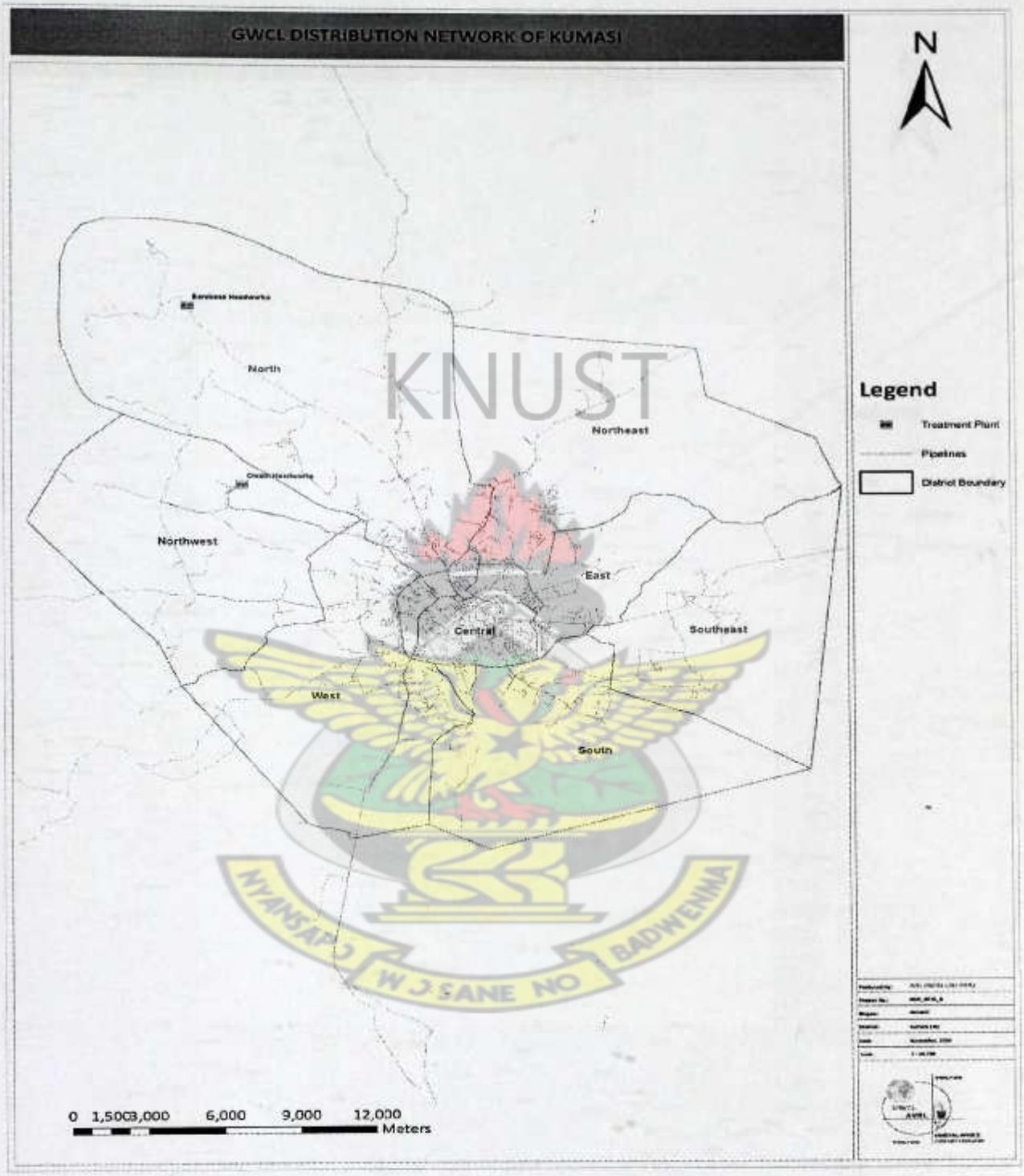
1. Meet the General managers to introduce yourself.
2. Find out how the distribution of the water is conducted.
3. Are there any rationing schedules.
4. Are the areas of supply divided into districts and how many districts are there? Ask for maps of districts.
5. Information on the contract and how better is the operations with the involvement of the private operator.
6. Is there any existing criteria for division of supplies into high medium and low income areas
7. Ask about the organizational structure.
8. Take pictures with resource persons.
9. What is your average customer level of satisfaction with overall quality of water in their household?

