UNIVERSITY OF CAPE COAST

IMPROVING WATER TARIFF PAYMENT IN RURAL AND PERI-URBAN COMMUNITIES CONNECTED TO URBAN WATER SYSTEMS IN NORTHERN GHANA

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BY

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Thesis Submitted to the Institute for Development Studies of the Faculty of Social Sciences, College of Humanities and Legal Studies, University of Cape Coast, in Partial Fulfillment of the Requirements for the Award of Doctor of Philosophy Degree in Development Studies.

FEBRUARY 2017

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature .... Date.................................

Name:…………………………………………………….…………………..

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature .... Date ....

Name: ………………………………………………..………………

Co-Supervisor's Signature .... Date ....

Name: …………………………………………………………………..….

ABSTRACT

In Ghana, despite the implementation of pro-poor models to make potable water affordable to small towns and rural communities, there are still cases of extension of urban water services at cost recovery-based tariff conditions to such communities. This defeats the aims of improving affordability and accessibility to safe water to low-income communities. The main objective of this study was to explore stakeholder roles in the improvement of water tariff payment in rural and peri-urban communities connected to urban water systems in northern Ghana. A sample of 386 households was selected from the Northern and Upper East Regions, and the concurrent triangulation design adopted for the study. It was revealed that no differentiated tariffs were set for rural and peri-urban communities connected to the urban water systems for the purpose of improving tariff payment. The Public Utilities Regulatory Commission regulates water tariffs and there was no authentic participation of rural and peri-urban communities in the tariff determination process. However, Ghana Water Company Ltd. collaborates with Community Water Committees basically to improve tariff collection. Logistic regression test results also indicated that tariff level, service quality and income were significant predictors of willingness to pay for water. However, generally, urban respondents were more willing to pay for water than rural and peri-urban respondents were. This study concluded that subsidisation of tariffs and poverty reduction schemes for women could improve water tariff payment in rural and peri-urban communities connected urban water systems.

KEY WORDS

Northern Ghana

Participation

Pro-poor services

Rural and peri-urban areas

Urban water services

Water tariff payment

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DEDICATION

To my children: Afiso, Eboresama and Titiaka

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LIST OF ACRONYMS

AAF	Automatic Adjustment Formula
APT	Ability to Pay
AVRL	Aqua Vitins Rand Ltd.
BCS	Bureau of Consumer Services
CBO	Community-based organisations
CEP	Community Empowerment Project
CIDA	Canadian International Development Agency
CMC	Community Management Committee
COM	Community Ownership and Management model
CPA	Consumer Protection Agency
CSIR	Council for Scientific and Industrial Research
CSO	Civil Society Organisation
CVM	Contingent Valuation Methodology
CWC	Community Water Committees
CWSA	Community Water and Sanitation Agency
DAC	Development Assistance Committee
DAs	District Aeemblies
DBT	Decreasing block tariff
DFID	Department for International Development of the United Kingdom
DVT	Differentiated volumetric tariff
DWST	District Water and Sanitation Teams
ECA	Economic Commission for Africa

EPA	Environmental Protection Agency
ERP	Economic Recovery Programme
FDC	Foundation for Development Corporation
GII	Ghana Integrity Initiative
GNA	Ghana News Agency
GSS	Ghana Statistical Service
GTZ	German Technical Cooperation
GWCL	Ghana Water Company Ltd.
GWSC	Ghana Water and Sewerage Corporation
IBT	Increasing block tariff
IDA	International Development Association
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IMF	International Monetary Fund
IWA	Institute Water for Africa
IWMI	International Water Management Institute
JICA	Japanese International Cooperation Agency
LDC	Less developed countries LDCs
LRMC	Long Run Marginal Cost
MC	Marginal cost
MDG	Millennium Development Goal
MLGRD	Ministry of Local Government and Rural Development
MMDAs	Metropolitan, Municipal and District Assemblies

MSWR	Minsitry of Sanitation and Water Resources
MWRWH	Ministry of Water Resources, Works and Housing
NAFIN	Namibian Alliance for Improved Nutrition
NDPC	National Development Planning Commission
NGOs	Non-Governmental Organisations
NR	Northern Region
ODI	Overseas Development Institute
OECD	Organisation for Economic Co-operation and Development
OECF	Overseas Economic Cooperation Fund
Ofwat	Office of Water Services in London
ORET	Development-Related Export Transactions
POI	Pragmatic Outcomes Incorporated
POO	Public Ownership and Operation
PPP	Public-private-partnership
PURC	Public Utilities Regulatory Commission
RCCs	Regional Coordinating Councils
SADC	Southern African Development Community
SAP	Structural Adjustment Policies
SNV	Netherlands Development Organisation
SRMC	Short Run Marginal Cost
TSP	Tri-sector partnership
TSP	Tri-Sector Partnership
TUC	Trades Union Congress

TWOP	Tamale Water Optimization Project
UER	Upper East Region
UMM	Utility Management Model
UN	United Nations
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNICEF	United Nations Children's Fund
USA	United States of America
USAID	United Sates Agency for International Development
VEI	Vitens Evides International
WB	World Bank
WHO	World Health Organisation
WRC	Water Resources Commission
WRI	Water Research Institute
WSP	Water and Sanitation Programme
WSP-SA	Water and Sanitation Program- South Asia
WSUP	Water and Sanitation for the Urban Poor
WTP	Willingness to pa
WUP	Water Utility Partnership

CHAPTER ONE

INTRODUCTION

Background to the Study

Scholarly writings on tariff for public potable water supply reveal changing considerations for consumer categories dictated by the political ideologies of governments and international policy. Between the 1950s and 1970s, theorists of the basic needs approach to development regarded drinking water as a social good provided by governments to promote social welfare (Manyire & Asingwire, 1996). The water sector was characterised by a top-down or supply-driven approach, in which governments were responsible for water infrastructure, operations, expansion and maintenance costs (Anokye, 2013).

By the late 1970s, the United Nations (UN) Declaration of Water as a Right at the Mar Del Plata Conference in 1977 emerged to re-echo the top-down approach (UN, 1977). This advocated for access to water by all peoples, irrespective of their social and economic conditions, in the right amounts according to their basic needs. This led to the adoption of 1981 to 1990 as the UN Drinking Water Supply and Sanitation Decade, during which governments provided drinking water mainly as a social good (O'Rourke, 1992). This was aided by the international community, especially the International Development Association (IDA), Organisation for Economic Co-operation and Development (OECD), and the Development Assistance Committee (DAC). These paid off the cost of water infrastructure in developing countries (Matsuoka & Yoshid, 2014).

From the late 1980s, as foreign aid gradually declined, the abilities of developing countries to sustain the supply-driven approach was also threatened by negative water use behaviour by the public due to the free access, lack of participation and the sense of ownership (Watson, Deeming & Treffny, 2009). Payment of annual subventions to water corporations was also problematic because the government faced economic depressions. These were due to high incidences of drought, bush fires, restrictions of exports from LDC to advanced countries, imported commodity price hikes, and falling local commodity prices, resulting in balance of payment deficits (Bacho, 2001; Todaro & Smith,2006). At the same time, the water sector yielded no revenue to sustain itself, leading to the deterioration of the water infrastructure, contributing to poor service quality (Nkrumah, 2004).

The above situation led to a shift to the concept of water as an economic commodity, characterised by tariff imposition and payment for public water services (Gbedemah, 2010). This means neo-liberalism influenced public water supply. This started when governments of the developing countries sought financial assistance from the World Bank and the International Monetary Fund (IMF) to revamp their water sector infrastructure (Grusky, 2010). The financial institutions in turn, initiated the privatisation of public water enterprises; cost recovery; withdrawal of government direct subsidies; and deregulation of the water sector by the state as conditionality for the loans (Schaub, 2004).

The conditions were components of the Economic Recovery Programme (ERP) and Structural Adjustment Policy (SAP). According to the World Bank, these were necessary because governments of developing countries were too poor to subsidise water, and that private sector participation could promote more efficient and sustainable services and reduce government expenditure (Grusky, 2001). These were re-echoed by the International Conference on Water and the Environment at Dublin in 1992, leading to the Dublin Statement on Water and Sustainable Development. This advocated for the need to recognise freshwater as a scarce and vulnerable resource, requiring participatory development and management, the incorporation of gender sensitivity in the process and recognising it as an economic good (Makoni, Manase & Ndamba, 2004).

The adoption of the neo-liberal conditions above by developing countries caused global increases in water tariff at an average of 18 percent per annum (Clarke, Kosec & Wallsten, 2008; Food & Water Watch, 2014). Given that potable water is very essential for the attainment of good health, personal hygiene, sanitation, poverty reduction and human and physical development (Berg & Mugisha, 2010), the questions of how rural and peri-urban low-income households connected to urban water systems could benefit from these under high tariff conditions and the necessary participatory issues arise. This is confirmed by WaterAid Ghana (2009), which asserts that the economic and social benefits of access to potable water are less felt by low-income households in the peri-urban and ruralareas compared to their urban counterparts. This is basically due to their inability to pay connection charges or afford the monthly tariffs.

Calculations based on data provided by the World Bank (2015) indicate that the lowest 20 percent subgroup or rural and peri-urban populations held only six percent of the per capita income in the world in 2011. This means the bulk of the world's income per capita is owned by urban households. In Africa, about 70 percent of the rural population is poor, and water companies extending services to them lose about US$500m of revenue every year due unpaid tariffs (International Fund for Agricultural Development [IFAD], 2011). This negatively impacts on the abilities of the companies to recover production and maintenance costs and provide sustainable services to the affected communities (Water and Sanitation Program [WSP], 2008).

The above situation further reduces access to water by low income rural and peri-urban communities in Africa. For instance, persons in rural areas of the developed countries use an average of 130litres of water per day, compared to 5litres in rural Africa, while the acceptable range for good living by an average person is 20 to 50 litres per day (Institute Water for Africa [IWA], 2015). Inadequate access to safe water from public sector compels the affected households to resort to more expensive vended or unimproved sources such as streams and unprotected wells. According to the United Nations Children's Fund [UNICEF], 2013), inadequate and polluted water use, poor sanitation and hygiene account for an estimated 1,800 deaths per day among under five years old. Rural Africa is therefore the most affected.

In view of the above problems, universal efforts have contributed to the achievement of target 7c of the Millennium Development Goals (MDGs) as of 2010. This aimed to reduce by half, the proportion of people living without sustainable access to basic water and sanitation services by 2015, with 2000 as the base year (UNICEF/World Health Organisation [WHO], 2012). However, the effects of cost recovery on tariff increases still limits access to water by rural and peri-urban communities in developing countries as described above. Cost recovery means user fees paid by consumers cover costs of operation, maintenance, capital expenditure and future expansions (Grusky, 2001).

The rural and peri-urban areas are of concern because of their distinguished characteristics which adversely affect their ability to pay water tariffs. Those of rural areas include smaller populations (below 5,000), over dependence on subsistence agriculture; high unemployment in the formal sector; low incomes; and low levels of access to basic services (e.g. water, electricity, schools, hospitals and road networks) (Noakes & Franceys, 2014). On the other hand, apart from higher population concentration (5,000 and above), urban areas are characterised by being political and administrative centres; centres of higher order services; having diminished agricultural participation; and having heterogeneous populations by class extremes based on the richest and the poorest (Mondal, 2015).

According to Norström (2007), whereas the distinction between rural and urban areas is clear, there is no simple division between a peri-urban area on one hand, and a rural and an urban area on the other. The author describes peri-urban area as an interface between the other two, strongly impacted by urban characteristics. Specific features include being zones of influence in terms of wider markets for farm produce, increasing demand for land due to urban expansion; subjugation to pollution due to urban waste disposal, and supply of labour to urban areas (Norström, 2007).

The above variations in socio-economic rankings among the settlement types imply that obvious differences exist in public utility services such as potable water supply. Urban water services are usually managed by public companies using expensive piped water systems. The capital cost of a piped water system for treated surface water for 5,000 urban dwellers is UD$1,600,000. This gives a per capita cost of US$320 (Edwards & Cameron, 2011). On the other hand, affordable point source facilities are often recommended for rural and small town or peri-urban communities (Ikpindi, 1990; Kendie, 1997; UNICEF & WHO, 2008). For instance, a borehole fitted with hand pump for 100 people costs US$ 5,000, with a per capita cost of US$50 (Edwards & Cameron, 2011).

The cost differences result in variations in water tariffs. The tariff per cubic meter of water from a borehole fitted with hand pump ranges from US$ 0.01 to 0.14, while that for a piped water system is higher, between US$0.05 and 1.52 (Nyarko, Dwumfour-Asare & Appiah-Effah, 2010). Where urban water is extended to rural and peri-urban communities there are inequalities in access due to income differentials. Efforts to address such differences often lead to ideological thoughts inclined towards the distributive paradigm (Berg & Mugisha, 2010). This paradigm assumes that social judgment is based on equality in access to social services, which is attainable in a society of unequal income status. This is possible by distributing social services according to the size of individual income, relative to incomes of other persons (Young, 1990). Efforts to fulfil such conditions demand the over-rule of existing institutional provisions that restrict access to water by some persons on the basis of income (Berg & Mugisha, 2010). For instance supplying safe drinking water to only households that are capable of paying for connection fees denies low-income households of equal access.

The leverage of this paradigm on development planning policy finds expressions in the UN General Assembly Resolution on the Right to Water and Sanitation in 2010. This policy advocates for increased access to, and affordability of drinking water (Environment News Service, 2010). The aim is to protect low-income people against the high tariffs associated with the neoliberal water delivery model. This in addition civil society advocacies against the commoditisation of water for the sake of the poor (Grusky, 2010) led to a third form of water delivery model, known as the Community Ownership and Management (COM) model adopted by national governments with the support of funding agencies (World Bank and the International Monetary Fund [IMF]).

Typically, Gbedemah (2010, p.1) posits that the COM model involves the "engagement of water users, or communities in the formulation, provision, management and use of domestic water facilities". Government is supposed to be responsible for meeting the cost of small town and rural water supply under this model through grants and local investments. On the other hand community Water Boards are to mobilise voluntary labour and contributions in cash or kind (Page, 2003, cited in Gbedemah, 2010). However, the dominance of foreign capital, especially from the IMF and the World Bank, still provides some mechanisms by which the low-income households in small towns and rural areas still pay for their water services (See Komives, Akanbang, Thorsten, Tuffuor, Wakeman, Larbi, Foster, Halpren & Wodon, 2005).

Stakeholder analysts opine that concepts such as water supply and tariff payments bring together some interest groups, including relevant government ministries and departments, managers of water companies, utility regulators and customers (Freeman, 1984; Fontaine, Haarman & Schmid, 2006). The respective interests of these include promotion of social welfare through policy making and implementation; operational efficiency and profitability; standardisation of service quality and tariffs that are fair to all stakeholders; and utility maximisation through value for money. The fact that profit entails excess of revenue over cost, whilst value for money implies greater quantity and quality at lower prices means that water companies and customers respectively, have diverging interests. This is consistent with the interest conflict dictum, which explains that conflict arises due to incompatibility of the interests of the stakeholders (Browne, Gleiber & Mashoba, 2009).

In Ghana and other developing countries, despite efforts to separate urban water from rural and small town water services, there are still instances of overlapping stakeholder roles, policy and regulatory applications (Ahlers & Zwarteveen, 2009). Adank and Tuffour (2013) describe how small town and rural water services were decentralised and placed under the District Assemblies and managed by the Community Water and Sanitation Agency (CWSA) and District Water and Sanitation Teams (DWST) since 1998. This established the COM model in Ghana.

In 1997, the Public Utilities Regulatory Commission (PURC) was established to ensure fair standards in tariff regulation and quality of utility services. This together with the conversion of the Ghana Water and Sewerage Corporation (GWSC) to the Ghana Water Company Limited (GWCL) as a public limited liability company in 1999, charged with the responsibility of urban water supply, marked the introduction of an urban-based model known as the Utility Management Model (UMM) (Adank & Tuffour, 2013). This is different from the COM model because it is devoid of government direct subsidies, urban oriented, private sector participation in terms of management, and cost recovery-based.

Despite the implementation of the UMM and the COM models, there are evidences of extensions of municipal and metropolitan cities' (Urbanised areas) piped water services to rural communities in Ghana. For instance GWCL's piped water services outside dwelling cover 28.4% urban and 3.5% rural in Bolgatanga Municipal, 16.5% urban and 3.4% rural in Sunyani Municipal, 40.8% urban and 20% rural in Ho Municipal, 45.2% urban and 23.3% rural in the Tamale Metropolis, 29.9% urban and 39.7% rural in Sekondi-Takoradi Metropolis, and 14.8% urban and 26% rural in Cape Coat Metropolis (Ghana Statistical Service [GSS], 2014c).

An overview of the stakeholders associated with the two models shows some dissimilarity. The Ministry of Water Resources, Works and Housing (MWRWH), GWCL, PURC, and urban domestic and commercial water users are the stakeholders of the UMM, while the Ministry of Local Government and Rural Development (MLGRD), District Assemblies, small town and rural community water users, the CWSA and DWST constitute the stakeholders of the COM model. The associated government ministries champion the policy making aspects in the models, while issues of tariff and service quality determination and regulations are the responsibilities of the PURC and GWCL for the UMM. In terms of tariff, the PURC uses an automatic tariff adjustment formula (AAF). This incorporates all cost items to determine tariff, while GWCL could also influence tariff changes by proposals to the PURC, based on changes in input prices (PURC, 2011). The District Assemblies and CWSA are also responsible for the COM model.

In terms of customer participation, the Trades Union Congress (TUC) and Consumer Protection Agency represent urban commercial and domestic water users respectively (Amexo, 2014). The interests of rural and small town water users are also defended by Community Water Boards, while Civil Society Organisations (CSO) play advocacy roles to ensure equity in access and fair treatment of the urban poor, as well as low-income households in rural and small town communities (Gbedemah, 2010). From the foregoing, where rural and peri-urban communities are connected to urban piped water systems, the mismatch between their socio-economic status and the expensive nature of the services (Edwards& Cameron, 2011) could generate some problems. These include inadequate tariff payment, inability of the utility to recover cost, disconnections, and inadequate use of water according to the basic needs of households (SNV, 2009). Thus, how the synergies and complementarities of stakeholders through various participatory approaches could address these challenges are of interest.

Stakeholder participation is capable of influencing the nature of services, how much tariff is charged and how these motivate service providers to provide sustainable services (The Netherlands Development Organisation [SNV], 2014). They can also promote consumers' abilities and willingness to use the services and pay the tariffs (Whittington, 2002). For instance, Vitens Evides International reveals that the GWCL/Aqua Vitens Rands Ltd. recovered up to 90 percent of annual water tariffs in 2010 under typical public-private partnership in urban water service conditions in Ghana between 2006 and 2011.

On the other hand, Komives *et a..l* (2005) and Nyarko, Nyarko, Odai and Fosuhene (2006) cited in Ghana Integrity Initiative (2011), report that under the COM model small towns and rural communities in the Volta, Ashanti and Brong Ahafo Regions of Ghana were also able to cover about 57 to 77 percent of the cost of borehole water services between 2003 and 2005. Both accounts reveal success stories in urban and rural water services respectively. What happens when rural and peri-urban consumers are connected to urban piped water services, yet the policy and regulatory conditions fail to consider them on the basis of their socio-economic conditions, is the unresolved challenge.

Statement of the Problem

Poor water tariff payment by rural and peri-urban communities connected to urban water systems persists in Ghana, despite the implementation of policies that support the participation of small towns and rural communities in potable water supply, including issues of tariff (Siabi & Tambro, 2008). This is basicallydue to problems of overlapping stakeholder roles and confusion over the target beneficiaries of policy provisions (Ministry of Water Resources, Works and Housing [MWRWH], 2007; Jonah, 2011). As a result, existing practices are far from attaining the best levels of participatory models and theories (Adinku, 2012). For instance the District Assemblies and CWSA are the direct organisational stakeholders of the COM model which targets small town and rural communities for water services in Ghana (Ofosu, 2010). However, the continued supply of urban piped water services to some rural and peri-urban communities under the urban oriented Utility Management Model (UMM) associates such communities with the GWCL and PURC.

The UMM uses a tariff determination procedure based on proposals and regulatory roles of the GWCL and PURC respectively, and the high cost of services also makes the tariffs higher than what is meant for rural communities. According to Walker, Ordofiez, Serrano and Halpern (2000) and Trémolet and Hunt (2006), these negatively affect the ability of rural households to pay the tariffs and access safe water, as well as the ability of utilities to provide sustainable services.

In terms of participation, the theoretical basis of stakeholder engagement is to safeguard the interests of all stakeholders who can affect or be affected by a decision or action by mechanisms of mutuality (Reynolds, Schultz & Heckman, 2006). The best rungs of such participatory mechanisms in universally recognised models such as the Ladder of Citizen Participation, is when ordinary people (citizens) gain power over the basis of participation (Arnstein, 1969). This happens when their involvement is functional or authentic in both decision making and implementation processes (Midgley *et al*., 1986; Millar, 2007). It is therefore clear that the nature of the UMM does not offer this opportunity to rural and peri-urban communities linked to their services, while the COM does. This results in lower tariffs determined by collective decision making processes with the District Assemblies (WaterAid Ghana, 2005; Marks, Komives & Davis, 2014).

The Africa Water Vision for 2025, for instance, acknowledges the importance of participatory management of water resources, as well as recognising the economic value of water, while taking the necessary steps to meet the special needs of the poor (Economic Commission for Africa [ECA], 2000). The National Water Policy of Ghana also has principles on improving equity, gender sensitivity and participatory decision making at the lowest appropriate level (Ministry of Water Resources, Works and Housing [MWRWH], 2007).

The concept of pro-poor water governance further emphasises authentic participation of the poor, mostly located in rural areas (IFAD, 2011; Ghana Statistical Service [GSS], 2014b) and so linked to the COM model. However, the water sector policies and practices reveal a gap for the articulation of the conditions of those connected to urban water systems from the documentary evidences provided above. Grusky (2010) argues that if such a situation is unresolved, high proportions of household expenditure would go into water tariff payment, at the expense of good health, child education and nutrition, housing and clothing, which amplify their conditions of poverty.

Northern Ghana, also referred to as the Savannah belt due to its relatively dry climatic and less dense vegetation conditions (Dickson & Banneh, 2001), comprises the Northern, Upper East and Upper West Regions of the country. The payment of urban water tariffs by rural and peri-urban areas of this zone are of interest because of the relatively high incidence of poverty. The Ghana Living Standards Survey Round 6 indicates that the poverty incidence of rural Savannah (northern Ghana) is 55 percent, compared to 30.3 percent for rural coastal and 27 percent for rural forest (GSS, 2014b). According to Edward and Cameron (2011), communities with low-income households would find it difficult to afford piped water services provided by urban water companies because of the higher per capita cost involved.

The case of rural communities and small towns in the Kumbungu District of the Northern Region of Ghana gives a vivid picture. Water tariff statements of the communities revealed that from 2007 to 2013, the average annual percentage of paid tariffs was 26 percent (Calculated from water tariff statements obtained from GWCL). In 2006, just when AVRL commenced its 5 year management contract, the communities paid only 8 percent of the annual water tariffs (GWCL, 2006). Meanwhile in 2013, the GWCL proposed to increase its tariffs by 112 percent even if it recorded 100 percent of collected tariffs in previous years, for sustainable services (PURC, 2013).

Given the common characteristic of low household incomes in rural north Ghana, is the pattern of tariff payment in all rural and peri-urban communities of this area connected to urban water systems the same as the Kumbungu District?

Are the causes of poor tariff payment the same for such communities in the rest of northern Ghana? What theoretical and water policy considerations are incorporated into the water tariff determination and collection processes? Are the communities involved in the tariff determination process? What are the complementarities of other stakeholders in improving willingness and ability to pay in the communities?

In the parlance of consumer behaviour, factors influencing consumers' willingness to pay for water include the nature of tariff designs, how services meet expectations of target consumers, economic and other explanatory factors (Deverill *et al*., 2001; Munasinghe, 1992). Given that urban water tariffs are considered to be unaffordable to rural communities and small towns in Ghana, and for which reason they are given low-cost water services, a number of theoretical gaps emerge as follows:

- Despite the relevance of lifeline marginal cost pricing, differentiated tariffs and cross-subsidies in promoting tariff payment among low-income groups, the PPP model in Ghana did not make provisions for the poor in rural and peri-urban areas (Vitens Evides International, 2012). Five years have elapsed since the end of the AVRL contract in 2011, as of 2016. Is this still the situation for such communities under urban water services?
- In connection with the expected nature of services, the preferences of rural and peri-urban communities connected to urban water systems do not influence the type of technology that suits their needs in terms of affordability (Alhassan, 2011);

- Related to the economic factors, the GWCL does not make any special provisions for linking the tariff rate and period of payment to rural household income size, nature of income flow and occupational characteristics (SNV, 2009);
- In terms of other explanatory variables, the literature leaves more room for determining how rural characteristics such as illiteracy, patriarchy, traditional belief systems and community participation affect willingness to pay for water in the context of urban water services.

Empirically, several studies have been conducted on urban water tariff imposition and willingness to pay e.g. Littlefair (1998), Whittington (2002), Blanc (2007), Castro (2007), Berg and Mugisha (2010), Kwak *et al*. (2013). But the focus of these studies has been on typical urban water tariff conditions and the urban poor. The case of rural and peri-urban communities connected to urban water systems is therefore derailed from the mainstream literature on urban water tariff payment. Other studies have also considered rural water services and tariff conditions e.g. Britwum (2004), Dovi (2007), Kangah (2009), Kendie (1997) and Komives *et al*. (2008). However, these are also committed to the description of rural and small town water supply conditions and their peculiar problems, rather than the challenges of paying urban water tariffs.

Furthermore, despite the relevance of stakeholder participation in resolving the challenges of tariff payment by rural communities connected to urban water systems, documented information on this aspect has been too general. In other words, there is inadequate literature on the practical aspects of making urban water tariff payment affordable to rural communities connected to the services. Examples are the works of Bohm (1980), Clark (1991), Overseas Development Institute (ODI) and Foundation for Development Cooperation (2003), Phillips (1976) and Stoteler, Reeder and Tulder (2012). Others also treat rural and urban water tariff problems separately, because they see the water supply conditions to be different e.g. Bacho (2001), Clarke and Wallsten (2009).

Adank and Tuffuor (2013). The lack of research findings that coherently link the elements of promoting willingness to pay in a multi-service area water delivery system comprising urban, peri-urban and rural areas makes it virtually impossible to see the challenges of the rural and peri-urban communities in terms of tariff payment. It also deprives the literature on water tariff payment of relevant policy recommendations that could address the special needs of such communities.

The practical, theoretical and empirical gaps imply the need for the re-conceptualisation of rural and peri-urban water service conditions by urban water companies that extend services to such areas under cost recovery. This study therefore seeks to address the gaps between theory and practice with regards to water tariff determination for rural and peri-urban communities connected to urban water systems. The main arguments in this thesis are that, whereas water tariff imposition is necessary for sustainable water services, inappropriate tariff determination and collection could negatively affect both the service providers and low-income households. In other words unwillingness to pay tariffs which are determined against customer expectations could jeopardise the quality and continuity of services as utilities fail to recover costs (Trémolet, & Hunt, 2006; Egyin, 2011). At the same time, failure to pay tariffs and connection charges deprives consumers of access to safe water through disconnections and non-extension of services (Walker, Ordofiez, Serrano & Halpern, 2000).

It is further argued that whereas mainstream literature identifies rural and urban water services with respect to their stakeholders and how water tariffs are determined for them, not enough is covered about peri-urban communities which are neither urban nor rural, yet subject to urban water supply and tariff conditions.

Purpose of the Study

This purpose of this thesis was to describe the nature of water tariff payment by rural and peri-urban communities connected to urban water systems in Northern Ghana. It exposes the reader to stakeholder participation and the inconsistent applications of policy provisions for rural/small town and urban water services.

Research Objectives, Questions and Hypotheses

Below are the research objectives, questions and hypotheses addressed by the study.

Research Objectives

The major objective of the study was to explore how water tariff payment in rural and peri-urban communities connected to urban water systems in northern Ghana is being improved. The specific objectives are to:

1. ascertain the relationship between the socio-economic characteristics of households and willingness and ability to pay for water;
2. ascertain how water tariffs are determined for rural and peri-urban communities connected to urban water systems;
3. explore the interests of rural and peri-urban communities and other stakeholders in participatory water tariff determination;
4. assess the effects of the tariff determination process on water tariff payment by the communities; and
5. explore the complementarities and synergies of the stakeholders in improving water tariff payment in rural and peri-urban communities.

Research Questions

The major research question was: how is water tariff payment in rural and peri urban communities connected to urban water systems in northern Ghana being improved? The specific research questions are:

1. What are the relationships between the socio-economic characteristics of rural and peri-urban households and willingness to pay for water?
2. What are the methods of water tariff determination for rural and peri-urban communities connected to urban water systems?
3. What are the interests of rural and peri-urban communities and other stakeholders in participatory water tariff determination?
4. What are the effects of the water tariff determination process on water tariff payment in the communities?

5. How do the complementarities and synergies of stakeholders contribute to improvement of water tariff payment in rural and peri-urban communities connected to urban water systems?

Hypotheses

The research hypotheses of this study were influenced by the adopted willingness to pay function, expressed in terms of tariff, service quality, economic factors (such as household income) and other explanatory factors (such as educational status). As a result, all the hypotheses related to research question one, and stated as below:

1. H_0: Socio-economic characteristics such as age, sex, monthly household income, marital status, education and household size of respondents have no significant relationship with willingness to pay for improved public standpipe water.
2. H_0: Water tariff level has no significant relationship with willingness to pay for improved public standpipe water.
3. H_0: Service quality has no significant relationship with willingness to pay for improved public standpipe water.

Significance of the Study

Based on the background statement, whereas it is common to identify the challenges of the urban poor and rural communities under their respective water delivery models, the case of peri-urban communities is apparently neglected in the literature on water services. This study therefore provides information on how the overlap of urban water supply conditions and the socio-economic characteristics of low-income househols in both rural and peri-urban areas under such schemes depict the inconsistencies with regards to tariff impositions in particular.

The study also reveals the gaps in the policy and institutional frameworks in literature regarding the challenges of rural and peri-urban communities connected to urban water systems. The aim is to inspire policy makers on the need for adjustments in stakeholder compositions and roles which could influence sustainable water tariffs and services for rural and peri-urban communities. It also provides a means for the identification of gaps between theory and practice. For instance, the lifeline model of the marginal cost pricing theory provides for affordable tariffs for the poor (Munasinghe, 1992). This thesis however, critiques the existing practice of using the optimal model of the theory, which is intended for urban areas by the PURC for the determination of water tariff in a system that serves both urban and rural areas, which could influence policy review for the benefit of the poor (World Bank, 2007).

While strategies such as Increasing Block Tariff (IBT) are available to cater for the needs of the poor in the case of Ghana, this study further exposes the existence of type II error. In other words urban affluent households also benefit from the strategy (Blanc, 2007). Given the evidences of poor tariff payment in rural and peri-urban communities, the findings of this study could inspire utility managers and policy makers on alternative ways of making water tariffs affordable and improving the abilities and willingness of low-income communities to pay for the services.

Furthermore, while there is adequate provision in the consumer theory that explains factors related to willingness to pay (Dost, 2012), there is little practical evidence on how utilities that serve urban, peri-urban and rural areas adopt them for the customer categories. For instance issues of water pricing, service quality, economic conditions and socio-cultural factors are independent variables that should not necessarily be held equal for urban and rural customers of a water utility company (Deverill *et al.*, 2001). However, mainstream literature is devoid of such differentiations. The findings of this study could therefore provide a means of filling such gaps for the benefits of water utility managers, regulators and academics.Additionally, the results have the potential to influence the success of existing water sector policies, such as the National Water Policy of Ghana and the Africa Water Vision for 2025 (ECA, 2000), which emphasise cost recovery, while providing safety nets for the poor.

Delimitations

This subsection presents the scope of the study. Thematically, the study explores how a stakeholder approach is used to improve willingness and ability to pay among rural and peri-urban communities connected to urban water systems. It assumes the segmentation of customers on the basis of urban and peri-urban/rural low-income groups, and focuses on the special treatment of the latter, where both benefit from the services of GWCL.

The study is geographically limited to rural and peri-urban communities of northern Ghana connected to the services of GWCL, as a result of the extension of treated surface water from the urban locations to such communities. This implies that where the company depends on ground water systems and piped water extensions from urban to rural areas are impracticable, this falls out of the scope of the study. Accordingly, the Northern and Upper East Regions of the northern Ghana are considered, while the Upper West Region is excluded.

Chronologically, reported field data pertains to the period in which fieldwork began and ended within a time range of August 2013 to May 2016. The process was however, not continues. For instance all field works beyond October 2015 related to aspects of follow up. It also includes all information obtained at the reconnaissance stage during the writing of the research proposal, which started in August 2013.

Limitations of the Study

According to Schwiesow (2010), the major stop-blocks of academic research include choosing the right topic, the right methodology, assembling a research team, finding study participants, getting institutions to participate, staying motivated to work your plan, and dealing with your data. I encountered some of these challenges. In view of the low-income status of the rural and peri-urban communities compared to the expensive urban water tariff payment, I initially sought to use a participatory action research methodology, with the aim of exploring for a multi-factorial model that could reduce income poverty for improving water tariff payment. This was to be through a stakeholder approach, but was constrained by getting institutions that could participate in the practical aspects of poverty reduction. There was also the problem of how such an approach could yield results that could be assessed and reported within the duration of my study (Three years), to show the relationship between poverty reduction and improving water tariff payment.

The methodological inconsistency was subsequently realised, leading to a modification of the topic to its present form. I was however, motivated to maintain the focus on improving water tariff payment, due to my desire to contribute to an identified rural development constraint. A careful search for a suitable methodological framework was then undertaken. The ultimate choice of a mixed research design that was cross-sectional, and the focus on how stakeholder participation in pro-poor water tariff determination improves willingness to pay in the target population were the remedies.

The use of a cross-section of the sample frame posed another limitation. That is, it involved a short time period, such that other studies with longer durations could yield different results. It was however, less expensive. It also enabled the estimation of the prevalence of the phenomena under study by assessing the effects of the relationships between multiple factors on the outcome (Levin, 2006; Schmidt & Kohlmann, 2008).

In view of the limitation, effort was made to execute the necessary research ethics for accuracy, validity and reliability of the findings on the phenomena investigated in situ, while recommendations were made for further studies in related topics by longitudinal researchers in the concluding chapter. Sampling and response errors and how resident research assistants were assembled and trained to solve them were also delat with. These together, support Schwiesow's (2010) observations about research challenges.

Operational Definition of Terms

Water tariff

Contextually this refers to the amount of money paid per unit of water drawn from a public standpipe.

Rural communities

Study communities with populations below 5,000 people, yet depending on urban water services.

Peri-urban communities

Small towns and villages closer to urban settlements, and depend on urban water services.

Urban water systems

Water services provided by GWCL for urban customers through a piped water system.

Northern Ghana

The focus was on Northern and Upper East Region because GWCL extended services to non-urban areas here as at the time of this study.

Organisation of the Study

This thesis is composed of eight chapters. Chapter One considers the Introduction, which specified the research problem, objectives questions and hypotheses. Chapter Two relates to Theoretical Foundations of the Study, while Chapter Three contains the Conceptual and Empirical Overviews. Chapter Four focused on Ghana's Water Sector Development and Indentified Stakeholders. Chapter Five concentrates on Research Methods, which explain the research design adopted to answer the research questions, followed by Chapter Six, which began the discussion of research results by focusing on Willingness and Ability to Pay Tariff by Rural Peri-urban Communities, how water tariffs are determined for them, and their interests in the participatory tariff determination process. Chapter Seven is about Community Performance in Water Tariff Payment and Complementarities of Stakeholders. The thesis ends with the Summary, Conclusions, Recommendations and Contribution to Knowledge in Chapter Eight.

Chapter Summary

In summary, Chapter One of the thesis defined the research problem by identifying the empiral gaps that justified the need for this study.In particular, it revealed the inconsistency between policy and practice regarding the treatment of rural and peri-urban communities connected to urban water systems in Ghana. It also generated the thematic issues that shaped the analytical focus through the research questions.

CHAPTER TWO

THEORETICAL FRAMEWORK

Introduction

This chapter reviewed the relevant theories explaining issues of water consumer behaviour, stakeholder participation and water pricing. Thsese facilitated the understanding of how the shortfalls in consumer willingness and ability to pay could be ameliorated by stakeholder participation from theoretical perspectives. The theories included the Consumer Theory, Stakeholder Theory and Marginal Cost Pricing Theory. The chapter was also relevant because it generated the essential concepts that informed the conceptual framework of this study.

Consumer Theory

A consumer is a person who makes consumption decision for him/herself, a household or any other social unit (Stengel, 2011). The consumer theory therefore explains consumer valuation and choice behaviour (Dost, 2012). It is based on the premise that the consumer's decision to purchase a commodity depends on the value he or she assigns to the choices available. In its classical form, it focuses on how a consumer maximises his or her utility, by choosing from a basket of goods and services, but limited by budget, given the prices of the various goods (Levin & Milgrom, 2004).

Vloerbergh *et al*. (2007), however, assert that apart from price and consumer's income level (budget), consumer preferences or effective demand for a particular commodity such as drinking water could be influenced by a multiplicity of factors such as location, the type of ownership (public or private), the technology involved, centralised or decentralized, cultural and political factors.

Related literature on water consumer behaviour shows departure from decisions involving choices from a basket of goods and services, and the associated applications of rigorous indifference curves and budget lines as used by robust consumer theorists. The focus has been on the determinants of willingness to pay for water, which refers to the amount of money a consumer is willing to pay for a unit of water after considering other compensating factors (Hanemann, 1991). According to Munasinghe (1992), the components of a consumer's willingness to pay for water include price, the service quality, level of economic activity (e.g. occupation and income) and a vector of other explanatory factors (e.g. education and believe systems). These constitute the determinants, predictors or independent variables in a willingness to pay function.

The predictors of willingness to pay depict that the philosophical position of the consumer theory about reality is multi-factorial determinism. It means an average consumer's willingness to pay for water is determined by multiple factors (Stengel, 2011). In the context of low-income communities and the application of the willingness to pay function, Adank and Tuffuor (2013), Blanc (2007), Ikpindi (1990), Kendie (1997) and McPhail (1993), directly or indirectly explain how the variables are manipulated as follows:

- Price or water tariff should be affordable in the context of rural and peri-urban low-income community water services. This could be by cross-subsidisation. It could also be by the use of life line rates in which a minimum amount is determined for the poor to pay. The 5 percent rule could also be adopted, in which the tariff is calculated based on 5 percent of the average household income of the poor.

- The expected service quality has to do with the provision of the water services according to the expressed needs of the poor. This is usually based on appropriate technology approach; a technology that is of low-cost and so affordable to the poor. It could also entail the adoption of a separate service delivery model, based on a stakeholder approach. In this, public, private, the civil society organisations and the target communities pool their efforts and resources together to provide the services to the poor on non-profit basis.
- The level of economic activity considers the identification of the economic status of the poor and providing the service in that context.
- The other explanatory factors focus on those factors with indirect bearing on willingness to pay, such as gender, education and believe systems.

Despite the fact that mainstream literature is replete with information about the applicability of the factors influencing willingness to pay for water, it is hard to come by a particular study that has focused on the case of rural and peri-urban communities connected to urban water systems. For example Ikpindi(1990) and Kendie (1997) looked at it from a typical rural water supply perspective, while Blanc (2007) and McPhail (1993) were more urban biased.

Specifically, an aspect of the Random Utility (RU) models, which are a facet of the Consumer Theory, was used. According to Baltas and Doyle (2000), dictums that explain consumer discrete choice behavior are collectively referred to as random utility (RU) models. In other words they are models that describe choice from alternatives that are discrete and mutually exclusive. In this study the semi-parametric model which makes use of discrete probability distribution, to approximate the distribution of preferences was adopted. This was applied to the contingent valuation methodology discussed in the chapter on research methods.

Contextually, the concept of multi-factorial determinism associated with the consumer theory, aids the exploration of how the tariff determination process imbibes the practical relevance of the determinants of willingness to pay in rural and peri-urban water services. It is specifically relevant for addressing research questions1 to 5. This is because the thematic issues of all the research questions affect water consumer bahviour.

Stakeholder Theory

Stakeholder as a term was first used in an internal memorandum in 1963, at the Stanford Research Institute, to refer to all interest groups whose support can sustain an organisation (Freeman & Reed, 1983). It was later developed as a theory by Edward R. Freeman in the 1980s to explain the essential values and morals and their applications in organisational management and business ethics. It stresses the need for management to identify who constitute the stakeholders of an organisation; what their interests are; and how to develop a model that enables management to knit such interests and related roles together through a set of collectively accepted methods and principles that give due regard to each stakeholder (Freeman, 1984; Reynolds, Schultz & Heckman, 2006). This implies that stakeholders of an organisation relate such that none of them in isolation can achieve the goal of the complex whole, and the absence of any of them would adversely affect the whole organization (Dau-Scmidt, 2001; Reynolds, Schultz & Heckman, 2006).

Despite the emphasis or the organisation, the relevance of the theory goes beyond organisational management, to include policy making, project planning and implementation and general process of decision making (Ridley & Jones, 2002; Mathur, Price, Austin & Moobela, 2007). Donaldson and Preston (1995), say that discussions of the stakeholder theory underscores three tenets, which could be exclusive or mutually supportive. These are discussed below.

Descriptive tenet

This involves inquiries into the culture and uniqueness of firms through business research (Donaldson & Preston, 1995). It deals with the identification of the stakeholders and how management perceives their roles and interests and deals with them as the custodian of the organization's culture. This means the interactions between management and stakeholders are based on regulations, principles and defined roles known to all parties and so provide a mutually binding framework to help managers manage better (Zanden & Sandberg, 2009). This premise of the descriptive tenet appears limited in scope due to its focus on the organisation and the orientation that it describes 'what is' and not 'what could be'.

The Overseas Development Institute and Foundation for Development Corporation (2003) and Stoteker *et al*. (2012), however, identify the potentials of stakeholders in problem identification, diagnosis and initiating for partnership formation for the implementation of defined projects for intervention. Midgley, Hall, Hardiman and Narine (1986) and Wakeford (2002) also posit that some stakeholders could just be ordinary listeners of the implication of a policy, or participate as a special group in a decision making process in which they have no influence on the actual implementation. The descriptive tenet of the stakeholder theory could therefore be relevant in the explanation of stakeholder relationship before, during and after the existence of an organization or any basis of participation.

Instrumental tenet

Donaldson and Preston (1995, p. 67) defined the instrumental tenet as "a framework for examining the connections, if any, between the practice of stakeholder management and the achievement of various financial performance goals". In other words, the instrumental orientation makes the achievement of collective goals by stakeholders more successful. It explains how the various stakeholders' interests and roles, influence the organisational structure and managerial arrangement through interconnectivity, with the aim of harnessing the intrinsic value of each stakeholder, using returns to financial resource commitment as a measure of effectiveness (Egels, 2004). Therefore, the assessment of how instrumental the entire stakeholder organisation is depends on the value for money derived from the executed roles. Such values include profitability, gaining market share, growth and stability (Jones, 1995). Other sources show some degree of convergence and divergence from these notions.

Damak-Ayadi and Pesqueux (2005, p.8) classify recent scholarly interpretations of the instrumental tenet into two main forms:

- "The relationship between the pressure that stakeholders can bring to bear and the way in which strategy is formulated" (e.g. Phillips & Reichart, 1998; Weaver, Trevino, & Cochran, 1999). This appears to be more open-ended, since it neither points to organisational set-ups nor the value of financial commitments. This context is therefore applicable to policy making, project development, organisational management, and general decision making processes. The focus is on the interests and associated actions by stakeholders serving as the pressure that could influence the achievement of collective goals, through a set of organised behaviours; and
- "The relationship between social and financial performance" (e.g. McGuine *et al*., 1988; Preston & Sapienza, 1990; Preston *et al*., 1991). This view corresponds to the original construct of the instrumental tenet by Donaldson and Preston (1995). It is therefore apparent that there is a conceptual confusion related to the instrumental tenet among scholars. Contextually from the economic perspective, rather than examining rigorous financial budgets and the associated benefits from transactional expenditures by various stakeholders, this study would focus on what stakeholders do to promote willingness to pay for water. From the social point of view, attention would be

given to stakeholders' responsibilities and the level of power that they wield to execute them to achieve collective goals.

Normative tenet

According to Donaldson and Preston (1995) and Damak-Ayadi and Pesqueux (2005), the normative tenet relates to the moral principles that govern ethical behaviour of stakeholders of a particular policy, project, organisation or decision for successful and sustainable outcomes. Butts (2006), links morality among stakeholders to loyalty, commitment to duty, and all other values that ensure that others can have trust in individual stakeholders. These are expressed through codes of conduct or partnership deeds (Goodpaster, 1989). These serve as the basis of good governance, along with motivation, monitoring, and evaluation that influence participatory outcomes (Melé, Garriga & Guillén, 2000). The normative tenet was relevant in the assessment of whether community representatives are able to attain equal power in the water tariff determination process as well as other strategies that improve their willingness to pay through the participatory process.