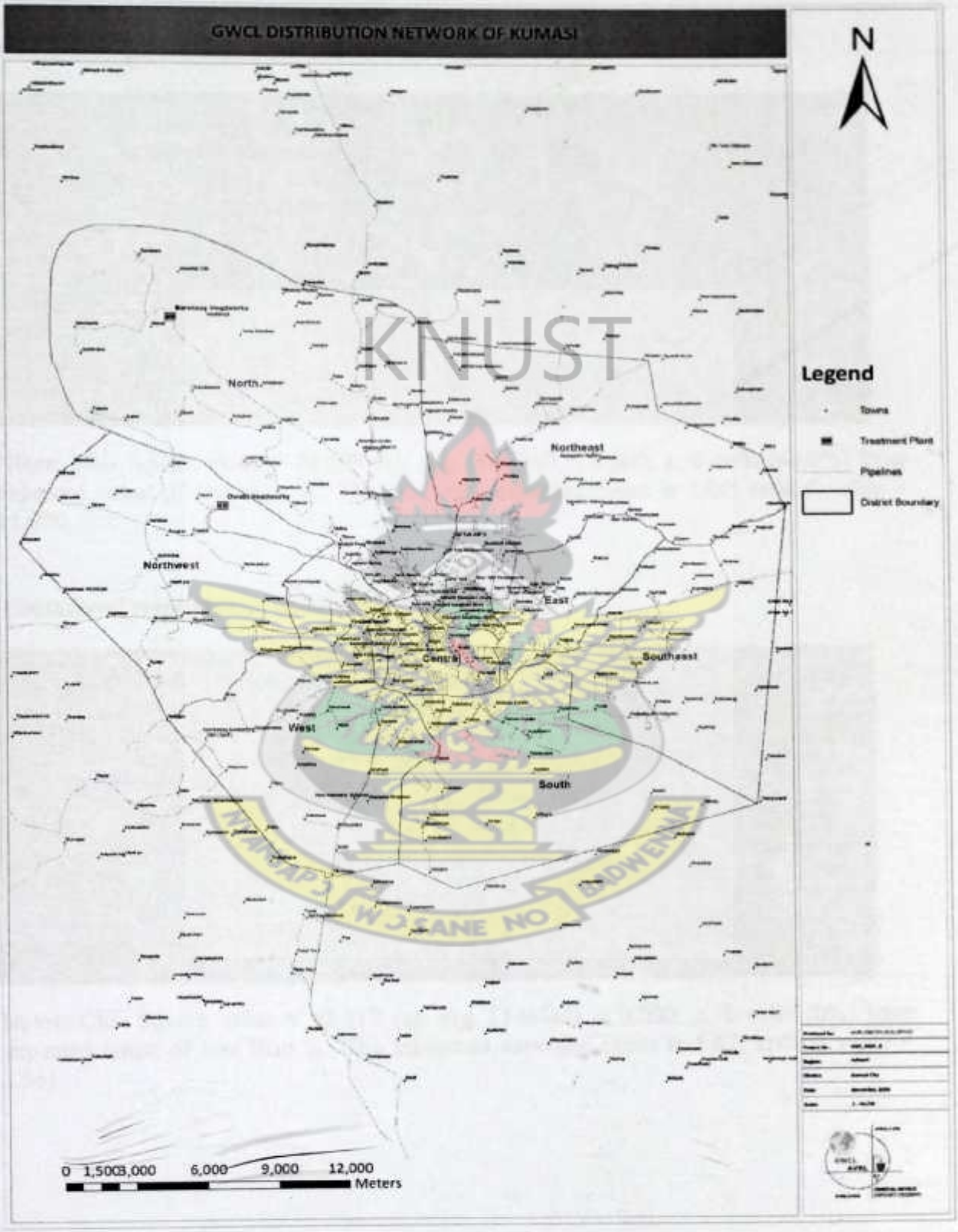
APPENDIX 3 - MAPS




GWCL- KUMASI CITY DISTRICT MAP INDICATING STUDY AREA
N
North
Central
South
KUMASI CITY
Legend
Upper East
Upper West
Northern
Brong Ahafo
Ashanti
Eastern
Greater Accra
Western
Central


GWCL- KUMASI CITY DISTRICT MAP INDICATING STUDY AREA
N
Legend
North
Central
South
KUMASI CITY


GWCL DISTRIBUTION NETWORK OF KUMASI
N
North
Northeast
Northwest
East
Central
Southeast
West
South
Legend
Treatment Plant
Pipelines
District Boundary
0 1,500 3,000 6,000 9,000 12,000
Meters


GWCL DISTRIBUTION NETWORK OF KUMASI
N
Legend
Towns
Treatment Plant
Pipelines
District Boundary
North
Northeast
Northwest
East
Central
Southeast
West
South
0 1,500 3,000 6,000 9,000 12,000
Meters