A major limitation of the stakeholder theory is that it assumes every organisation has some specific stakeholders, and that the absence of any of them impeded organizational success. Thus, additional skill is required in the definition and identification of the right stakeholders. Secondly, the notion of the individual tenets capable of standing independently as theories generates problems of redefining the specific tenets of each tenet adopted as a theory. However, in a planning framework for an intervention, all the tenets could be required at different stages in a single project. These cause confusion in the application of the theory. This study demonstrates how to adopt all the three tenets of the stakeholder theory.

Philosophically, the position of the stakeholder theory about reality is collective action through systems thinking. It is specifically relevant to addressing research questions three and five, which deal with stakeholder participation intariff determination and influencing willingness and ability to pay.

Marginal Cost Pricing Theory

According to Zamparelli (2007), the development of the marginal cost pricing theory came with neoclassical perfect competitive market conditions espoused by Backhouse (1990), Blaug (1997b) and McNulty (1967), and was typical of the works of Alfred Marshal and his followers (Marshall & Marshall, 1879b, cited in Zamparelli, 2007).The theory explains that the aim of the firm is to charge a price that is at least, equal to the additional cost incurred in producing an additional unit of the commodity or service. Any temporary shortages or surpluses arising in the short-run could be managed through short-run marginal costs. This entails recurrent expenditure associated with operations; cost of variable inputs; depreciation; scarcity; increased social pressure; and ecological costs (Rothengatter, 2001; Saglam, 2010).

In water pricing, marginal cost is the means by which the tariff a consumer pays per unit of water consumed is determined by the additional cost of inputs employed in producing that unit (Blanc, 2007). The determination of the cost items that go into the computation of the tariff by this method varies according to the discretion of a utility regulatory agency or by political decision, in relation to the socio-economic status of the target consumers.The philosophical position of the theory about reality is therefore, the objective measurement of price based on incremental costs of inputs. The theory is particularly relevant for addressing research question two of this study, relating to tariff determination. Munasinghe (1992) describes two methods of pricing derived from the marginal cost theory as below.

Lifeline method of water pricing

The lifeline method incorporates cost items that yield a minimum tariff affordable to the poorer segments of society. It generally includes the border shadow price. A shadow price is an estimated monetary value assigned by the management of a water company for an additional unit of cost item employed, when the actual value of the item is unknown (Munasinghe, 1992). On the other hand, a border shadow price means that theestimate is domestically determined, based on local market conditions. The second component is the social weight, which is the pressure mounted by the poor on the water infrastructure (Kanbur, 1987). The lifeline model is expressed as:

P= MCB/W

P represents the price or water tariff; ***MCB*** is the long-run marginal cost of water calculated using border shadow prices (i.e. marginal cost [***MC***] calculated at border shadow price [***B***]); and W is the social pressure mounted on the system (See Munasinghe, 1992, p. 307).

The popularity of lifeline rates in the promotion of fairness and affordability of services to the poor has been acknowledged (Wodon, Ajwad & Siaens, 2003). However, some scholars argue that most often, lifeline rates on certain services such as piped water do not reach the intended beneficiaries. This is because most of the poorer households are unable to connect to the water system or do not even have the opportunities to do so, such as the case of rural communities (Blanc, 2007). Others are of the view that water companies sometimes determine the lifeline rate such that it does not actually reflect the marginal cost. This could keep the rate either higher to the detriment of the poor, or lower to the disadvantage of the company (Komives, Foster, Halpren & Wodon, 2005).

Optimal method of water pricing

The optimal method of marginal cost pricing of water is based on the relationship between the marginal cost, a shadow price and other variables that reflect in the concept of marginal cost as discussed earlier (Kanbur, 1987). From this notion, let:

a= the water conservation or sustainability factor; *MC*= marginal cost of supplying a unit of water;

b= shadow-priced marginal cost of economic resources used;

W= specific social weight or pressure mounted on the water system per unit ofwater consumption by any given individual in the economy (Valued at market prices);

n= the elasticity of demand for water.

Then the optimal marginal cost price or tariff for water (*P*) as expressed by Munasinghe (1992: 306) is as follows:

$P= a.\ MC/[b+ (W - b)/n]$

In other words, to determine the tariff (P) per unit of any additional unit of water consumed by a customer, we first obtained the product of the water sustainability and conservation factor (a) and the additional cost incurred in the production of that additional unit or the marginal cost (MC). Next, the water utility identifies all cost items whose actual values are not immediately known, and assigns an estimated monetary value to such items as the shadow price (b), which is then added to the difference between the social weight exerted by any consumer in the economy (W) and b itself. The result is divided by the degree to which the quantity of water demanded by a consumer responds to the changes in price of water, also known as the elasticity of demand for water (n). The product of the water conservation and sustainability and marginal cost (a.MC) is then divided by the outcome of the last operation to obtain the optimal marginal cost tariff of water.

The optimal method integrates all cost items, including provisions for water conservation and sustainability. It is typically used by urban water companies in tariff determination, and automatically applies to all other consumers to which a company, making use of one production plant extends services to. These may include low-income non-urban communities (Janvry *et al*., 2002; Kanur & Venables, 2005; World Bank, 2007). It is therefore criticised on the grounds of being regressive to the poor in an economy with uneven distribution of income.

Chapter Summary

In summary, Chapter Two reviewed the theories that explaned the phenomena investigated. The essential theories were the consumer, stakeholder and marginal cost pricing theories. These facilitated the identification of the concepts and variables that informed the construction of the conceptual framework and the research methods.

CHPATER THREE

CONCEPTUAL AND EMPIRICAL OVERVIEWS

Introduction

This is another chapter on literature review, which concentrates on essential concepts generated from the theories. These included the concepts of the consumer, stakeholder and water tariff. Empirical literature on stakeholder participation for improving willingness and ability to pay water tariffs were also reviewed.The chapter ends with a conceptual framework to dictate the direction of the present study. Literature review was relevant because it enabled the researcher to identify his research niche through the identified gaps in the literature (Kumar, 1999). It also helped the researcher to obtain a clear focus on how to go about the study in a systematic way, based on how other researchers successfully carried out similar studies (Creswell, 2009).

Concept of Water Consumer

In the Consumer Protection Act 2005 of Great Britain, a consumer is considered as “any person who acquires or wishes to acquire goods for his own private use or consumption” (The House of Parliament-Great Britain, 2005, p. 5). Goodwin, Nelson, Ackerman and Weisskopf (2008), also see consumers as the last link in the chain of economic activity, and represent the people who put goods and services to final use. The term also means “any individual acting for purposes that are wholly or mainly outside that individual’s trade, business, craft or profession” (The House of Parliament-Great Britain, 2015, p. 2).

In this study, the contextual meaning of consumers is rural and peri-urban users of pipe-borne water supplied by GWCL. The focus is on the specific characteristics of rural and peri-urban households that affect their ability and willingness to pay for urban water services extended to them. This served to address research question one. The ensuing sections present the various types of consumers and the linkages to willingness to pay.

Types of urban water consumers

The United States Geological Survey (2005) and Ministry of Water and Energy- Ethiopia (2013), classify urban water consumers into domestic and non-domestic types. Cook *et al*. (2001) describe domestic water consumers as residential users, who could be grouped further under the single-family or household and the multi-family. The former have private connections while the latter share a common source such as a public standpipe.

The Public Utilities Regulatory Commission-Ghana, also delineates urban water users as comprising government departments and special commercial users, in addition to the domestic and industrial types (GWCL, 2012b). Industrial users include those engaged in agriculture, mining, manufacturing, construction, trading, transportation, finance and other services (Cook *et al.*, 2001). Special commercial users refers to those who purchase large quantities of water from the urban water companies to produce other drinking water related products, such as bottled and sachet water for the purpose of resale (Cook *et al.*, 2001).

It is noted that the literature on 'urban' water services makes no reference to rural or peri-urban water users. Any remarkable differentiation apart from the types of users described above is usually on the basis of income. So it is common to come across the ‘urban poor’, who are often given preferential treatment by urban water companies. These usually include cross-subsidies (WaterAid-Ghana, 2009); low-cost technology such point source facilities or public fountains (Ministry of Water and Energy-Euthyopia, 2013) among other strategies. These imply that rural and peri-urban low-income households connected to urban water systems need similar treatments for the promotion of positive consumer behaviour towards water tariff payment. The next section describes the specific features of such communities in relation to the abilities and willingness to pay urban water tariffs.

Characteristics of rural and peri-urban consumers and willingness to pay

This section reviews literature on inconsistencies between household characteristics in rural and peri-urban communities and nature of urban water service which affect willingness to pay.

Gender

According to the World Health Organisation (2015, p. 1), “Gender refers to the socially constructed roles, behaviours, activities, and attributes that a given society considers appropriate for men and women. Operationally, the key variable that emerges from the concept of gender is sex, that is, whether an individual is a male or female.

Socio-cultural factors related to gender, such as the traditional system of inheritance and its effects on access to productive resources such as farm land, and the right to make and execute personal decisions for the attainment of selfego needs, are more dramatic in patriarchal societies (Kendie, 1992; Apusigah, 2004). Scholarly writings have frequently expressed concerns about the task of paying for potable water being the responsibilities of housewives in rural communities, and which has often accounted for poor tariff payment due to their poor background (Kendie, 1992; Mugabi & Kayaga, 2010). The implication is that water supply projects in rural and peri-urban communities should be participatory, with women playing a key role in decisions regarding technology choice based on cost and tariff implications (Katakura & Bakalian, 1998). It also means that if there are any interventions for the purpose of promoting abilities and willingness to pay, the inclusion of women as the beneficiaries should be a priority (Kendie, 1997; Water Partners International, 2007).

Education

In adult illiterate dominated societies, especially in rural and peri-urban areas, many people (both men and women) lack formal educational qualifications for formal sector employments. This also means that they lack access to sources of regular wages or salaries, which could lead to poverty if the non-formal occupations such as food cropping are not rewarding enough (Adhikari, 2011). In Ghana, as of 2010 about 89.54 percent of urban males were literate compared to 79.17 percent of urban females. Comparatively, 69.9 percent of rural males were literate compared to 55.94 percent of rural females (GSS, 2013).

The level of education among the rural population, especially women, is a contributory factor, not only to the lack of formal sector employment, but also ignorance and the associated negative attitudes towards water use and tariff payment. In other words, the understanding of how waste of water could push the consumption level above the lifeline block in increasing block tariff systems, and theability to distinguish between treated piped water as an economic good, from freshwater obtained from surface sources are better among educated women than illiterates. This is relevant in understanding how willingness to pay for water by rural women could be lower in rural areas.

In view of the above, Littlefair (1998) notes that in water service schemes where water must be treated as economic good, additional efforts must be made to educate users about the different value of the treated water from the untreated. This could promote willingness to pay. Todaro and Smith (2006) however, argue that education alone would not be adequate unless multi-pronged approaches including poverty reduction are incorporated. Since poverty reduction does not fall in the jurisdiction of urban water companies, an exploration of alternative methods of addressing the problem is required.

Occupation

Occupational activities are classified under the primary sector consisting of agriculture, forestry, fishing and mining; the secondary sector composed of industry or manufacturing; and the tertiary sector, consisting of services such as education, financial services, marketing and distribution (Bastos & Perobelli, 2012). Other writers further identify the quaternary, related to research, information and the administration; and the quinary sector related to high level decision making in large organisations (Getis et al., 2006). The income for engagement in the activities of the various sectorsincreases in an ascending order, due to the increasing level of skill and value of services in the various activities. This implies that primary sector occupations earn the lowest incomes.

In Africa, agriculture as a primary activity employs 70 percent of the rural population, who are also considered to be among the 85 percent of the world's rural poor (IFAD, 2011). In Ghana, only about 9.5 percent of urban residents are self employed in agriculture, compared to 39.2 percent of rural residents (GSS, 2013). In rural north Ghana, about 97 percent of the rural population was reported to be in food crop farming, while 82 percent of their produce was for subsistence consumption (Ghana Statistical Service, 2008). This is relevant in the understanding of the incidence of poverty in the area; the corresponding nature of water services and household ability and willingness to pay; and what other exogenous factors have to be considered to enhance their abilities to pay (Katakura & Bakalian, 1998).

Low-income/poverty

Poverty is considered as the manifestations of general scarcity and lack of the basic needs of life such as food, potable water, food, clothing and shelter. It also refers to relative economic inequality with regards to comparisons between locations, such as rural and urban, by country and continents (World Bank, 2011).

According to the United Nations Education, Scientific and Cultural Organisation (UNESCO) (2016), income poverty is the poverty situation in which the household incomeof a family does not meet a national threshold. It is classified as extreme poverty, when it falls below the international standard or poverty line of $1 per day; absolute poverty when the income cannot satisfy the basic needs of life such as food, potable water, clothing and shelter; and relative poverty, when compared to other households and with reference to the prevailing standard of living of a given society.

Extreme and absolute poverty according to Rank, Yoon and Hirschl (2003) is caused by personal attributes such as laziness, illiteracy, ignorance and ill-health. On the other hand, relative poverty is based on the premise that poverty is influenced by social institutions through exclusion, marginalisation and the creation of conditions that perpetuate the cycle of poverty.

The above notions of poverty in turn, inspire development thinkers on the appropriate paradigms for resolution. The economic empowerment or the capability approach for instance, seeks to expose individuals to opportunities that enable them to function well and enhance their income generating abilities (UNESCO, 2016). The basic needs approach also seeks to prevent poverty through direct or top-down interventions involving the provision of basic needs (Pieterse, 2002).

In Ghana, the absolute poverty line is $1.83 per day and affects about 24 percent of the population, while the extreme poverty line is $1.10 per day involving above 8 percent of the population (Ghana Statistical Service, 2014b). These are the bases of classification of all settlement types by poverty incidence. The northern zone has the highest poverty incidence of about 30 percent for theurban and 55 percent for the rural areas. In the water sector, the implication of the gap between urban and rural poverty in general, has structural connotations. In other words, the institutional arrangement for urban utility management model for the more improved piped water services and rural COM model for the comparatively less improved point water sources, while being remedial, could also be said to be an exclusion of the rural poor from the benefit of piped water services. This is particularly true when we recall that both urban and rural areas ever used the same water supply facilities under the supply-driven approach of the socialist regime (Ghana Water Company Ltd., 2012a).

On the other hand, the separation of services, given the present consideration of water as an economic good, is inclined towards a basic needs approach as it reduces the vulnerability of peri-urban and rural people to water poverty. Water poverty means the lack of access to the required amount of safe drinking water for a decent living. It also implies that, if some rural areas are found under the urban utility water services based on the same tariff conditions, then capability or economic empowerment approaches are required to sustain their abilities and willingness to pay for sustainable services (UNESCO, 2016).

Traditional beliefs

The concept of traditional belief in the African context refers to the oral traditions that constitute the people's sources of religious faith. Among these is the belief in the Supreme Being (God) as the creator of the universe (Awolalu, 1976). Some of the belief systems have an apparent relationship with water poverty. For instance Akpabio (2011), reports that there is the belief in water as agift of God in the tradition of Nigeria, and this adversely affects rural people's willingness to pay water tariffs. Engel, Iskandarani and Useche (2005) also report that in Ghana the use and willingness to pay for improved water sources are determined by local customs and beliefs. The authors observe that generally, the influence of traditional belief on willingness to pay, among other factors decreased with levels of educational attainment. This means that illiterates are more likely to adhere to customs and religious belief systems in the payment of water tariffs than non-illiterates.

The implication of the above situation is that the planning of rural and small town water services in the context of urban water networks, and where such belief systems predominate should be able to incorporate the people's preferences that do not trespass their belief systems (Brookshire & Whittington, 1993). The apparent influences of endogenous and exogenous factors on household willingness to pay for water in low-income communities, means that interventions that seek to improve the situation should involve stakeholders of different but complementary backgrounds.

Concept of Stakeholder

According to the Stanford Research Institute, stakeholders are those groups without whose support an organisation would cease to exist (Freeman &Reed, 1983). It also refers to "any group or individual who can affect or is affected by the achievement of the organisation's objectives" (Freeman, 1984, cited in Fontaine, Haarman & Schmid, 2006, p. 3). Freemen and his followers, apparently appear to be thematic by linking stakeholders to organisations. In response to this Mathur, Price, Austin and Moobela (2007), disclose that the term finds applications in public policy and development projects too. For instance in public policy, tax payers, government ministries and other development partners constitute the stakeholders for participatory decision making (Audit Commission, 1999).

In the sphere of development projects, Ridley and Jones (2002) argue that the areas of interest of project related stakeholders could be consumerist or democratic. With the consumerist notion private sector participants prioritise the needs of the target consumers in their operations for the purpose of promoting competitiveness in the market. By the democratic school of thought, support for a project by the beneficiaries is achievable through equity, participation and citizens' empowerment (Mathur *et al*.., 2007).

Outside policy, organisational and project related conceptualisations of stakeholders, it has also been more generally considered as the groups orindividuals who can be positively or negatively, directly or indirectly be affected by a decision or the consequence of a decision (Duke & Swatuk 2002, cited in Anokye, 2013). Others also view stakeholders as the power holders, who could directly or indirectly influence a decision or outcome (Glicken, 2000, cited in Anokye, 2013). Thus, the operational definition of stakeholders in this study is, all those who have interests in water supply, consumption, tariff determination and promoting the abilities and willingness of rural and peri-urban consumers to pay the tariff in the context of urban water systems.

Types of stakeholders and their interests

The identification of the different types of stakeholders and their respective interests and roles is essential for the success of community development projects. This is because effective communication and the ability of each stakeholder to keep on track with the specific aspect of an intervention depends on how well the other partners and their roles are articulated to constitute the 'whole'.

Bourne (2006) asserts that project management constitutes the most influential stakeholders close to the project, while the project team comprises individual with identified roles for collective achievement of the project goal. The project board is also considered to have significant power to influence the success of the project, as well as the ability to kill it. The clients are those having a collective power to influence the project, but their individual influences are limited. The degree of influence of the types of stakeholders show that they could be put into primary and secondary; internal and external; direct and indirect stakeholders (Lindblom & Ohlsson, 2011; Anokye, 2013).

Those who are directly affected by the outcome of a project or decision tend to have a major interest and constitute the primary stakeholders. Examples are customers of a water company and management of the company. Secondary stakeholders are those who are not directly affected by a project or decision. Their role is intermediary (secondary) and they can have a major interest and can influence the effectiveness of the activities of project management and project team members. In the public water sector of Ghana examples include Ministry of Water Resources, Works and Housing (MWRWH), National Development Planning Commission (NDPC), Ministry of Local Government and Rural Development, Ministry of Finance and PURC. These are interested in water policy, funding, and regulation. It also includes the civil society and other non-governmental organisations, which are interested in equity and fairness through advocacy (Franch, Martini & Buffer, 2010). Lindblom and Ohlsson (2011) assert that primary and secondary stakeholders equally fall under the categories of internal and external stakeholders respectively, because their interests and influences relate to such categories.

According to Friedman, Khan, Hagman, Severson and Gill (2006), those who are concerned with the day-to-day activities of a project or intervention are described as direct stakeholders. Examples are the manager and functional managers of a water company, and a team of facilitators of a low-cost village water supply project. Customers of a company are interested in the end result, such as access to water and the affordability of the tariff, and not activities leading to that, and referred to as indirect stakeholders.

Anokye (2013), citing the work of Eden and Ackermann (2004), describes key stakeholders as secondary stakeholders who have the power to influence the coming into being or 'kill' a project or intervention. An example is the power of a government ministry to grant approval, disapproval or the political will to offer support for a pro-poor water tariff structure incommunity water supply projects.The above notions of stakeholders guide the study in the identification of the types of stakeholders in the context of urban water systems extended to rural and peri-urban communities, and how their roles generate the intervening variables for improving willingness to pay for water.

Stakeholder participation

The International Finance Corporation (IFC) (2007) and Jeffrey (2009), consider the continuous process of inclusive relationship between an organisation and all those who are potentially impacted by its operations, through a range of activities and approaches as stakeholder participation. De Stefano (2010), Reed (2008) and Hauck, Saarikoski, Turkelboom and Keune (2014) assert that the bases of stakeholder participation include decision and policy making processes.

In the operational context of this study, stakeholder participation means the approaches and processes by which all interest groups interact through policy, decision, and activities towards improving water tariff payment in rural and peri-urban communities connected to urban water systems. A typical model that explains stakeholder participation is the Arnstein's Ladder of Citizen Participation, which is a component of Figure 1.

The Arnstein's Ladder (columns 2 and 3 of Figure 1) explains how power structures interact in society and make participants who have power to influence change through processes of decision making (Arnstein, 1969). The ladder was conceptualised by Sherry R. Arnstein in a 1969 publication with the main aim of identifying and differentiating between the various levels of participation and the power associated with each level in an ascending order of importance (Collins & Ison, 2006).

It consists of eight rungs. According to Arnstein's exposition, manipulation and therapy constitute the first and second rungs corresponding to non-participation as the degree of power to influence the basis of participation. Midgley, Hall, Hardiman and Narine (1986) refer to this type of participation as passive or pseudo-participation, because mere education through manipulation or curing participants of a misconception does not enlist them into the power structure that has direct bearing on change.

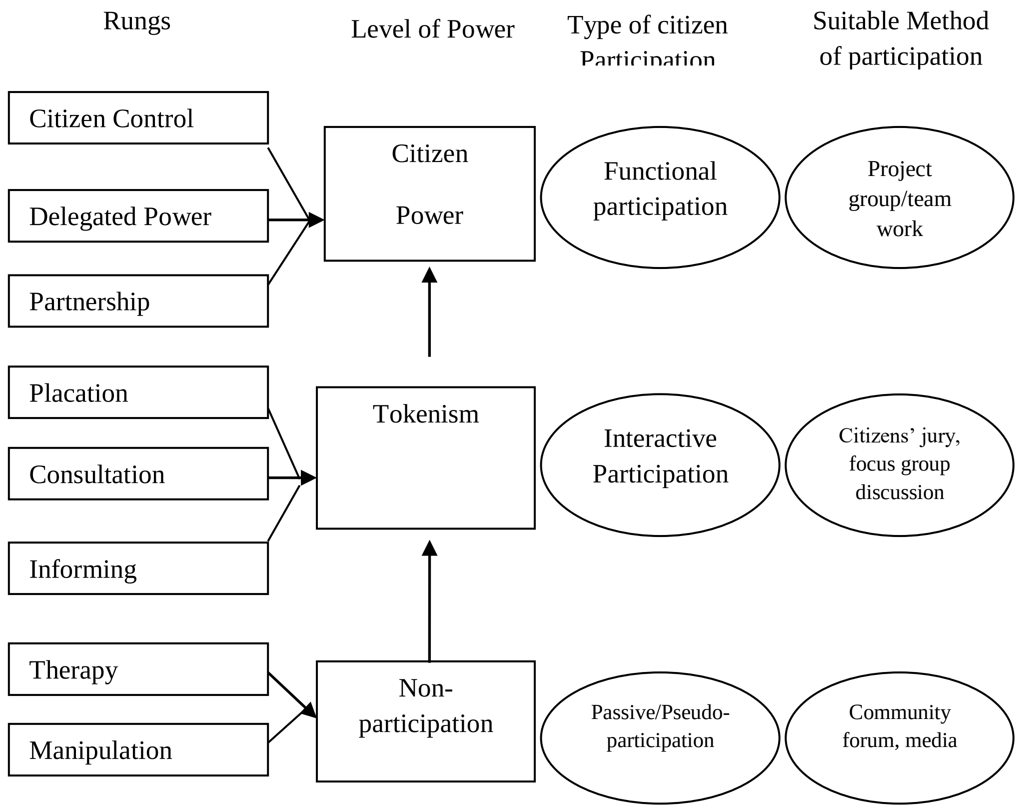

Figure 1: Ladder of participation
Source: This study, Bukari (2015), (Modified from Arnstein, 1969)

McLeod and Scheufele (1999) agree that the use of the mass media, such as newspapers, radio and television are more institutionalised and non-traditional methods of community participation as they merely inform or educate. These together with community or civic forums are the methods associated with citizens' non-participation, because the target groups of local participants have no direct influence on outcomes. The authors however, conclude that forums have more interpersonal impact at the non-participation stage than the mass media.

The third, fourth and fifth rungs deal with opportunities for citizens to hear and be heard, engage in consultative bargaining, and to be appeased of a grievance. These correspond to the degree of tokenism as the level of influence. The nature of participation at this stage corroborates with Koningsveld's (2005) description of interactive participation, which implies the inclusion of the minority groups through their representatives in the issues that constitute the basis of participation, which characterises tokenism. Local participants have the right to hear and be heard in the decision making process that influences an intervention. This avoids discrimination, exclusion and marginalisation, but there is no assurance of changing the status quo in the context of Arnstein's Ladder.

The corresponding methods of participation are citizens' juries and focus group discussions. According to Wakeford (2002), citizen juries involve democratic selection of local representatives to autonomously make decisions on an issue of public interest and submit a report to a body of experts. The latter decides what to do with the recommendations of the juries for the purpose of implementation. This together with focus group discussions incorporates the interests of different segments of the community into the participatory process. However, whether the views of participants in these methods are implemented or not, depends on the external stakeholders that initiated the discussions (Webster, Hollander, Scucci, Butter, Hlaine & Karraker, 1992).

The sixth, seventh and eighth rungs rely on partnership; delegated power and citizen control. Partnership formation formalises the participatory process between ordinary citizens and the power holders through enhanced negotiation and engagement in trade-offs. Delegated power entails citizens being given greater autonomy to manage a particular aspect of an intervention, while at the rung of citizen control, the minorities seek to minimise the extent to which the majority or outsiders could interfere with their delegated power and so aim at retaining full control over what they govern. These together form the degree of citizen power, which is associated with functional or authentic participation as explained by Midgley *et al*. (1986) and Millar (2007). This marks the preferred level of participation by the ordinary citizens through group or partnership formation with power holders, and the activities of the former authentically have impacts on the achievement of the objectives of an intervention.

Bahli and Bujukkurt (2005) indicate that the project group method (team work) is the best method of local participation because it fosters team building and group cohesion, leading to effective group performance. This makes it suitablefor application at the level of citizen power for functional or authentic participation by communities.

Since its postulation, the Arnsteins Ladder has been useful as a basis for academics, policy makers and development practitioners to access the effectiveness of stakeholder participation (Wilcox, 1994, cited in Collins & Ison, 2006). It has been applied in various fields including community local government, urban development and water resource development (Anokye, 2013; Blanc & Beaumont, 2005; Collins & Ison, 2006)

The ladder has not been without critics. Choguill (1996) posits that citizen control can be automatically established without governmental or external power holders. An example is when a community initiates its own development project. Others also argue that it is not in all forms of participation that some stakeholders seek to gain control over an issue as their ultimate aim through a hierarchical process (Bishop & Davis, 2002; Tritter & McCallum, 2006, cited in Collins &

Ison, 2006). The inclusion of the types and methods of participation at each level of the ladder in this study provides a clearer explanation of the participatory trajectory. It also provides a self-contained objective at each level once the associated participatory types and methods are executed.

As water services transit from the supply-driven approach, through the demand-driven, to the appropriate technology and community ownership and management model in Ghana, it becomes plausible to attempt an inquiry into the possibility of rural and peri-urban communities gaining power in the tariff determination process to suit their socio-economic conditions. That is, if they are still under an urban water system, by finding answers to research question 3.

Application of the stakeholder approaches in synergetic interventions

This section reviews literature on the application of the stakeholder theory through partnerships. A stakeholder partnership is one that addresses a complex problem through interventions involving multi-sectorial and multi-factorial measures, and so explores the synergies and complementarities of the partners in an integrated manner (Namibian Alliance for Improved Nutrition [NAFIN], 2013). The Multi-sectorial aspect means that stakeholders are drawn from two or more different sectors (SNV, 2014). The multi-factorial tenet also means that different factors need to be addressed in order to achieve the common goal (Panel on Animal Health and Welfare, 2014). These constitute the stakeholder approach (Beckers, Cummins &Woods, 1993; Stoteler et al, 2012), and mark the practical application of the level of citizen power in the Arnstein's Ladder (Arnstein, 1969).

The Overseas Development Institute (ODI) and Foundation for Development Corporation (FDC) (2003) consider the lifecycle of a stakeholder approach to cover three stages: partnership exploration, partnership building and partnership maintenance. This is similar to that of Stoteler *et al*. (2012), who consider the partnership exploration/initiation and partnership building as constituting the first phase of a partnership lifecycle known as the formation phase. The second phase is the execution phase, which is also represented as the maintenance stage. These are discussed briefly below.

Partnership formation phase

This phase is informed by the descriptive function of the stakeholder theory. ODI and FDC (2003) and Stoteler *et al.* (2012) posit that it is the organisation-centric stage and exploratory, during which individual organisations identify and assess their needs based on their specific operations and interests, and how the achievement of the interests could be enhanced in the context of a complex whole. The associated objectives and vision are thenoutlined prior to negotiation with other potential stakeholder for consensus building. These constitute the initial steps for attracting other stakeholders because it paves the way for establishing a partnership for stronger negotiating and bargaining powers (ODI & FDC, 2003).

After the partnership exploration stage has been completed, further consultations are made to establish channels of communication with potential stakeholders; emerge with requirements modeling; and identify the contributory potentials of interested stakeholders (Goodpaster, 1989). The Compassion Capital

Fund National Resource Centre (2010) asserts that the consultative process should identify potential barriers to the success of the partnership and the extent of interdependency among the stakeholders for the successful achievement of goals in the face of such barriers. The stakeholders could then reach an agreement through the process of consultation and negotiation on the terms of the partnership.

These aspects of partnership formation reflect the transition from the stage of non-participation to tokenism in the Arnstein's Ladder, and climaxed by interactive participation as the major type (See Figure 1). Its relevance to participatory pro-poor water tariff determination and willingness to pay is therefore indispensable.

Partnership building phase

This is related to the instrumental tenet of the stakeholder theory. This is the point where the partners identify themselves and responsibilities are assigned for the various roles (ODI & FDC, 2003).Partnership building also involves commitment to meet business deadlines; and establishment of cooperation among partners such that each obtains the necessary assistance to meet their interests. It has to do with avoidance of dictatorial tendencies and building agreements over the details of collaborative arrangements that cater for individual differences by culture and interests in consensus.

The World Bank (2009) also affirms that building partnership for sustainable community water services relates to a transition from ad hoc exploration and consultation to the creation of a structured system. This is built on cooperation for varied and multi-faceted issues in a stakeholder relationship that continues to grow, while focusing on the coherence of approach for the achievement of project objectives through collective action.

Some specific stakeholder approaches used in partnership building by the Water and Sanitation for the Urban Poor (WSUP) reported by Keatman (2013) include first, the use of coordinated approaches by stakeholder groups. This entails providing direct support for communities and community-based organisations (CBOs); forging and monitoring the relationship between service providers and communities; supporting providers of local community water services; and influencing localauthorities to consider community engagement as their mandate. Second, in a more tangible sense it involves building on physical assets and responding to community needs through collective action of the stakeholders. The third approach by WSUP deals with equity in the stakeholder participatory process. Here the aim of the intervention is to promote equitable access to the water services through consultation with all stakeholders as to how this could be achieved, and gender equity is central to the consultative process for the promotion of access.

The approaches used in partnership building reflect a transition from interactive to functional participation, and from placation to partnership on the Arnstein's Ladder. These together with the adoption of project group method of participation are features of the level of citizen power on the ladder. This serves as a useful guide for assessing the effects of the synergies and complementarities of stakeholders in the promotion of willingness of community people to pay for water.

Partnership maintenance phase

This is the last stage of the multi-stakeholder model as described by Overseas Development institute and Foundation for Development Cooperation(2003) and is linked to the normative tenet of the stakeholder theory. Managerial support, avoidance of reputational damage, trust, commitment and goal symmetry are some of the essential ingredients of this stage (Stoteler *et al*., 2012). Managerial support implies that the decision to form a partnership starts from the top management level, and the expectations of all other stakeholders regarding the running of the partnership depend on the approval of top management. Reputational damage also means that unethical behaviour or unfavourable campaigning could damage the reputation of an organisation.

For this reason the risk analysis stage should identify the possibilities of this arising and making provisions for its prevention.Trust is also considered as the positive expectations from each partner by others, which could minimise the chances of risks occurring. Commitment and goal symmetry also refer to the complementary relationships that partners develop in relation to the agreements, and which contribute to the achievement of the partnership goal (Stoteler *et al*., 2012).

Partnership maintenance also involves the fulfillment of core objectives. It is about upholding complementarities and abiding by activity schedules. It is the stage where the stakeholders seek to attain balance and power sharing, such that some stakeholders do not dominate (Foundation for Development Cooperation & Citi Foundation, 2013).

While the stage of partnership maintenance is about thebalance of power among stakeholders, it does not guarantee the smooth running of the partnership. This means that where all stakeholders are assumed to be of equal power and competence, then failure of any of them to measure up to expectation can lead to instabilities in the entire partnership (Inkpen & Currall, 2004). In view of this, partnership maintenance is also the stage where an implemented partnership may need to convene to re-negotiate certain aspects of the partnership agreement to determine whether things went on well as originally intended. It represents the review of stakeholders' roles, which could lead to redefinition of roles and changes in the resources committed (Rowe & Nejad, 2009).

Partnership maintenance could provide a useful guide in determining whether community level stakeholders are able to attain the stage of citizen control on the Arnstein's Ladder. It could also influence the identification of the type and method of participation, and to determine whether they are functional participation and project team method respectively. This could lead to an understanding of what challenges or effectiveness of the complementarities of the stakeholder partnership emerges to influence water tariff payment.

Empirical applications of the stakeholder approach for improving water tariff payment: case studies

This section presents an overview of empirical literature on the practical application of the stakeholder approach for improving water tariffpayment. The European Communities and Water Utility Partnership Africa (WUP) (2003), describe how stakeholder partnerships projects are proposed and implemented for the capacity building of water utilities and other stakeholders in Africa. The focus was on services to low-income communities through urban water networks.

The lead stakeholder is the Water and Sanitation Program-Africa (WSP), and funded by the European Commission. Other stakeholders include local authorities and sector ministries, which could also provide the capital requirements directly for the installation of standpipes for the urban poor. The water companies also provide the water infrastructure as well as the general management and operation of water services. There are also NGOs responsible for advocacy and capacity building initiatives and small-scale providers as intermediate distributors for households not reached by the network. Consumers as the final link are represented by community organisations for participatory decision making and community ownership responsibilities. The intervention actually completes the levels of non-participation, tokenism and citizen power respectively.

In this approach however, Peri-urban and rural communities are considered to be excluded from the urban piped water networks, and the purpose of the intervention is how such areas could be reached through small-scale distributers in the most affordable way. The emphasis has also been on promotingdistribution of services rather than addressing the challenges of poor tariff payment.

In Chile, Sjödin (2006) describes the stakeholders in matters of water tariff to include the Chilean Government, the utility regulatory authority (Superintendencia de Servicios Sanitarios), private sector water companies and the general public (consumers). By 2000 most of the public water companies were privatised under concessionary contracts with the state still owning assets. The real stage of citizen power therefore, was attained by the private sector companies, not the ordinary citizens. The companies provided services and charged tariffs subject to the approval of Superintendencia de Servicios Sanitarios.

Efforts were made to educate the public through the mass media, about the reasons for water privatisation, as well as the assurance of improved service quality, increased coverage and affordability to poorer households through subsidies. These aspects constitute citizens' manipulation and therapy, as the rungs associated with non-participation in the Arnstein's Ladder. Sjödin (2006) further indicates that although the general public was not involved through organised groups for the tariff determination process, the improvement in water services made them satisfied with the public water system and and promoted willingness to pay. Thus, apartfrom the incomplete adoption of the Arnstein's Ladder, there were also no clear procedures for formation, building and maintenance of partnership with the ordinary citizens on matters of water tariff determination. The account also focused on typical urban water services and the place of the urban poor, rather than rural communities connected to urban water schemes.

In Indonesia, Woodward (2009) reports that the Kredit Usaha Rakyat is a national multi-stakeholder programme that aimed to eliminate the effects of poverty on access to water among low-income peri-urban communities. This was to be achieved through CBOs. The stakeholders included the Water and Sanitation Program of the World Bank in collaboration with the Australian Aid (AusAid).

Which provided funds for the Indonesia Infrastructure Initiative (including urban water infrastructure). Ministry of Public Works and Directorate of Public-Private Partnership Development of the National Development Planning Agency also offered technical assistance to the community-based organisations, and Bank Negara Indonesia provided small loans to the CBOs.

The purpose of the programme is to promote the activities of small-scale enterprises in the extension of affordable metered water services to households not covered by the network through micro-financing. Thus, the direct involvement of CBOs is a climax of the level of citizen power, and the corresponding method of participation is project group or team work. The formation of the partnership with identified roles for the purpose of ensuringsustainable services to the poor illustrate the phases of partnership formation, partnership building and partnership maintenance.

Thus, although the programme is poverty reduction inclined, the end result does not affect the incomes of households in order to influence their ability and willingness to pay. It is rather about financial empowerment of small-scale distributers to extend urban piped water services in urban and peri-urban context. Despite mentioning that water services were to be made affordable, there is no indication of how communities participate in the tariff determination process, apart from CBOs being beneficiaries of a micro-credit scheme.

In Bolivia, Marston (2014), identifying the socio-economic differences between urban and peri-urban settlers (especially income disparities), was faced with the dilemma of whether peri-urban community water strategies should be integrated into urban water management. The author discloses that since the

Water War of April 2000 that led to the expulsion of Aquas del Tunari (a private sector multi-national water company) under the privatization policy, the re-introduction of public-ownership and operation of urban water services has seen no improvement. The major set-back is the failure of the publicly owned urban water company (SAMAPA), to extend services to peri-urban communities in the city of Cochabamba.

Before and after the privatisation of water in Bolivia, the supply of water in the peri-urban community of Zona Sur, located in the southern part of Cochabamba, was under the control of water committees or community-owned and-operated water systems. The committees are instituted by any “group of neighbours who decided to pool resources to drill a well, install a pump, and build a network of pipes to connect the households” (Marston, 2014, p.77). This establishes a stakeholder relationship between the committees and the households as customers, without any public or external stakeholder interventions.

This participatory method was influenced by the experiences of migrants from areas experiencing unfavourable mining and subsistence farming conditions (Kohl & Farthing, 2006). Thus, it was a form of cultural diffusion as such migrants made use of their knowledge of mining unions, peasant unions and community structures to influence the formation of the water committees and the associated services. It is obvious from this participatory process, that a form of citizen control over community water services was attained. This is consistent with the criticism of Choguill (1996) against the hierarchical nature of the Arnstein’s Ladder (Arnstein, 1969), that citizen control could be reached without governmental and external stakeholder influences, especially in community self-initiated projects.

Solmit (2010) reveals that the community committees in peri-urban water services became more internationally, nationally and locally popular upon the advent of the Water War of Bolivia, because they were among the major protesters against the privatisation of water policy in Bolivia. The activism of thewater committees was stimulated by the Bolivian Potable Water and Sanitation Law No. 2029, which was passed in 1999 without any form of citizens' participation (Marston, 2014). The regulation meant that all local cooperative groups and neighbourhood committees in the small-scale water business were either to loss their water systems to, or be subordinated to the private companies through sub-contracts, which would undermine the independence of the former groups (Assies, 2003).

The severity of the protests led to the introduction of Law No. 2066 in April 2000, which legitimized peri-urban and rural water committees w to be independent of the private sector concessionary companies (Perreault, 2006, cited in Marston, 2014). This is a reflection of bottom-up transition, that is "from neighbourhood association to recognised water providers" (Marston, 2014, p.77). This represents a typical attainment of citizens' power. Although there is no direct focus on water tariff as the basis of stakeholder interactions in this Bolivian case study, it paves the way for an inquiry into the future of participatory community water tariff determination and the promotion of willingness to pay in communities under urban water systems.

In Ghana, the Water and Sanitation for the Urban Poor (WSUP) describes a stakeholder partnership project in Kotei, a peri-urban neighbourhood in Kumasi.WSUP-Ghana facilitates the implementation of a decentralised water system and a toilet block in this community (WSUP-Ghana, 2013). The water system comprises a mechanised borehole as the main source of water which is pumped for distribution to households through standpipes. WSUP considers this technology as being pro-poor because it is of low-cost, and the associated tariffs are low, compared those charged by the GWCL for urban water services. This is suitable for Kotei because as an urban village, poverty levels are high, which manifests itself in the forms of under-enrolment of school children, adult unemployment and the prevalence of small-scale informal traders (WSUP-Ghana, 2013).

The dominant stakeholders include WSUP-Ghana which provides expertise; United Sates Agency for International Development (USAID) and CARE International which provide funding supports. Internally, the Kumasi Metropolitan Assembly plays a role in policy, soliciting funding sources and attracting external stakeholders, as well as the implementation, monitoring and evaluation of water and sanitation projects. There is a Project Steering Committee which includes representatives of the dominant stakeholders and community representatives, as well as a separate Community Management Committee (CMC) (WSUP-Ghana, 2013). These are to ensure the management of the water and sanitation project and community ownership of the water infrastructure through community mobilisation respectively. Traditional Chiefs are to offer the necessary support, while households are to exhibit good water use behaviours such as rational use of water and tariff payment.

The Kotei case shows that although a piped water system is used for the peri-urban community, it is of low-cost and independent of the services of the GWCL. Furthermore, while it is stressed that the establishment of community level structures is to incorporate their voice into the participatory process, it is not clear at which level of the project formulation and implementation stage, how the communities were involved. For instance, how they are involved in the choice of technology, tariff determination and payment need to be ascertained in order to identify the strengths and weaknesses of the stakeholder participatory process.

Concept of Water Tariff

Water tariff is a price determined by regulation or country's public utility laws, and imposed by a public company for water supplied to its customers, the purpose of which is to recover the cost of services (Brook & Smith, 2001; OECD, 1987).

Reasons for water tariff imposition

The failures of the supply-driven or top-down approach to water services in developing countries, and global recognition of water as a scarce commodity which needs to be conserved by rationing, are central to the arguments for water tariff imposition (Gbedemah, 2010). Economic Commission for Africa [ECA] (2000) acknowledges that even though Africa has abundant surface and groundwater resources, climatic factors such as climate change, and human factors resulting from pollution, pose a threat to the sustained availability of the water. These call for the need for more effective management of water to meet the various competing demands, and the commoditisation of water is one of the strategies.

Furthermore, the Africa Water Vision for 2025, the Dublin Conference of 1992, and Ghana's National Water Policy, recognise the adoption of cost-recovery methods that are equitable and sustainable, whilereflecting the concerns of the poor (Economic Commission of Africa [ECA], 2000; MWRWH, 2007). Apart from these, a number of scholars and organisations support the notion of water tariff imposition. For instance Winpenny (1994), Page (2005) and Water and Sanitation Program- South Asia, assert that:

- water tariff is important because water is a scarce resource and so should have an economic value;
- water tariff ensures efficient production, equity in distribution, conservation and sustainability;
- water tariff increases coverage to low income areas through extra water charges to urban domestic and industrial users;
- water tariff helps water utilities and service providers understand and adopt mechanisms that promote sustainable revenue strategies;
- the processes of water tariff imposition enable service providers to focus on specific performance improvement areas by advancing technical, commercial, and operational efficiency (e.g. leak reduction, billing and collection, customer service);

- efforts in water tariff imposition could also ensure that successful achievements remain sustainable and viable in the long term through arrangements such as performance agreements, monitoring andevaluation.

On the other hand, the fact that drinking water is a basic need of life without any substitute, compels authors such as McDonald and Ruiters (2005) to advocate for its treatment as a human right. They argue that applying the market principles would price the poor out of access to drinking water. A balance between the two extremes is the need for the appropriate determination of the tariff that ensures fairness to various categories of water users.

Water tariff structures and their empirical applications to pro-poor situations

Because of differences among water consumers, development thinkers use design various tariff structures to ensure cost recovery, sustainable services and increased affordability to the poor (Fankhauser & Tepic, 2005).According to Whittington (2002), there are three broad categories of metered water tariff structures: volumetric tariff, differentiated volumetric tariff and flat rate. In volumetric tariff, a meter reading determines the tariff to be paid; differentiated volumetric tariff provides for customer stratification on the basis of income with special considerations for the poor, while the flat rate is a specific charge without a meter. Below are the subcategories of volumetric water tariff structures.

Linear tariff

This is the type of tariff charged based on the proportion of water consumption. It is irresponsive to income and so regressive to the poor (OECD, 1987). As a result, poor households might cut down their consumption of the safe drinking water to levels below what is considered for decent living or not connect to the water network at all (Foster & Yepes, 2005). The linear tariff is therefore not pro-poor, and an economy in which the welfare of all citizens is a political concern, alternatives are sought to address the needs of vulnerable groups, such as the use of increasing block tariff.

Increasing block tariff (IBT)

This involves an initial lower block of consumption being free of charge (the lifeline rate), to cater for the poor consumers, after which subsequent blocks attract tariff in volumetric water systems (Whittington, 1992). Although IBT is pro-poor, with public standpipes there are tendencies for increased demand to push up consumption farabove the lifeline rate to defeat the objective of IBT (Nkrumah, 2004). It is therefore important to educate the poor on how to help themselves by avoiding the waste of water.

Empirically, Whittington (2006) explains that IBT is common in historically water-scarce regions such as Spain and the Middle East. It is also extensively used in developing countries to cater for the needs of low-income public water consumers. The lifeline block of lower tariff could be set by the utility or determined by the national or local government or the national regulatory agency. Cardone and Fonseca (2004) are of the view that in services for low income areas, the determination of the lifeline block and the tariff setting process should be done through consultation with the local people. This facilitates the identification and integration of the real needs of the poor with cost recovery initiatives.

Despite these relevant applications and recommendations in the above literature, there still remains an information gap concerning findings on where increasing block tariffs have been applied and still, sustainable water tariff payment in rural low-income areas is a challenge to utilities. In Ghana, it is emphasised that the determination of the lifeline block and the associated tariff shall be such that it is affordable. In other words it covers at least, the basic operational cost, but not the costs of capital and depreciation. Although the Public Utilities Regulatory Commission recognises the weakness of the IBT in low-income areas as expressed earlier, it is specified categorically in its tariff policyoptions, that the method is reserved for domestic consumers in low-income areas (PURC, 2005). Unfortunately, even the scope of what is defined as low-income areas by the Commission, does not include rural areas. Instead it refers to urban slum dwellers among others.

Decreasing block tariff (DBT)

Under this, there is a higher tariff per unit of water at an initial lower block, after which the tariff decreases as consumption increases (Whittington, 2002). Decreasing Block Tariff therefore penalises low consumers, usually the poor, who are thought of to generally use lower amounts of water, and rewards larger commercial users. It also encourages waste of water in an attempt to enter the higher blocks of lower tariffs, which could negatively impact on the scarcenatural water resources. It is therefore not recommended for low-income communities. However, where full cost recovery is a priority in public water services, well designed decreasing block tariff structures are among the best options. It is however, still practiced insignificantly in some high-income economies such as the United States and Canada, but has not been found to be relevant to the public water sector of Ghana and other developing countries.

Whittington (2002) notes that there is a downward trend in the application of decreasing block tariff structures because of their generally regressive nature and the increasing need to make potable water affordable to the poor. It is obvious that each of the volumetric tariff structures has its own limitations, to the extent that there are perceptions in development circles, that the aspects of volumetric tariffs meant for the poor are not meeting expectations (Fankhauser & Tepic, 2005). Alternatives such as differentiated volumetric tariffs are also being considered.

Differentiated volumetric tariff (DVT)

This involves some differentiations in the volumetric tariff structures by adjustments in water tariffs according to customer stratifications on income basis. Thus, in the increasing block tariff, the lower block could be increased for standpipes in low-income communities with larger number of households per standpipe, by increasing the subsidy for that block (OECD, 1987). This means that the water utility company needs to have adequate data on customers based on segmentations by income levels and spatial locations to be able to practice price discrimination through tariff differentiation (Blanc, 2007).

For service areas with substantial distribution of high, middle and low income households, Fankhauser and Tepic (2005) recommend that a threshold should be defined for those eligible for subsidy. The subsidies could be direct, by a state paying an amount of money directly to the water company to defray part of the cost of services to the target beneficiaries. It could also be a cross-subsidy, implying that the utility charges extra amounts of tariff on urban and commercial users in order to support services to the poor (WaterAid, 2009).

The determination of the threshold could be by a stratification of target communities by household income through household surveys (low, middle and high income households), or by geographical segmentation on the basis of rural, peri-urban and urban. In developing country applications, McPhail (1993) also explains how the public water sector of Morocco for example, applied the 5 percent rule, after a survey that made customer segmentations such as the descriptions above possible. The five percent rule according to the author is based on the premise that once the cost of a service falls below five percent of the customer's income, it is considered affordable enough to stimulate demand the flexibilities of differentiated tariffs make it possible for utilities in developing countries to introduce two tariff structures at a time, such as increasing and decreasing block tariffs. Customers are then allowed to choose according to their consumption needs and abilities to pay (Joskow, 2005; World Blank, 2007).

In Ghana, the PURC approves the application of the increasing block tariff for low-income areas, as well as the application of cross-subsidies as means of the differentiation of tariff among customer categories (PURC, 2005). Rural and small town water services also depend on the appropriate technology approach, making tariffs affordable. It is the deviation from these obvious service and consumer differentiation that generates further inquiry into the tariff situation.

Flat rate

The flat rate is also non-volumetric, and based on a single charge for a service delivered irrespective of the level of water used by the customer (GWCL, 2012; Whittington, 2002). For instance in the City of North Bay in Canada, about 14,000 residential water users pay flat rates, but the bill is actually composed of two elements: a fixed charge covering a basic charge, provision for water filtration plants, sanitation for each apartment and a variable component based on the water outlets.

The fixed charge is irrespective of the number of outlets, except the sanitation aspect which is a percentage of the total variable charge. On the other hand, there are individual flat rates for various types of water consuming facilities in a dwelling. Thus, the variable component means that a dwelling with more of these facilities pays more of the associated flat rates to determine the total flat rate paid. The billing system is said to be flat because the charges are not based on the quantity of water consumed.

Empirically, Carey and Sunding (2001) and the World Bank (2007) report that in some countries such as the United States, piped water utilities serving poor households, areas on major lakes and rain scarce regions use lifeline models and favourable flat tariff structures. The arguments are that for those on major lakes, emphasis on cost recovery through higher tariffs cause sharp declines in demand for the water and a subsequent fall in the revenue of the utility, due to abundance of unimproved alternatives.

Zibechi (2008) also reports that in 2000, a water sector multi-national corporation known as Aquas del Tunari, tried to impose water tariff on the peri-urban poor households of Cochabamba in Bolivia by the use of marginal cost pricing for the first time. This led to violent reactions commonly called the 'Water War'. Apparently, the application failed to succeed in Cochabamba. In 2001, the French water sector multinational known as SAUR, was forced to abandon its public potable water contract with the Government of Mozambique. This was because the government failed to approve the company's proposal to adopt cost recovery for water tariff. This was a political decision to protect the poor (World Bank & Public-private Infrastructure Advisory Facility, 2009).

Water and Sanitation Program- South Asia [WSP-SA] (2008), posits that the determination and imposition of water tariffs are not enough for achieving the objectives of tariff. The decision making process on tariff should also include strategies for effective collection. WSP-SA (2008) accordingly recommends that such strategies should include "robust record keeping and billing procedures; updating customer databases; outsourcing billing activities and using improved technology; and encouraging and incentivizing staff to undertake billing and collection functions more diligently" (P. 3). However, the complexity of lowincome status of households in rural and peri-urban communities makes it difficult to predict whether a focus on the tariff determination and effective collection processes would be adequate to promote willingness to pay. In view of this uncertainty, the literature has other alternatives as examined below.

Other strategies that promote affordable water tariffs

Under this section, the influences of subsidies and differentiated water services on improving water tariff payment in rural and peri-urban communities are reviewed.

Subsidisation

A subsidy is a form of financial support intended to reduce the cost burden on some particular consumers of a service or commodity of a given economic sector, institution or supplier. The general aim is to promote economic and social policy of a government (Myers & Kent, 2001). According to WaterAid (2009), the two main types of subsides are cross-subsidies and direct subsidies.

Cross-subsidy

This is usually from customer to customer. It takes the form of extra charges added to the tariff paid by affluent or urban consumers, industry and commercial enterprises in order to support services to the poor or rural consumers (Pareto optimal) (WaterAid, 2009). The applications of cross-subsidies have often been in consonance with existing international, multi-lateral or bilateral programmes, such as the UNDP-World Bank Water and Sanitation Programme that aims to gauge consumer demand, while assuring sustainability of water services to low-income populations in developing countries (Yepes, 1999). Forinstance in Guayaquil in Ecuador, domestic water users pay 60% of the water consumed to the utility, while the remaining 40% comes from cross-subsides, especially from industries using water as a major raw material, which pay up to 150% of their consumption levels as tariff (Yepes, 1999).

Blanc (2007), reports that in Colombia, 20 percent of the water sector turnover is used as cross-subsidies for the water needs of the urban poor in order to promote sustainable access. In the case of Ghana, the water tariff policy statement number ‘5’ of the Public Utilities Regulatory Commission specifies that non-domestic consumers would be charged at higher tariff rates in order to cross-subsidise domestic customers (PURC, 2005).

The effectiveness of cross-subsidies in meeting the needs of the poor has been critiqued on several grounds. Yepes (1999) and Blanc (2007) argue that in developing countries, the fact remains that piped water utility services involving tariffs and cross-subsidies are usually provided in the urban areas, because rural households can either not afford or not covered. Thus the lack of adequate information on the very poor in society who really need subsidies, often leads to situations where the subsidies miss the poor.

It is also further argued that even where the poor are connected there is often no guarantee that cross-subsidies in the tariff differentiation process actuallymeet their needs. This suggests that if there are any reasons why rural water resources are exploited for urban areas, but the rural areas do not qualify for such services, there should provisions for the proportion of the cross-subsidy that goes to such rural communities.

Direct subsidy

This involves the government paying part of the water tariffs charged to a target group of water consumers, such as rural areas or low-income people, to the utility (WaterAid, 2009). Direct subsidies played a very important role in the promotion of access and affordability of water to both domestic and industrial users prior to the emergence of the privatisation of water. Even from 1977 until recently, the Irish Government subsidised potable water services by 100 percent through the tax system (Workers Solidarity Movement, 2006). This implied that there was free access to potable water to all persons irrespective of income or other socio-economic status. In Ghana as well, from 1928 until the onset of privatisation and utility regulation in the late 1990s, water services were totallysubsidized by the government through foreign aid (GWCL, 2012).

Privatisation of water involves the direct role of the private sector in the provision of public water services or jointly with the government. In developing countries, it was a neoliberal condition imposed on the national governments by the International Monetary Fund and the World Bank, as the countries tried to find solutions to their internal water crises through financial aid from these institutions. Neo-liberalism advocates for greater privatisation of public corporations, reduced state interventionism and the removal of government direct subsidies in other to cut down government spending among other conditions (Taylor & Gans-Morse, 2009).

The acceptance of the neoliberal conditions led to the removal of direct subsidisidies on water. Even in Ghana, it is not recognised as part of the policy options on promoting sustainable access and affordability of water services, despite its relevance in cost reduction to utilities and affordable tariffs to customers (PURC, 2005). Discussions on the concept of subsidy therefore focused on cross-subsidies in this study.

Measuring coverage and targeting of water subsidies for the poor

According to Blanc (2007), coverage of subsidies refers to the actual proportion that is covered of the intended recipients of a subsidy. On the other hand targeting refers to the determination of the intended beneficiaries. Generally, low coverage and inappropriate targeting of subsidies in public water networks negatively impact on the goal of the use of subsidies to redistribute water among consumers of different backgrounds through the adjustments in the tariff structures, especially in meeting the needs of the poor (Komives, Foster, Halpern, Wodon & Abdullah, 2005).

One instrument for measuring effective coverage and targeting of subsidy distribution is by the use of a tabular matrix. In this, households are grouped into 'poor' and 'non-poor' with the belief that the grouping is without error, once the data is obtained by surveys. It is further assumed that the subsidy is meant for the poor, so that the policy maker is concerned with the outreach of the subsidy, which is classified into 'reached' and 'not reached'. Thus, by crossing the outreach with the type of households, it is possible to identify the extent of coverage, and whether the subsidy application is well targeted (Coady, Grosh & Hoddinott, 2004, as in le Blanc, 2007). This is shown in Table 1.

Table 1: Effectiveness of Coverage and Targeting of Subsidies

Outreach progress	Poor Households	Non-poor households
Reached	Ideal case	Leakage issues
Not reached	Coverage issues	//

Source: Blanc (2007, p.15)

By matching the outreach progress in the first column against the types of households in the second and third columns, it is observed that there is an ideal case where some poor households are reached. It is also observed along the same row, that there are also cases of leakages, because some non-poor households are also reached by the coverage of the subsidy. In the last row, some poor households are not reached. This means that there is a coverage deficit. Meanwhile, all the non-poor households are reached by the coverage of the subsidy.According to Blanc (2007), such coverage anomalies results from the difficulty of measuring poverty due to lack of data, such that two types of errors occur as follows:

Type 1 error: where some households which are poor aremistakenly counted among the non-poor, they would be left out of the target group and hence not covered. This is also known as an error of exclusion.

Type 2 error: in a case where non-poor households are mistakenlycounted among the poor and so covered by the subsidy, there is an error of inclusion or type 2 error.

The policy implication of such errors is that the differentiation of tariffs based on customer stratification through subsidisation would not satisfy the desired objective. For instance, increasing block tariff would be wrongly applied to non-poor households, and the subsidy intended for the poor rather used to subsidise the lifeline block for the non-poor. The relatively expensive tariffs for the poor households not reached by coverage of subsidy would therefore affects willingness and ability to pay, resulting to tariff arrears that could impact on the sustainability of the services to them.

In view of the above situation, Blanc (2007) and Komives *et al.* (2005) are of the view that policy makers could adopt some measures to identify the customer categories through surveys and emerge with the following stratifications for some specified stakeholder interventions:

Group 1: Households which can pay connection fees and pay monthly water bills do not need subsidies and so no differentiated tariffs.

Group 2: Households which can pay connection fees but cannot afford monthly water tariffs require the supply of water at relatively lower tariff levels.

Group 3: Households which cannot pay connection fees but can afford monthly water tariffs need water connection subsidies or there should be some financial facilities to enable them pay for the connection fees.

Group 4: Households which cannot pay for both connection and monthly water tariffs need lower connection fees and highly subsidised volumetric water tariffs for those who want individual connections, and differentiated services such as free community stand pipes for all other households (Blanc, 2007).

Earlier parts of the reviewed literature on tariffs and subsidies have given the empirical applications of the various kinds. The latter part appears to present a practical policy guide for dealing with pro-poor water tariff and subsidisation issues. Typically, the situation of Group 4 is where one could place rural low-income communities connected to an urban piped water network. There are however, limitations regarding the implementation of some aspects of this policy guide. For instance in neoliberal urban water schemes, as the case is for developing countries such as Ghana, free water services are not within the policy framework.

Even rural communities served with low-cost water supply technology are subject to cost recovery conditions of tariff. But the concept of differentiated services, other than tariffs or subsidies, is broader in this context to permit exploration of other means of addressing the challenges not directly related to tariffs and subsidies.

Differentiated water services through appropriate technology

Water service differentiation is another strategy for improving water tariff payment. Product or service differentiation as conceptualised by Edward Chamberlin in 1933, refers to the process whereby the service provider varies the services or product according to different consumers in order to make it more attractive to a target group (Kotler, 2006). The main features include the ease of service connection and/or installation, the ease of service delivery by the provider to the customer, the ability of customers to operate the service after training without difficulty, customer participation in service design through consultation, and the ability of the customers to repair and maintain the service (Deverill *et al.*, 2001).

Water service differentiation also aims at promoting the benefits of water projects to communities, improve public sector performance, and meet the profit expectations of the business partners (Building Partnerships for Development, 2004). Examples of appropriate water supply technologies for rural and peri-urban communities include point water sources such as boreholes; dug wells fitted with, or without hand pumps; rainwater harvesting systems; and underground piped water systems, which promote willingness to pay by the poor (Gyau-Boakye & Dapaah-Siakwan, 2000; WaterAid-Ghana, 2009).

Conceptual Framework

The conceptual framework describes the researcher's position regarding how the interrelated construct of ideas, concepts and variables derived from the reviewed theories and empirical evidences are operational, in order to address the identified research niche (Kumar, 1999). It is basically informed by the consumer theory, the stakeholder theory, the marginal cost theory of tariff and the associated concepts of consumer willingness to pay, participatory tariff determination and tariff differentiation.

Generally the construction of the conceptual framework in Figure 2 is based on the stakeholder analysis framework. Reed, Dandy, Posthumus, Hubacek, Morris, Prell, Quinn and Stringer (2009), define the stakeholder analysis as "a process that: i) defines aspects of a social and natural phenomenon affected by a decision or action; ii) identifies individuals, groups and organisations who are affected by or can affect those parts of the phenomenon; and iii) prioritises these individuals and groups for involvement in the decision-making process" (p. 1933). Thus, the framework in Figure 2 identifies the social phenomenon as the need to improve willingness and ability to pay water tariffs in rural and peri-urban communities as the dependent variable.

The dependent variable appears at the extreme right side of Figure 2 is the outcome of the intervention. The need to improve willingness and ability to pay for water sets in a planning process for a stakeholder partnership. The process begins at the extreme left side of Figure 2, dubbed the planning phase. The initial stage of this process is informed by the descriptive tenet of the stakeholder theory, which relates specifically to issues of partnership formation. It is the stage where the various stakeholders identify a problem and the need for intervention depending on how their interests are affected or can affect a desired change (Freeman & Reed, 1983; Goodpaster, 1989).

In matters of water tariff, an identification of unwillingness or inability to pay for water by rural and peri-urban communities could prevent GWCL from being able to achieve its cost recovery objective. This has negative implications on the sustainability and quality of services. For instance some households could be disconnected, and the regularity of services and water quality could fail to meet the expected standards (Nkrumah, 2004). The need to curb such problems could compel the service provider (GWCL) to initiate a stakeholder partnership for intervention.

As a public urban water sector issue, WaterAid Ghana (2005) and GWCL (2012b) identify the Public Utilities Regulatory Commission (PURC), as an autonomous body in charge of urban utility tariff and service quality regulation. However, we have a situation where rural and peri-urban low income households benefit from urban water services. How the tariff regulatory powers of the PURC cover the needs of the rural and peri-urban areas is a niche that generates researchinterest.

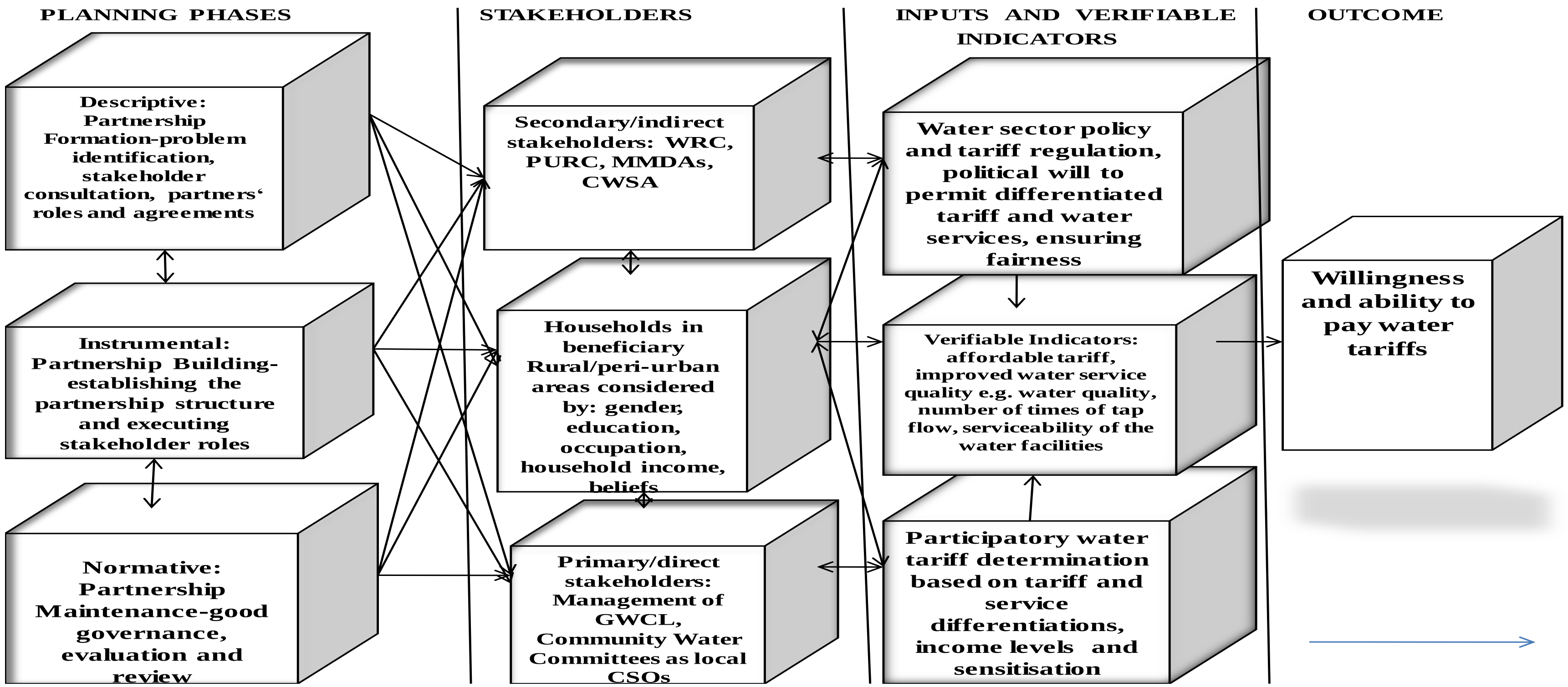

Figure 2: Stakeholder framework for improving willingness and ability to pay
Source: This study, Bukari (2015).

The Water Resources Commission (WRC) under the Ministry of Water Resources, Works and Housing (MWRWH) is also in charge of granting water abstraction rights to water companies, as well as the conservation of the quality of water resources for sustainable use. In cases where surface water resources are located in rural and peri-urban communities, but abstracted to serve urban areas, the conflicts of interest between the water resource owning communities and GWCL needs to be identified. For instance questions of whether GWCL would serve the communities, and whether the tariff conditions would be the same as the urban consumers or not need to be answered. These then pave the way to understand how the WRC addresses such conflicts of interest.

The Metropolitan, Municipal and District Assemblies (MMDAs) and the Community Water and Sanitation Agency (CWSA) under the Ministry of Local Government and Rural Development (MLGRD), are responsible for tariff regulation and management of rural and small town water service conditions respectively. In view of the fact that rural and peri-urban communities connected to piped water systems of GWCL were supposed to be under the jurisdictions of these local government bodies, there arises the need to investigate the modalities between the local government and GWCL. In particular, issues regarding fair treatment of the communities in terms of water tariff imposition need to be addressed.

Additionally, at the rural and peri-urban community level, households are represented by Community Water Committees, which defend their interests (Bacho, 2001). These committees therefore represent the local Civil SocietyOrganisations, which play advocacy roles concerning favourable tariff and service conditions, in their relationships with GWCL. Given that the statutory role of GWCL is to serve urban settlements, an inquiry into the extent of participation by the Committees to influence tariff conditions was considered necessary.

Once the stakeholders are identified, a consultative process starts for the actual establishment of the partnership through the definition of project goal and objectives; specific roles of the stakeholders based on their interests and other terms of partnership agreement. These may centre on the communities involved, how the tariffs are determined; the types and methods of participation in the tariff determination process, and the complementarities of the stakeholders towards improving tariff payment by the target communities (NAFIN, 2013).

The assignment of roles to the stakeholders for implementation leads to their classification into types. To the right of the box on 'Descriptive: Partnership Formation" in Figure 2 is the box on 'Stakeholders' who have secondary/indirect interest in the problem of unwillingness and inability to pay water tariff. For instance the PURC,WRC, CWSA and the MMDAs, can influence water tariff regulation, service quality, and pro-poor water sector development projects, through the MWRWH and MLGRD, which command the political will to change policy (See WaterAid-Ghana, 2005). These constitute the inputs.

The actual process of executing the roles and achieving the objectives and goal of the stakeholder partnership formulated at the descriptive/partnership formation phase is by the partners' activities at the instrumental/partnership building phase. In other words the double arrow between the two phases in Figure 2, show that while the purpose of the stakeholder partnership is designed at the descriptive phase, it is at the instrumental phase that they are executed. At this stage, the partnership is established. This is then used to make the multi-faceted issues on improving water tariff payment raised through consultative processes at the partnership formation stage operational (World Bank, 2009). This also explains the link between the instrumental phase and secondary/indirect stakeholders.

The inclusion of Community Water Committees as Civil Society Organisations (CSOs) among the primary/direct stakeholders qualifies the links between the normative/partnership maintenance and the instrumental/partnership building phases. In other words, the normative tenet of the stakeholder theory together with the partnership building stage in the stakeholder partnership, aid explanation of how the local CSOs could also impede the effectiveness of the expected inputs and what could be done to forestall these from occurring (Franch, Martini & Buffer, 2010). Put differently, there is the need to identify potential barriers to the achievement of the partnership objectives and how these could be ameliorated as a component of partnership maintenance.

Stoteler *et al*. (2012) posit that the move towards the maintenance of partnership entails offering support to management and ensuring commitment to the respective roles of all stakeholders. Here, the role of Community Water Committees and any identified external CSOs to serve as watch dogs, especiallyin ensuring equity and fairness in the participatory process is important. This promotes equity in access to drinking water and affordability of tariffs to low-income households in rural and peri-urban communities through advocacy (WaterAid Ghana, 2005).

The climax of partnership maintenance or the normative stage of the stakeholder interventions to improve water tariff payment in rural and peri-urban communities is attainable at the level where there is a mechanism for the evaluation and review of stakeholders' roles. This should cover the stages of the planning cycle of the intervention, which could lead to redefinition of roles (Rowe & Nejad, 2009). This might entail a shift from households and Community Water Committees participating by being manipulated through the media or community forums, to functional participants by having delegated power to determine their own water tariffs using the project team method (Arnstein, 1969; Bahli & Bujukkurt, 2005).

Partnership maintenance therefore promotes good governance in a stakeholder partnership that seeks to promote community participation in order to improve water tariff payment. This is because it is the stage where authentic participation, accountability and transparency of all stakeholders can be ensured for the achievement of multiple interests through the complementary strengths of the multi-sectoral stakeholders (Stoteler *et al*., 2012).

Figure 2 also shows the collective influence of the descriptive, instrumental and normative phases of the framework on the primary/direct stakeholders and the rural and peri-urban beneficiaries of the intervention, as indicated by the arrows. In the stakeholder column of Figure 2, the direct/primary stakeholders are found to include the GWCL which is directly responsible for the daily management and operation of urban water services, including tariff imposition and collection. There are also customers of rural and peri-urban communities represented by Community Water Committees. These are primary stakeholders because although they are not directly involved in the daily operations of water supply, they are affected directly by the nature of water services and the associated tariffs. They also provide a structure by which the communities can interact with other stakeholders in matters of their interest (Gill, 2006).

Figure 2, shows that the collective roles of the direct/primary and indirect/secondary stakeholders in the have dual relationships with households in beneficiary rural and peri-urban communities. These are represented by the middle box between the categories of stakeholders and connected to the latter by the double arrows in Figure 2.

The explanation is that service providers and regulators could provide services and impose tariffs based on their cost recovery objectives. These would be experienced directly by households with varying characteristics. For instance in terms of gender, women are most likely to fill the effects of tariff increases on water use because they are more involved in water acquisition (Kendie, 1992). In terms of education, educated households are in a better position to have formal sector jobs and earn regular income for water tariff payment. They can also easilyunderstand why tariffs are imposed and should be paid for treated urban water services compared to illiterates (Littlefair, 1998).

In relation to occupation, Bastos and Perobelli (2012) observe that rural and peri-urban communities engage in primary economic activities such as farming and collection, compared to their urban counterparts, who engage in secondary and tertiary activities. These in addition to differences in formal educational attainment place households in rural and peri-urban communities at a disadvantage. This is because these conditions lead to low income earnings in such communities which adversely affect their ability and willingness to pay water tariffs regularly (UNESCO, 2013). Akpabio (2011) also claims that traditional beliefs such as water being a free gift of God are dominant in rural communities because of the high level of illiteracy, and negatively affect their willingness to pay water tariffs imposed by water companies.

With the initial interactions between the service providers and customers over issues of poor tariff payment, and the expressed desire to form a stakeholder partnership to address the problem following the stakeholder framework, some change could be possible. It is assumed in Figure 2 that the collective actions of the secondary/indirect and primary/direct stakeholders could lead to a change. This would be where the water tariff and service conditions are adjusted to suite the socio-economic characteristics of households in rural and peri-urban communities as indicated in the box between the two categories and explained as above.

Among the primary/direct stakeholder group, the box at the immediate right side of that representing the group shows that participatory tariff determination and differentiated services could be attainable to address the problem (Blanc, 2007). This could be enhanced by the indirect/secondary stakeholders undertaking the necessary regulations and policy prescriptions in the areas of water tariff and service differentiation, and the political will to support their implementation. These are also indicated in the box at the right side of the latter group of stakeholders. The effects of the roles of the different groups of stakeholders represent the inputs as shown in the third column of Figure 2. Put differently, they constitute the intervening variables, while the attributes of households in the beneficiary communities constitute the independent variables (See Creswell, 2009).

The immediate indicators that could be used to measure the variables are shown in the box between the inputs for the two groups of stakeholders. In other words, if the participatory process is effective, there would be changes in water tariffs paid by rural and peri-urban households; improvement in water quality, number of times of tap flow and serviceability of the water facilities (McPhail, 1993; Deverill *et al.*, 2001). These satisfy the conditions for consumer willingness and ability to pay for water as the dependent variable (Munasinghe, 1992; Stengel, 2011). This appears at the extreme right side of the framework in Figure 2, as the outcome of the entire stakeholder analysis framework.

Chapter Summary

In summary, Chapter Three reviewed the concepts and models related to consumers of water services, participation and water tariff. It also examined empirical literature related to the thematic issues of the study. The interconnection of these aspects through the conceptual framework construcvted, provided a map through which this study contributed to filling the conceptual, theoretical and empirical gaps regarding how to improve water tariff payment in low-income communities connected to urban piped water systems.

CHAPTER FOUR

STAKEHOLDERS AND GHANA'S WATER SECTOR DEVELOPMENT

Introduction

According to the Water and Sanitation Programme (WSP) (2011), the prioritised issues on stakeholders in Ghana's water sector include the identification of the stakeholders, their roles and weaknesses. Accordingly, this chapter presents a picture of the place of stakeholders in Ghana's public water sector. It begins with the historical development of public water services and the associated regulations and policy, after which the stakeholders in these aspects are identified with their specific roles. The chapter is climaxed with a section on the contextual relevance of stakeholder framework in Ghana's Water Sector regarding paradox and nexus of the urban-rural water service and tariff conditions.

Historical Development of Public Water Services, Regulation and Policy

Public water services in Ghana began with a focus on urban settlements in 1928. However, from 1948 to the period before 1999, despite various institutional and policy reforms including the establishment of the Department of Rural Water Development in 1948; decentralisation of sanitation and water services for small towns to the District Assemblies in 1993; and the institutionalisation of the Community Water and Sanitation Agency (CWSA) for rural and small town water and sanitation services in 1998, there were still overlapping institutional roles in public water services for urban and rural areas until 1999 (GWCL, 2012a). In other words, it was in 1999 that the Ghana Water and Sewerage Corporation, which served both rural and urban areas since 1965, was converted to a public limited liability company under the new name Ghana Water Company

Limited (GWCL). This was charged with the responsibility of providing urban water services under the Conversion of Statutory Corporations to Companies Act, Act 461 of 1993 (WaterAid Ghana, 2005).

The influence of the Economic Recovery Programme led to the withdrawal of government direct subsidies (subventions) on public water services in 1986. This together with emphasis on water tariff payment under the GWCL, facilitated by the establishment of the Public Utilities Regulatory Commission (PURC) under Act 538 of 1997 spelt a full brim cost recovery drive in urban water services in Ghana (Grusky, 2010). Appendix J presents details of the historical development of public water services in Ghana.

Edwards and Cameron (2011) assert that in view of the low-income status of rural communities, low-cost technologies are usually adopted for water supply in such areas. Thus, although rural water services could also entail water tariff imposition, the associated low-cost technology involved, make the tariffs moreaffordable compared to urban piped water systems making use of treated surface water. This generates interest in the situation of rural and peri-urban areas still connected to urban water services.

Stakeholders in Ghana's Water Policy Formulation and Regulation

Recognising that despite the abundance of natural water resources there is still inadequate production and use of potable water, Ghana has undertaken some institutional and policy reforms to optimise the performance of the water sector (Ministry of Water Resources, Works and Housing, 2007). The stakeholders in public water policy formulation and regulation, as well as an overview of the national water policy are discussed below.

Stakeholders in water policy

The stakeholders in public water regulation and policy formulation are presented in Figure 3. It relates to the government institutions tasked with the responsibility of promoting optimum and sustainable use of water through the planning and development of water resources (Ministry of Natural Resources-Belize, 2008; Smith, 2002). It shows the details of the stakeholders and the aspects of policy they engage in. It is revealed that the task of policy formulation rests with the political wing of the institutional framework, namely the Ministry of Works and Housing (now Ministry of Sanitation and Water Resources [MSWR]). According to Ricato (2010), apart from being controlled by the dominant political institution in the water sector, some stakeholders actually have a role in the water policy making process according to their interests. The author identifies the following as the categories in which such stakeholders fall:

- Ministries in charge of water and sanitation (e.g. MSWR) and other social programmes such as rural development with a focus on issues such as water subsidisation, e.g. Ministry of Local Government and Rural Development). These represent the state as the key stakeholders in the policy formulation process. This includes water policy, frameworks, and facility management plans (Gbedemah, 2010);
- The regulatory agencies, either as part of the dominant ministry in charge of water or as independent authorities. Examples are the PURC as an independent regulatory authority, Water Resources Commission, and Environmental Protection Agency under the Ministry of Environment, Science and Technology. Central to this sphere of stakeholders are issues

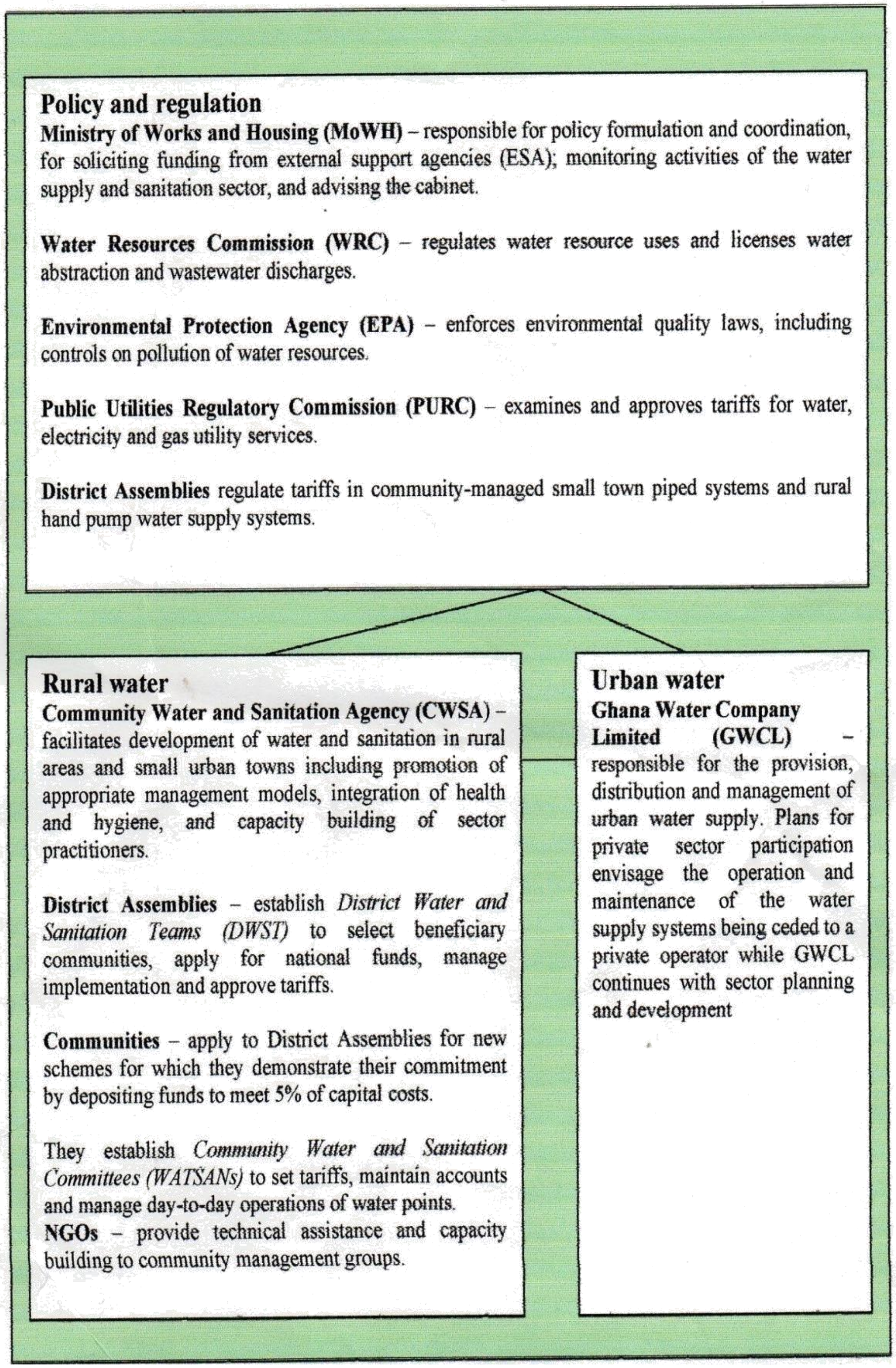

Figure 3: Framework of stakeholders in ghana's water sector
Source: WaterAid Ghana (2005: 5); Adams (2010: 22).

of stakeholders are issues of tariff regulation and setting standards for service quality, environmental bye-laws and local regulations, Acts of Parliament related to water, and other legislative instruments (WaterAid Ghana, 2005; GWCL, 2012);

- Intermediate levels of government, such as the Metropolitan, Municipal and District Assemblies. These may also be interested in policy interventions in matters of water subsidies and their implementation, or owning their local water utility agencies such as the CWSA (Anokye, 2013);
- Public or private water utility companies which are interested in matters of efficient services and cost recovery. The GWCL is an example in the public sector, while The Water Dome and Universal Aqua Ghana Ltd. are examples in the private sector;
- Alternative service providers (communities, private water vendors through water tanker services, NGOs, private borehole operators and consultants of water project development) with profit motives; and
- Consumers as part of local level stakeholders (households, agricultural, commercial and industrial), which can participate directly or through intermediaries, (e.g. Consumer Ptrotection Agency and Community Water Committees in Ghana).

The Water and Sanitation Monitoring Platform (2009) also acknowledges the influence of the mass media on national water policy. This is through publicity of the views and actions of the state and its agencies, as well as public expectations and feedback on the strategies and actions of the public and private service providers and other stakeholders. Research institutions and academics have also been found relevant in water policy making (Japan International Cooperation [JICA], 2000). This is by generating new knowledge that could be expressed as part of policy recommendations for problem solving (Crew & Young, 2002). In Ghana, the Council for Scientific and Industrial Research (CSIR), International Water Management Institute (IWMI), Water Research Institute (WRI) and the Universities are the major stakeholders in the field of research for water policy influencing (Gbedemah, 2010).

Furthermore, the ability of the MSWR to advice cabinet on reforms on existing policies and the formulation of new ones is also a potential for inducing political will by parliament for adoption and implementation of external stakeholder proposals and advocacies. For instance Civil Society Organisations such as WaterAid Ghana play advocacy roles by building, encouraging and propelling the voice of water consumers to influence political attention. Its main aim is to promote demand, equitable, inclusive and sustainable services through direct interventions, advocacy and networking at all levels of water and sanitation services (WaterAid Ghana, 2010).

Apart from the above which are found within the country, there are also external stakeholders who participate in the policy making process. For instance according to WaterAid Ghana (2005) the MWS, also solicits external supports in the forms of funds and expertise for water sector projects from external sources. The World Bank, African Development Bank, Nordic Development Fund, European Union and the Austrian Government have been useful in the funding of the water sector in Ghana (GWCL, 2012b & 2012c).

In addition, a number of donor countries offer technical support and expertise through their international development agencies and multinational corporations. Examples are the Canadian International Development Agency (CIDA), Department for International Development (DFID) of the United Kingdom, German Technical Cooperation (GTZ), Overseas Economic Cooperation Fund (OECF) of Japan and Vitens Evides Internationa (VEI) of The Netherlands (GWCL, 2012a & c). These contribute to policy making since their interests,expertise and resource commitments are incorporated into the national water policy.

Ghana's water sector regulation

Regulations in the water sector are distinguished from policies, because they refer to the norms of legality that serve to prevent or correct some imperfection by shaping the identified conducts leading to such imperfection. They could take the forms of command-and-control regulation; incentive regulation; and preference shaping regulation (Orbach, 2012). These involve prescriptions and bans; making some considerations as incentives; and changing preferences respectively. Gbedemah (2010) also posits that water sector regulation includes water related bye-laws, legislative instruments, Acts of Parliament and conventions.

In Ghana, the thematic issues of water sector regulation identified in Figure 3 relate to water resource use and pollution control through prescriptions and outright prohibitions/bans; tariff and special service conditions either through changing the preferences of service providers or making special considerations for some customer groups as incentives (WaterAid Ghana, 2005; Adank & Tuffour, 2013). These are the responsibilities of the Water Resources Commission (WRC), Environmental Protection Agency (EPA), PURC, and the District Assemblies respectively. Figure 3 provides adequate explanation of their roles. The roles of the WRC, PURC and District Assemblies are of paramount importance in water sector regulation and so are worth detailed examination.

Water Resources Commission

The WRC was established for the regulation and management of natural water resource utilisation under the Water Resources Commission Act No. 552 of 1996 (GWCL, 2012). This Act declares all water resources to be under the ownership and control of the President on behalf of the people of Ghana. The functions of the WRC as contained in section 2 (2) of the Act include the following:

- Propose integrated water resources management plans to guide the utilisation, conservation, development and improvement of water resources;
- Initiate, control and co-ordinate activities connected with the development and utilisation of water resources;
- Grant water abstraction rights;
- Collect, collate, store and disseminate data or information on water resources;
- Engage water sector agencies to undertake scientific investigations, experiments or research into water resources;
- Monitor and evaluate programmes for the operation and maintenance of water resources;
- Advise the Government on any matter likely to have adverse effect on the water resources;
- Advise pollution control agencies in Ghana on matters concerning the management and control of pollution of water resources; and

- Perform such other functions as are incidental to the foregoing (WRC, 2015).

In addition to the stakeholders mentioned in the section on water policy, the Commission partners with a host of others. These include the Hydrological Services Department, Volta River Authority, Irrigation Development Authority, Ghana Meteorological Agency, Forestry Commission, and Minerals Commission (WRC, 2015). The collective effects of sustainable use of water through conservation and pollution control, result in affordable water tariffs since water scarcity and high cost of treating polluted water are prevented, for the benefit of service providers, urban, peri-urban and rural consumers (CWSA, 2004).

Public Utilities Regulatory Commission

The PURC was established under the Act of Parliament No. 538, 1997 (WaterAid Ghana, 2005; GWCL, 2012). Central to its mission is to regulate tariffs and set quality standards for consumers and potential consumers of public utility services, particularly water, electricity and gas (PURC, 2005). The roles of the Commission in the regulatory process include:

- To take the lead role in the resolution of pro-poor issues in the urban water sector in line with its regulatory mandate to protect the interest of consumers, as well as Government poverty reduction objectives;
- To support any interventions which result in improved and more reliable access to water, with the ultimate goal of direct connections;
- To instruct urban water utilities to include pro-poor criteria when undertaking investments in water supply projects;
- To lead the formation of a working group of stakeholders to address the provision of services to the urban poor;

- To adopt innovative approaches to reaching the urban poor in the short term through secondary suppliers like tanker operators (PURC, 2005; Gbedemah, 2010, p. 128).

In the performance of these roles, the Commission seeks “to become a model institution which ensures the delivery of the highest quality services to all consumers at fair prices” (PURC, 2005, p. 3). This information shows that the PURC is more urban-focused and its pro-poor strategies target the urban poor. However, support for special considerations for the poor in water supply projects as one of its roles, could benefit rural and peri-urban areas connected to urban water systems. The District Assemblies handle issues of rural and small town water services as discussed below.

District Assemblies and decentralised water regulation

Figure 3, shows that the regulation of rural and small town water tariff is the responsibility of the District Assemblies in Ghana. This started with the Decentralisation of sanitation and small town water supply services to the District Assemblies under the Local Government Act No. 462 of 1993. This was to be in collaboration with the Ministry of Local Government and Rural Development (GWCL, 2012). Specifically, the roles of the Assemblies in rural and small town water systems include:

- the promotion of community participation in the choice of location, type and design of water facilities, as well as their management;
- preparation of budgets based on government transfers (5 percent as District Assemblies Common Fund), raising revenue from local sources and other external aids for the provision of social services, including

drinking water; and regulate tariffs for small town piped water systems and rural hand pump water systems (WaterAid Ghana, 2005, p. 4-5).