APPENDIX 4 – DESCRIPTIVE STATISTICS

Consumers' perception on attitude of meter readers

	High Income group (n = 90)	Middle Income group (n = 90)	Low Income group (n = 90)	Total (n = 270)
	%	%	%	%
Very Poor	0	3.3	0	1.1
Poor	12.2	23.3	10	15.2
Fair	27.8	25.6	13.3	22
Good	55.6	46.7	75.6	59.3
Excellent	4.4	1.7	1.1	2.4
Total	100.0	100.0	100.0	100.0

Notes: Chi- Square value = 26.599 (a); Sig. (2-sided) = 0.000; a. 6 cells (40.0%) have expected count of less than 5. The minimum expected count is 1.00; critical value = 11.070

Consumers' perception on water taste

	High Income group (n = 90)	Middle Income group (n = 90)	Low Income group (n = 90)	Total (n = 270)
	%	%	%	%
Very Poor	0	0	0	0
Poor	5.6	11.1	2.2	6.3
Fair	10	22.3	8.9	13.7
Good	63.3	65.6	85.6	71.5
Excellent	21.1	1.1	3.3	8.5
Total	100.0	100.0	100.0	100.0

Notes: Chi- Square value = 42.117 (a); Sig. (2-sided) = 0.000; a. 0 cells (0%) have expected count of less than 5. The minimum expected count is 5.67; critical value = 3.841

Consumers' perception on water smell

	High Income group (n = 90) %	Middle Income group (n = 90) %	Low Income group (n = 90) %	Total (n = 270) %
Very Poor	0	0	0	0
Poor	3.3	11.1	4.4	6.3
Fair	13.3	28.9	8.9	17
Good	64.5	58.9	82.3	68.6
Excellent	18.9	1.1	4.4	8.1
Total	100.0	100.0	100.0	100.0

Notes: Chi- Square value = 40.341 (a); Sig. (2-sided) = 0.000; a. 0 cells (0%) have expected count of less than 5. The minimum expected count is 5.67; critical value = 3.841

Consumers' perception on water colour

	High Income group (n = 90) %	Middle Income group (n = 90) %	Low Income group (n = 90) %	Total (n = 270) %
Very Poor	5.5	1.1	3.3	3.3
Poor	22.3	30	24.5	25.6
Fair	25.6	50	40	38.5
Good	42.2	17.8	27.8	29.3
Excellent	4.4	1.1	4.4	3.3
Total	100.0	100.0	100.0	100.0

Notes: Chi- Square value = 22.146 (a); Sig. (2-sided) = 0.005; a. 6 cells (40.0%) have expected count of less than 5. The minimum expected count is 3.00; critical value = 11.070

Consumers' perception on satisfaction of flow condition 5 ys ago

	High Income group (n = 90) %	Middle Income group (n = 90) %	Low Income group (n = 90) %	Total (n = 270) %
Very Poor	5.5	0	5.6	3.7
Poor	22.2	27.8	10	20
Fair	34.5	40	38.9	37.8
Good	36.7	32.2	44.4	37.8
Excellent	1.1	0	1.1	0.7
Total	100.0	100.0	100.0	100.0

Notes: Chi- Square value = 15.680 (a); Sig. (2-sided) = 0.047; a. 6 cells (40.0%) have expected count of less than 5. The minimum expected count is 0.67; critical value = 11.07

Consumers' perception on satisfaction of flow condition now

	High Income group (n = 90) %	Middle Income group (n = 90) %	Low Income group (n = 90) %	Total (n = 270) %
Very Poor	0	2.2	0	0.7
Poor	14.4	26.7	3.3	14.8
Fair	13.4	36.7	21.2	23.7
Good	38.9	33.3	72.2	48.2
Excellent	33.3	1.1	3.3	12.6
Total	100.0	100.0	100.0	100.0

Notes: Chi- Square value = 94.101 (a); Sig. (2-sided) = 0.000; a. 3 cells (20.0%) have expected count of less than 5. The minimum expected count is 0.67; critical value = 5.991

Consumers' perception on notification to service interruption

	High Income group (n = 90)	Middle Income group (n = 90)	Low Income group (n = 90)	Total (n = 270)
	%	%	%	%
Very Poor	4.4	5.6	1.1	3.7
Poor	17.8	23.3	4.5	15.2
Fair	24.5	25.6	13.3	21.2
Good	51.1	44.4	74.4	56.6
Excellent	2.2	1.1	6.7	3.3
Total	100.0	100.0	100.0	100.0

Notes: Chi- Square value = 30.214 (a); Sig. (2-sided) = 0.000; a. 6 cells (40.0%) have expected count of less than 5. The minimum expected count is 3.00; critical value = 11.070

THANK YOU.