Appendix J shows further that the Community Water and Sanitation Agency was established in 1998 to support the District Assemblies in the Management of rural and small town water services.

Stakeholder Participation in Rural and Small Town Water Supply

According to Adank and Tuffour (2013), the stakeholders and their roles in the sphere of rural and small town water supply constitute a separate model known as the Community Ownership and Management model (COM). It is anchored on bottom-up, demand-driven and appropriate technology approaches (Gbedemah, 2010). As illustrated above in Appendix J, the Community Water and Sanitation Agency was established under the Act of Parliament (Act 564 of 1998). The agency acts as the intermediary institution between District Assemblies and communities on one hand, and external institutions on the other, for funding, technical construction of low-cost water infrastructure (e.g. boreholeswith pumps) and major repairs, as well as integrating sanitation and hygiene education into the process (Ofosu, 2010).

The District Assemblies, through their established DWSTs, select communities that apply for water and sanitation services. The Assemblies then apply for government funds and other funding options from donors as recommended by the Community Water and Sanitation Agency for project implementations. It also encourages the mobilisation of funds by client communities to meet five percent of capital investment cost of projects to be implemented (Adank & Tuffour, 2013). The District Assemblies in collaboration with the Community Committees set tariffs approved by the Community Water and Sanitation Agency for collection from households by Committees for the use of the facilities.

The tariffs are calculated based on the operation, maintenance, major repairs, replacements and extensions to new areas. The need to promote affordability of the tariffs to rural low income households is further emphasised by ensuring that the final tariff is low and should not exceed \$1 per m^3. This makes the final tariffs set somewhat negotiable (Ghana Integrity Initiative [GII], 2011).

Some case studies on rural tariff conditions in Ghana provide relevant data worth presenting. For instance Nyarko, Nyarko, Odai and Fosuhene (2006) cited in Ghana Integrity Initiative (2011), state that rural communities in the Ashanti Region of Ghana paid an average tariff of \$0.60 per m^3 of water per month in2003. This was said to cover about 57 to 77 percent of the total cost of water supply. This reveals a success story in the realm of pro-poor water tariff determination and collection in the selected regions in a typical rural water supply context.

The effectiveness of the tariff collection process is attributed to the roles of Community Committees. These are instituted by the District Assemblies to facilitate the community ownership facet of rural water and sanitation projects. They are composed of gender balanced community members, who determine the procedures for tariff collection, as well as book keeping and minor repairs and maintenance of rural and small town water systems (Gbedemah, 2010). They also receive capacity building, technical assistance and other forms of support from Non-Governmental Organisations (NGOs).

The relevance of rural water sector stakeholders and their roles to this study is that it facilitates the understanding of how the non-profit nature of the service providers, the freedom of choice of technology, affordable tariffs and the sense of ownership overcome constraints of willingness to pay by the rural poor. However, the COM model provides avenues for assessment research on whetherthe socio-economic status of rural and peri-urban communities actually have no effects on sustainability of services and cost recovery objectives.

Most studies on the COM model in Ghana have focused on the effectiveness of community participation on sustainability, such as the work of Kangah (2009), or the expectations of the communities from the projects, such as the work of Adam (2010). But there is virtually none to account for improving willingness to pay water tariff by rural and peri-urban communities through stakeholder participation in the context of urban water systems in Ghana. Furthermore, while premium is placed on rural and urban water supply conditions, the situation of peri-urban communities is often nipped in the bud of mainstream literature (Anderson, 2007)

Stakeholder participation in urban water supply

The stakeholders and their roles in the urban water sector also constitute the Utility Management model (Adank & Tuffour, 2013). This involves the PURC setting standards for water tariff determination and service quality, as well as assessing the viability of proposed tariff increases by the GWCL. Although the PURC has a formula for automatic tariff adjustments, utility companies may submit proposals for tariff adjustments in order to meet their operations and maintenance costs (PURC, 2013). In the case of the general public (consumers), the Commission engages in a process known as “extensive stakeholder consultations to solicit views and gather inputs for the final upward adjustments” (PURC, 2013, p.1).

The consultation of the general public is popularly through the media, while the PURC observes public reactions, via the Bureau of Consumer Services (BCS) within the PURC secretariat. Thereafter, the key stakeholders including the PURC as the statutory regulator, GWCL as the service provider, TUC as the representative of commercial/industrial water users, Ministry of Water Resource and Sanitation; and Consumer Protection Agency (CPA) representing all other utility consumers, among others, meet to negotiate for the final tariff to be imposed. The PURC then decides and publishes the approved tariff after its own internal meeting (PURC, 2012 & 2013).

The Ministry of Sanitation and Water Resources, Water Resources Commission, and EPA are at the apex of both rural and urban water policy and regulation issues in Ghana as illustrated in Figure 3. However, the urban water sector is dominated by the PURC and GWCL as the direct stakeholders. This generates criticism of Figure 3, as designed by WaterAid Ghana (2005). In other words, it is not clear why the PURC and District Assemblies appear at the top of the box, when their roles affect only urban and rural/small town water services respectively.

Additionally, even though both rural and urban water services are now demand driven, rural and small town services are typically bottom-up, while there is some degree of centrality in urban water services (Britwum, 2004). This is because the latter is based on a high-tech piped water network with specific options: domestic (individual/public), industrial and commercial connections (GWCL, 2012). Services are readily available for extensions upon demand,compared to the rural water sector, where clients choose the type of technology before it is constructed.

The emphasis on neoliberal principles in urban water services also involves some rigid conditions such as cost recovery, removal of direct subsidies and encouragement of private sector participation to re-echo the centralised character of urban water services or the utility management model (Grusky, 2010; Adank and Tuffour, 2013). Figure 3 however, suggests that both rural/small town and urban water services are bottom-up, looking at the direction of the arrow between the two. However, given the authority of the PURC over tariff determination, the specificity of piped water service technology, and the subjugation of urban water services to the manipulation of external funding agencies such as the World Bank and IMF, rural water services are more bottom-up than the urban.

The last critique is the failure to indicate where and why overlapping roles of stakeholders exist. For instance, under what conditions would urban piped water services be extended to rural areas and still remain under the management of the Ghana Water Company Ltd. and hence subject to the urban tariff conditions of the Public Utilities Regulatory Commission? The extension of urban water services to rural and peri-urban areas manifests the encroachment of the jurisdictions of the District Assemblies and the Community Water and Sanitation Agency, by the GWCL and the PURC.

The implication is that adequate information on this issue is necessary for ensuring the success of the policy making machinery to address the special challenges of affected rural communities. The lack of sufficient information ontendencies of overlapping roles or the neglect of what is available, explains why the stakeholder framework above is incomplete. This is because the overlapping issues must reflect alongside special institutional arrangement to mitigate the negative consequences of subjecting the rural poor to service conditions, such as regular monthly water tariffs that are not within their capabilities (Blanc, 2007).

Public-private-partnership in the water sector of Ghana

Appendix 0 indicates that beginning from 1986, neo-liberalism started gaining roots in the public water sector of Ghana. This took the form of withdrawal of Government direct subsidies on water supply. In addition, the conversion of the GWSC to GWCL as a limited liability company in 1999 (WaterAid Ghana, 2005), the failed attempt to award a 10 year lease contract to Azurix of the United States of America (USA) due to the activisms of the Coalition Against Water Privatisation in 2000 (Rahaman, Everett & Neu, 2007), and the award of a five year management contract to Aqua Vitens Rand Ltd. (AVRL) of The Netherlands from 2006 to 2011, are in consonance with the neo-liberal ideologies of the World Bank and the IMF (Alhassan, 2011).

The AVRL contract in particular, had the main objectives of improving the reliability and quality of potable water; ensuring the company's financial sustainability; improving customer service; and providing access to potable water at affordable prices to low income consumers (Vitens Evides International, 2012). The Ghana Water Company Ltd. was still responsible for investments in assetsand funding the operations of the company (Dovi, 2007). Some positive achievements of the contract included improvement in water quality in terms of effective monitoring of PH, water colour, residual chlorine, turbidity and e-coli (Vitens Evides International, 2012). On the issue of financial sustainability, the annual revenue of the company increased from GHC 57 million before the contract to GHC 143 million by the end of the contract. There was also an operational surplus that grew up to GHC 36 million per annum under the private operator (Vitens Evides International, 2012).

Water tariff collection efficiency was 97 percent in 2009, and remained 90 percent in 2010 (Alhassan, 2011). These were improvements over the average of 80 percent unpaid tariffs between 1997 and 2005 (SNV, 2009). The establishment of customer call centers and the training of staff also improved customer satisfaction, as well as staff attitudes towards customers.

On the issue of affordability and improved access to the poor, it is reported that the company made no special provision for tariffs and access targets for the poor (Vitens Evides International, 2012). But generally, new connections increased from 364,000 to 438,000, while the role of non-governmental organisations (NGOs) in the pro-poor water sector, led to increased access to improved water sources to about 75,000 people in peri-urban areas. This report however, concludes that if there were any peri-urban and rural low-income areasthat benefitted from the services of the company within the PPP regime, there were no special pro-poor considerations for them, despite the provision for this component in the objectives of the contract.

State of Water Supply and Associated Challenges in Ghana

Previous discussions have shown that the GWCL and the CWSA are the major direct stakeholders in management of urban and small towns/rural community water supply respectively. The CWSA (2004) classifies rural areas as those with populations not exceeding 1,200; small towns as those not exceeding 50,000 and big towns and cities (herein referred to as urban areas) as those whose populations exceed 50,000. An assessment of comparative access to water services in general and urban piped water services in particular, are presented in Tables 2 and 3 respectively.

Table 2 shows that with the exception of 2010, in which rural and small towns in Ghana recorded 62 percent coverage of improved drinking water services over that of urban areas (58 percent), urban areas enjoyed a wider coverage than rural and small towns. Despite the disparities, Ghana was apparently measuring up to its Millennium Development Goal (MDG) targets of 85 percent and 76 percent coverage for urban and rural areas respectively by 2015, with effect from 2000 (NDPC, 2010; GSS, 2012).

Table 2: Overall Coverage of Water Services

		Coverage of water services by settlement types	
Year	National	Urban	Rural, peri-urban and small towns
1990	56%	86%	39%
2004	53.05%	55%	51.10%
2006	68%	79%	52.86%
2007	-	59%	53%
2008	83.8%	93%	76.6%
2010	86%	58%	62%

Source: Water and Sanitation Management Platform Ghana (2009); National Development Planning Commission [NDPC] (2010); GSS (2012); Anokye (2013).

Table 3 also provides evidence of extension of urban piped water services of municipalities and metropolises to rural areas, based on the 2010 population and housing census data. The development of public water supply services has been with some challenges. The first challenge is the inability of the state to develop and maintain its own service delivery model. For instance Kwame Nkrumah's African Socialist inclination influenced his choice of the supply-driven approach to public water services to both rural and urban areas

(Nkkrumah, 1967; GWCL, 2012). This was initially successful because the economy performed well enough to generate surplus revenue to pay annual subventions to the public water utility and direct subsidies for water services (GWCL, 2012a).

Table 3: Access to Municipal and Metropolitan Piped Water

		Piped inside	water dwelling	Piped outside	Water Dwelling	Public	Standpipe
Region	Municipality/ Metropolis	Urban	Rural	Urban	Rural	Urban	Rural
Upper East	Bolgatanga Municipal	37.6%	5.2%	28.4%	3.5%	5.4%	0.8%
Volta	Ho Municipal	36.1%	7.9%	40.8%	20%	15%	23.4%
Brong-Ahafo	Sunyani Municipal	33.5%	10.1%	16.5%	3.4%	18.5%	7.4%
Central	Cape Coast Metropolis	37.7%	18.8%	14.8%	26%	32%	35.6%
Western	Sekondi-Takoradi Metropolis	32%	18.2%	29.9%	39.7%	24.9%	17.7%
Northern	Tamale Metropolis	46.2%	9.2%	45.2%	23.3%	4.7%	6.2%

Source: GSS (2014b).

With the decline in economic performance and subsequent dependence on foreign capital for the water sector from the 1970s and beyond, the Government of Ghana lost its sovereignty over the water delivery model. This has brought about neo-liberal influences such as privatisation, cost recovery and emphasis on tariff payment in both rural and urban water services in Ghana as described earlier.

More specifically, the dominance of foreign influences on the water sector is attributed to lack of investment capital (Moss & Young, 2009), and the dependence of external managerial expertise due to inadequate skilled personnel for the sector within the country (Vitens Evides International, 2012).Additionally, in the case of the use of surface water sources, high cost of water treatment due to high levels of pollution of water bodies, increases production costs of water utilities (CWSA, 2004; Anokye, 2013). These together, lead to increases in water tariffs, and low income households mostly found in rural and small towns (GSS, 2014b) are the most vulnerable. It is also argued that declining rainfall patterns and other human activities threaten the water resource base of the country (Nkrumah, 2004), and justifies the need for tariff imposition to discourage waste of water by consumers as a move towards sustainability.

Furthermore, there is still the problem of overlapping stakeholder roles and water delivery models, despite efforts to promote affordability and equity in access to water services, through the separation of urban water services from that of rural and small town settlements (Gbedemah, 2010). This is particular true of rural and peri-urban communities connected to urban water systems instead of benefiting from the services of the CWSA. How low income households in such communities cope with the high urban water tariffs and the influence of stakeholder participation in addressing their special needs is therefore a major challenge of research interest.

It is important to mention that since this study makes use of population data provided by Ghana Statistical Service, the classification of settlement types would be based on GSS' standards. That is rural areas are those with populations below 5,000, and urban areas are those with 5,000 or more people. Peri-urban areas are those closer to urban areas and exhibit features of both rural and urban areas as defined by Mondal (2015). It means their population sizes could be similar to rural areas but not up to urban areas.

Ghana's National Water Policy

The basic principles of the National Water Policy of Ghana are stated as follows:

- The principles of fundamental rights of all people without discrimination to safe and adequate water to meet basic human needs
- The principle of meeting the social needs for water as a priority while recognizing the economic value of water and the goods and services that it provides
- The principle of improving equity and gender sensitivity
- The principle of recognising water as a finite and vulnerable resource, given its multiple uses
- The principle of integrating water resources management and development with environmental management in order to ensure the sustainability of water resources in both quality and quantity
- The principle of adopting the river basin (or sub basin) as planning unit
- The principle of polluter pays to serve as disincentive to uncontrolled discharge of pollutants into the environment
- The principle of subsidiarity in order to ensure participatory decision making at the lowest appropriate level in society
- The principle that international cooperation is essential for sustainable development of shared basins
- The principle of integrating management of river basins with management of coastal zones and wetlands
- The principle of greatest common good to society in prioritising conflicting uses of water and

- The principle of solidarity, expressing profound human companionship for common problems related to water (MWRWH, 2007, p. 11).

Recognising that the lack of effective collaboration among stakeholderS has been the major setback in the successful implementation of previous water sector reforms, the MSWR sought to address this problem through the formulation of the National Water Policy of Ghana (MWRWH, 2007). The basic principles of the National Water Policy are guided by Ghana Poverty Reduction Strategy (GPRS), the MDGs and Africa Water Vision for 2025. The important aspects of these principles, so far as the needs of rural and peri-urban communities are concerned, include improving access to safe water supply and sanitation to reduce the proportion of population without access to basic water and sanitation by 50% by 2015 and 75% by 2025; promoting efficient and sustainable use of water to address food security, income generation and reduction of cases of malnutrition; and empowerment and capacity building for improving equity, gender sensitivity and pro-poor water governance and policy (MWRWH, 2007).

The water policy is of relevance to this study because it embraces a stakeholder approach for integrated water management, including issues of urban, rural and small town water delivery which have linkages to the specific objectives of this study. The stakeholders and their roles expatiated earlier in this chapter, as well as the data on the state of water supply show that Ghana is on track in terms of compliance to the principles of the National Water Policy and the associated achievements. However, the issue of rural and peri-urban communities connected to urban water systems still remains a complex issue. This is because the country can boast of achieving its targets for rural and urban water supply. But the situation in which rural areas are connected to urban water systems and the associated challenges of tariff payment seems to attract no direct attention in the policy framework.

Contextual Relevance of Stakeholder Framework in Ghana's Water Sector

In summary, Chapter Four facilitated the identification of stakeholders in urban and small town water services. This offered an opportunity to identify the gaps, inconsistencies or conflicting roles of the stakeholders in rural and peri-urban water tariff determination and payment. It also helped to shape the analytical trajectory on how to improve water tariff payment in rural and peri-urban areas connected to urban water systems, through the complementarities of stakeholders.

CHAPTER FIVE

RESEARCH METHODS

Introduction

This chapter presents a systematic analysis of the methods applied in the study to answer the research questions (Berg, 2009). The essential components of the chapter include a description of the study area, philosophy of the study and the research design. The chapter is significant because it shows the scientific procedures used to arrive at the results with accuracy, validity and reliability.

The Study Area

This section presents the physical, demographic, socio-economic and political characteristics of the study area. It indicates the regions, districts and communities in northern Ghana on which the strudy was based. Figures 4 and 5 are maps of the Nothern and Upper East Regions respectively, as the study areas.

Northern Ghana shares borders to the south with Burkina Faso, to the east with Togo and to the west with Coted'Ivoire.It is also referred to as the Savanna Belt due to its dry climatic conditions and less dense vegetation (Dickson & Benneh, 2001). Rural households in this sector of the country experience the highest incidence of poverty, up to 55% (GSS, 2014). According to Adjei (2008), poverty limits the ability of rural peoplein Ghana to pay for life supporting services, such as health and safe drinking water. Specifically, the study covers rural and peri-urban communities connected to the services of GWCL, through the extension of piped water supply from capital cities in Northern Ghana. The sector consists of three regions: the Northern, Upper East and Upper West Regions, with Tamale, Bolgatanga and Wa as the respective regional capitals.

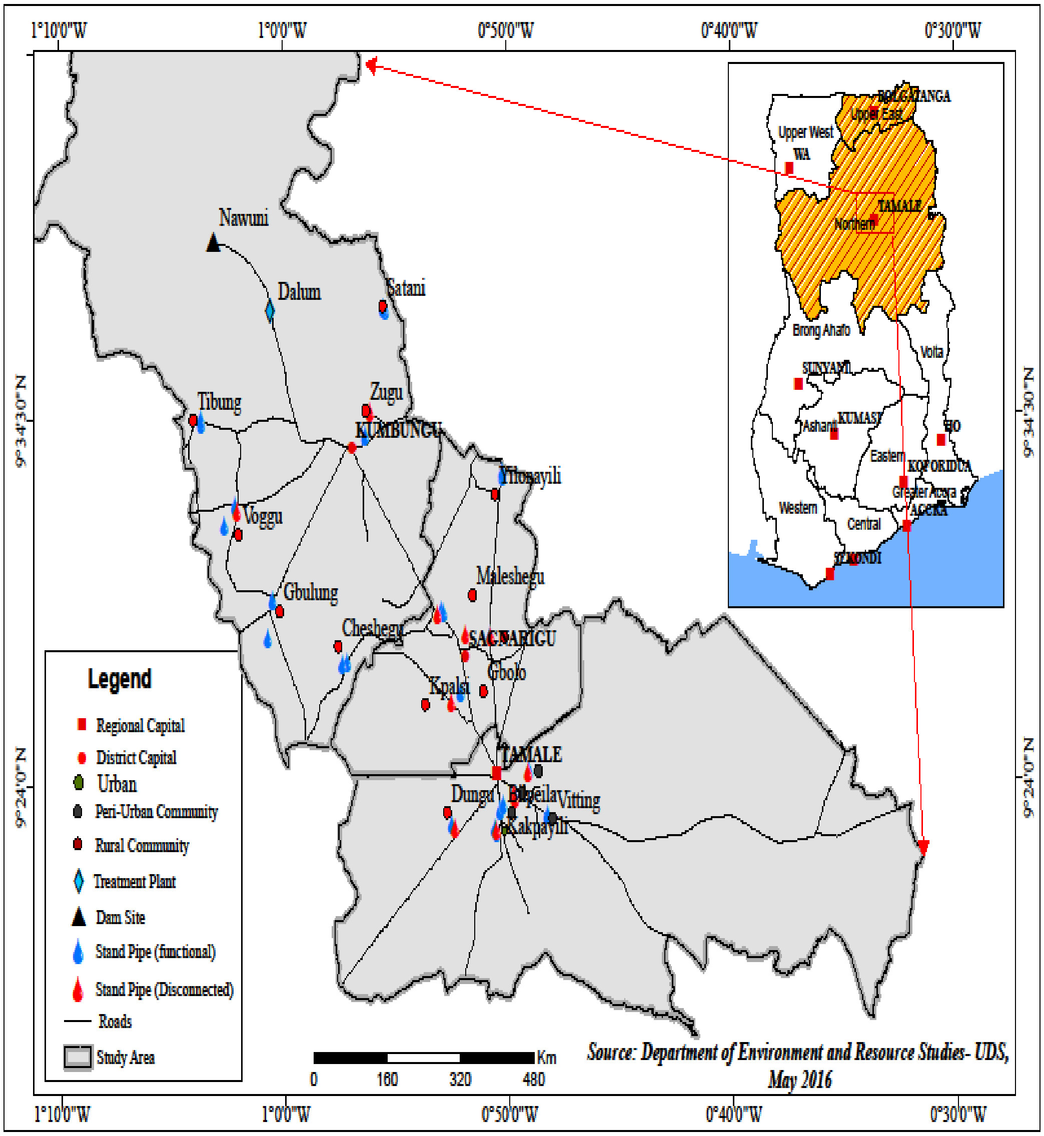

Figure 4: Study communities in the Northern Region context

Source: Department of Environment and Resource Studies (2016)

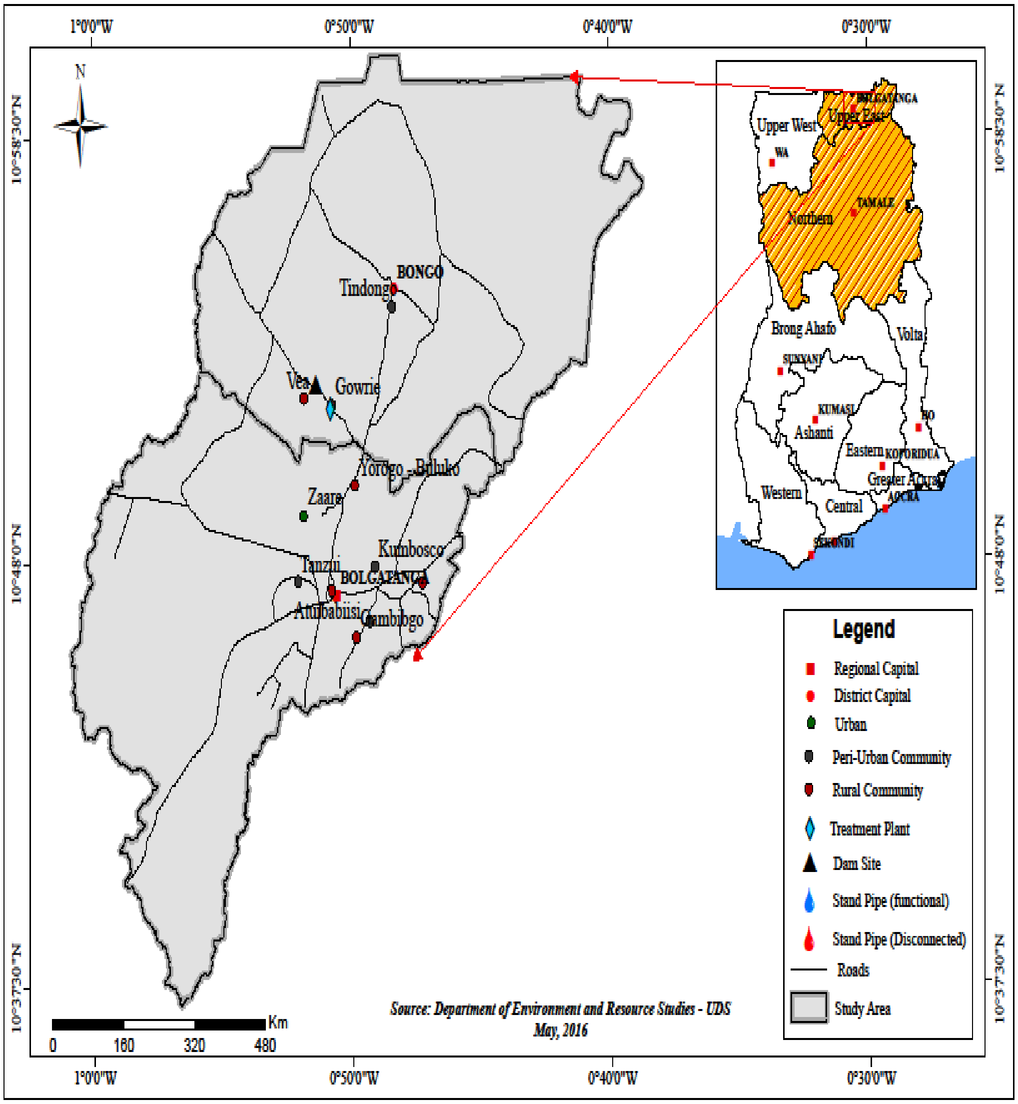

Figure 5: Study communities in the Upper East Region context
Source: Department of Environment and Resource Studies (2016)

Communities in the Upper West Region were excluded from this study because the GWCL depends on groundwater for the urban areas in the region, as of the time of this study, even though piped water through treated surface water is under construction. The technology used during the period of this study was the same as the low-cost small town piped water services used by the CWSA, while rural and peri-urban areas have their own boreholes.

A total of 27 communities were studied, with 17 in the Northern and 10 in the Upper East Regions respectively, which are indicated in the last row of

Appendix M.Figures 4 and 5 show the study communities classified into settlement types and how the public standpipes and their working conditions are distributed over space (See also, Appendix K). They also show treatment plants and dams as freshwater sources for GWCL in the Northern and Upper East Region contexts, as indicated in the legends.

Physical, demographic and socio-economic features of the study area

The Northern Region shares borders to the north with the Upper East and Upper West Regions, and the Brong Ahafo and Volta Regions to the south. To the east is Togo and to the west is Côte d'voire. It has a population of 2,479,461 as of 2010, 69.7 percent of which is rural (GSS, 2012). Tamale is the capital city of this region. Other features of the study area are indicated in Appendix M. Access to water from public standpipes is the commonest of the various types of piped water connections (12.2%), but the dominant source of drinking water to households in the region is borehole fitted with hand pump.

The Upper East Region is found in the north-eastern part of the country. It shares boundaries to the north with Burkina Faso, to the south with West Mamprusi District of the Northern Region, to the east with Togo and to the west with Sissala District of Upper West Region. It has a population of 1,046,545 as of 2010 which according to the GSS (2012a), has the most rural population (79 percent). Bolgatanga is the capital city of the region. Public standpipes outside dwellings are the highest of the various forms of piped water connections (17.9%). The major source of drinking water in the region is however, borehole fitted with hand pump (57.3%) (GSS, 2012).

Some of the districts are either entirely or predominantly rural. Examples are Kumbungu and Bongo Districts of the Northern and Upper East Regions respectively. Accordingly, drinking water services meant for rural communities in Ghana dominate in these areas (boreholes or tube wells fitted with hand pumps). There is, however, some degree of piped water services. Details of thecharacteristics of the Regions, Districts and study communities are presented in Appendix M.

For instance GSS (2012a) data indicates that the Bongo District has 2.9 percent coverage of piped water outside dwelling, but 9.3 percent of urban households are covered compared to 2.3 percent of rural households. Although the Kumbungu District is entirely rural, it has piped water because of the abundance of natural water resources in its environment, which the GWCL of Tamale Metropolis depends on. In the same way, the GWCL of Bolgatanga depends on the Vea Dam in the Bogo District. These justify service extensions to such areas.

Governance

All districts and communities in northern Ghana are politically administered from the regional capitals, namely Tamale, Bolgatanga and Wa for the Northern, Upper East and Upper West respectively, as the case is for other parts of the country. The Regional Coordinating Councils (RCCs) are the main administrative structures, which are responsible for monitoring, coordinating and evaluating the functions of the District Assemblies (DAs). These are often with respect to effective use of financial resources allocated to the DAs by government bodies; performance of public services; and any other functions assigned to them by any enactment (MLGRD, 2006).

SNV (2009) described the relevance of aspects of this structure of governance in the management of piped water services extended from urban areasto rural communities. The focus was however, on the roles of chiefs, ordinary residents and Community Water Committees in the participatory management of piped water facilities in some rural communities connected to services of the GWCL of the Tamale Metropolis. It was found imperative to ascertain how the GWCL collaborates with such a political structure and other stakeholders for improving water tariff payment in such communities in the context of urban water services in this study.

The profile of the study area did not only justify the reasons for the inclusion of the selected communities in the study, but also provided a data base that facilitated ease of explanation of relationship between the socio-economic characteristics as independent variables, and water tariff payment as the dependent variable.

Research Philosophy

This aspect of the study deals with the beliefs that influence the systematic examination of the conceptualisation of the causalities, as well as how to establish the truth and realities (Sarantakos, 1996; Weaver & Olson, 2006) of improving piped water tariff payment in rural and peri-urban communities in northern Ghana. The essential epistemological positions and philosophical paradigms are discussed below.

Epistemology

Epistemology relates to the theory and processes of generating knowledge. It is the branch of philosophy that deals with the nature, scope and assumptions, as well as the extent of reliability of claims to knowledge (Ballantyne, 2000). The relevant epistemological positions about knowledge are direct or objective perception of realism, and indirect or subjective perception of realism. A third position found useful is prospectivism. These are discussed in the ensuing sub-sections. Philosophical realism considers truth as what the mind holds to correspond to rightness (Blackburn, 2005; Mason, 2013). Such perceptions of the mind vary from one position to the other, as they are adopted by the dominant paradigms that shape the structure of research in social science (Sarantakos, 1996).

Objective perception of reality

Objective reality, as developed by the Russian-American writer Ayn Rand in 1943, considers the acquisition of knowledge through all that can be perceived by the senses (McLemee, 1999), and which is subject to strict unchangeable laws (Sarantakos, 1996). It perceives truth as that which can be experienced in the same way by all members of society, and so independent of human consciousness. It constitutes the philosophical position of positivism, which inspires the measurability of variables in this study. It is much associated with the aspect of quantitative approach.

The rationale for objectivism is to present situations as they are, and reduce researcher's bias (Sarantakos, 1996).The limitation of objectivism is that human behaviour cannot be predicted with certainty through the application of natural laws. Therefore, social scientists usually assume a ceteris paribus, which means 'all things being constant' (Schlicht, 1985).

Subjective perception of reality

Subjective reality is the philosophical position that knowledge emanates from the minds of people. Subjectivism associates reality to what is internally experienced, socially constructed and subject to the interpretations of the actors based on their interactive outcomes (Sarantakos, 1996). It is an indirect perception of reality, compared to objectivism (Creswell, 2009). It sees reality from the way people define it, rather than what is. Its prominence in research philosophy originates from Descartes' methodic truth, which considers all laws and measurements as primarily resulting from subjective experiences (Frankfurt, 1977). A major weakness of subjectivism is the lack of mechanisms to discourage researcher's bias towards the determination of reality. However, the mixed research design adopted in this study aimed to neutralise this effect.

The philosophical paradigm of participatory/ advocacy worldview which directs the qualitative facet of the mixed research design in this study, is inclined to the subjective position of reality. On the other hand, other adopted paradigms such as multiple realities relate to both objectivism and subjectivism (Sarantakos, 1996). These together, influenced the choice of the stakeholder theory and theassociated models of participation. The possibilities of stakeholder participation to influence change, contextually in the sphere of water tariff payment based on social constructionism, makes the adoption of subjectivism and the ultimate use of qualitative approach indispensable.

Prospectivism

The origin of prospectivism as a philosophical position about reality appears to be heavily confined to the works of Elinor Mason in 2013. In an abstract statement of her article entitled 'Objectivism and prospectivism about rightness', she asserts that prospectivism is a new philosophical argument she was advancing, which considers rightness to depend on what is prospectively best rather than what would actually be best from a consequentialist point of view (Mason, 2013).

Consequentialism itself refers to the dominant belief held by normative ethical theorists that the outcomes of one's conduct, become the basis of judging any rightness or wrongness of that conduct (Mizzoni, 2009). Mason's (2013) argument is that, what would be best could be predetermined by means of identified causes that could lead to known effects, from the standpoint of objectivism. From the prospectivist position, however, reality is considered as what would make sense to the agent, given reasonable beliefs, reasonable probability estimates and a reasonable understanding of value. According to Mason (2013) prospectivism allows some degree of self judgment by the agent independent of existing laws of causalities. It therefore does not completely ignore the objective and subjective epistemological positions.

I find it convenient, to adopt prospectivism as the position about reality of paradigms such as multiple realities, which explains how sub-universes can affect or be affected by us (Schütz, 1945).In this study, the price discriminatory nature of theories explaining water tariff for rural/low income households and urban areas appears to have both subjective and objective orientations. It is therefore better rooted in the prospectivist position than either, or both of objectivism and subjectivism. This justifies the use of a mixed research design involving quantitative and quantitative approaches.

Philosophical paradigms

A discussion of the selected research paradigms, which provide the thought patterns that dictated the methodological procedures for the promotion of scientific standards, is presented below.

Multiple realities

According to Schütz (1945), 'multiple realities' as a philosophical paradigm was conceived by Williams James in an attempt to analyse human sense of reality. Multiple realists argue that reality is subjective and concerns all that excites and stimulates our interests, and which can affect or be affected by us (Schütz, 1945). This implies that reality cannot be one, it is consciousness that constitutes reality, and that each of us lives in a universe independent of others, as conditioned by the individual's subjective consciousness (Franks, 2015).

Such elements of subjectivity were conceptualised by James as sub-universes, which constitute the tenets of multiple realities, but each is ontologically independent of the other. Examples include "the world of sense or physical things (as the paramount reality), the world of science, the world of ideal relations, the world of 'idols of the tribe', the various supernatural worlds of mythology and religion, the various worlds of individual opinion, the worlds of sheer madness and vagar" (Schütz, 1945, p. 533).

Even though multiple realists hold reality to be non-objective, the sub-universes include the world of science and of sense and physical things. Science, however, concerns a systematic, organised, testable and predictable way of knowledge acquisition, while the application of the senses in relation to physical things yields common experiences (Wilson, 1999). These make prospectivism a better epistemological position concerning truth for multiple realists. Thus, while examining water tariff payment in terms of the multiple roles of separate stakeholders in this study, their individual influences are considered as sub-universes, which lend themselves to the multiple realist perspective. The varied nature of the sub-universes also call for objective and subjective methods and hence quantitative and qualitative approaches in the application of the paradigm.

Positivism

Positivism is the dominant paradigm in social research involving pure theoretical contexts and the application of strict natural laws (Sarantakos, 1996). Auguste Comte and Emmanuel Durkheim are the key contributors to thisparadigm (Creswell, 2009). It considers knowledge as that which emanates from data obtained from direct experiences through the use of the senses, tested and interpreted through logical reasoning, rather than from metaphysical speculations and intuition (Macionis & Gerber, 2010). Its epistemological position about reality is objectivism.

Positivist assumptions have been criticised for the use of rigid natural laws that cannot adequately predict human behaviour. This subsequently leads to structural policies that are inconsistent with principles of social justice, thus leaving the problems of marginalised groups in societies unaddressed (Creswell (2009). The contextual relevance of positivism to this study is that, those aspects of the research questions that deal with directly observable and measurable phenomena, such as the effects of tariff rate, size of household income and service quality on willingness to pay, were ascertained by the use of quantitative approach, which goes with the objective position of positivism.

Advocacy/participatory worldview

The advocacy/participatory paradigm inspires research activities that influence policy in terms of the integration of political authority, with collaborative actions that lead to the empowerment and changes in the conditions of previously marginalised groups (Creswell, 2009). Also Hutton (2010) asserts that this paradigm is suitable for researchers confronted by groups, whose rights to participation in decision making are abused. That is, projects that affect them are implemented without their involvement.

The role of advocacy/participatory researchers is therefore to determine how to promote the participation of the marginalised groups in pro-poor development projects, with a focus on issues of empowerment, inequality, domination and alienation among others, through policy recommendations after a research has been conducted (Creswell, 2011). It is a philosophical paradigm that tolerates both quantitative and qualitative approaches, or is suitable for mixed research designs.

It sees truth or reality in terms of knowledge gained through the subjective and objective participation of the target beneficiaries and stakeholders on the bases of advocacy. Subjective participation involves the expressions of the mind, while objective participation refers to the materialistic aspect of participation, as advocated by researchers as being necessary to bring about the desired social change (Creswell, 2011).

The practical relevance of advocacy/participatory worldview to this study is that, it provides a guide to the understanding of whether imposition of urban water tariff on rural and peri-urban households is regressive. It also inspires the need to include both the potential beneficiaries and stakeholders from the institutions that have influenced the basis of criticism of the water tariff situation as well as those with the potentials to improve the tariff paying abilities of the people, through their responses to qualitatively oriented research questions.

Postmodernism

Postmodernism as a philosophical term is considered as a contemporary philosophical movement. It follows as a reaction to some aspects of modernismrelated to western philosophy (Kamil, 2011). According to Sim (2011), postmodernists criticise the foundational assumptions and universalising inclinations of Western philosophy as it applies to structuralism. According to Harrington (1962), structuralism relates to how social institutions influence the extent of vulnerability of minority groups to exclusion and discrimination. It includes rigid policy provisions that fail to promote the exclusive rights of the minority in terms of access to social services such as safe water, which create conditions that perpetuate the cycle of poverty.

Postmodernism, anchors on the fundamental elements of constructionism and critical theory. These criticise the existing unfavourable conditions of vulnerable groups as shaped by the objectivist perspective, and emerge with socially constructed measures for the liberation of such groups respectively, through research and remedial actions (Kane, 1995). This is because it emphasises on power relationships, discourse and personal consciousness as the drivers of social change. It is however, the most difficult philosophical school of thought to understand due to its rigid assumption that there is no direct explanation of the reality of anything that physically exists, yet offering no reason for this assumption (Kalle & Bruce, 2000; Kuhn, 1970). Put differently, postmodernists believe that philosophers have the problem of clearly distinguishing knowledge, social progress, dominance, good, and presence, from ignorance, reversion, submission, bad and absence respectively (Sim, 2011).

In view of the roles of organisations and political influences on policies and practices related to water tariff imposition, structuralism has a role to play in the determination of any evidences of vulnerability to inadequate access to safe water as a result. This study therefore adopts the postmodernist school of thought as a way of identifying the weaknesses of structuralism in the water sector. Other philosophical positions such as multiple realities are then adopted as a way of ascertaining the realities. The alternative strategies that could be advanced for addressing the challenges are then considered in the recommendations sections of the concluding chapter. They also influenced my suggestions for future research in related topics.

Research Design

The research design is developed as a plan for the research activities undertaken to answer the research questions (Creswell, 2009; Sarantakos, 1996). The study was typically cross-sectional or transversal. This involved carrying out the study within a short period, for the purpose of estimating the prevalence of the effects of stakeholder efforts to improve water tariff payment in rural and peri-urban communities in northern Ghana. Its relevance was to provide a 'snapshot' of the characteristics of improving water tariff payment in the study areas at a specific time period, and how the roles of the stakeholders are associated with such characteristics (see Levin, 2006). The multi-faceted philosophical perspectives of the study made the use of a mixed research design, involving bothqualitative and quantitative approaches and methods necessary. Specifically, the concurrent triangulation design was employed.

Concurrent triangulation mixed methods design

The triangulation design in general, is the most common design associated with the mixing of research methods (Creswell, 2003). However, as a social scientist, the specific procedure I followed in this study is the concurrent or single-phase method. This entails the concurrent interpretation of research results with both quantitative and qualitative approaches (Creswell & Clark, 2006).

Quantitative approach

This relates to the objectivity facet of the philosophical perspectives of this study, and concerns investigative procedures involving the use of mathematics and statistical correlations (Creswell, 2009; Sarantakos, 1996). In short it applies to the measurability or presentation of data in the forms of numbers, percentages and correlation coefficients. The method of quantitative data collection and analysis, as well as the justification are discussed below.

Survey

According to de Leeuw, Hox and Dillman (2008), a survey is a research strategy for the collection of information from a relatively large sample of a population in a systematic way, and which can be expressed quantitatively. Groves *et al*. (2009) and Salant and Dillman (1994), stress that due to its association with objectivism, there is the need to avoid errors by ensuring construct validity in a survey. Construct validityaccording to the authors, refers to the extent of reliability of the findings in relation to what was intended, and viewed in the context of the research focus and survey questions. The sub-sections discuss the focus of the research and survey questions, as well as how construct validity was achieved in this study by following the four cornerstones of survey research defined by the authors.

Specifications of the research focus and survey questions

In line with the criteria defined by Groves *et al.* (2009) and Salant and Dillman (1994), the first step in the survey process of this study was the objectives and associated research questions. Accordingly, the major and specific research objectives and questions were stated in Chapter 1. Five research questions were framed corresponding to the specific objectives. For each of the research questions on a structured interview guide, a number of specific items or close-ended survey questions were set ona likert scale, and respondents were to choose between 'Agree', 'Disagree' or 'Undecided' (See de Leeuw, Hox & Dillman, 2008).

Survey questions on the background of respondents and other measurable variables related to specific survey questions under the research questions had options based on the specific characteristics to be measured. For instance ranges were given for variables such as age, household size, monthly income and tariff rates respondents were willing to pay at varying amounts of water and other service conditions, while categories were specified for sex, settlement type,education, employment status, occupation and religion among others. Appendix 'A' (structured interview guide for household respondents) provides details of the aspects described above. The questions were set by using empirical indicators for the measurement of the concepts generated by the theoretical bases of the study, as well as policy and other socio-economic influences that shaped the research problem. These are all stipulated in the conceptual framework (see Kerlinger,1986; Hox, 1997).

In terms of accuracy, validity or reliability of survey results, de Leeuw *et al.* (2008) assert that the commonest error in surveys is the specification error, resulting from measurement of the wrong parameter. This is due to the use of a different construct in a survey question from what is intended to be measured. In the context of this study for example, a question such as "How much are you willing to pay for 54ltr of water?" is not a fair measure of the survey construct question for an area where tariffs area already being charged for available water services. This is because there is a specification error. In other words it exposes the respondent to responses based on his/her subjective perceptions of valuing water. This is the continuous method of accessing willingness to pay, which is acceptable for a project preparation leading to the determination of fresh tariffs for new water service connections (Gunatilake & Tachiri, 2012). On the other hand, "Would you be willing to pay less than 20GHp, 20GHp, or more than 20GHp for 54ltr of water?" This question involves an objective position of pricing water from the standpoint of a given price level (20GHp), and is known as thediscrete choice method, involving close-ended questions(See Leeuw et al, 2008; Greene, 2008).

The above idea guided me to examine each item on the structured interview schedule, to ensure that survey questions measured the intended constructs. The survey instrument was also pre-tested using real respondents in different locations from the actual study areas to ensure that they could be interpreted in the local languages in a manner that did not deviate from the intended construct. It also helped to determine whether respondents understood the questions based on the ease and accurate choice of options. Identified challenges were then addressed before the final survey began.

Coverage of target population using sample frame and sample size

After specification, which is central to every survey, coverage is the first of the four cornerstones for construct validity (de Leeuw et al, 2008). This study first determined the target population. This included districts with rural and peri-urban communities nearer to freshwater sources from which the GWCL draws freshwater, located along treated water delivery pipelines leading to urban settlements in Tamale(capital city of Northern Region) and Bolgatanga (capital city of Upper East Region), or relatively closer to such settlements and benefit from public standpipe services of GWCL. Thus, Kumbungu and Bongo Districts of Northern and Upper East Regions respectively fall in the category of freshwater resource owning areas, while communities in Sagnerigu District and Tamale Metropolis of Northern Region and Bolgatanga Municipal of Upper EastRegion fall in the category of areas along treated water delivery pipelines. Rural and peri-urban settlements that do not belong to the categories above were selected for their relative closeness to the urban settlements for the purpose of comparison. One urban settlement was also included for each region. The purpose was to compare the socio-economic characteristics of the various settlement types and how they influence tariff payment.

A multi-site selection of the sample frame then began. Records comprising lists of communities, their population sizes and number of households in the identified districts, metropolis and municipality with the desired characteristics above were obtained from publications of GSS (See Table 4). These were supplemented by data from the District, Municipal and Metropolitan Assembly offices. The original lists obtained included communities that either had no piped water services or were disconnected long ago. Those that qualified for the study were compiled together for the two regions as the sample frame and totally enumerated, with the exception of the two urban communities, which were randomly selected. Table 4 presents the communities.

Table 4: Distribution of Sample Size across Communities

Region	District	Communities	Population	Number of households	Sample per community (Nc)	Settlement type
Northern Region	Sagnarigu	Maleshegu	2,162	331	12	Rural
		Vitting	2,234	394	14	Peri-urban
		Yilonayili	1,721	174	6	Rural
		Gbolo	1,876	332	12	Rural
		Zagyuli	3,296	501	18	Peri-urban
		Kpalsi	2,097	361	13	Rural
	Tamale Metropolis	Dungu	2,623	296	11	Rural
		Jakarayili-Kukuo	2,807	482	17	Peri-urban
		Dohinayili	2,849	541	19	Peri-urban
		Bilpeila	3,754	470	17	Peri-urban
		Kapkayili	7, 983	1,283	46	Urban
	Kumbungu District	Tibung	770	89	3	Rural
		Satani	580	57	2	Rural
		Zugu	519	57	2	Rural
		Voggu	1,135	111	4	Rural
		Gbulung	1,864	246	9	Rural
		Cheshegu	1,448	159	6	Rural
Upper East Region	Bolgatanga Municipal	Kumbusco	1,031	162	6	Peri-urban
		Zaare	6,285	1,257	45	Urban
		Atulbabisi	1,253	251	9	Rural
		Bulunko-Yorogo	920	183	7	Rural
		Yarigabisi	2,965	608	22	Peri-urban
		Gambibgo	1,602	303	11	Rural
		Zuarungu Dubila	1,054	208	7	Rural
		Tanzui	4,127	825	30	Peri-urban
	Bongo District	Gowrie	3,848	699	25	Rural
		Tindongo	2,014	365	13	Peri-urban
		Total	**64808**	**10,745**	**386**	

Source: Tamale Metropolitan Assembly (2011); Ghana Statistical Service (2012)

Given that the sample of 27 communities contained a total population that was too large, there was a further down-scaling of the figure by calculating the sample size using the total number of households instead. This is because the sampling unit was the household. Taro’s formula (1967) was used to calculate the sample size. This is stated as follows:

$$\textbf{Sample size (n)} = \frac{N}{1+N(e)^2}.$$

Where n= required sample size; N= known population; e= margin of error.

Where n= required sample size; N= known population; e= margin of error.

Table 4 indicates a total population of households of 10,745. Using a margin of error of 0.05, a sample size of 386 (to the nearest whole number) isobtained. To obtain the number of households for each community as presented inTable 4, the following formula was used:

Nc= (p/[Σp]*n)

where Nc= proportional sample of households studied in a community; p= total number of households in a community; Σp= sum of households in all the study communities; and n= sample size.

Respondents were also identified by their socio-economic characteristics such as age, sex, marital status, education, religion, occupation, income, and household size. The actual distribution of these characteristics was determined after field work, and so presented as part of the findings in the analysis chapters.

Accuracy, validity and reliability of issues of coverage were considered by the identification of types of coverage errors described by de Leeuw et al (2008) and how to prevent them. For instance frame coverage error relates to a mismatch between the sample frame and target population. This was solved by cross-examining all communities on the sample frame for the required characteristics by reconnaissance survey. This ensured cross-triangulation of secondary data (on community lists) with field observation, and necessary corrections effected as stated earlier. There is also the error of over coverage, in which communities that lack the desired characteristics appear on the sample frame. This was also addressed by the same criterion for under coverage. By this method, six out of the proposed thirteen communities on the original sample frame in the Upper East Region were found not to have public standpipes.

The communities without standpipes were replaced by communities with the facilities, yet not on the list. However, ten communities finally qualified instead of thirteen for this region. Northern Region also recorded two cases of over coverage, which was solved as described above. The second component of construct validity in a survey is sampling, including sampling errors and the remedies. Sampling is concerned with the identification and systematic procedures for selecting units for data collection, and the basis of arriving at generalisations based on data from the downscaled representative sample drawn from the target populations (See Yin, 1993; d Leeuw et al., 2008).

In this study, Northern and Upper East Regions and the associated districts were selected by purposive sampling for reasons discussed earlier in this work. The need for a large representation for the purpose of generalisation also led to total enumeration of qualified study communities (Sarantakos, 1996; Branner, 2007). The fish-bowl method as a simple random sampling procedure was used for selecting houses from which households were drawn as sampling units. To do this the location of public standpipes were first identified in each community. Total enumeration of all houses without private home connections, and which depend on the identified standpipes was taken as the cross-section. This was achieved by snow-balling. They were then coded and recorded on a master list with names of their landlords.

The codes were written on pieces of paper and put into a small parking case. This was followed by one-by-one random selection after each mixing of thecontent until the proportion of the sample size assigned to the community in

Table 4 was reached (See Kumar, 1999). The master list was then used to trace the houses. The first household member to meet upon entering each house, who was 18 years old and above, was taken as a respondent by consensus (accidental sampling). However, other members of the same household could participate in the interview as respondents. The sample unit was therefore, a household member who represented an entire household (See Gbedemah, 2010). According to de Leeuw et al. (2008), the use of simple random sampling technique in the selection process allows standard statistical techniques to be applicable and can yield accurate values of statistical significance (*p*).

Regarding accuracy, validity and reliability of survey results by sampling, it is noted that sampling errors are greater with smaller samples for a population, compared to total enumeration (de Leeuw et al., 2008).To promote accuracy or precision, Devore and Peck (2005) assert that a population of 96 could be represented by $\pm$10%, while a larger population of 9,604 could have a sample size of $\pm$ 1% (p.377-378). In this study, the total household population was 10,745, and Taro's formula yielded 386 as the sample size, representing about 3.6 percent of the population. This is acceptable compared to the range given by the authors above for larger populations.

Quantitative data collection, response and ethical considerations

I begin discussions on this stage of the survey method by examining the sources of data and instruments of data collection after which the ethicalconsiderations followed to prevent response errors are presented. The basic sources of data included the primary and secondary. Primary data entails first-hand information from the field using primary data collection instruments such as interviews, questionnaires, observation and focus group discussions. I narrow the focus to the aspects of primary data which are relevant to the survey as a quantitative method.

Appendix A was the survey instrument used to collect primary data from household respondents. It is a structured interview guide with largely close-ended questions on a likert scale. The questions and items on the instrument were designed to provide answers to the specific research questions for quantitative analysis. It was ensured that issues discussed were contextually related to the observed and lived experiences of respondents. Structured interview was preferred to a questionnaire for rural and peri-urban household respondents, so that illiterate ones would face no difficulties in reading and writing the responses.

Survey response refers to information obtained from sample units that answer all survey questions and determine the quality of survey results (Biemer & Lyberg, 2003b). Apart from the general concept of survey response, de Leeuw et al (2008) also identify unit response and item response as specific aspects of survey related response. The former refers to information from a sample unit to survey questions, while the latter refers to an answer to a specific survey question. Since survey, unit and item responses are vital for achieving accurate results, the associated errors and their prevention were identified in advance and thenecessary research ethics executed to prevent their effects on the findings of this study.

To avoid survey nonresponse error, which is the inability to obtain responses from all sample units and on all survey questions, the questions were based on situations that were familiar to the target population, and actually conducting the survey in the locations of this population. Pre-survey notices were also done by sending letters to relevant organisations, including the GWCL, Community Water Committees, Public Utilities Regulatory Commission, Water

Resources Commission, Community Water and Sanitation Agency, Traditional Rulers and Metropolitan, Municipal and District Coordinating Directors on the intended survey. These contained the subject matter, date of the survey, target respondents and purpose of the survey. This enabled me to obtain permission and so prevent situations where the entire survey could be stopped by any authority at the community or organisational level.

Effort was also made to ensure contact with the proposed number of sampling units at the various communities until the total sample size was reached. Apart from avoiding the effect of noncontact on unit nonresponse, possible refusal of a respondent to answer all survey questions was avoided by first introducing the purpose and subject matter of the study and asking for permission to administer questions to a sampled respondent. At the reconnaissance stage, the appropriate timing of the activities of community people was observed. This influenced the data collection period to commence in November, during whichhouseholds in rural and peri-urban communities in northern Ghana have less farm work, and could be met at home, thus reducing the likelihood of noncontact (de Leeuw et al, 2008).There were no cases of refusal, but in case it occurred, a replacement could be sought by the same sampling procedure described earlier.Item nonresponse error was also addressed by making sure that the language in the questions was clear, or the interpretation was understandable to the respondent. The close-ended nature of the interview guide and the options provided made item response easier, since it merely involved choosing an option. Cell phone numbers of respondents were also recorded on the instruments. This facilitated contact for any missing items or unclear responses during the data cleaning stage. The last aspect of field research ethics related to community exit.

The authorities identified earlier were informed of the completion of the field work and departure from the communities. Letters of appreciation were later distributed to them (See Jones, Lewis, Woodland, Jones, & Byard, 2008).

Measurement, presentation and analysis of quantitative data

Attention was given to measurement scales and other quantitative measurement procedures, presentation and analysis in this section. Two main types of measurement scales were found relevant namely the nominal and ordinal scales. According to Kumar (1999), nominal scale applies to variables that cannot be ranked. Here their distributions are accessed using absolute numbers, percentages, medians and modes (central tendencies) presented in tables and charts. This was applied to the study regions, districts, communities, and othersocio-economic characteristics of respondents such as age, sex, education and occupation.

The ordinal scale applies to data that could be ranked. It was applied to variables such as size of household income, willingness to pay at a price and service quality. The case of service quality, issues such as service duration and water quality were measured in terms of number of hours of tap flow and the use of appropriate metric units for ascertaining the various parameters of water quality. These include colour, odour, taste, pH value, faecal coliforms, turbidity, and other relevant parameters (Appendix L). I present first, how willingness and ability to pay for water were measured using contingent valuation methodology and the binary logistic regression model in the next subsection.

Contingent valuation methodology

Contingent valuation method (CVM) was adopted in this study as a direct approach to collecting and analysing data on willingness to pay (WTP) for water.

It involved the administration of an interview guide in which household respondents were asked three different sets of questions. The first was to enquire whether they were willing to pay 20GHp as tariff per basin of improved standpipe water services, with 'Yes' and 'No' options. The findings to this question were used to test a binary logistic regression model discussed at an appropriate section of this unit. The remaining two sets of questions directly related to the contingent valuation method. One of these questions involved how much respondents were willing to pay per basin of improved water at a public standpipe, while the otherdealt with how much their households actually spent on water per person per day. The associated responses were used for cross-tabulation of willingness to pay and ability to pay respectively, based on the socio-economic characteristics of the respondents (See Tiltnes, 1998). The last two cases were where the CVM was applied. In this approach, a structured household survey interview guide was administered to 386 households located in the rural, peri-urban and urban communities of the Northern and Upper East Regions of Ghana.

WTP and ability to pay (APT) were assessed separately because they mean different things. WTP determines the maximum amount of money an individual is willing to pay in order to benefit from a particular good or service. On the other hand, ATP is a subjective judgment based on some assumptions as to what should be considered as fair for people to pay for a particular good or service (Rina & Rosminah, 2011). In other words, consumers may indicate what tariff they would be willing to pay for water, but what they could actually pay depends on the proportion of their disposable income that could be spent on water. Accordingly, households were asked directly, how much they would be willing to pay per unit of water, and how much they are able to pay for the water (based on household budget).

According to Tiltnes (1998), there are different versions of contingent valuation survey tools for willingness and ability to pay studies. However, a distinction can be made between two main types, namely, the continuous methods and the discrete choice methods. Continues methods of CVM involve open-ended questions. In other words, the questions ask respondents to state, rather thanchoose the maximum amount of money they would be willing and able to pay for a given commodity. On the other hand, the discrete methods of CVM depend on the dichotomous choice format. Thus, respondents are asked whether they would be willing and able to pay less than or above a set monetary value for the commodity. I choose the discrete choice method.

Application of the discrete choice method of contingent valuation

My position for this study is the discrete choice method, specifically the referendum format. This is related to the semi-parametric or discrete choice behaviour model under the random utility models of the consumer theory. This involves lowering or raising an offer to a commodity from a specific bid, and so exposes the respondent to the minimum and maximum WTP options using close-ended questions (Train, 2009). Questions related to discrete choice methods ask ‘which one?’, and options could be set based on past consumption and responsiveness to the associated tariff (Rina & Rosmina, 2011). Practical situations of the dichotomous discrete choice method include choosing to pay less than or more than a ruling market tariff for a specified quantity of water (See Greene, 2008; Train, 1986).

The choice of a particular method of CVM in water supply related issues depends on the purpose of the study or the stage of development of water services in the study area. Thus, a willingness to pay study carried out as part of project preparation for the supply of water to an area without piped water connections would use the continuous method (e.g. Gunatilake & Tachiri, 2012). In other words, you ask respondents how much they would be willing to pay for the water if provided (Rina & Rosmina, 2011). This is because of the need for beneficiaryparticipation by survey responses and other consultative procedures for proposed service conditions, including tariff determination.

The justification for the adoption of the discrete choice method in my study is that I sought to determine willingness and ability to pay an already imposed tariff on existing water services, and how observed poor tariff payment performance could be improved. This called for the need to include the ruling market tariff in the option. The aim was to prevent respondents from stating options that would emerge irrelevant with regards to concluding whether they were willing and able to pay the ruling market tariff or not.

Thus, during the reconnaissance survey, the commonest container on which water tariff at the public standpipes is based on was the aluminum basin. Others of similar capacity were the yellow plastic cans also seen in Figure 6, nicknamed ‘Kuffour gallons’. For all containers that were not smaller than the basin, water was drawn into the aluminum basin and then transferred into those containers to ensure fair measurement. In Figure 6, the small container in the basin is for conveying the water into the Kuffour gallon nearby.

Figure 6: The aluminum basin as the basis of measurement of water
Source: Field survey, Bukari (2015)

The common type of aluminum basin observed has a capacity of 54ltr (0.054m^3) or three times the volume of an 18ltr bucket (Obtained from measurements on the field). The ruling market tariff per aluminum basin at the standpipes was 20GHp at the time of this study. Being largely illiterate, and because the sample units were households, it was convenient to use the aluminum basin as the basis of measurement than metric units such as litres (ltr) and cubicmetres (m^3). Majority might not understand these. Furthermore, it also reduced guesses as to what quantity of water they consume and pay for on daily, weekly or monthly basis.

Additionally, the use of the basin and reference to the tariff level of 20GHp incorporated the 'past consumption' and 'responsiveness to the associated tariff' as asserted by Rina and Rosmina (2011). The variations in household sizes also made it difficult to set discrete choice options based on empirical findings. Accordingly, based Institute Water for Africa's [IWA] (2015) specification that a person needs about 50ltr of safe water for ideal living conditions per day, the choice of the basin which is about the same quantity (54ltr) was considered to be an alternative standard unit of measurement. Therefore, respondents were asked how much they were willing to pay for treated standpipe water per aluminum basin. Options were set for less than 20GHp, and 20GHp or more.

The choice of two levels of options was influenced by the binary logistic regression statistic used to test the relationships between WTP as a dependentcategorical variable, and other independent categorical variables or predictors such as income. Even though this method has been criticised for loss of detailed information, the minimum number of options also reduces the dataset to economise space. It is also easier to understand compared to the more complex multinomial regression, which uses more than three options (Powers & Xie, 1999).

Care was taken to ensure that the grouping of options involved adequate definition that carried the desired meaning and understanding (Pallant, 2005). Accordingly, variables that could otherwise be continuous, such as income, household size and even WTP at a price, were grouped into categories or classes. Thus, respondents could express their WTP by choosing between 'less than 20GHp' and '20Gp or more' per basin of water. Cross-tabulation was used to present the data using the socio-economic characteristics of the respondents, settlement types (rural, peri-urban and urban) and the tariff options respondents were willing to pay. Descriptive statistics such as percentages and frequencies were used to measure WTP in the CVM tables.

The dichotomous and categorical requirements for the dependent variable in the adopted binary logistic model influenced the use of 'No' and 'Yes' as options. Thus, respondents were to choose between these two options when asked whether they were willing to pay 20GHp per basin of improved standpipe water services. This question related to the dependent variable for the statistical aspects of the analysis. Similar options were set for the independent or predictor variables in the WTP model, such as price or tariff level, service quality, household incomesize, and educational status. For example, respondents were asked whether the level of water tariff or household income determined their willingness to pay for water. These together with the responses related to the dependent variable were used to test the WTP model.

The CVM was used to address research objective one and the associated question. This concerns the relationship between the socio-economic characteristics of households and willingness and ability to pay for water. The outcome of this research using the CVM revealed how urban water tariffs ought to be set for rural and peri-urban communities connected to urban water systems. It also indicates what households would decide about the tariff conditions of urban water services extended to them. This could influence policy makers to ensure fairness in the imposition of tariffs on such communities. In the ensuing subsections I discuss how biases in CVM were managed, followed by the application of the binary logistic regression.

Dealing with bias

Despite its wide applications in the fields of market and non-market studies, CVM has not been devoid of criticisms. The detractors of the method argue that it lends itself to question format, strategic, starting-point and hypothetical biases. Question format bias concerns how the nature of questions could affect WTP bids; strategic bias involves how a set of factors could minimise or maximise respondents' motivation for strategic behaviour, and hence their expressions of WTP. These are different from starting-point bias, in which the initial price set as an option in the question influences subsequent bids (See Free,2010). A situation in which there is divergence between what respondents say they pay, and what they actually pay is known as hypothetical bias (Mohammed, 2012).

I sought to manage hypothetical bias. This is because the cross-sectional nature of this study did not make provisions for different instruments for managing the different types of biases. Furthermore, an approach such as strategic bias management would involve exposing respondents to the factors that minimise and maximise their incentives for strategic behaviour. However, this study is an exploratory academic exercise not carried out for the rigorous assessment of an implemented project.

My choice to manage hypothetical bias is due to its possible inflationary effect on a tariff determination policy for a population from which over-stated WTP tariff data were generated. This was managed by ascertaining respondents' willingness to pay and ability to pay for water concurrently for the purpose of comparison.

Binary Logistic Regression Model and Willingness to Pay Function

Logistic regression or logit model is a statistical method which uses a logistic function as the cumulative logistic distribution, to measure relationship between a categorical dependent variable and one or more independent variables by estimating probabilities. All of the independent variables could be dichotomous and categorical, but some could be continuous (Pallant, 2005). Specifically, the binary logistic regression was used in this study. This is used when the dependent variable is dichotomous with only two categories (two options), usually by discrete choice (Leech, Barrett & Morgan, 2005).

Binary logistic regression also assumes that the outcomes are independent or mutually exclusive. This means that a single case must belong to one group or another and represented only once. This statistic was used to test the willingness to pay model adopted for this study, and related factors used in the CVM for research question one. The next sub-section presents the model specification based on this method.

Model specification

I adopt a function for consumer demand or willingness to pay for water at a price (Munasinghe, 1992, p.129) expressed as:

$$D=D(P, R^{*}, Y, \underline{Z}) \qquad (1)$$

Where D= Willingness to pay for water

P= price of water (tariff)

R*= service quality consumers expect to receive;

Y= level of economic activity; and

<u>Z</u>= vector for other explanatory variables.

Using the binary logit model, let the dependent variable be D. Since the logit model depends on categorical data, then by the discrete choice or referendum method, according to Pallant (2005) and Leech, Barrett and Morgan (2005), respondents could be asked a question such as 'Are you willing to pay20GHp as tariff per aluminum basin of improved public standpipe water services? Theoptions to this question were'Yes' or 'No'. This served to measure the dependent variable D. It is assumed that *di*is the realisation of D*i* (WTP for water) at random by the *i*-th respondent. Based on the use of the binary logit model, the response *di* is a binary one that could take only two values coded zero and one. Therefore, *di*is defined as follows:

$$di = \begin{cases} 0 \; if the \; i{-}threspondentisnotwillingtopayforwater \; (No) \\ 1 \; if thei{-}threspondentiswillingtopayforwater \; (Yes) \end{cases}$$

The probabilities of the *i*-th respondent choosing 0 and 1 are $1-\pi_i$ and π_i respectively. This implies that if $d_i=0$, we obtain $1-\pi_i$, and if $d_i=1$, we obtain π. Since the binary logit function is one of a cumulative probability distribution, we could express $D_i$in terms of its distribution using the Bernoulli distribution with π_i as the parameter. We consider also that there could be n_i observations that take on the values 0,1...........n_i If the n_i taking the various values are independent, but with the same probability π_i of having WTP, then the distribution of D_i is binomial with $\pi_i$and n_i as parameters, and expressed as

D_i~ B(n_i-π_i),

and its probability distribution function is

$$\Pr\{D_i = d_i\} = \binom{n_i}{d_i} \pi_i^{d_i}[1 - \pi_i]^{n_i - d_i} \quad (2)$$

for d_i=0, 1..........n_i. Here $\pi_i^{di}[1-\pi_i]^{n_i-di}$ is the probability of obtaining d_i successes (i.e. a respondent selected at random chose 'yes'), and n_i-d_i failures (i.e. a respondent selected at random chose 'no') in some specific order. Thus, the likelihood of successes or failures are realised by indicator variables, which in this case, represent the levels of WTP described herein. In view of this, Powers and Xie (1999), posit that the probability of a respondent's WTP taking on an expected value in a defined group is obtained by the sum of all indicator variables in that group. My aim in this section is to express how binary logistic regression explains the probability distribution of respondents' WTP in accordance to the definition provided.

To link the binary logit model to the WTP function D=D(P, R*,Y, $\underline{Z}$), it is implied by the arrangement of the elements in this function that they are independent or predictor variables. Put differently, each is capable of influencing WTP or D_i. Thus, the realisation of P_i (price in an identified group, such as age), can also be represented by the response p_i. In the same way, R_i* (expected service quality), Y_i (economic factor) and $\underline{Z}_i$ (vector for other explanatory factors) for the defined group, could be represented by responses r_i*, y_i and $\underline{z}_i$ respectively. These responses are equally binary, based on the two WTP values coded one and zero. Therefore, these are defined as follows:

$$P_i, r_i{*}, y_i z_i = \begin{cases} 0 \; if\, i{-}threspondent doesnot choose the option of interest \\ 1 \; the\, i{-}threspondent chooses the option of interest \end{cases}$$

The option of interest here refers to positive response, for instance when a respondent answers 'yes' to the question of whether she/he is willing to pay water tariff, or literate, to the question on educational status. The probability distribution of each predictor is also obtainable by substituting them in turns, into equation (2). Thus, the probability distributions of P_i, R_i*, Y_i and $\underline{Z}_i$, respectively are:

$$P_r\{P_i = p_i = \binom{n_i}{p_i} \pi_r^{p_i} [1 - \pi_i]^{n_i - p_i} \qquad (2.1)$$

$$P_r\{R_i^* = r_i^*\} = \binom{n_i}{r_i^*} \pi_i^{r*i} [1 - \pi_i]^{n_1 - r_i^*} \qquad (2.2)$$

$$P_r\{Y_i = y_i\} = \binom{n_i}{y_i} \pi_i^{y_i} [1 - \pi_i]^{n_i - y_i} \qquad (2.3)$$

$$P_r\{Z_i = z_i\} = \binom{n_i}{z_i} \pi_i^{z_i} [1 - \pi_i]^{n_i - z_i} \qquad (2.4)$$

for $p_i, r_i{*}, y_i, \underline{z}_i = 0, 1..........n_i$

The final model adopted for the willingness to pay for water, for observations that take on the values 0,1...........n_i, is expressed as the sum of the indicator variables for all the predictors or independent variables that influence WTP (D_i) for an indented group. Let *i* and *j* denote the probability of a respondent choosing 'No' (Failure) and 'Yes' (Success) respectively. The developed model (based on Powers & Xie, 1999) is expressed as

$$D_{ij} = \Sigma[P_{ij}, R^*_{ij}, Y_{ij}, \underline{Z}_{ij}] \qquad (3)$$

Specifically, since binary logistic regression requires categorical dependent variables, while the independent variables could be both categorical and continuous but with only two levels of options, a sample question relating to price was whether the level of water tariff (P) determines a respondent's WTP. The options for this and the subsequent predictors or independent variables were 'No' and 'Yes', representing *i* and *j* and coded 0 and 1 respectively. For the expected service quality (R*), inquiry was based on whether service quality, such as number of hours of tap flow per day determines a respondent's WTP. For the economic factor (Y), respondents were asked whether their household income sizes and occupation determine their WTP. For the other explanatory vector $\underline{Z}$, I investigated whether age, sex, education, religion and marital status of a respondent determined WTP. I wish to stress that other variables measured in this study followed the binary approach of setting options, provided the discretion to collapse responses into two values would have no significant effect in terms of loss of data. This was to ensure that in case it became necessary to test any of such variables by the binary logit model it should be possible.

In the SPSS entries, the variable related to respondent's WTP for treated standpipe water (with yes and no options) was entered into the dependent variable box. This was followed by moving tariff, quality of services, household monthly income, and educational status as predictors of WTP into the covariates box. These represented the independent variables in the adopted WTP model.

Essential components of the analysis of output, after checking the descriptive statistics, were the 'Classification Table', indicating the percentage of correct predictions and 'Variables in the Equation' table for the odds of successful predictions (i.e. the probability that respondents would not satisfy the option of interest). This is followed by 'Variables not in the Equation' table, which shows how SPSS predicts how significant each independent variable could determine WTP at Block 0, before they are actually entered into the model at Block 1. The actual contribution of each variable in terms of statistical significance is indicated in the Variables in the Equation table of Block 1. The results of this table (in Block 1) serve as the realisation of the various predictors in the WTP model. These are compared to the results of Block 0 to see how best the model performs with the predictor variables.That is, the probabilities that a randomly selected respondent's WTP would be influenced by a specific variable in the WTP model, which were given as P_i,r_i*,y_i, *and* $\underline{z}_i$.Hence, the alpha levels of significance (α) are the probability outcomes for equations 2.1 to 2.4.

Thus, a significant level of 0.05 for income implies $Pr\{Y_i=y_i\}=0.05$. This means the probability that the*i-th* respondent selected at random would choose 'No' on the question of whether household income size determines his/her willingness to pay for water is less than 0.05 (Less than five percent).Put differently, it means we could be 95 percent confident that the economic factor (Income) determines the respondent's WTP.

The Omnibus Test of Model Coefficients tests the significance of the model or equation in terms of the collective effects of all the predictor variables used. In this study this represents the outcome of the model $D_{ij}=\Sigma[P_{ij}, R^*_{ij}, Y_{ij}, \underline{Z}_{ij}]$. On the other hand,the Model Summary estimates the percentage of the variance accounted for. This statistical analysis helped to identify which variables should be considered for policy recommendations for rural and peri-urban communities connected to urban water systems, in terms of their significant association with willingness to pay for water.

Qualitative approach

This is the second component of the concurrent triangulation research design. By this approach, the study employed data collection and analytical methods that were non-quantitative, in order to complement the quantitative approach concurrently. It specifically aimed to explore the social relations that exist between stakeholders and describe reality from the experiences of respondents on matters of water tariff determination and payment in rural and peri-urban communities in northern Ghana (See Sarantakos, 1996; Kumar, 1999).

While the quantitative facet used survey method, the qualitative approach was exploratory, and theoretically influenced by hermeneutics, phenomenology and symbolic interactionism. By the exploratory character, the study sought to obtain detailed information using the trajectory specified by Barton and Lazarsfeld (1979). In other words, analysis of research objects was facilitated through this approach by interpreting, understanding and relating published research findings to the contextual basis of the current study as a feature of hermeneutics. This spanned the definition of the research problem to the results and discussions chapters.

The next step was by identification of indicators as defined in previous research findings and central to the present research problem. This includes evidences of rural and peri-urban communities connected to urban water systems and subject to tariff payment, and with some level of stakeholder participation. The final stage of the trajectory is the establishment of typologies, typically by the classification of communities as rural, peri-urban and urban and respondent categories (household respondents, service providers [GWCL] and community level organisations [Community Water Committees]).

The initial step of the exploratory process was the reconnaissance stage, which helped in the final selection of study communities and the active stakeholders to be included in the samples based on evidence of their activities.

The phenomenological perspective was applied by finding answers to the same research questions addressed under the survey method, using qualitative instruments such as focus group discussions, observations and interviews. The aim was to obtain information based on how community respondents perceived and interpreted phenomena from the constructivist point of view, and then comparing findings to what has been objectively shaped for them as covered by the quantitative approach.

Symbolic interactionism also aided inquiries into how stakeholders perceive, interpret, and assign tariff as a symbol of the value of water consumed by communities. This serves as the basis of their interactions, and how the participatory interactive processes cause changes in water tariff or influencehousehold willingness to pay the tariff (see Herman-Kinney &Reynolds, 2003).According to Flick (2013), qualitative data analysis techniques include collection and documentation of data; categorisation of the data into concepts; connection of the data to show how one concept may influence another; corroboration and presenting the findings. The contextual applications of these techniques are discussed in the subsections below.

Qualitative data collection and documentation

This was an important step for the beginning of qualitative data analysis. Based on the qualitative theories of phenomenology and hermeneutics, both primary and secondary sources of qualitative data were used respectively. The primary sources included information from qualitative data collection instruments such as a semi-structured observation guide (Appendix B);structured questionnaire with open and close-ended questions for GWCL (Appendix C), Public Utilities Regulatory Commission (Appendix E), Water Resources

Commission (Appendix F); Community Water and Sanitation Agency (Appendix I), Metropolitan, Municipal and District Assemblies (Appendix H) and Health officials (Appendix G); and semi-structured focus group discussion guide with close and open-ended questions for Community Water Committees or a mixed gender group of men and women between 6 to 12 participants, in communities without water committees (Appendix D).

The items on the instruments were designed to obtain answers for the specific research questions concurrently with those from the survey data. Thespecific questions therefore influenced the construction of the themes on the instruments for both quantitative and qualitative instruments. Although non-numerical data from officials of the various organisations were analysed qualitatively, non-response rate was reduced by setting close-ended questions similar to those for household respondents, for the purpose of triangulation. Furthermore because officials of the urbanisations interviewed were educated, questionnaires with close and open-ended questions were administered to them. Extra spaces for even close-ended questions were provided on the instruments to promote further elaboration of answers, which were sometimes recorded in filed notebooks if the space provided was not enough. It was also chosen because of the difficulty of meeting such officials given their work schedules (Cohen & Crabtree, 2006). The merit of using focus group discussions and observations under the qualitative approach are similar to those mentioned under the survey method.

The additional merit of observation was to triangulate what respondents say they do, to what they actually do (Taylor-Powell & Steele, 1996). Focus group discussions also enabled the incorporation of group story from a mixed gender perspective into the findings. The problems of time management with interviews and focus group discussions, due to encounter with 'talkative' respondents, and the effect of poor interpretation of questions on response errors were foreseen. The use of close-ended questions and the involvement of trained resident research assistants were the adopted strategies to solve such problems.

Secondary data, especially non-numerical forms constituted the next source of qualitative data. These included literature from published articles in journals, textbooks, organisational reports and newspapers. Secondary data was relevant during the definition of the problem and literature review chapters, as well as the analysis of results by serving as a means of measuring levels of conformity of the findings to the mainstream literature on the subject matter.

The collected data were documented by transcribing responses into the appropriate margins of the instruments and field notebooks. Mobile phones and cameras were also used to record voices of respondents and to snap relevant features. The notes, recordings and pictures were studied on the field. The purpose was to determine how to code them under specific themes based on the research questions so that they correspond to those covered in the quantitative approach for triangulation.

Conceptualisation

This involved listing of concepts identified in the responses and how they interrelate. For instance where responses emphasised poverty as a cause of unwillingness to pay water tariff, the dominant occupation, household income and how these vary by gender in the community were cross-examined. New concepts that emerged from the responses were also identified through meetings with research assistants for team reflection over field notes. This helped to refine the concepts during data analysis.

Corroboration, presentation and analysis of qualitative data

After the data was collected, recorded, categorised and relationships between concepts and variables were identified, presentation and analysis of qualitative data began concurrently with the quantitative analysis. Qualitative data presentation took the forms of pictures, maps, tables and boxes. For instance the pictures of broken-down public standpipes, queuing at serviceable ones, and technicians at water quality control laboratories were used to aid analysis of services quality. Maps were also used to show study communities and extent of coverage of piped water services in the study areas. Tables with non-numerical coding that rank nominal and ordinal data (e.g. on nature of water services) into high, medium and low; sometimes, always, not at all; and other descriptions relating to colour, taste, and smell of water were also used. Narration of some responses from focus group discussions were also presented in boxes.

The actual analysis went beyond the mere description of phenomena, to include narrations and explanations as to why the observed situations were so. This entailed corroboration of findings from the categorisation process described earlier, as well as making reference to the theoretical, conceptual, empirical and policy frameworks expressed in the literature. The aim was to fulfil the effectuation of the overarching philosophical paradigm of multiple realities. This was by following an analytical trajectory that integrated the multiple relationships among the several constructs of realities through interpretations, explanations, narrations and verbal correlations. These also internalised the basics of the qualitative theories of phenomenology, hermeneutics and symbolicinteractionism.

Attention was paid to the identification of relevant variables, the evidences that support their connections, and how these contribute to answering the specific research questions. Again, this was done alongside the quantitative analysis. Table 5 shows the categories of respondents for qualitative data. Table 6 also

Table 5: Non-household Respondents

Instrument	Location	Organisation	Designation of participants	Number of participants
Questionnaire	Accra /Tamale	PURC	Data Analyst	1 each
	Accra	WRC	Legal Officer	1(Accra)
	Tamale/ Bolgatanga	GWCL	Production Manager	1 (Tamale)
			Water Quality Laboratory Technician	1 each (Tamale/Bolgatanga)
			Customer Care Officer	1 each (Tamale/Bolgatanga)
		Metropolitan /Municipal Assembly	Assistant Director II B (Tamale Metro) Environmental Health Officer (Bolgatanga Municipal)	1 each
		CWSA	Chief Hydrologist (Tamale) Principal Water and Sanitation Officer (Bolgatanga)	1 each
		GHS	Regional Disease Control Officer (Tamale) OPD Midwife (Bolgatanga)	1 each
Focus group discussion guide	Study communities	Community Water Committees	Male and female members	6 participants or more

Source: This study, Bukari (2015)

summarises the concurrent triangulation design. The justification for triangulation is that it facilitates the generation of research data that is different but complementary on the same topic (Morse, 1991).

Table 6: Summary of the Concurrent Triangulation Mixed Methods Design

Specific research question	Method of data collection	Analytical approach
What are the relationships between the socio-economic characteristics of rural and peri-urban households and willingness and ability to pay for water?	Structured interview guide with close-ended questions (Likert scale), structured interview guide with open and close-ended questions, focus group discussion guide with open and close-ended questions.	Contingent valuation methodology, with both qualitative and quantitative approaches.
How are water tariffs determined for rural and peri-urban communities connected to urban water systems?	Structured interview guide with close-ended questions (Likert scale), structured interview guide with open and close-ended questions, focus group discussion guide with open and close-ended questions.	Quantitative and qualitative
What are the interests of rural and peri-urban communities and other stakeholders in participatory water tariff determination? Table 6 continued	Structured interview guide with close-ended questions (Likert scale), structured interview guide with open and close-ended questions, focus group discussion guide with open and close-ended questions, structured observation guide.	Quantitative and qualitative
What are the effects of the water tariff determination process on water tariff payment in the communities?	Structured interview guide with close-ended questions (Likert scale), structured interview guide with open and close-ended questions, focus group discussion guide with open and close-ended questions.	Quantitative and qualitative
How do the complementarities and synergies of stakeholders contribute to improvement of water tariff payment in rural and peri-urban communities connected to urban water systems?	Structured interview guide with close-ended questions (Likert scale), structured interview guide with open and close-ended questions, focus group discussion guide with open and close-ended questions, structured observation guide.	Quantitative and qualitative (but largely qualitative)

Source: This study, Bukari (2015).

With the exception of measurement procedures, the errors associated with quantitative data collection and related ethical approaches are similar to those of qualitative approach. Flick (2013) posits that accuracy, validity and reliability of qualitative research results could be adversely affected if the issues of inquiry are not experienced by the target population, or the investigation does not adopt a holistic approach. In other words, it is inappropriate to detach thought, events and social contexts from an investigation. The ethical considerations discussed under the survey approach showed how these aspects were addressed. More specifically, following the views of Flick (2013), the credibility of informants; the relevance of the questions asked; and the active involvement of the researcher and training of assistants that could influence the quality of responses were of focal considerations.

To achieve the required standard, respondents were selected from a sample frame defined in the context of association with the phenomena studied. These include households in rural and peri-urban communities of Northern and Upper East Regions depending on pro-poor public piped water services, basically public standpipe users.

Questions were also arranged under sections derived from the specific research questions of the study. Non-household respondents were also selected from the identified stakeholders who were readily available. Researchassistants were trained and pretesting of instruments undertaken with my direct involvement at all stages of the data collection process.

Overview of the Types of Variables Used in the Mixed Research Design

Table 7 presents the linkages between the theories, concepts and variables used in this study. The measurement of variables under the various measurement scales in quantitative and qualitative approaches has been discussed in the respective sections. However, it is necessary to also look at the categories of the variables, concepts and theories they relate to. How the relationship contributed to addressing the main research question on improving water tariff payment has also been considered.

Table 7: Linkage between Theories, Concepts and Variables

Theories		Marginal cost pricing theory of water tariff	Stakeholder theory
Conceptual issues	Concept of consumer	Concept of water tariff	Concept of stakeholder participation
Independent variables	Age, gender, occupation, educational status, marital status, religion, household income, household size, region, settlement type of the communities (rural/peri-urban)	Types of water tariff: increasing block tariff, decreasing block tariff, flat tariff, differentiated tariff	Types of stakeholders: households as consumers, GWCL as service provider; PURC as tariff regulator; NGOs/civil societies as advocates
Dependent variables	Willingness to pay	Willingness to pay	Willingness to pay
Intervening variables			Type of stakeholder participation: functional, interactive or pseudo participation; Bases of stakeholder participation: water service delivery, pro-poor tariff determination, subsidisation, service quality; stakeholder interests: cost recovery, fairness, affordability

Source: Modified from Creswell (2009)

Contextually, variables are the concepts which could cause or undergo changes and can be measured to determine for instance, the impact of the stakeholder participation on water tariff payment (Kumar, 1999). In this study, the independent, dependent and intervening variables are prioritised. Independent variables are the causal variables that can cause changes in the willingness and ability to pay water tariffs in the study area (see Kerlinger, 1986).

Dependent variables on the other hand, are the change variables affected by the manipulation of the independent variables (Heppner, Kivlighan, & Wampold, 1999), while intervening variables influence the level of change in the relationship between the dependent and independent variables (Kumar, 1999). Just as the conceptual bases of the study were derived from the theories, the types of variables were also derived the concepts. Table 7 shows the relationships. It is also obvious from the table that intervening variables are mainly related to thestakeholder theory, and specifically derived from the concept of stakeholder participation.

The stakeholder concept also has independent variables and the common dependent variable of willingness to pay water tariff. The type of participation, the bases of participation and the interests of stakeholders, and how these influence the independent variables in order to improve willingness to pay water tariff have been discussed in literature review chapter.

Chapter Summary

In summary, Chapter Five covered the study area, philosophical bases and research design. These were integrated to present a methodological framework to guide the scientific procedures for achieving the results. It was also presented such that any other researcher who wishes to verify the results could use the same procedures as a map with ease (Twumasi, 2001).

CHAPTER SIX

WILLINGNESS AND ABILITY TO PAY WATER TARIFF

Introduction

This chapter is particularly shaped by the consumer and stakeholder theories, Arnstein's ladder of citizen participation and the associated concepts. It focuses on the background of the respondents and other conditions that qualify them as consumers of urban piped water services of GWCL. These were achieved by first addressing research questions one and two, which are about the socio-economic characteristics of households and the links to willingness and ability to pay for water, and how water tariffs are determined for them respectively. These relate to the evidence of implemented aspects of the planning phase of the conceptual framework, and so consider aspects of the descriptive tenet of the stakeholder theory. Also included is the identification of the interests of stakeholders in the participatory water tariff determination process. This constitutes a feature of the stakeholder analysis framework, and served to answer the third research question.

Background of Respondents and the Contingent Valuation Method

This section discusses the application of contingent valuation method to the socio-economic characteristics of respondents for all the study areas using data from the household interview guide (Appendix A). The characteristics include age, sex, education, occupation, monthly income, religion, marital status and household size. The link between each characteristic on willingness to pay for water was then ascertained by cross-tabulation, after giving a picture ofwillingness to pay for water in the Northern and Upper East Regions. The focus was on comparison of willingness to pay for water by settlement type and across the various characteristics of respondents. Testing of hypotheses using the binary logistic regression model provided statistical inferences on the relationship between the background of respondents and willingness to pay for water. The discussions herein, partly addressed research question one.

Age of respondents

At the household level, this study relied on household respondents who were 18 years or older, and pay for public standpipe services. The purpose was to ensure that respondents could not only provide relevant information, but also contribute meaningfully to decision making or recommendations that could influence water policy, based on their experiences as water tariff payers. In the Northern Region, Figure 7 shows that 55 percent, 37 percent and eight percent of household respondents were in the age groups 18-33, 34-49, and 50-65+ years old respectively.

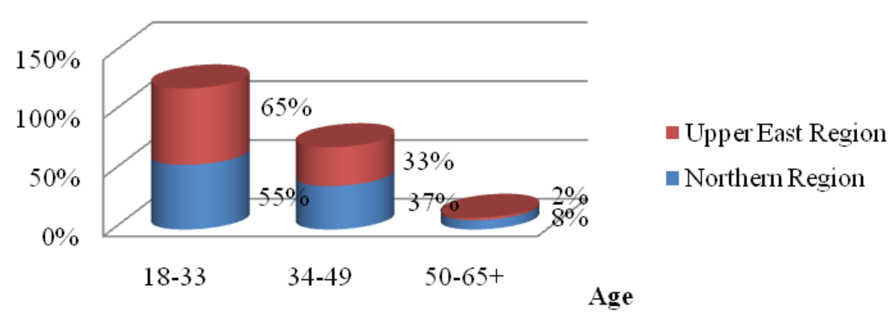

Figure 7: Age distribution of respondents by regionSource:

Field survey, Bukari (2015)

In addition, in the Upper East Region, the respective age groups were represented by 65 percent, 33 percent and 2 percent. Age group 18-33 was therefore dominant, while the group 50-65+ was less represented in the two regions. This pattern of age distribution is in line with the age structure of

Ghana's population which is generally youthful, with persons aged 65+ constituting only 4.8 percent (GSS, 2014b).

Details of age distribution by settlement type and the link to willingness to pay are presented in Table 8. It is seen that 40 percent of urban respondents chose the tariff option of less than 20GHp, while the remaining 60 percent opted for the higher tariff bid of 20GHp or more per aluminum basin of water.Of these, 37 percent of the age group 18-33, 54 percent of the group 34-49 and zero percent of the age group 50-65+ were willing to pay the lower tariff option, compared to 63 percent, 46 percent and 100 percent of the respective age groups willing to pay the higher tariff bid of 20GHp or more. This implies that the proportions of urban respondents in the age groups 18-33 and 50-65+ increased as water tariff increased, while that of group 34-49 decreased.

Among the peri-urban respondents, the majority of 69 percent were willing to pay the lower tariff, but the remainder (31 percent) was willingto pay the ruling market tariff of 20GHp or more per basin of water. Within the age groups, 68 percent, 70 percent and 75 percent of the groups 18-33, 34-49 and 50-65+ were willing to pay the lower tariff bid of less than 20GHp per basin of water. On the other hand, willingness to pay was lower for the ruling market tariff of 20GHp or more, with 32 percent, 30 percent and 25 percent of the respective age groups willing to pay this amount. All age groups of peri-urban respondents were therefore less willing to pay for standpipe water, but the group 18-33 was willing to pay more than the others were.

Table 8: Willingness to Pay by Age:

Settlement type	Willingness to pay tariff per basin of water	Descriptive	Age groups 18-33	34-49	50-65+	Total
Urban	Less than 20GHp	*F*	22	14	0	36
	Within settlement	%	37	54	0	40
	20GHp or more	*F*	38	12	5	55
	Within settlement	%	63	46	100	60
	Total urban	*f* %	60 100	26 100	5 100	91 100
Peri-urban	Less than 20GHp	*F*	67	40	3	110
	Within settlement	%	68	70	75	69
	20GHp or more	*f*	31	17	1	49
	Within settlement	%	32	30	25	31
	Total peri-urban	*f* %	98 100	57 100	4 100	159 100
Rural	Less than 20GHp	*f*	47	38	7	92
	Within settlement	%	66	70	64	68
	20GHp or more	*f*	24	16	4	44
	Within settlement	%	34	30	36	32
	Total rural	*f* %	71 100	54 100	11 100	136 100
	Grand total	*f* %	229	137	20	386 100

Source: Field survey, Buakri(2015)

Table 8 also shows that a greater proportion of 69 percent of the rural respondents was willing to pay the lower tariff, while the remaining 31 percent was willing to pay the ruling market tariff or more. Again, greater proportions of all age groups among the rural respondents were willing to pay the lower tariff option. Thus, among the various settlements, willingness to pay was higher within the age group 50-65+, followed by the group 18-33, with the 34-49 group the least willing to pay. The finding is consistent with that of Moffat, Motlaleng and Thukuza (2011), who initially hypothesised that persons below 40 years are willing to pay more for water. However, their study results indicated that willingness to pay for water increased with age.

Sex of respondents

Out of 211 respondents in the Northern Region, Figure 8 reveals that 37 percent were males and 63 percent were females. In the Upper East Region, there were 175 respondents with 42 percent males and 58 percent females. This patternof sex distribution was not surprising because Ghana's population is made up of female majority (51.2 percent) (GSS, 2012a). Another explanation is that, I gave equal chances of selection to both gender groups by not focusing on household heads as the sampling units, in which case males would have dominated, since northern Ghana is a patriarchal society (Apusigah, 2004).

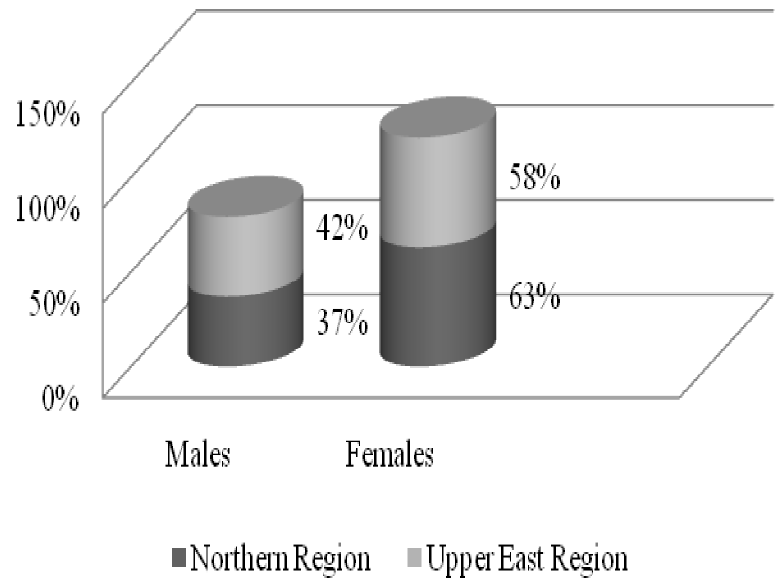

Figure 8: Sex distribution of respondents by region

Source: Field survey, Bukari (2015)

Details of sex distribution by settlement type and the association to willingness to pay for water are presented in Table 9. In terms of WTP, the data in Table 9 reveals that 40 percent of urban respondents offered to pay less than 20GHp per basin of water, while 60 percent opted for the higher tariff bid.

In terms of WTP by gender, 35 percent and 43 percent of males and females respectively, were willing to pay the lower tariff bid of less than 20GHp per basin of water. Willingness to pay the ruling market tariff of 20GHp or more therefore attracted the highest proportions of urban males and females, with 65 percent and57 percent representations respectively. Thus, both gender groups of urban respondents were willing to pay more for water, but the proportional increase in urban males willing to pay more for water was higher than the females.

Table 9: Willingness to Pay by Sex

			Sex		
Settlement type	Willingness to pay tariff per basin of water	Descriptive	Male	Female	Total
Urban	Less than 20GHp	*F*	13	23	36
	Within settlement	%	35	43	40
	20GHp or more	*f*	24	31	55
	Within settlement	%	65	57	60
	Total urban	*f*	37	54	91
		%	100	100	100
Peri-urban	Less than 20GHp	*f*	46	64	110
Table 9 continued	settlement	%	71	68	69
	20GHp or more	*f*	19	30	49
	Within settlement	%	29	32	31
	Total peri-urban	*f*	65	94	159
		%	100	100	100
Rural	Less than 20GHp	*f*	34	58	92
	Within settlement	%	67	62	68
	20GHp or more	*f*	17	27	44
	Within settlement	%	33	38	32
	Total rural	*f*	51	85	136
		%	100	100	100
	Total	*f*	153	233	386
		%	40	60	100

Source: Field survey, Bukari (2015)

Among the peri-urban respondents, 71 percent of males and 68 percent of females were willing to pay less than 20GHp per basin of water. This implied that willingness to pay was lower for the ruling market tariff of 20GHp, with 29 percent of males and 32 percent of females willing to pay this amount. Peri-urban female respondents were therefore willingness to pay more than the males were. In the rural areas, willingness to pay by sex was comparable to that of peri-urban areas. Higher proportions of 67 and 62 percent of males and females respectively, were willing to pay less than 20GHp per basin of water, compared to 33 percent and 38 of the respective gender groups willing to pay the ruling market tariff or more.

Like the case of peri-urban respondents, rural females were also willing to pay more than the males were. From a gender perspective, water acquisition is traditionally the responsibility of women. Despite evidence of their willingness to pay for water more than men, especially in rural and peri-urban areas, their choice of the lower tariff bid was higher. This is because women shoulder the responsibilities of hauling and paying for water (Moffat *et al*., 2011), who constitute the poorest segment of society in northern Ghana (Kendie, 1992). During focus group discussions with Community Water Committees comprising women and men, a woman at Gbolo, a rural community in the Northern Region said:

> We women pay for the water because our household responsibilities have to do with water. However, the tariffs are too high for us to pay. The standpipes flow, but you can find some children going to school withoutbathing because their mothers could not pay for water.

In view of the fact that women are more associated with water acquisition and use for home keeping activities, there is the need to consider their reactions to tariff levels for policy recommendations, especially in rural and peri-urban communities.

Educational status of respondents

Literacy as a social characteristic is about the ability of a person to read and write a simple statement and understand (GSS, 2013). It is preferable, yet similar to educational attainment because it reduces the number of options or categorical variables to analyse, and particularly influenced by the binary logit model adopted for detailed analysis in this work. Respondents were therefore, grouped into illiterates and literates. In the Northern Region, out of 211 respondents, Figure 9 shows that 147 (70 percent) were illiterates, while the remaining 64 (30 percent) were literate. In the Upper East, 81 (42 percent) out of 175 respondents were illiterates, while the remaining 94 (58 percent) were literates. The proportion of literate respondents in the Upper East Region was therefore higher than the Northern Region.

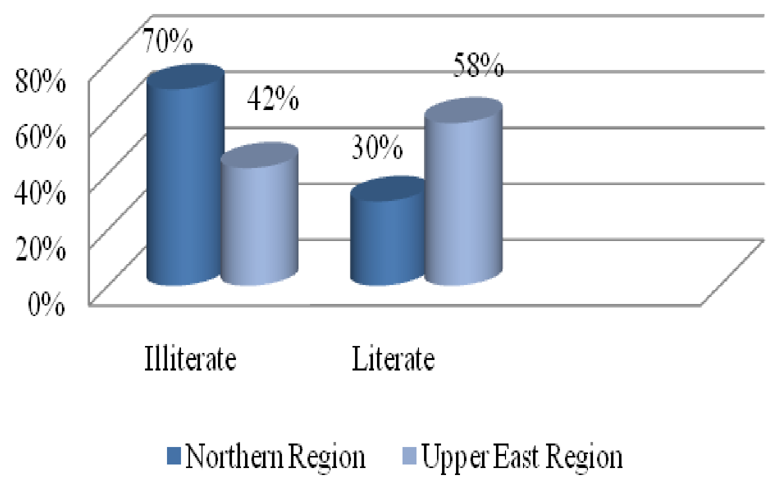

Figure 9: Literacy status of respondents

Source: Field survey, Bukari(2015)

Table 10 presents details of the distribution of the literacy status of respondents and their corresponding WTP by settlement type. The total column in Table 10 shows that 40 percent of urban respondents expressed the willingness to pay less than 20GHp per basin of water, while 60 percent was willing to pay 20GHp or more.

Table 10: Willingness to Pay by Literacy Status of Respondents

			Literacy status		
Settlement type	Willingness to pay tariff per basin of water	Descriptive	Illiterate	Literate	Total
Urban	Less than 20GHp	*f*	23	13	36
	Within settlement	%	61	26	40
	20GHp or more	*f*	15	40	55
	Within settlement	%	39	74	60
	Total urban	*f* %	38 100	53 100	91 100
Peri-urban	Less than 20GHp	*f*	60	50	110
	Within	%	65	75	69.
Table 10 continued	more	*f*	32	17	49
	Within settlement	%	35	25	31
	Total peri-urban	*f* %	92 100	67 100	159 100
Rural	Less than 20GHp	*f*	64	28	92
	Within settlement	%	65	74	68
	20GHp or more	*f*	34	10	44
	Within settlement	%	35	26	32
	Total rural	*f* %	98 100	38 100	136 100
	Grand total	*F* %	228 59	158 41	386 100

Source: Field survey, Bukari (2015)

A greater proportion of 61 percent of the illiterate urban respondents expressed willingness to pay less than 20GHp, compared to 26 percent of the literates who opted for this amount per basin of water. As the tariff bid increased to 20GHp or more, 74 percent of urban literates said they were willing to pay, while 39 percent of the illiterates also did the same. Willingness to pay was therefore higher among urbanliterates than the illiterates.

Among the peri-urban respondents, 65 percent of illiterates and 75 percent of literates expressed willingness to pay less than 20GHp per basin of water. On the other hand, relatively lower proportions of 35 percent and 25 percent of the respective groups expressed willingness to pay the ruling market tariff of 20GHp or more. Thus, unlike the urban areas, willingness to pay was lower among peri-urban respondents, but illiterates were more willing to pay than the literates were.

The case of rural areas was similar to the peri-urban, where 65 percent and 74 percent of illiterates and literates respectively, were willing to pay less than 20GHp per basin of water. For the ruling market tariff of 20GHp or more, 35percent and 26 percent of illiterates and literates respectively, were willing to pay this amount. Thus, only urban literates were willing to pay the ruling market tariff or more, while both illiterates and literates in peri-urban and rural areas were less willing to pay the ruling market tariff.

From the findings on the linkage between educational status and WTP, the contention of Littlefair (1998), that the educational status of water users can affect their WTP for water, seems to be applicable to the urban respondents only. This is because education was inversely related to WTP in rural and peri-urban areas. This raises the question of whether respondents' educational status has any effect on WTP. To answer this, more detailed statistical applications are required, but considered later in this work. This appears in the section on model testing.

Religious background of respondents

Figure 10 describes the religious affiliation of the respondents in the Northern and Upper East Regions, while Table 11 links religion to WTP.

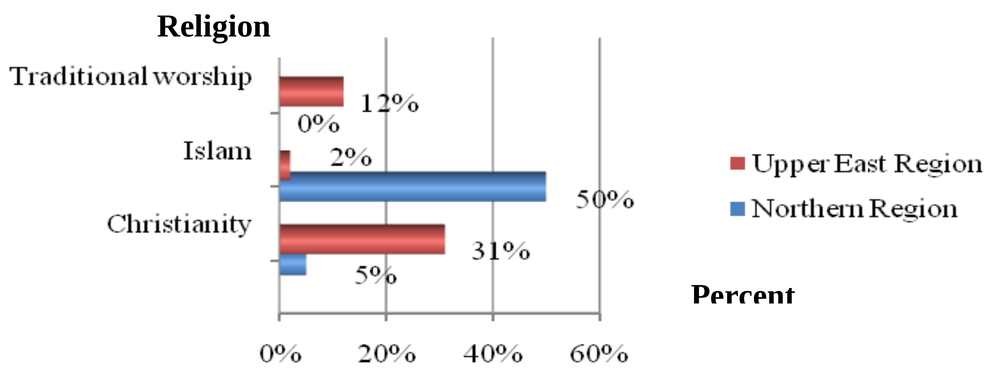

Figure 10: Religious affiliation of respondents

Source: Field survey, Bukari (2015)

Figure 10 reveals that the common religions are Christianity, Islam and Traditional Worship. Traditional worshippers were found only among respondents in the Upper East Region, with 12 percent share of the respondents' population. Islam also dominated in the Northern Region with 50 percent share of the total sample, while Christians were popular among the Upper East Region Respondents (31 percent).

Table 11 presents the link between religion and willingness to pay for treated public standpipe water by settlement type. Among the urban respondents, the data in Table 11 show that for the lower tariff bid of less than 20GHp per aluminum basin of water, 100 percent of Traditional Worshippers, 55 percent of Christians and 22 percent of Islamists were willing to pay.

Table 11 : Willingness to Pay by Religious Affiliation

			Religion			
Settlement type	Willingness to pay per basin of water	Descriptive	Christianity	Islam	Traditional	Total
Urban	Less than 20GHp	*f*	21	11	4	36
	Within settlement	%	55	22	100	40
	20Gp or more	*f*	17	38	0	55
	Within settlement	%	45	78	0	60
	Urban total	*f* %	38 100	49 100	4 100	91 100
Peri-urban	Less than 20GHp	*f*	46	41	23	110
	Within settlement	%	79	53	100	69
	20GHp or more	*f*	12	37	0	49
	Within settlement	%	21	47	0	31
	Peri-urban total	*f* %	58 100	78 100	23 100	159 100
Rural	Less than 20GHp	*f*	35	39	18	92
	Within settlement	%	81	53	95	66
	20GHp or more	*f*	8	35	1	44
	Within settlement	%	18	47	5	34
	Rural total	*f* %	43 100	74 100	19 100	136 100
	Grand total	*f* %	139 36	201 52	46 12	386 100

Source: Field survey, Bukari(2015)

As the bid approaches the ruling market tariff of 20GHp or more, no Traditional Worshipper was willing to pay, but 45 percent of Christians and 78 percent of Islamists were willing to do so. Urban Islamists were therefore willing to pay more for water, followed by Christians. The same pattern of WTP persisted among in the peri-urban and rural respondents, with Islamists most willing to pay for water and Traditionalists not willing to pay the ruling market tariff, except in the rural areas, which attracted one percent response rate for the option of 20GHp or more.

What is common about these three religions is the believe in God as a Supreme Being and creator of the Universe, including life and all natural resources such as water (Awolalu, 1976). According to Akpabio (2011), this tends to influence traditional people's belief in water as a gift of God, and so should not be sold. This claim is proven by the findings of this study, as Table 11 shows that traditional worshippers were not willing to pay as the tariff bid increased. The association of this belief with low water tariff payment was further expressed by one focus group respondent in Gowerie, a rural community in the Upper East Region as follows:

> We know that Ghana Water Company is asking us to pay because they have constructed pipelines and added some medicine to the water. We request for the standpipes and we pay for that. When the standpipes break down, they tell the committee members to collect money from the people to repair them. They can sell their pipelines and medicines, but for the water bills that they continue to bring, I want to know how much they give to God, who provides the water free of charge.

Occupational distribution of respondents

The identified occupations of respondents were farming, trading and services and formal sector jobs (such as teachers, nurses and other salaried workers). Other respondents could not identify themselves with any occupation (No work), while married women in this category preferred to choose housewifery as an occupation. The rest were classified as ‘others’, such asblacksmiths, mechanics, small-scale miners and many more. Figure 11 shows the percentage distribution of the occupations across the study regions.

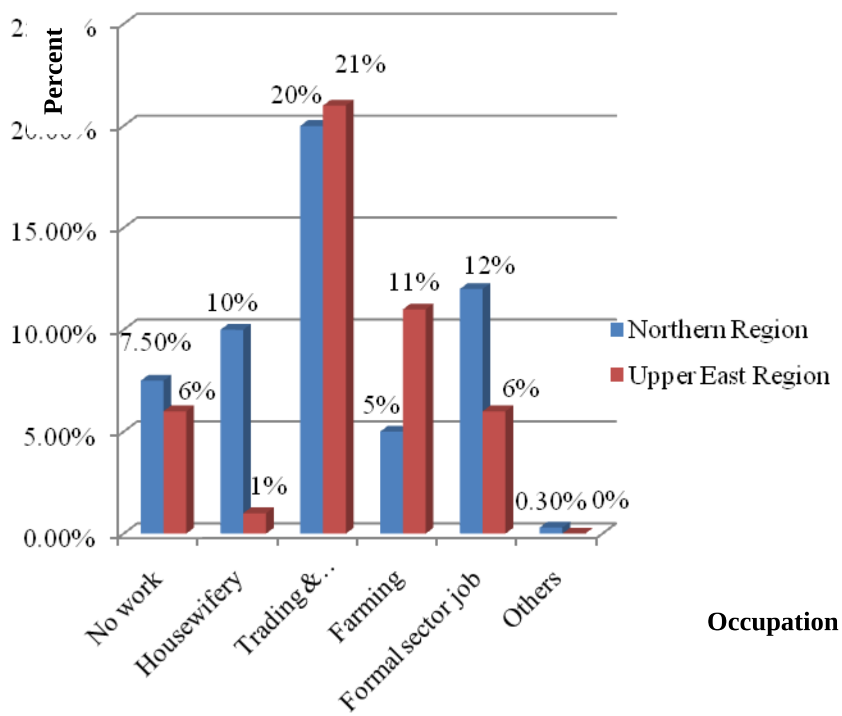

Figure 11: Occupation of respondents

Source: Field survey, Bukari(2015)

Figure 11 reveals that the dominant occupation was trading and services. This employed the highest percentage of 21 in the Upper East Region and 20 percent in the Northern Region. The formal sector, farming and housewifery also attracted impressive percentages of respondents in the Northern and Upper East Regions as Figure 11 illustrates. The data deviate from GSS (2014b) report, that farming is the dominant occupation of northern Ghana. This might be due to the smaller sample used.

In terms of occupational distribution by settlement type, housewifery and farming were common in the rural areas as they attracted 13 percent and 22 percent respectively, of the respondents. In the urban areas, housewifery and farming attracted only seven (7) percent and 10 percent respectively. The corresponding proportions for the peri-urban respondents were 11 percent and 15 percent. There were equal percentage representations of 44 percent for trading and services by urban and peri-urban respondents, while rural respondents recorded 34 percent for this industry. Urban respondents led in the formal sector jobs, with a proportion of 40 percent, compared to 34 percent for the peri-urban and 33 for the rural respondents.

Table 12 presents the linkages between occupation and willingness to pay for water by settlement type. The preference of pictorial presentation to cross-tabulation of WTP by occupation was to avoid long tables. This is because of the need to present detailed information about the occupations of respondents by settlement types, in order to understand the reasons for variations in willingness and ability to pay for water.

Table 12 : Willingness to Pay for Water by Occupation

			Occupation						
Settlement type	WTP per basin of water		NW	HW	T/S	Fm	FS	O	Total
Urban	Less than 20GHp	*f*	1	2	25	5	3	0	36
	Within settlement	%	6	33	62	56	16	0	40
	20GHp or more	*f*	16	4	15	4	16	0	55
	Within settlement	%	94	67	38	44	84	0	60
	Urban	*f*	17	6	40	9	19	0	91
	Total	%	100	100	100	100	100	0	100
Peri-urban	Less than 20GHp	*F*	15	9	47	23	16	0	110
	Within settlement	%	83	53	66	96	57	0	58
	20GHp or more	*f*	3	8	24	1	12	1	49
	Within settlement	%	17	47	34	4	43	100	42
	Peri-urban total	*f*	18	17	71	24	28	1	159
		%	100	100	100	100	100	100	100

NW-no work; HW- house wife; T/S; trading and services; Fm- farming; FS- formal sector jobs; O- others; *f*- frequency*; %*- percent.

Table 12, continued

			Occupation						
Settlement type	WTP per basin of water		NW	HW	T/S	Fm	FS	O	Total
Rural	Less than 20GHp	*f*	14	10	27	22	19	0	92
	Within settlement	%	78	56	59	73	79	0	68
	20GHp or more	*f*	4	8	19	8	5	0	44
	Within settlement	%	22	44	41	27	21	0	32
	Rural total	*f*	18	18	46	30	24	0	136
		%	100	100	100	100	100	100	100
	Grand total	*f*	53	41	157	63	71	1	386
		%	14	10	41	16	18	Negligible	100

NW-no work; HW- house wife; T/S; trading and services; Fm-farming; FS- formal sector jobs; O- others; *f*- frequency*;* %-percent.

Source: Field survey, Bukari (2015)

Table 12 illustrates that among the respondents with no work (NW), peri-urban and rural respondents scored 83 percent and 78 percent respectively for the lower tariff of less than 20GHp, while urban respondents scored 6 percent for this amount per aluminum basin of water. Thus, relatively lower proportions of peri-urban and rural respondents expressed willingness to pay the ruling market tariff of 20GHp or more, compared to 94 percent of urban respondents with no work willing to do so.

Among the housewives, no rural respondent expressed willingness to pay the ruling market tariff of 20GHp or more, while urban respondents ranked highest with 67 percent, followed by 47 percent for peri-urban respondents for this option. Thus, peri-urban and rural housewives were more willing to pay less than the ruling market price.

These results were slightly different from those of respondents in the trade and service industry, in which all respondents in the various settlement types had lower percentages for the ruling market tariff, but higher percentages for the option of less than 20GHp per aluminum basin of water. Rural respondents in this industry were however, willing to pay more with41 percent representation for the 20GHp or more option, while both urban and peri-urban respondents scored less than 40 percent.

Farmer respondents were also largely in favour of paying less than 20GHp per aluminum basin of water, with all the settlement types recording above 50 percent response rates. For the ruling market tariff of 20GHp or more, urban farmers ranked highest with 44 percent, compared to 27 percent for rural and four percent for peri-urban farmers.

There were no respondents for ‘others’ as an occupation in urban and rural communities, but only one respondent belonged to this category in the peri-urban areas. He/she expressed willingness to pay the ruling market tariff of 20GHp or more per aluminum basin of water, which constituted 100 percent as a single respondent. Just before the ‘others’ appear the expressions of WTP by the formal sector employee respondents. Table 12 shows that within this occupational group, those in peri-urban and rural areas had more than 50 percent of responses in favour of paying less than 20GHp per basin of water, compared to urban respondents who recorded 84 percent for the higher tariff option of 20GHp or more.

The impressions from Table 12 are that, for all the occupational groups, peri-urban and rural respondents have largely expressed willingness to pay less than the ruling market tariff, while urban respondents were more willing to pay the right amount. It is also observed that there were fairer expressions of willingness to pay the ruling market tariff by housewives, trade and services andformal sector employees across the settlement types. However, for the more primary occupation of farming, even urban respondents in this category were less willing to pay for water. Given that this same occupation employed more of rural and peri-urban respondents as revealed in this study, the contentions of Bastos and Perobelli (2012) and Getis, Getis, and Fellmann (2006) rank this and other primary occupations lowest among the various industries. The associated occupations are also of lower incomes, compared to formal sector jobs, which are mostly tertiary. Also, housewifery as an occupation, which was common among rural and peri-urban respondents, has been reported to be associated with poverty in rural areas (Kendie, 1992). Farming and housewifery therefore have negative effects on willingness to pay.

This study has also revealed that rural and peri-urban respondents earned lower than their urban counterparts. This is as a result of the seasonal nature of income flow due to the dependence on rain-fed food cropping, coupled with low productivity and unstable prices. These are economic factors which adversely affect willingness to pay for water (Munasinghe, 1992).

Householdsize of respondents

The household size of respondents was another characteristic considered for the determination of WTP for water. The study made use of households as the sample units. It was therefore necessary to access the effect of household size on WTP for water, since the social pressure a household exerts on a potable water system would depend on its size (See Munasinghe, 1992).

The selection of the discrete choice options (‘3 or less’ and ‘4 or more') was based on comparison with the national mean household size of four (GSS, 2014b). Therefore, respondents either had less than, or equal to or more than the national average. In the Northern Region, out of 211 households, Figure 12 indicates that 158 (75 percent) had household sizes of four and above, while the remaining 53 (25 percent) had three persons or less. Thus, most household sizes among the respondents in the Northern Region were above the national average of four. According to GSS data, the mean household size of the three districts studied in the region (Tamale Metropolis-6.3, Sagnarigu District-6.3, and Kumbungu-9.5) was approximately seven.

In the Upper East Region, out of the 175 households studied, 124, representing 71 percent had household sizes of four and above, while the remaining 51 making up 29 percent had three or fewer persons per household. Of the two districts studied in this region, the average household size was five (Bolgatanga Municipal-5 and Bongo District-5.5), based on GSS (2014b) data. Thus, Northern Region had the highest average household size.

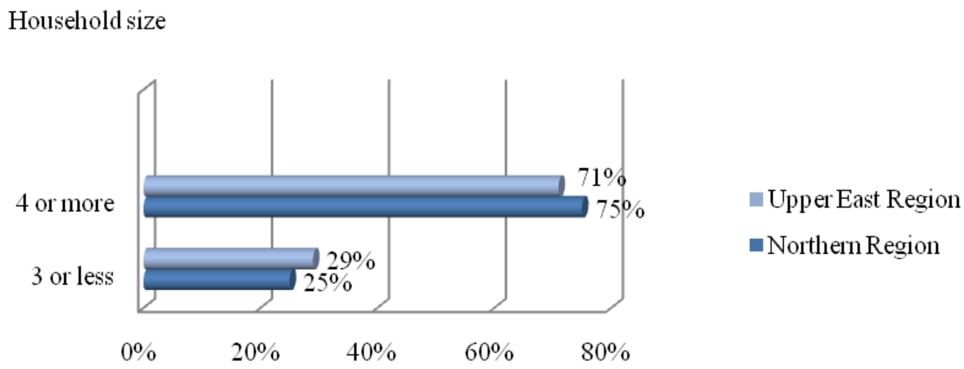

Figure 12: Household sizes of respondents by region

Source: Field survey, Bukari (2015)

Table 13 presents the link between household size and WTP by settlement type. The data in Table 13 reveal that urban respondents of smaller (3 persons or less) and larger (4 persons or more) household sizes were all willing to pay more for public standpipe water. However, WTP was higher for larger households (61 percent for 20GHp or more), than the smaller households (59 percent for 20GHp or more per basin of water). The same pattern of WTP reflected among the peri-urban respondents.

Even though both categories of households had higher proportions of over 60 percent willing to pay less than 20GHp per basin of water, 31 percent of larger households were willing to pay the ruling market tariff, compared to 30 percent for the smaller households. Rural households did not show differences in WTP by household size. The reasons for the urban and peri-urban larger households' willingness to pay more for water were that, apart from the higher demand for water, this study revealed that 15 percent and 31 percent of these had the higher monthly household income of GH¢446 or more.

Table 13: Willingness to Pay for Water by Household Size

			Household Size		
Settlement type	Willingness to pay per basin of water	Descriptive	3 or less	4 or more	Total
Urban	Less than 20GHp	*f*	12	24	36
	Within settlement	%	41	39	40
	20GHp or more	*f*	17	38	55
	Within settlement	%	59	61	60
	Urban total	*f*	29	62	91
		%	100	100	100
Peri-urban	Less than 20GHp	*f*	35	75	110
	Within settlement	%	70	69	69
	20GHp or more	*f*	15	34	49
	Within settlement	%	30	31	31
	Peri-urban total	*f*	50	109	159
		%	100	100	100
Rural	Less than 20GHp	*f*	17	75	92
	Within settlement	%	68	68	68
	20GHp or more	*f*	8	36	44
	Within settlement	%	32	32	32
	Rural total	*f*	25	111	136
		%	100	100	100
	Total	*f*	104	282	386
		%	27	73	100

Source: Field survey, Bukari (2015)

Table 13 further shows that smaller households recorded 13 percent and 30 percent for the higher household income in urban and peri-urban areas respectively. In other words, larger households were more willing to pay for water than smaller households were (See also, Rananga & Gumbo, 2015). The next section discusses the relationships between household income and settlement type in terms of WTP.

Household income of respondents

This study also ascertained the monthly household income of respondents and the differences between income levels and WTP by region and settlement type. Income level was assessed because it concerns the amount of material or monetary possession by households, and serves as the indicator of purchasing power or effective demand for water and other necessities of life. Specifically, income as a measured variable facilitated comparison of households by settlement types in terms of relative economic inequality or income poverty in the national context (See World Bank, 2011). Figure 13 presents the household monthly incomes of respondents according to regions and type of settlements.

The national average gross per capita monthly income is GH¢446 (Based on GSS, 2014b). However, Figure 13 reveals that the monthly household incomes of most respondents fall below the national level. For instance in the Northern Region, 96 percent of rural respondents have monthly household incomes of GH¢445 or less, which is below the national average. Peri-urban respondents with 91 percent follow these, while urban respondents recorded 57%.Thus, 43 percent of urban household respondents earn up to or more than the national average of GH¢446 per month, compared to nine percent for peri-urban and four percent for rural respondents.

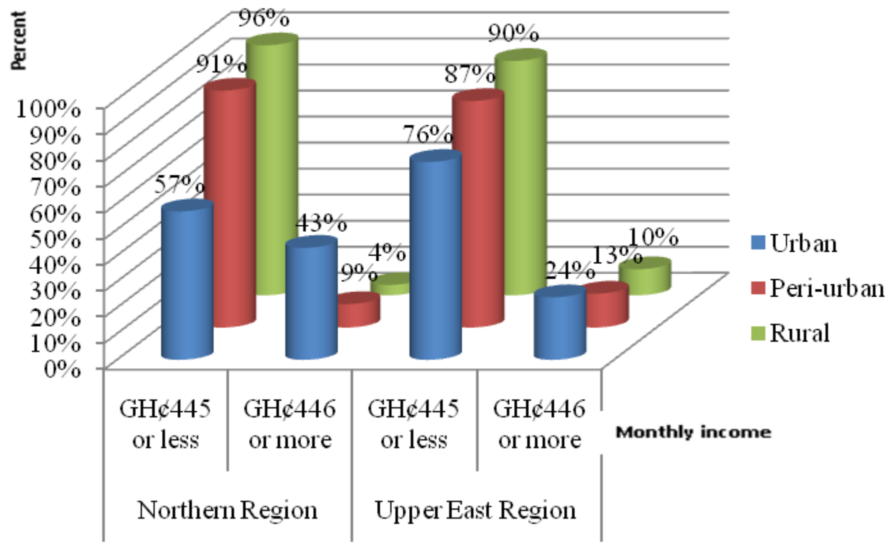

Figure 13: Household monthly income of respondents

Source: Field survey, Bukari (2015)

In the Upper East Region, more urban respondents earned lower than the national average monthly household income. That is, 76 percent earn GH¢445 or less, while a relatively lower percentage of the urban respondents of the region (24 percent) earn GH¢446 or more. Among the peri-urban and rural household respondents of Upper East region, 13 and 10 percent earned the GH¢446 or more, thus performing better than those in Northern Region. This supports the Ghana Living Standards Survey Report-round six, that comparatively, the Upper East Region has lower poverty incidence of 44.4 percent, compared to 50.4 percent for Northern Region (GSS, 2014b). Generally, however, most household respondents in the study area earn below the national average monthly income.

Table 14 relates household income size to WTP for water. It shows that urban low-income household respondents (GH¢445 or less) were equally divided between paying less than 20GHp and 20GHp or more per aluminum basin of water. However, only 16 percent of those in the higher income bracket wished to pay less than 20GHp, while a larger proportion of 84 percent was willing to pay 20GHp or more.

The results show that urban high-income households were therefore willing to pay more. This situation was similar to WTP among the peri-urban households, among which 35 percent of the high-income group opted for the higher tariff, while 30 percent was willing to pay the lower tariff. The difference was that, WTP for the lower tariff option was higher between both income groups of peri-urban respondents.

Rural respondents presented a different picture of WTP from the urban and peri-urban. In other words, WTP by respondents who earned the higher income of GH¢446 was in favour of the lower tariff of less than 20GHp per basin by 89 percent, with only 11 percent willing to pay the ruling market tariff. The low-income group of respondents in rural areas was therefore more willing to pay for water, since 34 percent of them wished to pay the higher tariff of 20GHp or more per basin of water. Since water tariff payment has to do with spending household income, but there were variations in income by settlement types, the next section ascertains the proportion of household monthly income respondents were willing to spend on improved public standpipe water.

Table 14: Willingness to Pay for Water by Household Income Level

			Household monthly income		
Settlement type	Willingness to pay per basin of water	Descriptive	GH¢445 or less	GH¢446 or more	Total
Urban	Less than 20GHp	*f*	30	6	36
	Within settlement	%	50	16	40
	20GHp or more	*f*	30	25	55
	Within settlement	%	50	84	60
	Urban total	*f*	60	31	91
		%	100	100	100
Peri-urban	Less than 20GHp	*f*	99	11	110
	Within settlement	%	70	65	68
	20GHp or more	*f*	43	6	49
	Within settlement	%	30	35	31
	Peri-urban total	*f*	142	17	159
		%	100	100	100
Rural	Less than 20GHp	*f*	84	8	92
	Within settlement	%	66	89	68
	20GHp or more	*f*	43	1	44
	Within settlement	%	34	11	32
	Rural total	*f*	127	9	136
		%	100	100	100
	Grand total	*F*	329	57	386
		%	85	15	100

Source: Field survey, Bukari(2015)

Application of the five percent rule of willingness to pay

The Five Percent Rule explains that households would be willing to spend on a commodity such as drinking water, if the cost of obtaining it is less than or equal to five percent of their income (McPhail, 1993). Table 15 presents responses to the question of what percentageof respondents' household monthly income they were willing to spend onwater. The results illustrate some level of conformity to the findingson WTP by income status relative to tariff level. It shows that rural respondents inthe Upper East Region were more willing to spend five percent or more of their incomes on water per month (8%), than peri-urban respondents (4%).

The gap was also very close between rural and peri-urban respondents in the Northern Region, where peri-urban households ranked a bit higher with 52 percent, compared to rural respondents with 51 percent for the willingness to spend five percent or more on water per month. Average WTP (by adding the percentages for five percent or more of household income for both regions and dividing by two) based on the Five Percent Rule therefore, ranks rural areas higher than peri-urban areas, while urban respondents still remained higher in both regions.

As to why rural respondents' willingness to pay was higher than peri-urban respondents, FGDs revealed that some rural communities, such as Gbolo in the Northern Region, lack alternative water resources that could be substituted for the pipe-borne. Therefore the only way to obtain and sustain access to safe water is to pay tariffs for GWCL's services, but constrained by poverty.

The findings are consistent with those of Moffat et al. (2011), that households in communities lacking adequate water resources are most likely to express willingness to pay more for piped water connections. In relation to this and similar contentions from the other respondents, this study went further to investigate statistical relationships between income and other socio-economic factors and WTP, from which statistical inferences are drawn.

Table 15: Proportion of Monthly Income to Spend on Water

			Percentage of	income	
Region	Settlement type	Descriptive	4% or less	5% or more	Total
Northern	Urban	*f*	8	38	46
		%	17	83	100
	Peri-urban	*f*	42	46	88
		%	48	52	100
	Rural	*f*	38	39	77
		%	49	51	100
	Total	*f*	88	123	211
		%	42	58	100
Upper East	Urban	*f*	28	17	45
		%	62	38	100
	Peri-urban	*f*	68	3	71
		%	96	4	100
	Rural	*f*	54	5	59
		%	92	8	100
	Total	*f*	150	25	175
		%	86	14	100
	Grand total	*f*	238	148	386
		%	62	38	100

Source: Field survey, Bukarti (2015)

Binary Logistic Regression Results on the Willingness to Pay Model

This section discusses the results of statistical tests on the adopted willingness to pay model, previously stated as:

$$D_{ij}=\Sigma[P_{ij}, R^*_{ij}, Y_{ij}, \underline{Z}_{ij}].$$

Where D_{ij}= WTP the ruling market tariff as the dependent variable, while the predictor variables are P_{ij}= response to the question of whether tariff level determines one's WTP; R^*_{ij}= the response to the question of whether service quality determines one's WTP; Y_{ij}= the response to the question of whether economic factors such as income and occupation determine one's WTP; and $\underline{Z}_{ij}$=

response to the question of whether other explanatory factors such as age, sex, education, marital status and household size determine one's WTP.

Realising that the outputs of regression analysis by SPSS involve numerous tables, Leech et al (2005) and Pallant (2005) advice that presentations that focus on the B, S.E. Wald, df, Sig., Exp(B), 95% CI elements are adequate. This is because they constitute all the relevant statistical elements for analysing how the independent variables predict willingness to pay for a commodity, such as 20GHp per aluminium basin of water.

It was however, considered worthwhile to illustrate the number and percentage of cases relating to the responses to questions on whether the predictor variables determined willingness to pay the ruling market price. If we take income for instance, a typical question was, "Does your monthly household income determine your willingness to pay for water?" inwhich case respondents were to choose either 'yes' or 'no' options. The results are presented as the 'categorical variable codings' in SPSS output, and Table 16 presents the outcome of this study for the predictor variables in the adopted model for this study.

The data in Table 16 show that the percentage differences in the 'yes' and 'no' responses to questions of whether the various characteristics determined household willingness to pay for water were lower for age, education, marital status and household size. Tariff and sex had equal response rates of 52 percent and 48 percent for the 'yes' and 'no' options respectively. However, respondents who said the level of water tariff determined their willingness to pay (answered yes), had a higher frequency of 201, compared to 199 for sex. The percentage was actually rounded off from 51.5 to 52. Impliedly, most respondents considered monthly income, service quality and tariff to be the factors that influenced their willingness to pay for improved public standpipe water. This is because the 'yes' response options had relatively higher frequencies and percentages compared to the opposite.

Table 16: Categorical Variable Codings

Questions related to predictors	Options	Frequency (*f*)	Percent (%)
Tariffdet.wtp	No	185	48%
	Yes	201	52%
	Total	386	100%
Service qualitydet.wtp	No	130	34%
	Yes	256	66%
	Total	386	100%
Monthlyincomedet.wtp	No	79	20.5%
	Yes	307	79.5%
	Total	386	100%
Agedet.wtp	No	191	49%
	Yes	195	51%
	Total	386	100%
Sexdet.wtp	No	187	48%
	Yes	199	52%
Educ.detwtp	No	198	51%
	Yes	188	49%
	Total	386	100%
Religiondet.wtp	No	189	49%
	Yes	197	51%
	Total	386	100%
Marital statusdet.wtp	No	189	49%
	Yes	197	51%
	Total	386	100%
Householdsizedet.wtp	No	188	49%
	Yes	199	51%
	Total	386	100%

Source: Field survey, Bukari (2015)

The information in Table 16 was necessary for the understanding of Table 17, which presents the Variables in the Equations table in Block 1.

Table 17: Variables in the Equation

								95.0% C.I. for EXP(B)	
		B	S.E.	Wald	Df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	PRICE(1)	-.424	.214	3.934	1	.047	.655	.431	.995
	QUALITY(1)	-.563	.245	5.286	1	.022	.569	.352	.920
	INCOME(1)	-.821	.294	7.808	1	.005	.440	.248	.783
	OCCUPATION(1)	-.284	.323	.773	1	.379	1.447	.927	2.257
	AGE(1)	-.297	.466	.407	1	.523	.743	.297	1.851
	SEX(1)	.369	.227	2.646	1	.104	1.447	.927	2.257
	EDUCATION(1)	.075	.218	.118	1	.732	1.078	.703	1.653
	RELIGION(1)	.202	.345	.343	1	.558	1.224	.622	2.406
	MARRIAGE(1)	.545	.313	3.036	1	.081	1.724	.934	3.182
	HOUSEHOLD SIZE(1)	-.097	.240	.163	1	.687	.908	.566	1.454
	CONSTANT	.761	.211	12.972	1	.000	2.141		2

a. Variable(s) entered in step 1: PRICE, QUALITY, INCOME, OCCUPATION, AGE, SEX, EDUCATION, RELIGION, MARRIAGE, HOUSEHOLDSIZE

Source; Field data, Bukari (2015).

To explain the linkage between the two tables, assuming that a respondent answered 'yes' or 'no' to the question of whether any of the predictor variables in Table 17 determines his/her willingness to pay for water. The probability that he/she would be willing or not willing to pay the ruling market tariff of 20GHp per aluminium basin of water (by choosing 'yes' or 'no' to the associated to question) is what Table 17 presents. Here, the Wald test is what explains the relationships between the predictor variables and WTP.

The values of the Wald statistics show that no variable had a zero (0) value. Meaning that they all contribute to WTP, but the magnitudes of the values ranked INCOME highest (7.808), followed by QUALITY and PRICE. If we scandown the Sig. column for variables that have significant alpha levels because their values are less than the P-value of 0.05, we observe that INCOME is the most significant (0.005), followed by QUALITY (0.022) and then PRICE (0.047). Therefore, the first null hypothesis linked to research question one, that there is no relationship between background characteristics of respondents and WTP for water is rejected for household income, and cannot be accepoted for age, sex, education, religion, marital status and household size.

The second and third null hypotheses, that there is no relationship between tariff and service quality respectively are rejected. Thus, the major determinants of whether a respondent would answer that she/he would be willing to pay the ruling market tariff of 20GHp per aluminium basin of standpipe water include the size of monthly household income, service quality and tariff level. The significant values for the respective predictors are the probability outcomes for the predictorvariables which were previously expressed as equations 2.1 to 2.4. These support the predictions of the categorical variable codings in Table 16.

The B column indicates the log odd units used as values by the logistic regression equation for predicting the dependent variable (willingness to pay for water), from the predictor variables. These indicate both the coefficients and direction of the relationship. For instance Table 17 reveals coefficient values of

0.424 (42 percent) for PRICE or tariff level, 0.563 (56 percent) for QUALITY or service quality and 0.821 (82 percent) for household INCOME, representing monthly household income. The coefficients are however, negative. This signifies inverse relationships. Thus, the B value of -0.424 for PRICE means that an increase in the score for water tariff level, would lead to a decrease in the probability of recording a score of ‘1’ (Yes) for willingness to pay 20GHP per aluminium basin of improved standpipe water. Put differently, respondents who said water tariff level determined their WTP for water (chose Yes), are less likely to answer ‘Yes’ to the question of whether they were willing to pay 20GHp per basin of public standpipe water. Leech *et al*. (2005) disclose that the interpretation of how the B values predict relationships between the variables is difficult, and so analysts could rather use the EXP(B) column in place of B.

The EXP(B) stands for the exponentiation of the B coefficient, and the values in the associated column are the odds ratios (OR) for each of the independent variables (Leech *et al*., 2005; Pallant, 2005; Strand *et al*., 2011). In Table 17, the odds ratios for PRICE, QUALITY and INCOME are 0.655, 0.569 and 0.440 respectively, which are all less than one. When the OR is less than one, it represents the decrease in odds of being in one outcome category, as a result of an increase in the value of the predictor by one unit (Tabachnick & Fidell, 2011).

Given the inverse relationship with WTP based on the negative B value, the odds ratio for PRICE for instance, means that the odds of a respondent who is influenced by price but not willing to pay the ruling market tariff (answered ‘No’ to the question on willingness to pay the ruling market tariff) is 0.655 times larger than one who is also influenced by price and is willing to pay the tariff (said ‘Yes’ to the ruling market tariff) (See Tabachnick & Fidell, 2011). Put differently, respondents who said water tariff does not determine their willingness to pay (answered 'no'), were more likely to be willing to pay theruling market tariff of 20GHp (answered 'yes'). In other words, the more a person said his/her WTP for standpipe water is determined by tariff level, service quality and household income size, the less likely they would be willing to pay 20GHp per basin of water (Inverse relationship). This is why the Exp (B) coefficients are referred to as odd ratios.

The odds ratios are however, guesses, and the accuracy of such guesses depend on the size of the sample (Pallant, 2005). The column labelled '95.0% C.I. (confident interval) for EXP (B)', has lower and upper range of values. In other words this column gives the range of values that yield 95 percent confidence level around the true value of the odds ratios. Thus, the 95 percent confidence interval for PRICE ranges from 0.431 to 0.995. This means that although we estimated an odds ratio of 0.665 for tariff level (PRICE), we can be 95 percent confident that the true odds ratio for this predictor variable lies between 0.431 and 0.995 for ourstudy population. The same explanation applies to the other significant predictorsfor their respective odds ratios.

The explanation for respondents whose willingness to pay was determined by income and service quality as well, yet expressed unwillingness to pay for quality urban water supply at the ruling market tariff of 20GHc was given by focus group discussion participants. All Community Water Committee members in the various communities tallied low willingness and ability to pay for water to poverty. A respondent at Yarigabisi in the Upper East Region said that:

> Everybody in this community knows the importance of paying for piped water. This is because the government also spends money to supply the water. However, the problem is that we do not just pay 20GHp for a basin of water once a day at the standpipe. We buy water as frequently as we need it, yet many households do not earn any income for a greater part of the year after the sale of their surplus harvests. The amount we pay nowadays for water looks like piped water is meant for rich people.

The findings above correspond with those of Almendarez-Hernandez, Polanco, Trejo, Ortga-Rubio, Morales (2016) that higher water tariffs have implications of reducing consumers' effective demand. Service quality is also inverselyrelated to WTP. This is because according to the interpretations of the automatic tariff adjustment formula by the PURC (2011), improved piped water involves treatment and other cost items such as labour and capital costs, which influence the tariffs imposed.

It is apparent that the adopted binary logistic regression model has identified water tariff level, service quality and household income as the significant determinants of WTP. Age, sex, religion, marital status, education, occupation and household size failed to be significantly related to WTP. Therefore, the first null hypothesis that the socio-economic status of respondents has no effect on WTP for water cannot be accepted for the monthly household income size, but cannot be rejected for the other characteristics. The second and third null hypotheses that water tariff level and service quality respectively, have no effects on WTP for water are also rejected. Impliedly, households with lower monthly incomes have lower WTP.

Concerning the possibility of low-cost technology and the associated lower tariff and the effect on WTP, a CWSA official in Bolgatanga stated in an interview that “In rural and peri-urban communities, the problem of water tariff payment is not only about low household income. The people simply see water as free gift or a political good which should be provided free of charge”.

The view of the CWSA officer is consistent with the findings of Akpabio (2011), that there is the belief in water as a gift of God in the tradition of Nigeria, and this adversely affects rural people’s willingness to pay water tariffs.The CWSA official in Tamale also added,“In rural and peri-urban communities, household income flow is seasonal, due to over dependence on rain-fed agriculture, but they have to pay dailyfor water. This is a problem for many rural households”.

Ability to Pay for Improved Water Services

This section is a continuation of the discussion related to research question one. It is concerned with the assessment of whether respondents’ willingness to pay for improved standpipe water is matched by the ability to pay. This is necessary because the two concepts mean different things. Willingness to pay measures the maximum price that an individual is willing to pay for a commodity, while ability to pay is an indicator of what people ought to pay, or their actual purchasing power (Rina & Roseminah, 2011). Thus, by the discrete choice method, respondents were not only asked how much they were willing to pay for water, but also how much they actually paid for water.Table 18 presents and compares results from the Northern and Upper East Regions.

Table 18: Ability to Pay for Water

Region	Actual daily water tariff paid per person	Urban	Peri-urban	Rural	Total
Northern Region	Less than 20GHp	0 0%	34 39%	41 53%	75 36%
	20GHp or more	46 100%	54 61%	36 47%	136 64%
	Total	46 100%	88 100%	77 100%	211 100%
Upper East Region	Less than 20GHp	0 0%	62 87%	51 86%	113 65%
	20GHp or more	45 100%	9 13%	8 14%	62 35%
	Total	45 100%	71 100%	59 100%	175 100%
	Grand total	91 24%	159 41%	136 35%	396 100%

Source: Field survey, Bukari (2015).

Household ability to pay for water was also ascertained with reference to the tariff per aluminium basin of water (20GHp) in the discrete choice format. The data show that all urban respondents were able to afford one basin of water (54ltr) per household member daily. Among the peri-urban respondents, 61 percent of those in Northern Region and 13 percent of their counterparts in Upper East Region were able to afford one aluminium basin per household member per day. Rural respondents in Northern Region and Upper East Regions also recorded47 percent and 14 percent respectively, for the ability to afford a basin of safe piped water per person per day.

The data has shown that in both Northern and Upper East Regions, ability to pay for water is higher among urban respondents than peri-urban and rural respondents. However, respondents in Northern Region have a greater ability to pay than their counterparts in the Upper East. One explanation for the differences in ability to pay is income (IFAD, 2011; World Bank, 2011).

This study has shown that urban respondents ranked highest in terms of monthly household income, followed by peri-urban and rural areas. According to GSS (2014b), rural Savannah (northern Ghana) has the highest poverty incidence of 55 percent, compared to 30.3 percent for rural coastal and 27.9 percent for rural forest. This generates interest in whether the tariff determination process for urban waterservices, considers the low-income status of rural and peri-urban communitiesconnected to the urban water systems.

Urban Tariff Determination and the Place of Rural and Peri-urban Areas

This section addresses the second research objective and the associated question. It concerns how water tariffs are determined for rural and peri-urban communities connected to urban water systems. The analytical approach is shaped by the marginal cost pricing theory, and the concept of water tariff, especially the tariff structures.

Methods of water tariff determination

Central to this aspect of the study is the role of the PURC in urban water tariff regulation, as well as GWCL in the billing and collection of tariffs and how these affect rural and peri-urban communities. In particular, the PURC determines water tariffs for public urban water services only (WaterAid Ghana, 2005). However, GWCL as the service provider decides which other communities to extend services to, apart from the urban areas.

Interviews with PURC officials in Accra and Tamale (Appendix E), confirmed that the Commission is responsible for the determination and regulation of urban water tariff. Both interviewees also agreed that the tariff determination method is based on the optimal model of marginal cost pricing. This means that the tariff per unit of water is determined by the additional cost of input employed in production as water production levels change. It is alsocharacterised by the inclusion of aspects of sustainability and social pressure (Munasinghe, 1992).

The PURC formula is known as the automatic adjustment formula (AAF), which is expressed in terms of various cost items related to operations, materials and labour, as well as provisions for the re-valuing of net fixed assets and depreciation. Appendix N presents the parameters of the AAF and their interpretations. The AAF is informed by the optimal model of marginal cost theory because any additional unit of water produced is valued at the additional cost of variable inputs employed, and also aims at full cost recovery (See Munasinghe, 1992). Details and practical applications of the AAF are however, beyond the scope of this thesis.Water tariffs are adjusted quarterly or subject to changes in the exchange rate of the cedi, which affects input prices. Figure 14 shows the pattern of regulated water tariffs from 2001 to 2016.

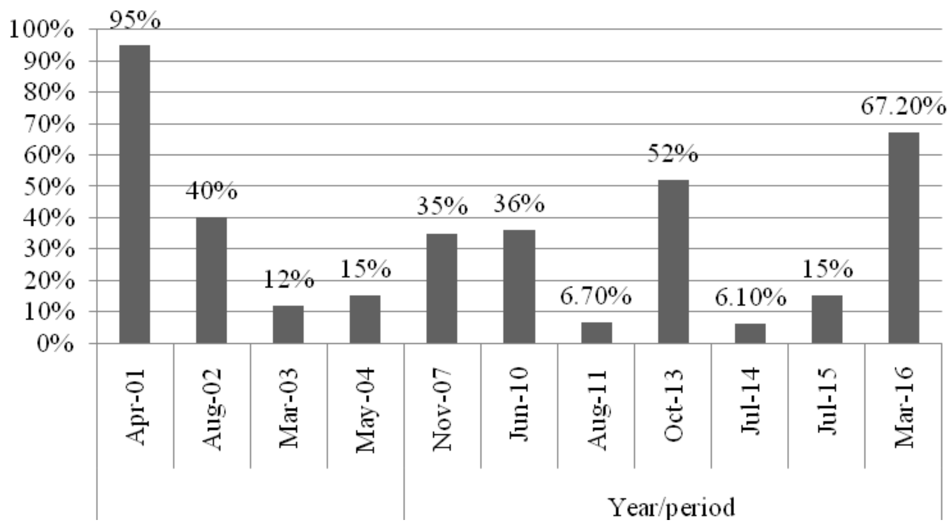

Figure 14: Increases in water tariffs from 2001 to 2016

Source: GNA (2007); GNA (2016); Kunateh (2011); Laary (2014); Ofori-Adeniran (2014); PURC (2014); VIBE Ghana (2013).

The data in Figure 14 show that PURC mostly regulates tariffs upward, but sometimes no changes in tariff take place. For instance 2005, 2006 and 2009 are not represented in Figure 14 because there were no water tariff adjustments. The 2016 percentage increase in water tariff was 67.2 percent as shown in Figure 14. This percentage was what the PURC officially approved.

However, some sources indicate that the actual increase in water tariff was more than the approved percentage (GNA, 2016). For instance a written response to an open-ended question about current tariff rates by the PURC interviewee in Tamale, and a printed document provided by the counterpart in Accra signed by the Chairman of the PURC, Dr. Emmanuel K. Annan, contained the same information about the 2016 tariff rates. Both indicated that with effect from 1st April 2016, which is the beginning of the second quarter of 2016, metered domestic water services attract 298.17GHp (GHc2.98) for the consumption bracket of 0-5000 litres. Consumption levels exceeding 5000 litres attract 504.40GHp (GHc5.44). However, there was no upward percentage adjustment in tariff from the first quarter, which ended in March 2016 as shown in Figure 12. In other words the 67.2 percentage increase for the first quarter remained unchanged.

In the third quarter of 2015, consumers paid GH¢1.28 for 0-5000 litres. So if they had to pay GH¢2.98 in the first quarter of 2016 (up to the time the time this supplementary data was collected, August 2016), after declaring an approved percentage increase of 67.2 percent, then the actual percentage increase in watertariff was about 132.8 percent (See also Ghana News Agency, 2016). This raises questions of how the PURC's regulatory powers in ensuring fair tariffs in the interests of both consumers and the GWCL benefits the former. In other words, there is no effective mechanism for ensuring compliance to approved tariffs by the PURC. This resulted in utilities charging more than the approved rates (TV3 news, Tuesday, March 29, 2016, 7:00 PM).

Interviews with officials of GWCL in Tamale and Bolgatanga, as well as the PURC officials in Accra and Tamale, further disclosed that the monthly bills consumers pay for water is by the volumetric method. This means that they are determined by meter readings. It was further disclosed that the volumetric method is based on the increasing block tariff (IBT) structure, which starts with a lifeline block free of tariff. The purpose is to cater for the needs of persons who cannot pay for water in society. Beyond the lifeline block tariff increases as water consumption increases. However, Nkrumah (2004) argues that the lifeline block in IBT does not benefit public standpipe users because ignorance of how the IBT operates leads to waste of water. The effects of ignorance and the pressure of multiple households on public standpipes push consumption levels above the lifeline block. As a result, high and middle income households with private home connections rather benefit from the lifeline than low income households depending on public standpipes.

Even though water bills are issued and paid monthly, results from observations and focus group discussion with Community Water Committees in the study communities indicated that standpipe users pay on cash-and-carry basis.According to the respondents, the Customer Care unit of GWCL informs the tariff collectors about tariff for various sizes of containers. The commonest container observed to be used in hauling household water at the standpipes was the aluminum basin, with a capacity of 54ltr, which costs 20GHp. This tariff was found to be the same in all the study communities (See Appendix L). A participant at Gbolo, a rural community in the Northern Region, explained that:

> The Committee recommends a member to GWCL, who collects the tariffs as the water is drawn from the standpipe. We have all accepted this method because if you share the water bill at the end of the month, the amount would be too high for some households to pay. Others may not even have money at the time the bill is received and shared.

Another respondent at Yarigabisi, a peri-urban community in the Upper East Region, added that:

> The daily collection of tariffs is better because we can buy water at the standpipe when we have the money and according to how much each household can afford. If you cannot afford to buy water at any time from the standpipe you can decide where to go and get your water free. The

tariff collector gathers the money and pays to Ghana Water Company at the end of the month. Whether it is up to the water bill amount or not, his duty is to pay what he has collected.

Table 19 presents responses of the two PURC officials interviewed in Accra and Tamale to specific items on how rural and peri-urban communities are treated in the urban water tariff determination process. Table 19 shows that the PURC respondent in Tamale remained undecided for the item on PURC's policy for urban water extension to rural and peri-urban areas. According to him, the Commission targets the urban poor. He continued, by stating that "the PURC seeks to take the lead role in the resolution of pro-poor issues in the urban water sector in line with its regulatory mandate to protect the interest of consumers, as well as Government poverty reduction objectives".

Thus, by revisiting research question two which is about how tariffs are determined for rural and peri-urban communities connected to urban water systems, it is obvious from the data in Table 19 that there are no preferential treatments for rural and peri-urban communities. In other words, the tariff determination process is the same. This necessitates the need to examine the participatory process in urban water tariff determination, and whether the interests of rural and peri-urban communities and other stakeholders are covered.

Table 19: Considerations for Rural and Peri-urban Communities in Urban Water Tariff Determination

	Responses			
Item	Accra (PURC)	Tamale (PURC)	Accra (Comment)	Tamale (Comment)
The PURC regulates tariffs for urban utilities only	Agree	Agree	-	But also rural utilities in the electricity section
The PURC is aware that some rural and peri-urban communities are connected to urban water systems	Disagree	Agree	-	-
PURC has differentiated water tariffs for rural and peri-urban communities connected to urban water systems	Disagree	Disagree	-	-
PURC has a policy regulation for utilities that extend urban water systems to rural and peri-urban areas	Disagree	Undecided	-	-
PURC monitors water utilities to ensure compliance to non-urban water tariff regulatory provisions	Disagree	-	-	No such policy exists

Source: Filed Bukari, Bukari (2016)

Interests of Stakeholders in Participatory Water Tariff Determination

This section answers the third research question, with a focus on how the interests of rural and peri-urban communities and the other stakeholders informed the participatory tariff determination process. In terms of 'urban water tariff' determination, the conceptual and stakeholder frameworks of this study identified the PURC, GWCL and urban public water consumers as the stakeholders. PURC is considered as the secondary stakeholder, because it has the power to determine tariff, but its role is intermediary between GWCL and its customers.

On the other hand, GWCL and its customers are primary stakeholders because they are directly affected by water tariff conditions (Lindblom & Ohlsson, 2011). The identification of thestakeholders was confirmed in interviews with officials of PURC, GWCL and Water Resources Commission (WRC) under the MWRWH. Apart from the PURC and GWCL, interviewees of PURC, disclosed that the Consumer Protection Agency (which the PURC respondent in Tamale described as a civil society organisation-CSO) and the urban public water consumers are also stakeholders in the tariff determination process. However, funding agencies were not identified as stakeholders in the tariff determination process. Table 20 presents interviewees' responses regarding the stakeholders and their interests in the urban water tariff determination process.

With the exception of Community Water Committees, the inability of respondents to recognise other CSOs associated with issues of rural/peri-urban and urban water services and associated tariff conditions among Ghana's urban water sector stakeholders is the reason why they are not included in Table 20. PURC respondents however, identified the Consumer Protection Agency as a CSO in the interest of urban public water consumers during the interview. Accordingly, the responses of all the stakeholders to the last item in Table 20 was in recognition of the roles of CSOs, especially CWCs in the rural and small town water sector in the promotion of access to safe water to such areas.

Table 20: Stakeholder Interests in Urban Water Tariff Determination

Item	PURC (Accra)	PURC (Tamale)	GWCL (Tamale)	GWCL (Bolgatanga)
The interest of the PURC is to ensure fairness in water tariff imposition	Agree	Agree	Agree	Agree
PURC is not concerned about the interests of rural and peri-urban areas connected to urban water systems because they are not covered by urban utility tariff conditions	Agree	Disagree	Agree	Agree
GWCL is interested in tariffs that cover all costs and generate profit	Agree	Agree	Agree	Agree
Civil Society Organisations are interested in fair tariffs that promote equal access to water by rural people	Agree	Agree	Agree	Agree

Source: Field survey, Bukari (2016)

Table 20 further illustrates that all respondents agreed that the PURC is interested in fair tariffs, while GWCL is interested in cost recovery and profitability. However, the PURC interviewee in Tamale disagreed that the

Commission is not concerned about the interests of rural and peri-urban communities connected to urban water systems. Unfortunately, however, the same interviewee in an earlier response, mentioned that the PURC has no policy regulation regarding the control of urban utilities in their relationships with rural and peri-urban areas in matters of water tariff. This was further confirmed by an official of the Water Resources Commission in Accra. Apart from testifying that the WRC does not deal with issues of tariff setting, the respondent was emphatic:

> The Ghana Water Policy of 2007 is clear on which organisation should provide for which jurisdiction: CWSA is responsible for rural water, and GWCL for urban water. Water provision in peri-urban areas is a problem since new areas are becoming urbanised and many rural areas are beingperi-urban. Until the policy is amended, there is no need for GWCL to extend urban services beyond urban areas to encounter tariff payment challenges. Also, lots of CSOs and NGOs are actors in the rural area framework providing water services.

The above response by the WRC officer supports the option chosen by the PURC interviewee in Accra and GWCL officials, regarding the third item in Table 20. Interviews with CWSA officials in Tamale and Bolgatanga confirmed that the agency provides water and sanitation services to rural, peri-urban and small towns, and not urban areas (See Appendix I).

Table 21 also shows the interests of household respondents in the various settlement types, in water tariff determination.Table 21 shows the responses to the question of community interest in the water tariff determination. The total column of Table 21 shows that out of 211 respondents for the Northern Region, 70 percent agreed that communities are interested in affordable water tariffs, with no settlement type recording less than 60 percent for the 'agree' option.

Table 21: Interests of Communities in Water Tariff Determination

Region	Item	Options	Descriptive	Urban	Peri-urban	Rural	Total
Northern	Communities are interested in affordable water tariff	Agree	*f*	34	64	51	149
			%	74	73	66	70
		Disagree	*f*	8	11	15	34
			%	17	13	20	16
		Undecided	*f*	4	13	11	29
			%	9	14	14	14
		Total	*f*	46	88	77	211
			%	100	100	100	100
Upper East		Agree	*f*	34	51	41	126
			%	76	72	69	72
		Disagree	*f*	8	11	13	32
			%	18	15	22	18
		Undecided	*f*	3	9	5	17
			%	6	13	9	10
		Total	*f*	45	71	59	175
			%	100	100	100	100
		Grand total	*f*	91	159	136	386
			%	24	41	35	100

Source: Field survey, Bukari (2015)

Respondents in the Upper East Region also scored 72 percent out of 175 respondents in favour of the same option, and the response pattern by settlement type was similar to that of Northern Region. However, urban respondents had the highest percentages, followed by peri-urban and rural respondents in support of the affordable tariff interest. This implies that irrespective of settlement type, households would always expect water tariffs to be affordable. The inverse but significant relationship between tariff level andwillingness to pay for water in the logistic regression results in this study, and the failure to accept the associated null hypothesis, further support findings in Table 21.

The data in Tables 20 and 21 reveal some paradox of interests between the stakeholders in matters of water tariff determination. For instance the PURC's interest in fair tariffs does not benefit rural and peri-urban communities because they are not prioritised in the determination of the tariffs that are meant for urban dwellers. Also, GWCL's interest in cost recovery means that they insist on full payment of metered water bills, irrespective of whether rural and peri-urban consumers are able to pay or not.

All the above go against the interest of rural and peri-urban households, who are only supported by the CSOs because the latterrepresent the interests of the former. These are manifestations that inconsistencies in the application of models of water service delivery would result to conflict of interests. In other words, rural and peri-urban communities in Ghana are covered by the COM model which is pro-poor (Adank & Tuffour, 2013). Failure to incorporate pro-poor strategies into the Utility Management model for such communities to which urban water services are extended generates some unmet expectations. This makes it necessary to access how such conflicting interests influence the participatory process in urban water tariff determination.

Stakeholder Participation in Water Tariff Determination

This section continues with the answer to research question three, by focusing on the participatory aspect of urban water tariff determination. In other words, the second research objective related to water tariff determination, while the initial stage of answering research question three focused on the interests of the stakeholders in the determination of water tariffs. Thus, since rural and peri-urban communities of the study area are connected to the urban water systems, are they and other stakeholders actually involved in the tariff determination process to pursue their interests? This is the basis of this section of the study. The Arnstein's ladder and the concept of participation aided the analytical focus of this section.

In response to the question on participation, public information by the PURC was recognised and confirmed by interviewees of GWCL and PURC, as well as household respondents. According to the PURC official in Accra, in the first instance, when the PURC automatically adjusts water tariffs using the AAF, it informs the public about the proposed adjustments in tariff through the media(television, radio and news papers). It then listens to reactions from the general public, water utilities and other stakeholders for the review and declaration of the approved tariff.

The use of the AAF entails the stages of non-participation and tokenism on the Arnstein's ladder (See Arnstein, 1969). The non-participation stage is where the results of the AAF are announced without prior participation and consent of the public. On the other hand, public information and the processes leading to tariff review correspond to the rungs of information and consultation, which are tokenistic. Regarding the involvement of rural and peri-urban community participation, the PURC official in Tamale said: "When the quarterly tariff adjustments by the use of the AAF are announced, the discussion is open to every consumer. So anyone can express his or her opinion irrespective of settlement type".

Implied here is that PURC regulates tariff for urban water services. However, it is the GWCL and other public water utilities affected by the regulated tariffs that deliver the services and impose and collect the tariffs. Therefore any consumer affected by the tariff could participate in public discussions about the tariff through the media.

Interviewees of GWCL at Tamale and Bolgatanga, also disclosed that apart from the AAF, GWCL could submit proposals to the PURC for upward adjustments in tariff in response to input price increases. The associated processof participation is more authentic, since there is a transition from tokenism to citizen power on the Arnstein's ladder. This process starts by the PURC receiving the proposal and convening a stakeholder platform to discuss the tariff adjustment proposed by GWCL. According to the PURC officials, the stakeholders include the Commission itself, urban water utilities and the Consumer Protection Agency (as a CSO in the interest of consumers). The consultative process results to consensus among the stakeholders for the final approved tariff. The PURC interviewee in Accra added that "All approved utility tariffs are published by the PURC, as required under Section 19 of the PURC Act 538 of 1997. Also, once tariffs are approved, they remain in force until they are reviewed by PURC".

However, in view of the low income status of rural and peri-urban communities, interviewees were asked whether such communities are also represented as stakeholders on the platform. The PURC and GWCL officials responded that rural, peri-urban and small town Community Water Committees or Traditional Chiefs are not represented as stakeholders (except in the area of electricity, where they have a rural electricity division to deal with rural tariffs separately). This is because the water tariffs regulated by PURC are for urban water services. Given that GWCL is also mandated for urban water services under Act 461 of 1993, it would be a policy confusion to have differentiated tariffs for rural and peri-urban areas. This is so because the CWSA and the DistrictAssemblies are responsible for the management and regulation of rural and small town water services and tariffs respectively (MWRWH, 2007).

Participatory relationships between the communities and GWCL

Given that PURC and GWCL are responsible for urban water tariff regulation and service provision respectively, Tables 22, 23 and 24 examine the relationships that exist between GWCL and the communities in matters of tariff, as observed by the respondents. The rows labeled ‘Item’ in the three tables identify three major ways by which GWCL engages Community Water Committees in water tariff related issues. These include merely informing the Committees about tariff changes by GWCL, consulting the Committees for the determination of tariffs to suit their ability to pay, and no form of involvement of the Committees in water tariff determination.

Respondents of the various settlement types agreed, disagreed or remained undecided over the applicability of the participatory options in their communities. The results in Table 22 show that in urban Northern Region, 48 percent majority of urban respondents were undecided over the option of GWCL informing their Water Committees about tariff changes. The rest were equally divided between the agree and disagree options (26 percent each). ‘Disagree’, was the modal response for peri-urban and rural Northern Region, with 45 percent and 48 percent response rates respectively. The total row for Northern Region reveals only 13 percent of respondents agreeing that GWCL informs their Community Water Committees about tariff changes. This implies that urban respondents inNorthern Region observed a better relationship with GWCL through informationdissemination on tariff changes than rural and peri-urban areas.

Table 22: Community Participation by Information

Item	Information tariff	of changes	Committees	by GWCL	About
Region	Settlement type	Agree	Disagree	Undecided	Total
Northern	Urban	12	12	22	46
		26%	26%	48%	100%
	Peri-urban	12	40	36	88
		14%	45%	41%	100%
	Rural	4	37	36	77
		5%	48%	47%	100%
	Total	28	89	94	211
		13%	42%	45%	100%
Upper East	Urban	16	11	18	45
		36%	24%	40%	100%
	Peri-urban	3	42	26	71
		4%	59%	37%	100%
	Rural	3	31	25	59
		5%	53%	42%	100%
	Total	22	84	69	175
		13%	48%	39%	100%
	Grand total	50	173	163	386
		13%	45%	42%	100%

Source: Field survey, Bukari (2015)

In urban Upper East Region, an appreciable 36 percent of respondents agreed that their Committees are informed by GWCL compared to 24 percent who disagreed, while over 50 percent of peri-urban and rural respondents disagreed. Like the case of Northern Region, only 13 percent of respondents in the Upper East Region as a whole agreed that their Committees are informed by GWCL about tariff changes. The implication is that, GWCL gives more attention to urban areas in terms of information on tariff changes than rural and peri-urban areas in Northern Ghana, but the extent of this form of participation is very minimal.

Interview with GWCL officials at Tamale and Bolgatanga yielded slight differences in the responses regarding water tariff information dissemination to the communities. The interviewee at Bolgatanga agreed that GWCL informs Community Water Committees about tariff changes, so that tariff collectors could adjust the tariffs they charge per container on cash-and-carry basis. On the other hand, the GWCL official in Tamale, in a detailed response, stated that:

> We do not inform communities about water tariff changes, once tariff adjustments are announced by the PURC. The company's responsibility is to ensure that the new tariff rate reflects in the next monthly water bill to be served to the public standpipe tariff collectors at the community level. Any group of users who have problems with their water bills could then lodge complains at the Customer Complaints office of the company. Here, we explain to them about the reasons for the change in tariff. Such complains cannot lead to a reduction in the tariff level, if only consumers actually used the amount of water that is billed.

Focus group discussions with Community Water Committees also produced contrasting results from the Northern and Upper East Region on whether GWCL informs the communities about tariff changes. At Gowerie, a rural community in the Upper East Region, respondents disclosed that the Customer Care officers of GWCL meets the Water Committee to discuss issues of water tariff changes, and the new amounts to charge customers on the cash-and-carry method. Another participant at Gbolo, a rural community in the Northern Region also expressed that:

> We are not told when water bills increase or decrease. We only charge our people as we have always done when they come to fetch water. But sometimes at the end of the month we are given a monthly water bill that

> is higher than what we usually pay. Then when we go to pay what we have collected the officers tell us that water tariffs have been increased.

Given the low income status of households in rural and peri-urban areas, it is unlikely that all households would have television and radio sets. The lack of information on tariff changes therefore deprives rural and peri-urban households of the advantage the rung of therapy at the level of non-participation on the Arnstein's ladder could offer. In other words, if citizens are not informed, educated and cured of misconceptions about adjustments in tariffs, their willingness to pay could be adversely affected, compared to those with adequate access to information, such as urban communities in this case.Table 23 presents the second aspect of participatory relationship between GWCL and the Community Water Committees, which is about consultation on water tariff determination.

The data satisfy an inquiry into the issues of whether GWCL enters into a different consultative bargaining process for pro-poor water tariff determination in the rural and peri-urban areas. The results showthat only three percent of the respondents in both regions agreed that GWCL engages the Water Committees for the deliberation of differentiated water tariffs for the communities. Most respondents were undecided over this issue (87 percent).

Table 23: Community Participation by Consultation

Item	Consultation with Water Committees by GWCL on Tariff determination				
	Settlement type	Agree	Disagree	Undecided	Total
Northern	Urban	0	0	46	46
		0%	0%	100%	100%
	Peri-urban	8	21	59	88
		9%	24%	67%	100%
	Rural	3	13	61	77
		4%	17%	79%	100%
	Total	11	34	166	211
		5%	16%	79%	100%
Upper East	Urban	0	3	42	45
		0%	7%	93%	100%
	Peri-urban	0	2	69	71
		0%	3%	97%	100%
	Rural	0	0	59	59
		0%	0%	100%	100%
	Total	0	6	169	175
		0%	3%	97%	100%
	Total	11	40	335	386
		3%	10%	87%	100%

Source: Field survey, Bukari (2015)

All urban respondents in Northern Region were undecided over the issue of consultative water tariff determination, while no respondent in urban, peri-urban and rural Upper East agreed to the same item (zero percent for all the settlement types). Peri-urban and rural Northern Region however, recorded nine percent and four percent respectively for the agree option. That is, some respondents observed that GWCL consults their Water Committees on matters of tariff determination. The differences in responses between the urban areas on oneside, and rural and peri-urban areas on the other, is due to the fact the urban areas did not have water Committees, but rather tariff collection agents. They were also aware that tariffs are determined and announced by the PURC, and so there was no need for consultation of water committees about tariff setting.

Both interviewees (Tamale and Bolgatanga) of GWCL indicated that Community Water Committees are not involved in Water Tariff determination. However, they are told how to effectively charge customers for the various container capacities on the cash-and-carry basis. A typical response to the question of CWC involvement in tariff determination was given by a focus group discussion participant at Yarigabisi, a peri-urban community in the Upper East Region as follows:

> Ghana Water Company talks about water tariff issues with us. But all I can say is that they tell us how much customers should be paying. They have never asked us about how much we want to pay for water. As for the actual water bills, it is based on monthly readings of the meter, and we are not involved in the determination of rates on which metered water is based. We only collect tariff on cash-and-carry basis, and the amounts charged per container is the same everywhere.

It could be deduced from the results that community participation in water tariff determination is not authentic, but pseudo-participatory. Expresseddifferently, the task of engagement of local people in the tariff collection process elevates the participatory relationship to citizen power, specifically through delegated power on the Arnstein's ladder. However, in terms of tariff determination, the participatory process does not go beyond the non-participation level of the ladder. Water Committees in rural and peri-urban communities are only told what current tariff rates are, after which they must endorse and charge households as directed by GWCL. It is therefore not surprising that 66 percent of the total sample of 386 respondents were undecided, in response to the third item on ‘No form of community involvement in water tariff determination’, presented in Table 24.

Linking the interests of the stakeholders to the participatory process of water tariff determination for rural and peri-urban communities to addressresearch question three, it is obvious from the findings that the interest of the communities is not being met in the urban water context. In particular, the position of the PURC as the regulator of ‘urban water tariff’ prevents it from being able to extend it interest in fair tariffs to cover rural and peri-uran areas.

Table 24: No Community Participation

Item	No form of	Community	Involvement	in water tariff	Determination
Region	Settlement type	Agree	Disagree	Undecided	Total
Northern	Urban	14	13	19	46
		30%	28%	42%	100%
	Peri-urban	0	6	82	88
		0%	7%	93%	100%
	Rural	4	1	72	77
		5%	1%	94%	100%
	Total	18	20	173	211
		8.5%	9.5%	82%	100%
Upper East	Urban	12	19	14	45
		27%	42%	31%	100%
	Peri-urban	21	40	10	71
		30%	56%	14%	100%
	Rural	1	0	58	59
		2%	0%	98%	100%
	Total	34	59	82	175
		19%	34%	47%	100%
	Total	52	79	255	386
		14%	20%	66%	100%

Source: Field survey, Bukari (2015)

Apart from the observations and other responses given by the GWCL, it was also revealed that the participatory process did not focus on issues of the socio-economic backgrounds of the communities. In other words, despite the pro-poor orientation of the participatory process, both interviewees of GWCL in

Tamale and Bolgatanga, disagreed that issues of the size and nature of flow of household income and occupation constituted the basis of deliberations on water tariff determination. However, the officials agreed that women constitute part of the Community Water Committees, so that their interests could reflect in the participatory management of the water system.

Furthermore, the interest of GWCL in full cost recovery as dictated by the AAF restricts its ability to offer services at lower tariff rates to rural and peri-urban communities. On the other hand, if the roles of CWC as civil society groups in defending the interest of rural and peri-urban communities in affordable water tariffs were emphasised, then the National Water Policy requires that they advocate for the communities to be shifted to the jurisdictions of the CWSA and District Assemblies, as contended by the interviewee of the Water Resources Commission in Accra. This study therefore, proceeded to investigate the tariff paying performance of the communities in the midst of the tariff determinationprocess and conflict of stakeholder interests.

Chapter Summary

In summary, results of Chapter Six indicate that comparatively, willingness and ability to pay water tariffs by rural and peri-urban communities connected to urban water systems were lower than those of urban households. The urban water tariff determination process does not also cater for the special needs of rural and peri-urban communities connected to the water systems. This is because of the cost recovery interest of GWCL and the fact it is mandated to serve only urban areas. These are clear manifestations of western philosophy, through structuralism, which deprives the minority groups of their exclusive rights of entitlement to safe water as a basic need of life (Harrington, 1962; Sim, 2011).

CHAPTER SEVEN

TARIFF PAYMENT AND COMPLEMENTARITIES OF STAKEHOLDERS

Introduction

This chapter is devoted to finding answers to research questions four and five. The fourth research question concerns the effects of the tariff determination process on water tariff payment by rural and peri-urban communities connected to urban water systems. How do the annual water tariff paying performances of the communities conform to the claims that rural and peri-urban communities are poor and so cannot competitively pay tariffs for metered urban water services with their urban counterparts, and what are the effects? The analytical focus in relation to this aspect of the study is influenced by consumer theory.

Answer to the fifth research question focused on the complementarities of stakeholders in improving the tariff paying abilities of the communities. Here, the tenets of the stakeholder theory and the phases of the stakeholder analysis framework were found to be practically relevant. The chapter also explored alternative development strategies that rural and peri-urban community people considered to be capable of addressing their special needs, through stakeholder complementarities.

Urban Water Tariff Payment by Rural and Peri-Urban Communities

This section answers research question four. By recording the monthly debit and credit figures from water tariff records provided by the GWCL (Appendix O) to obtain annual totals, the payment performances of the settlement types in the study area from 2010 to 2015 are shown in Table 25.

Table 25: Water Tariff Payment Performance

Rural Northern Region Communities	Water tariff payment (GH¢)	2010	2011	2012	2013	2014	2015
Yilonayili	Debit	2,111.20	674.26	864	946	691	2679
	Credit	1,119.40	657.40	501	688	490	2577
	Remark	47% arrears	2% arrears	42% arrears	27% arrears	29% arrears	4% arrears
Gbolo	Debit	-	368.76	232.63	308.52	68	-
	Credit	-	218	145.5	100	100	-
	Remark	-	41% arrears	37% arrears	68% arrears	32% over paid	-
Dungu	Debit	-	-	511	705	1822.57	1292
	Credit	-	-	146	1140	1550	1091
	Remark	-	-	71% arrears	62% over paid	15% arrears	16% arrears
Kpalsi	Debit	-	368.76	232.54	245.29	-	-
	Credit	-	270	155.5	100	-	-
	Remark	-	27% arrears	33% arrears	59% arrears	-	-
Jakarayili	Debit	-	-	4.21	135.51	398	174.87
	Credit	-	-	0	30	92	60
	Remark	-	-	100% arrears	78% arrears	77% arrears	66% arrears
Dohinayili	Debit	-	192.68	501.52	1081.52	1000.21	425.38
	Credit	-	0	417	1167	811	321
	Remark	-	100% arrears	17% arrears	8% over paid	19% arrears	25% arrears
Bilpeila	Debit	-	521	61.54	364.09	98.51	245.30
	Credit	-	79	74	190	101	130
	Remark	-	85% arrears	20% over paid	48% arrears	2.5% over paid	47% arrears
Zagyuli	Debit	-	517.46	367	860	2285.17	5,447
	Credit	-	528.00	329	1,175	1956	4,090
	Remark	-	2% over paid	10% Arrears	37% over paid	14% arrears	25% arrears
Urban Northern Region							
Kakpayili	Debit	-	-	629.64	1,584.68	1,391.57	1,968.92
	Credit			279.00	1,634.00	1,470.90	1,901.00
	Remark			56% arrears	3% overpaid	5.7% overpaid	3.4% arrears

Table 25, continued

Rural Upper East Region	Water tariff payment(GH¢)	2010	2011	2012	2013	2014	2015
Bulungu	Debit	514.38	290.15	89.36	46	220.77	454.98
	Credit	704.00	185.00	111.50	46	214.00	360.00
	Remark	37% overpaid	36% arrears	24.7% overpaid	Tariff cleared	3% arrears	20.8% arrears
Gowerie	Debit	454.38	282.33	334.69	339,01	124.05	196.24
	Credit	360.20	264.00	384	319.00	70	212
	Remark	20.7% arrears	6.5% arrears	14.7% overpaid	6% arrears	43.6% arrears	8% overpaid
Tenzui	Credit	-	-	-	263	164	404
	Remark	-	-	-	17.4% arrears	35% arrears	24% overpaid
Peri-urban Upper East Community							
Yarigabisi	Debit	-	-	-	318.23	253.43	325.51
	Credit	-	-	-	263	164	404
	Remark	-	-	-	17.4% arrears	35% arrears	24% overpaid
	Credit	872.70	1465	1237	1059	1732.00	1506.00
	Remark	13% arrears	5% over paid	12% over paid	2% over paid	0.43% overpaid	11.4% overpaid
Urban Upper East Region Communities							
Zaare	Debit	1007.70	1389.75	1106.19	1041.46	1715.57	1351.70
	Credit	872.70	1465	1237	1059	1732.00	1506.00
	Remark	13% arrears	5% over paid	12% over paid	2% over paid	0.43% overpaid	11.4% overpaid

Source: Based on tariff data from GWCL (2015).

The findings indicate that urban areas performed better in tariff payment than rural and peri-urban areas in descending order. Table 25 revealed that urban areas had the incidences of overpaid water tariffs for three out of the six years for which tariff records were available (2011, 2013 and 2015). They also had the lowest average annual water tariff arrears in 2010 and 2012. Rural areas followed with comparatively lower tariff arrears for 2011, 2012 and 2015. Between the regions, however, communities in the Upper East Region performed better than those in the Northern Region.

In the explanations of Raphael (2009) and United Nations Educational, Scientific and Cultural Organisation (UNESCO) (2015), the poor performance of rural and peri-urban communities in water tariff payment is an aspect of relative poverty. Their explanation is consistent with the postmodernist perspective. In other words there is a state of structural cause of water poverty, because the institutionally determined urban water tariffs lack differentiation in the best interests of the rural and peri-urban low-income households.

The performance of rural areas over peri-urban areas in water tariff payment however, deviates from the income-tariff payment nexus. In other words, this study revealed that peri-urban households had higher household incomes than their rural counterparts, yet rural areas paid for tariffs better than the peri-urban. Community Water Committee members at Gbolo, a rural community in the Northern Region, disclosed that they are enticed to enforce effective piped water tariff collection from households in the area because there is lack of alternative sources of water in the area. The strategy is therefore necessary to avoid disconnections. This further supports the contention of Moffat et al (2011) that areas with scarce water resources have higher willingness to pay for improved water services.

The apparent good performance of urban areas over rural and peri-urban areas gives an opportunity to confirm the findings of this study, that urban areas do not only have higher household monthly incomes than peri-urban and rural areas, but also that their willingness and ability to pay for water were higher. The relatively higher tariff arrears of peri-urban and rural areas also conform to the provision of the willingness to pay function related to the consumer theory, that an unfair price could negatively influence consumer willingness to pay for water (Munasinghe, 1992). Accordingly, the logistic regression results of this study revealed a significant but inverse relationship between tariff level and WTP for water.

In response to a question on factors influencing water tariff payment (Question 9, Appendix D-Focus Group Discussion Guide), all the Community Water Committee members who participated also ranked poverty as the main cause of inability to pay for water. This was followed by the recognition of high water tariffs imposed on their communities by GWCL. At Yarigabisi, a peri-urban community in the Upper East Region, a participant said:

We pay for water every day at the same price that those in Bolgatanga and other big towns do. But we know that the government and those in the cities think that most people in small towns and villages are poor, yet they want us to pay for water equally. The government and Ghana Water Company should consider rural people who use piped water, just as thosewho use boreholes.

Interview with CWSA officials in Tamale and Bolgatanga, however, yielded converging and contrasting views concerning the conviction that rural and small town areas with borehole water services do not pay tariff. Both respondents said that communities pay for borehole water services. However, the tariffs are determined by the Community Water Committees and the Traditional Chiefs. This implies that the tariff determination process here attains the rung of citizen control on the Arnstein's ladder. Once tariffs are determined, they are either collected on cash-and-carry basis, monthly or any time the water system is broken down and there is the need for households to contribute for repairs. However, respondents at the borehole sites (see Appendix B) disclosed that they only contributed for maintenance and repairs upon the request of the Borehole Water Committees, but no rigorous tariffs are paid for borehole water.

Both CWSA officials in Tamale and Bolgatanga confirmed that tariff collection for borehole services is by the Community Committees, who keep all the amounts collected for the purpose of maintenance and repairs. It was also disclosed that tariffs for borehole services vary, because they are determined by the traditional authorities and Community Borehole Water Committees. The tariffs are also charged on cash-and-carry basis. There is therefore, flexibility in the tariff determination process, and generally lack of emphasis on tariff collection. These conditions are aspects of the COM model,and prove that the COM model under the CWSA and District Assemblies is more pro-poor and so suitable for rural and peri-urban communities, compared to the Utility Management model under the PURC and GWCL.

Effects of Inadequate Water Tariff Payment

In this section, the effects of inadequate water tariff payment are discussed in terms of service quality, water use and the health implications. A comment by the respondent of GWCL in Tamale disclosed that to prevent further revenue losses, standpipes with high tariff arrears are disconnected. Figure 15 shows a disconnected standpipe at Jakarayili, a peri-urban community in the Northern Region since 2009, due to high water tariff arrears.

Figure 15*:* Disconnected public standpipe at Jakarayili

Source: Field suvey, Bukari (2015)

Table 26 presents the number of public standpipes and their working conditions across the regions, districts, communities and settlement types. It also indicates the average number of days of water flow. The data in the column labelled 'Number of standpipes' were obtained by administration of a structured observation guide (Appendix B).

The observation process was aided by the use of a global positioning system (GPS) to track the locations of the public standpipes during community walks. Appendix J shows details of the coordinates and their accuracy levels. A summation of the number of standpipes in rural settlements from Table 26 gives 30. Of these, there were four disconnected standpipes representing 13 percent. A summation of standpipes in the Peri-urban settlements gives 12, with four, representing 33 percent disconnected. The two urban communities had three standpipes, but there was one case of breakdown, and not a disconnection (at Kakpayili).

Table 26: Working Conditions of Public Standpipes

Region	District	Community	Settlement type	No. of stand-pipes	Working Condition	No. of days of pipe services in the commun-ity
Northern	Sagnari-gu	Maleshegu	Rural	3	3 functioning	4
		Vitting	Peri-urban	1	1 functioning	4
		Yilonayili	Rural	2	2 functioning	4
		Gbolo	Rural	2	2 functioning	4
		Zagyuli	Peri-urban	2	1 disconnected	4
					1 functioning	
		Kpalsi	Rural	1	1disconnected	4
	Tamale Metro	Dungu	Rural	2	1 disconnected	4
					1 functioning	
		Jakarayili	Peri-urban	2	1 disconnected	4
					1 functioning	
		Dohinayili	Peri-urban	2	1 disconnected	4
					1 functioning	
		Bilpeila	Peri-urban	2	2 functioning	4
		Kakpayili	Urban	3	2 functioning	4
					1Broken-down	
	Kumbungu District	Tibung	Rural	3	3 functioning	4
		Satani	Rural	2	2 functioning	4
		Zugu	Rural	2	1 disconnected	4
					1 functioning	
		Voggu	Rural	3	1 disconnected	4
					2 functioning	
		Gbulung	Rural	2	2 functioning	4
		Cheshegu	Rural	2	2 functioning	4
Upper East	Bolgata-nga Municip-al	Kumbusco	Peri-urban	1	1 disconnected	-
		Zaare (Avutubisis)	Urban	1	1 functioning	7
		Atulbabisi	Rural	1	1 functioning	4
		Bulunko	Rural	1	1 functioning	7
		Yarigabisi	Peri-urban	1	1 functioning	7
		Gambibgo	Rural	1	1 functioning	4
		Zuarungu-Daboo	Rural	1	1 functioning	7
		Tanzui	Rural	1	1 functioning	7
	Bongo District	Gowrie	Rural	1	1 functioning	3
		Tindongo	Peri-urban	1	1 functioning	3

Source: Field Bukari, (2016)

The fewer number of standpipes in the urban communities was because most urban households had private connections (based on field observations, as well as GSS data, 2014b). The relatively high level of disconnections in peri-urban areas confirms the response by the GWCL officials that communities with higher water tariff arrears are disconnected. However, this study revealed that peri-urban areas owed more tariff arrears.

Apart from disconnections, the GWCL official in Bolgatanga, disclosed that since the production and distribution of treated water involve cost, the returns to investment in production, through water tariff payment could affect the regularity of services. In other words, where customers do not pay adequately, another strategy is to minimize supply in order to reduce cost. Thus, strategies such as limiting the number of days or hours of water flow are adopted. In terms of number of days of water flow, Table 26 shows that Upper East Region communities exhibited some variations, while those ofNorthern Region wereuniform. The urban communities in both regions, however, are among those with the highest number of days of water services.

Much clearer comparison of the various aspects in Table 26 could be made between the regions than the community level. With the exception of Gowerie and Tenzui, all other communities in the Upper East Region recorded four or seven days of services per week. In the Northern Region, study communities had an average of four days per week. Upper East Region communities therefore, enjoyed more days of services per week, with only one case of disconnection, compared to Northern Region, where there were fewer days of pipe services and more cases of disconnection. Table 27 also makes comparison on hourly basis.

Table 27: Hours of Piped Water Services

Region	Number of hours of pipe flow	Urban	Peri-urban	Rural	Total
Northern	Less than 5 hours	0 0%	1 1%	2 3%	3 100%
	5-12 hours	46 100%	87 99%	75 97%	208 99%
	More than 12 hours	0 0%	0 0%	0 0%	0 0%
	Total	46 100%	88 100%	77 100%	211 100%
Upper East	Less than 5 hours	0 0%	0 0%	0 0%	0 0%
	5-12 hours	2 4%	43 61%	45 76%	90 51%
	More than 12 hours	43 96%	28 39%	14 24%	85 49%
	Total	45 100%	71 100%	59 100%	175 100%
	Total	91 24%	159 41%	136 35%	386 100%

Source: Field survey, Bukari (2015)

Table 27shows that respondents in all settlement types in the Upper East Region received piped water services exceeding 12 hours per day, with urban Upper East recording 96 percent response rate. The Peri-urban and rural communities followed with 39 percent and 24 percent response rates respectively. However, no community in the Northern Region exceeded 5-12 hours of services.

It is not surprising that communities in the Upper East Region performed better in terms of water tariff payment than those in the Northern Region. In other words, inadequate water tariff payment in the Northern Region also adversely affected the quality of services, since there were more cases of disconnections, as well as fewer days and hours of piped water services per week.Table 28 presents the effect of inability to pay tariff adequately on access to safe drinking water.

Table 28: Demand for Water and Affordability

Region	Quantity of water needed per household member daily	Urban	Peri-urban	Rural	Total
Northern Region	One basin or more	46 100%	88 100%	77 100%	211 100%
	Total	46 100%	88 100%	77 100%	211 100%
	Respondents able to afford one basin of water per household member daily	46 100%	54 61%	36 47%	
Upper East	One basin or more	45 100%	71 100%	59 100%	175 100%
	Total	45 100%	71 100%	59 100%	175 100%
	Respondents able to afford one basin of water per household member daily	45 100%	9 13%	8 14%	
	Total	91 24%	159 41%	136 35%	386 100%

Source: Field survey, Bukari (2015)

Table 28 indicates that respondents in all the settlement types in the Northern and Upper East Regions needed one aluminum basin (54ltr) or more per household member per day. However, there were variations in their abilities to afford the required quantity. The row labeled ‘Respondents able to afford one basin of water per household member daily’ is an extract from the data on ability to pay. It shows the number and percentage of respondents within each settlement type that was actually able to afford one basin per household member daily.Within the settlement types, it is seen that all urban respondents in both regions said they could afford a basin of water per household member per day. This costs 2GHp.

In addition, 61 percent of the peri-urban and 47 percent of rural respondents could satisfy their daily water demand with a basin of water per head in the Northern Region. On the other hand, only 13 percent of peri-urban respondents and 14 percent of rural respondents in the Upper East Region said they paid for a basin of water per head in the household. This information implies that the services of GWCL are more affordable to the urban areas for which the company is mandated to serve, than rural and peri-urban communities.

Focus group discussions with Community Water Committee members also yielded experiences of the community respondents on the effects of nature of water tariff payment to GWCL. In response to the question of the socio-economic effects of water tariff payment on the lives of the people, a female participant at Jakarayili, a peri-urban community in the Northern Region said:

> Water is very important in all aspects of our daily lives, but the high water bills prevent us from being able to obtain and use it to our satisfaction. In the big towns, women who have access to adequate water use it for trading. But we those here cannot even pay for enough water to cater for our families. If you even start a trade that involves the use of piped water you stand the risk of losing because the people here do not have enough money for traded goods, compared to those in Tamale town.

The male agent for GWCL in charge of water tariff collection, who was part of the discussion, also added that:

> The inability of many households to buy and use enough water in this community forces some poor households to use very little amount of water

> for drinking, bathing, cooking and washing, and other cleaning responsibilities of women. Farming is the main occupation here. Immediately after harvest, GWCL pays my commission well because people buy enough water to cover a good part of the monthly water bill. But in the middle of the year people reserve the rest of the harvest forhousehold use, no more money to buy other needs.

At Gbolo, another rural community in the Northern Region, a male participant mentioned that water tariff payment is actually a problem. According to him, they paid only 10GHp per basin of water in 2014, but it is now 20GHp this year-2015. He pointed out that:

At Gbolo, another rural community in the Northern Region, a male participant mentioned that water tariff payment is actually a problem. According to him, they paid only 10GHp per basin of water in 2014, but it is now 20GHp this year-2015. He pointed out that:

> An amount of 20GHp sounds small, but households do not need just a basin of water. There are so many persons per household in a house, so women need a lot of water to cater for the needs of their families. However, how much water can the women actually buy? The situation is worse in this community because there are no rivers and dams. Look, the pipe is not flowing at the moment, (Pointing to the public standpipe just closer to where the discussion was taking place, he continued). Can you see even youngmen refusing to go back home because the pipe is not flowing.

The experiences of the respondents in rural and peri-urban Northern Region are consistent with the available literature. For instance Grusky (2001) asserts that the introduction of cost recovery principles in the public water sector of Ghana exacerbates the incidence of poverty, as expressed by the local respondents. IFAD (2011) and IWA (2015) also report that the prevalence of poverty in rural Africa results to revenue losses to water utilities and limits safewater use to less than five litres per day per person, compared to the acceptable quantity of 50 to 20 litres for an average person per day (Institute Water for Africa [IWA], 2015)

The situation at Gowerie in the Upper East Region was slightly different. The participants rather attributed inadequate water tariff payment to the abundance of other sources of water in the environment. These included proximity to the Vea irrigation Dam, protected and unprotected wells, as well as boreholes fitted with hand pumps. A female participant added that:

> Getting water in this community is not a problem, but when it comes to drinking water, we all know that water from the standpipe is safe. It is true that the water from the standpipe is also expensive for many people, but the reason why some people want to use pipe water but not ready to pay is not only about poverty. Some think that the pipe water is from the dam in our area and so it should be free.

The findings reveal differences in access to water and its use, in response to high urban water tariffs in rural and peri-urban communities. There are those who find it difficult to pay for pipe-borne water, and yet have no alternative sources of water, and those who can obtain water from other sources and so are not seriously affected by high urban water tariffs. These generates interest in the effects of not using enough water because of affordability problems, as well as the effects of using other unsafe sources of water because they are available. The data in both Tables 29 and 30 were obtained by interviewing health officials at the Northern Regional Health Directorate in Tamale and the Bolgatanga Regional Hospital in the Upper East Region, about the health implications of inadequate water use and drinking unsafe water.

The purpose of of the interviews with health officials was to ascertain the effects of inability to pay water tariffs on the health of rural and peri-urban households connected to urban water systems, as part of the answer to research question four.Table 29 reveals that inadequate water use results to water-washed and water-borne diseases in the study regions, and rural and peri-urban communities are the most susceptible to such diseases. According to Funari, Kistemann, Herbst and Rechenburg (2011) water-washed diseases are poor hygiene related illnesses. They result from lack of adequate water for washing, bathing and cleaning, for example scabies. On the other hand, water-borne diseases result from drinking water contaminated with fecal coliform. The authors cited cholera and typhoid fever as examples.

Tables 29 and 30 show that urban areas are not threatened by diseases due to inadequate use of water and unsafe drinking water respectively, in both Northern and Upper East Regions. However, rural and peri-urban areas fall victim to water-washed diseases in Table 29, and those in Table 30, which are also water-borne.

Table 29: Diseases related to Inadequate Use of Water

Region8	Aspect of inadequate water use	Water-washed disease	Effect	Water-borne disease	Effect	Most affected settlement type
Northern	Not drinking enough water	Dehydration- Constipation-	Fatigue, dizziness, chest pain Digestive disorder			Rural
Upper East	-do-	-do-	-do-			Peri-urban
Northern	Not bathing regularly	Scabies- Ulcers,	Rash, Open, sores, body odour			Rural
Upper East	-do-	-do-	-do-			Peri-urban
Northern	Not washing clothing regularly	Skin infections	Rash, open sores, unpleasant body odour			Peri-urban
Upper East	-do-	-do-	-do-			Rural
Northern	Not mopping floors of rooms	Skin infections- Respiratory infections-e.g. pharyngitis	Irritations, open wounds, cyanosis Cough, sore throat			Not common
Upper East	-do-	Asthma-	Short breath, cough			Peri-urban
Northern	Not brushing teeth regularly	Gingivitis-	Inflammation of gums			Rural
Upper East	-do-	Periodontal -	Swollen gums, dental decay			Rural
Northern	Not washing hands before eating			Cholera	Dehydration, death	Peri-urban
Upper East	-do-			Hepatitis A	Liver infection	Rural
Northern	Not washing dishes before use			Cholera	Dehydration, death	Rural
Upper East	-do-			-do-	-do-	Rural

Source: Interview with GHS officials, Tamale and Bolgatanga, 2016.

The respondent in the Northern Region noted that, some rural and peri-urban communities are water-scarce areas without surface and groundwater resources. Under such circumstances, inability to buy safe water from the standpipes result to inadequate water use and drinking of unsafe water.

Table 30: Diseases Related to Unsafe Drinking Water Use

Disease		Causal organism	Associated aspect of poor water quality	Most affected settlement type
NR	UER			
Cholera	Cholera	Vibrio cholera	Pollution	NR: Rural UER: Rural
Dysentery	Dysentery	Shigella dysenteriae	NR: Contamination UER: Fecal coliforms	NR: Rural UER: Rural
Intestinal worm	Typhoid	NR: Helminthes UER: Salmonella typhi	NR: Contamination UER: Contamination	NR: Rural/Peri-urban UER: Rural
-	Hepatitis A	Hepatitis A virus	Contamination	Rural

Source: Interview with GHS officials, Tamale and Bolgatanga, 2016.

Table 29 shows that respondents in the two study regions cited dehydration and constipation as the effects of not drinking enough water. They also noted that inadequate water alsoleads to poor personal hygiene practices such as not washing hands before eating, not washing dishes and clothing, not mopping floors and not brushing teeth. They gave examples of water-washed diseases reported at the health facilities in their regions, related to skin, respiratory and dental infections as detailed in Table 29.

Regarding diseases due to drinking of unsafe water, the health officials provided the information presented in Table 30, which corresponds to the findings of Funari et al. (2011).Details of how water tariff payment relates to the incidence of diseasewere provided by Water Committee members during focus group discussions. At Gowerie in the Upper East Region, the disclosure by respondents that some households resort to the use of the Vea Dam and unprotected wells because they cannot afford tariffs charged at public standpipes depicts their vulnerability to the diseases listed in Table 30. In view of the health problems associated with inadequate water tariff payment, the interviewees of GWCL agreed thatinadequate water tariff payment defeats the company's aim of extending safe drinking water to the communities in order to promote good health.

This study did not collect and test samples of piped water supplied by GWCL to prove that it was actually safe for dinking. However, Section D of Appendix C was administered to laboratory technicians of GWCL at both Tamale and Bolgatanga of the Northern and Upper East Regions respectively. Appendix L presents the parameters and their values, while Appendix Q also shows how the water samples were taken and tested. The data show that the parameters of the treated piped water met both international standards and GWCL's target for safe drinking water. Thus, in relation to research question four, GWCL meets its objective to provide safe water, but inability to pay for services by rural and peri-urban households, still exposes them to the risk of water related diseases, due to unsafe and inadequate water use.

Complementarities of Stakeholders in Improving Water Tariff Payment

This section of the thesis answers the fifth research question concerning the complementarities of the stakeholders in improving water tariff payment in rural and peri-urban communities connected to urban water systems. The focus is on the identification of water tariff payment related problems, how stakeholders complement each other's efforts for improving water tariff payment in the study area, and what alternatives are available to addressing unresolved challenges.

Problems of water services requiring stakeholder intervention

This subsection discusses respondents' experiences of urban water related problems involving connections and tariff payments, and possible complementarities or synergies of the stakeholder for interventions. The information in Table 31 is based on the typology of Blanc (2007) as reviewed in chapter two. It presents Community Water Committee members' observations of pertinent problems requiring stakeholder interventions. These were obtained from the completion of the table in section C of Appendix D.

Responses in Table 31 are presented by settlement type, indicating whether participants agreed or disagreed, in relation to each identified problem.The first identified problem related to some households not being connected to public standpipes due to inability to pay connection charges. Participants of Kapkayili and Zaare, which are urban communities of the Northern and Upper East Regions respectively, disagreed to the applicability of this problem. On the other hand, all peri-urban and rural participants agreed that inability to pay connection charges was a problem in their communities.

Table 31: Problems of Connection to Urban Water Systems

	Urban		Peri-	Urban	Rural	
Identified problems of piped water requiring stakeholder intervention	Agree	Disagree	Agree	Disagree	Agree	Disagree
Some clusters of households cannot contribute for public standpipe connection and so no extension	-	Kakpayili-NR, Zaare-UE,	Jakarayili-NR, Kumbusco-UE, all other peri-urban communities	-	Malsheu- NR, Dungu, Zuarungu-Daboo-UE, all other rural communities	-
Many households cannot afford private home connections and so put pressure on public standpipes	All urban communities	-	All peri-urban communities	-	All rural communities	
Some locations are disconnected from public standpipe services due to tariff arrears		Kakpayili-NR, Zaare-UE	Zagyuli-NR, Jakarayili-NR, Dohinayili-NR, Kumbusco-UE	Vittin-NR, Bilpelia-NR, Tindongo-UE	Dungu-NR,Zugu-NR,Voggu-NR, Zugu-NR, Cheshegu-NR, Kpalsi-NR, Gbolo-NR,	Atulbasisi-UE, Gowerie-UE, Bulunko-UE
Some households are disconnected from private connections due to arrears	-	Kakpayili-NR, Zaare-NR		All peri-urban communities		All rural communities

Interpretations: NR-Northern Region; UE-Upper East Region.

Source: Field survey, Bukari (2015)

The results show that the inability to pay for connection charges for public standpipes is a problem to rural and peri-urban households, but not a problem for urban households. The second problem was about households not being able to pay connection charges, as a result of which many depend on public standpipes. All participants in the various settlement types in the Northern and Upper East Regions agreed that they experienced the problem.

Urban respondents also agreed to the problem of inability to have private connections, because the study actually focused on only public standpipe users. This is because public standpipes are typically for pro-poor urban water services (Franceys & Gerlach, 2008). Thus, all households which cannot afford private home connections depend on public standpipes. This was applicable to all the urban, as well as the peri-urban and rural household respondents.

This study revealed that 100 percent of the respondents depended on public standpipes. This is because the sample units were households that use and pay for public standpipe service. In other words, they were all connected to public standpipe services provided by GWCL, including all the urban respondents. Since the focus group participants in the urban communities (Kakpayili and Zaare) also supported the view that poverty is the reason why many households are not connected to urban water services, including themselves, the findings therefore, confirm the assertion by Franceys and Gerlach (2008) that public standpipes are for low-income households.

Another problem identified by the participants in Table 31 is that some locations (within the communities of the focus group discussion participants), were disconnected from public standpipe services due to water tariff arrears. All the urban communities disagreed to the realisation of this problem, while the ‘Agree’ columns registered both rural and peri-urban communities. This is a reflection of the difference between urban public water users or the urban poor, and rural and peri-urban water users, which are also stereotyped to be of low-income status (Noakes & Franceys, 2014). The socio-economic characteristics ofrespondents of this study, have, however, indicated that urban households had relatively higher monthly incomes than their rural and peri-urban counterparts. The apparent rejection of the problem of disconnections from public standpipe services due to water tariff arrears by urban respondents, coupled with their comparatively good performance in water tariff payment, support the view that public standpipe services are suitable for the urban poor, but unaffordable to rural and peri-urban households.

The last problem has to do with the disconnection of private household piped water services due to water tariff arrears. Representatives of the communities of all the settlement types in Table 31 disagreed that privately connected households are disconnected. In other words, despite not having private home connections, the participants said they do not observe cases of disconnection of neighbours with private connections. Urban participants at Kakpayili and Zaare, observed that most Landlords with private home connections restrict usage to their own households and tenants. There is also effective collection of tariffs because the users live in the same house, which implies that tariff evasion is not possible. They added that such private facilities serve fewer people, so the consumption and associated tariffs are lower. The lifeline block in increasing block tariff therefore, benefits households with private home connections than clusters of households using public standpipes.

The focus group discussion participants also expressed dissatisfaction that the water tariffs charged by GWCL were too high, without any consideration for their socio-economic conditions as low-income rural and peri-urban communities.Participants also agreed that women, who are mostly responsible for household water acquisition and payment, were relatively of low income status. For instance, this study found that of the total of 233 female respondents, 88 percent (206) earned less than the national per capita income of GH¢446, compared to 80 percent of the male respondent population 153 who also earned less than the national average. Of the total sample population of 386, 85 percent earned below the national average income per capita (Source: Field survey, 2015). Low income status was therefore a general feature of the public standpipe users, but women were the most affected. According to Kendie (1992), the low-income status of women in rural north Ghana negatively affects water tariff payment in the communities.

Apart from the problems related to connection and tariff payment, poor sanitary practices also lead to pollution of freshwater resources. This leads to the need for water treatment, the cost of which is a component of the automatic adjustment formula for water tariff determination (Appendix N). Observation results from the administration of Appendix B revealed that all the rural communities practiced open defecation, backyard dumping of solid waste and poor management of open dump sites. A CWSA official in Bolgatanga, also added that some rural and peri-urban communities engage in indiscriminate digging of the ground for local toilet constructions to pollute groundwater aquifers.

The sanitary related problems in rural and peri-urban areas were due to lack of public latrines, household dustbins and sanitary landfills. The sanitationsituation was however, better in urban and peri-urban communities, because households had access to public latrines, public waste containers and sanitary landfills. The case of rural communities is however, of major concern because the dams serving the Tamale and Bolgatanga branches of GWCL are both located in rural communities. Improper sanitary practices therefore result to pollution of the water, and the associated cost implications in terms of water treatment, as indicated in Appendix N.

Complementarities of stakeholders in addressing identified problems

Table 32 presents the complementarities of stakeholders in addressing the problems related to connection and tariff payment identified in Table 31. The data in the table were obtained from interviews with the various stakeholders therein. In the columns on active stakeholders, contextually primary/direct stakeholders are those with direct interest and have the power to influence decisions and can be affected by the outcome of the decisions on water tariffs, e.g. GWCL. Primary/indirect stakeholders have interest in, and are affected by decisions on water tariffs, but have no direct power to influence the decisions, e.g. Community Water Committees and households.

The secondary/direct stakeholders have the interest and power to influence policy or decision on water tariffs, but are not directly affected by the outcomes, e.g. PURC. On the other hand secondary/indirect stakeholders play intermediary role. They may have interest in, but cannot influence decision on urban water tariffs, e.g. MMDAs (See Anokye, 2013; Lindblom & Ohlsson, 2011).

Table 32: Roles of Stakeholders

	Active Stakeholders				
Problem	Primary/ Direct	Primary/ Indirect	Secondary/ Direct	Secondary/ indirect	Remedial roles
Some clusters of households cannot contribute for public standpipe connection and so no extension	GWCL-		PURC-	MMDAs-	-Extra levies on urban customers to cross-subsidise rural water connections -Payment of cost of service extensions to rural and peri-urban areas. -Responsible for administration of tariff structures
Many households cannot afford private home connections and so put much pressure on public standpipes	GWCL-			CWSA-	-Training of Water Committees for effective management of the standpipes -Provides additional connections for clusters of households that apply for separate new standpipes
Some locations are disconnected from public standpipe services due to tariff arrears		CWCs-		NGOs, e.g. WaterAid	-Mediate between households and GWCL for reconnection. -Provide boreholes for rural and peri-urban areas
Some households are disconnected from private connections due to arrears	GWCL	Individual households-			-Problem was not reported

Source: Field survey, Bukari (2016).

In the ‘Problems’ column of Table 32, the first item reveals inability to pay connection charges. Tamale Metropolitan and Bolgatanga Municipal Assembly officials indicated that they are responsible for meeting the cost of delivery pipeline extensions to small towns, rural and peri-urban communities by GWCL. Apart from the opportunity of rural and peri-urban communities to benefit from the support of the MMDAs, GWCL officials also said that the company imposes a two percent levy on the monthly water bills of urban customers as seen in Appendix P. The extra levy on urban areas is cross-subsidise service extensions to rural communities. This serves to supplement the efforts of the Metropolitan, Municipal and District Assemblies (MMDAs).

The PURC officials also said that they allow GWCL to administer the increasing block tariff as a strategy to cater for the needs of the poor. This is however, applicable to all urban water consumers, including rural and peri-urban communities without further considerations, since services are metered and the tariffs are determined by formula.Once delivery pipelines are extended to the communities, service connection is demand driven. That is, clusters of households that express interest in a public standpipe, or individual household connections could apply to GWCL. Whether households actually connect or not is based on ability to pay the connection charges.The identification of the problem of inability to connect in Table 32 shows that some households in rural and peri-urban communities still face this problem, as observed by the focus groups in the communities, despite the corresponding roles of the stakeholders in the last column. The failure of somehouseholds to connect to piped water services despite their availability reduces the total revenue that GWCL could get through water tariff payment.

Table 33 evaluates the effectiveness of the coverage of subsidies.Through interview with GWCL officials in Tamale and Bolgatanga, the findings indicate that direct subsidies are not applicable to any of the settlement types in both regions, hence, the responses are not in Table 33. On the other hand, in the Northern Region, rural and peri-urban communities, which the cross-subsidies are meant for were actually covered. In addition, urban communities are also covered by cross-subsidies. The situation in which subsidies reach people who are not supposed to be covered is known as 'Type II error' (Blanc, 2007).

Table 33: Coverage of Subsidies

	Cross-	Subsidy		
Region	Rural and peri-urban households using public standpipes	Urban poor households using public standpipes	Urban households with private connections	Urban commercial/ industrial users
Northern Region	Reached	Reached	Reached	Reached
Upper East Region	Reached	Not reached	Not reached	Not reached

Source: Field survey, Bukari (2015) (Based on Blanc, 2007).

The Upper East Region respondent, however, contended that cross-subsidies reach only rural and peri-urban communities, but not urban, which is the ideal situation. In the case of Northern Region, the interviewee explained further that the cross-subsidies are not meant for only rural and peri-urban areas, but also the urban poor. It is therefore appropriate to say that in the Northern Region, cross-subsidies in urban water sector are simply pro-poor.Apart from the roles of stakeholders to address the issues, the problem of inadequate tariff payment due to poverty was found to have attracted stakeholder attention.

CWSA officials in Tamale and Bolgatanga were asked why some rural and peri-urban communities are connected to urban piped water systems rather than the services of the CWSA, and how the agency ensures fairness of the tariffs GWCL charges the communities. Both officials of CWSA disclosed that some communities had piped water connections under the former Ghana Water and Sewerage Corporation (GWSC), which was responsible for both urban and rural water services before rural and small town water services were decentralised to CWSA and the District Assemblies (DAs). In addition, some communities do not have adequate groundwater aquifers to yield enough water for point source water systems such as boreholes with hand pumps. They also said that the decision to connect rural and peri-urban communities to services of GWCL arises in situations where it is technologically cost effective to do so, compared to other forms of water supply.

The officials, however, acknowledged that during the era of GWSC, public water was provided as a social good under the supply-driven approach. However, with the policy shift to water provision as an economic good under the present demand-driven approach, the rural and peri-urban communities are too poor to pay urban water tariffs to GWCL. Accordingly, in response to the question of ensuring fair treatment of rural and peri-urban communities in terms of tariff payment to GWCL, the CWSA official in Tamale said that they train the CWCs on how to ration the flow of the standpipes to avoid wasteful use of waterwith high tariff implications. At Bolgatanga, the CWSA official stated that sometimes they sign a memorandum of understanding involving the CWSA, GWCL and the CWCs regarding tariff conditions. However, the CWSA basically ensures that the CWCs make households know the tariff conditions of GWCL, and the effective payment of the tariffs.

The Tamale Metropolitan and Bolgatanga Municipal Assembly officials also disclosed that the Assemblies are stakeholders in matters of tariff payment by rural and peri-urban communities connected to urban water systems. Both interviewees stated that the Assemblies do not influence the tariff amount for communities; rather, they negotiate and pay delivery pipeline extension fees to GWCL. They also ensure that communities pay the water bills charged by GWCL through encouragement of CWCs to instil positive attitudes in community members for effective tariff payment.

On the issue of reduction of cost of water treatment and how that could reduce water tariff, the CWSA in collaboration with the MMDAs, as well as the Water Resources Commission, prevent insanitary practices that could pollute freshwater resources. Interviews with CWSA officials at Tamale and Bolgatanga revealed that the MMDAs, provides public latrines and also engages waste management contractors such as Zoomlion Ghana Ltd. to manage solid and liquid waste collection and disposal. They stressed that in communities with surface water resource, public waste containers are usually place not less than 50m away from the water bodies. Figure 16 presents an example of a Zoomlion public waste container at peri-urban Jakarayili in the Northern Region.

It is obvious from Figure 16 that without the container, all the waste would have been on the open dump site to pollute the environment and groundwater aquifers. It could also get carried away by water erosion to pollute water bodies. The CWSA officials stated in their responses that they occasionally monitor the quality of ground and surface water sources of drinking water by taking samples to GWCL's laboratories for testing. They also educate communities on environmental hygiene and the health implications of poor sanitation.

Figure 16: Public waste container at jakarayili

Source: Field survey, Bukari (2015)

In an interview with an official of the Water Resources Commission in Accra, on the role of the Commission in the promotion of water quality in communities, he said, "The Water Resources Commission has a Water Quality Department, which tests the quality of water in surface water sources. The Commission also educates communities about water resources conservation".

In terms of the WRC's association with water tariff payment, the official said the Commission plays no role in tariff setting. Instead, it grants permits to water companies to abstract water volumes from water resource owning communities. He added that conflict could, however, arise if the companies fail to extend services to the communities or charge unfair tariffs to the water resource owning communities.

The WRC interviewee further noted that, the prevention of water pollution does not only aim at reducing the cost of water treatment for GWCL. The primary aim is to conserve the quality of water resources, so that the health of poorer households that consume the water directly because they could not afford pipe-borne water could be protected. With the above roles of the stakeholders in relation to the identified problems, Table 34 presents findings from focus group discussions with the CWCs.

The focus of this section is on the experiences of the Committees in their relationships with the various stakeholders for improving water tariff payment, following the phases of the stakeholder analysis framework spelt out in the conceptual framework of this study. The findings from the focus group discussions were supported by interview results from the relevant organisations.It is observed that there are slight differences in the composition of the partners or stakeholders. For instance, at the urban level, PURC is represented for water tariff determination, but WRC and CWSA are not represented. This is because PURC determines tariff for urban water, but the freshwater sources forGWCL are not located in urban communities. Also CWSA is meant for the management of rural and small town water and sanitation, as well health and hygiene education. Furthermore, it is observed from Table 34 that the formal aspect of partnership formation is by GWCL initiating for appointment of agents at the urban level or CWCs at the peri-urban and rural levels.

Table 34: Stakeholder Interventions to Improve Tariff Payment

Settlement type	Presence and composition of stakeholder partnership	Partnership formation	Purpose of partnership as basis of partnership building	Partnership maintenance
Urban	Partnership existed between GWCL, PURC, Metropolitan , Municipal Assemblies and community standpipe agents	Urban water service extension and tariff determination drew GWCL into partnership with PURC, MMAs and community agents. Appointment of agents was initiated by GWCL.	Extension of piped water services to the urban poor, water tariff determination, maintenance of the standpipes and effective tariff collection.	Payment of commission to community agents for effective tariff collection and punishment of defaulters of tariff payment through disconnections by GWCL; PURC permits urban water tariff negotiations at stakeholder platforms.
Peri-urban	There are six to eight member CWCs, with equal numbers of men and women. The Committees partner with GWCL, MMDAs, CWSA, and WRC.	Piped water service extensions, the need for effective management of the water system, and water quality control brought the stakeholders together	To promote water tariff payment and management of standpipes, regular water supply and water resource conservation and pollution control	Educating community members on the importance of tariff payment for sustainable services by MMDAs, payment of commissions to tariff collectors by GWCL, sensitisation of communities on the importance of good sanitation and water resources conservation by CWSA and WRC.
Rural	There were six to eight member CWCs, with equal numbers of men and women. Other partners were GWCL, MMDAs, CWSA, and WRC.	GWCL initiated partnership with CWCs in consultation with Chief and elders of the communities. Other stakeholders include the MMDAs, CWSA and WRC.	Sustainable supply of water by GWCL, through effective water tariff payment by households; maintenance of the standpipes by CWC; and water resources conservation and pollution control bt CWSA and WRC.	CWSA trains CWCs and sensitisation of households on how to minimise tariff;GWCL pays commission to tariff collectors; WRC controls water pollution and grants abstraction rights to water companies to prevent conflict with the communities.

Source: Field survey, Bukari (2016).

The association with the other formal sector stakeholders as identified in Table 34 is indicated by their existing roles at the various types of settlements. The identified stakeholder organisations fall under relevant ministries constituting the secondary stakeholders, which have the power to influence water sector policies, but have no direct roles in their implementation. For instance the PURC, GWCL, CWSA and WRC belong to the Ministry of Sanitation and Water Resources (MSWR) now rebranded as Ministry of Water and Sanitation, while the MMDAs belong to the Ministry of Local Government and Rural Development (MLGRD). It is the policies of the MSWR that influence the regulatory roles of the PURC in urban water tariff determination, which has a bearing on GWCL and urban water consumers, as well as rural and peri-urban communities connected to urban water services.

On the other hand, the policies of the MLGRD influence the regulatory roles of the MMDAs, which affect the activities of CWSA, with a bearing on small towns, peri-urban and rural communities. However, the policies and regulations relate to communities depending on point source water facilities provided by the MMDAs and managed by the CWSA. Table 34 shows that there are linkages between the stakeholder organisations under MSWR and the MLGRD. These linkages are obvious in the partnership maintenance column, where for instance, the CWSA trains peri-urban and rural Community Water Committees on how to minimise water tariff to affordable levels.

According to the CWSA official in Tamale, the ability to minimise water tariff levels by CWCs is by rationing the flow of the standpipes. In other words, the CWCs are trained to lock and open the standpipes at specific periods to avoid waste of water. According to Nkrumah (2004), such a strategy prevents consumption levels from rising to the higher tariff brackets of the increasing block tariff structure. The CWSA respondent further said that the agency also builds the confidence of rural and peri-urban households in the billing process by training the CWCs on how to do monthly meter reading with the GWCL field officers. This avoids suspicions of overestimated water bills and the associated effect of unwillingness to pay the tariff. The performance of the settlement types in water tariff payment has already been discussed in this work. The realisation that rural and peri-urban areas still had higher annual water tariffs arrears despite all the interventions described above are indications that the best solutions for improving water tariff payment were not yet found.

Examining the findings from the theoretical perspectives, it is noted that the descriptive tenet of the stakeholder theory was not properly defined for rural and peri-urban communities. Put differently, the linkage between rural and peri-urban communities on one hand, and PURC and GWCL on the other, created conflict between policy and practice. This obviously affected the instrumental and normative tenets, involving the role of the PURC in urban water tariff determination, and GWCL for urban water supply, for communities that were not urban. At the same time, the implementation of the normative tenet was nothing more than emphasising that the communities adhered to the strict conditions of paying the tariffs.

In the context of the consumer theory, the aspects of urban water tariff determination and imposition on rural and peri-urban communities meant that the tariff (P) was not suitable for this group of consumers. Also the nature of services, that is public standpipes, and the higher cost of surface water treatment for the promotion of water quality (R*), which contribute to high urban water tariffs, did not match the policy provisions for the communities. That is, they are supposed to benefit from low-cost point source water facilities such as boreholes fitted with hand pumps, with relatively favourable tariff conditions (Britwum, 2004). For the economic factor (Y), despite identifying households in rural and peri-urban communities as poor, the interventions did not make provisions for the promotion of income generating abilities of the people, neither were there differentiated tariff policies that reduce the tariffs in favour of rural and peri-urban communities.

Furthermore, the marginal cost pricing theory makes provisions for the optimal model for urban water pricing and the lifeline model for pro-poor water pricing. But in the case of this study, both urban and rural/peri-urban low income households were subjected to the application of the optimal model of water pricing, which is a feature of the automatic adjustment formula used by the PURC. Thus, despite the combination of several stakeholder roles in a multiple realist perspective, the apparent poor performance of the rural and peri-urban communities in the payment of urban water tariffs was an indication that the adopted approaches failed. In other words, the efforts of the stakeholders focused on changing attitudes, or the other explanatory vector ($\underline{Z}$), such as emphasis on education, rather than improving abilities to pay water tariffs by rural and peri-urban communities connected to urban water systems.

These confirm the significant but inverse relationships between the predictor variables, namely water tariff level, service quality and income, and willingness to pay for standpipe water as the dependent variable in this study. On the other hand, age, sex, marital status, religion, education, occupation and household size were not significantly related to WTP in the binary logit results of this study. These findings are consistent with the position of postmodernism, which criticises the rigid policy provisions in structuralism, as the cause of the failure to promote the exclusive rights of the minority in terms of access to social services such as safe water, which create conditions that perpetuate the cycle of poverty (Harrington, 1962; Kamil, 2011; Sim, 2011). In other words, lack of safe water is an indicator of poverty, and payment of urban high water tariffs by low-income rural and peri-urban communities is regressive. This could deny them of access to other basic necessities of life as a result of disproportionately higher expenditure on safe water (Grusky, 2010).

Furthermore, the unmatched relationship between the socio-economic characteristics of rural and peri-urban communities and the urban water tariff conditions means, the objective of the automatic tariff adjustment formula to achieve full cost recovery could be far from being attainable, given the payment performance of the communities. The next section considers alternative ways of solving the problem of inadequate water tariff payment in rural and peri-urban communities connected to urban water systems.

Alternatives for Improving Water Tariff Payment

This subsection is a continuation of the answer to research question five, related to the complementarities of stakeholders in improving water tariff payment in rural and peri-urban communities connected to urban water systems. It anchors on multiple realities as a paradigm, but I adopt prospectivism as the position about truth. In other words, given that the approaches used in improving water tariff payment were structurally considered as what would be best, the failures to meet the needs of the target population calls for a shift to consider rightness as what is prospectively best, from a consequentialist point of view (Mason, 2013).

In this sub-section, I begin by assessing the views of the organisational stakeholders about the relationship between GWCL and rural and peri-urban communities in terms of water services. This is followed by the ideas of CWCs from focus group discussions regarding how urban water supply and tariff conditions should be extended to them in a sustainable manner. Table 35 presents the responses of interviewees to the questions of whether GWCL should continue to serve rural and peri-urban communities, and what ought to be done if the services should continue or discontinue.

The data in Table 35 shows that all the respondents in Northern Region (except the CWSA) as well as the WRC in Accra did not support the issue of urban water extensions to rural and peri-urban communities, but the opposite was the case in Upper East Region.According to the interviewee of the Bolgatanga Municipal Assembly, there was the need for GWCL to continue to serve rural and peri-urban communities, despite the services of the CWSA. He argued that the service was needed to increase supply of safe water to meet increasing demand for water due to rural and peri-urban population growth.

Table 35: Alternatives for Service Extensions and Tariff Conditions

		Items		
Region	Stakeholder	GWCL should continue serving rural and peri-urban communities that face problems of inadequate access to water because they cannot pay the tariffs	Suggestion for improving stakeholder participation if GWCL must continue to serve low-income rural/peri-urban communities facing tariff payment problems	Alternative suggestions for rural and peri-urban areas If GWCL discontinues services due to inability to pay water tariffs,
		Responses		
Northern	CWSA	Agree	Involve private vendors to manage bulk meters and sell water to the communities.	GWCL should allow private vendors to pay for the bulk meters monthly, and then sell the water to households in the communities.
	Tamale Metro Assembly	Disagree	A different payment plan should be adopted for the communities, such as annual tariff payment after harvest of food crops; commercial farming should be encouraged.	The communities should be served by the CWSA.
Upper East	CWSA	Agree	Educate communities on the importance of paying for safe water.	The communities should opt for less expensive sources of water such as boreholes fitted with hand pumps.
	Bolgatanga Municipal Assembly	Agree	GWCL should reduce the tariffs for rural and peri-urban communities.	Boreholes with hand pumps should be drilled for such communities.
Greater Accra	WRC	Disagree	-	The communities should be supplied by CWSA.

Source: Field survey, Bukari (2016)

On the other hand, interviewees who kicked against the relationship between GWCL and rural and peri-urban communities said that the relationship was not in line with Ghana's National Water Policy. All respondents also expressed the views that if the services to the communities should continue, there could be some alternatives for improvingtheir abilities to pay the tariffs. They advanced private sector participation for effective sale of the water, reduction of the water tariffs to affordable rates, and economic empowerment schemes, such as commercial farming as some of the solutions.

The idea of engaging the private sector for effective sale of urban piped water to rural and peri-urban communities already facing tariff payment challenges, however, sounds radical. This position emerges from the notion that unwillingness to pay is attitudinal, rather than poverty related. However, the facts remain that Ghana Living Standards Survey reports have always stratified rural communities as being poor (GSS, 2008 and 2014b), while the National Water Policy of Ghana makes provision for a separate model of water supply to the rural communities and small towns, including peri-urban areas in recognition of the socio-economic differences (Adank & Tuffour, 2013; MWRWH, 2007). These suggest that the communities deserve some preferential treatment if urban water service extensions to them must continue.

The PURC interviewees in Accra and Tamale did not answer similar questions as presented in Table 35, because earlier responses to some items on their questionnaires implied that GWCL was not expected to serve rural and peri-urban communities. Their suggestions for improvement of the existing relationship between GWCL and the communities were however, different. The

PURC official in Accra was of the view that rural and peri-urban water supply and tariff conditions should be left in the hands of the traditional leaders, since they were not part of the jurisdictions of the PURC.

On the other hand, the officialin Tamale was optimistic that a policy amendment in the water sector of Ghana could make provisions for the special needs of rural and peri-urban communities connected to urban water systems. He argued that the policy change is necessary because the decision for GWCL to serve some of the communities was strategic, such as water-scarce areas and water resource owning communities.

At the community level, focus group discussions with Community Water Committee members or men and women's groups indicated that there were differences in participants' views by settlement type. Rural participants were more interested in poverty reduction strategies. Some of the suggestions included interventions by Government, through the provision of credit facilities to promote smallholder businesses, especially for women. Water resource owning communities such as Gowerie in the Upper East Region added that, if GWCL was not satisfied with their tariff payment performance, then the company should introduce less expensive technology for the supply of safe water for them at lower tariffs.

In the peri-urban areas, suggestions included the extension of stakeholder partnership to include non-governmental organisations (NGOs). These should support the provision of alternative low-cost water supply facilities such as boreholes to serve very poor households that cannot pay for the services of GWCL. Regarding the role of the Government, they said that direct subsidies should be introduced to make water tariffs affordable. They also suggested theinclusion of poverty reduction interventions for women to improve their ability to pay for piped water services.

Men and women's groups in the urban communities were more concerned about the need to enforce policies that protect the interests of low-income households in terms of water tariff determination. They also called for the re-introduction of direct subsidies by Government on potable water supply for the poor. These suggestions conform to the multiple realist, advocacy/participatory and postmodernist paradigms.

In the multiple realist context, the above suggestions deal with more than one potential reality of improving water tariff payment (See Schütz, 1945). As contextualised in this study, they begin first, by basing decisions on physically observable aspects of water services, tariff determination and payment, peculiar to the 'world of physical things'. They also suggest opportunities for the incorporation of interests of individual stakeholders as part of the remedies for improving tariff payment, which conforms to the 'various worlds of individual opinion'. Additionally, the review process itself aims at improving the roles of stakeholders in the participatory process for best results, which measures up to the 'world of ideal relations', while the research process that led to the compilation of the knowledge expressed herein pertains to the 'world of science'.

The findings also show how constructionism by the participants sought to influence policy by the integration of political authority with collaborative actions. This aims to empower and change the conditions of previouslymarginalised groups in terms of decision-making and direct actions to improve abilities and willingness to pay for water, which conforms to the advocacy participatory worldview (Creswell, 2009).

Finally, the identification of the weaknesses of the ideologies, such as the neoliberal concept of cost recovery and its negative effects on access to water by the poor, as well as the need for remedies to the problem fulfills the postmodernist philosophical facet (Sim, 2011). In general, the above suggestions advocate for more authentic local participation in water tariff determination; development of local capacities to pay for water through the direct involvement of beneficiaries in small-scale businesses; and the introduction of more pro-poor technologies in water services with enhanced community ownership and management.

Empirically Anokye (2013), asserts that local participation, especially in community managed water systems are more effective. Theoretically, it also makes the roles of the local people realistic in the application of the descriptive (Partnership formation); instrumental (Partnership building/implementation) and normative (Partnership maintenance) tenets of the stakeholder theory (Donaldson & Preston, 1995). They also provide a trajectory from pseudo/passive participation to functional participation (Midgley et al, 1986). These enable local people to ascend from the rung of manipulation to citizen control on the Arnstein's ladder (Arnstein, 1969), in terms of participatory water services to improve tariff payment.

The implementation of these suggestions could also fulfill "the principle of subsidiarity in order to ensure participatory decision making at the lowest appropriate level in society"; and "the principle of solidarity, expressing profound human companionship for common problems related to water", under the water policy of Ghana (MWRWH, 2007, p. 11). In the international context, the integration of cost recovery-based urban water services with pro-poor strategies is also consistent with the Africa Water Vision for 2025, which recognises the adoption of financing and cost-recovery methods that are equitable and sustainable, while reflecting the concerns of the poor (ECA, 2000).

Chapter Summary

In summary, results of Chapter Seven revealed that low capabilities to pay urban water tariffs by rural and peri-urban households connected to such water systems affect adequate access to safe water due to disconnections and other aspects of poor service quality, which account for water related diseases. Despite stakeholder complementarities through the involvement of CWCs, pollution controls to reduce cost of treatment and cross-subsidisation of water extension costs, the problems persisted. These called for suggestions for alternative strategies such as economic empowerment to address the situa

CHAPTER EIGHT

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter presents the summary of major findings and conclusions related to the research questions and hypotheses. Also included are the policy recommendations to address identified challenges, contribution of the study to existing body of knowledge and suggestions for future research.

Summary of Results

This section presents summaries of the major findings that answered the research questions and hypotheses. The first research question and associated hypothesis deal with the relationship between the socio-economic backgrounds of respondents and willingness to pay for water. The results indicated that there were significant relationships between household income and not age, sex, religion, marital status, education, occupation and household size and willingness to pay for water as the outcome. Regression test results showed that the relationship was significant at the 0.005 alpha level for household income.

For all the socio-economic determinants, willingness to pay for water was highest among urban households, followed by rural and peri-urban households respectively. However, all urban households were able to pay for the standard daily requirement of water per household member (54ltr at 20GHp), followed by peri-urban households in the Northern Region, where 61 percent of households were able to afford 54ltr per head per day. In the Upper East Region,13 percent of household respondents in the peri-urban areas, and 14 percent of those in rural areas were able to pay for right amount of water per head daily. Rural Upper East was therefore slightly more able to pay for water than peri-urban households were.

In relation to research question two, which is about water tariff determination, the results indicated that water tariffs are determined by formula and stakeholder consultation. The PURC is responsible for determining and regulating tariffs for urban water supply by GWCL.

In line with research question three, which concerns the interests of the stakeholders in the participatory tariff determination process, the interest of PURC is to ensure fairness of the water tariffs to both GWCL and urban consumers. GWCL seeks to recover cost, while rural and peri-urban communities connected to urban water systems are interested in affordable tariffs. Community Water Committees serve as local Civil Society Organisations to defend the interests of the communities. The participatory tariff determination process does not include the Community Committees because they are not part of the target urban consumers. GWCL, however, extends services to the communities and partner with the Committees for effective water tariff collection, but not determination of tariff.

To address research question four, which relates to the effects of the tariff determination process on water tariff payment, logistic regression results revealed that the levels of tariff and service quality as factors of the determined watertariffs significantly related to household willingness to pay for water at the 0.047 and 0.022 alpha levels respectively, but the relationship was inverse. Accordingly, rural and peri-urban communities, owed high levels of water tariff arrears, compared to their urban counterparts. The persistent annual tariff arrears due to inability of rural and peri-urban communities to pay adequately resulted to disconnection of services and inadequate water use. These expose affected households to water-washed and water-borne diseases as a result of inadequate use of safe water and the intake of unsafe water. These situations were so because the participatory tariff determination process was suitable for the urban areas who are the target consumers, but unfavourable to rural and peri-urban communities.

There were observed complementarities and synergies of the stakeholders in order to improve water tariff payment in rural and peri-urban communities connected to urban water systems in the study areas. These constituted the bases of research question five. Results indicated that GWCL is in partnership with Community Water Committees and pays commissions to the tariff collectors as a motivation for effective tariff collection. MMDAS and CWSA help to educate and train households and Community Water Committees on the importance of paying water tariffs, as well as how to avoid high water bills. The CWSA and the WRC also control water pollution. This conserves water quality and reduces the cost of treatment, to keep tariffs from rising.

Despite these interventions, average annual water tariff data from GWCL indicated that rural and peri-urban communities have always owed tariff arrears from 2010 to 2015. However, urban communities overpaid their annual watertariffs in 2011, 2013 and 2015, while in 2014 average payments equaled average water bills. As a way forward, the stakeholders suggested the use of direct subsidies and policy change in the urban water sector to make provision for differentiated tariffs for rural and peri-urban communities connected to urban water systems. Other suggestions included the need for the economic empowerment of women to improve their abilities to pay, and the termination of service extensions to rural and peri-urban communities by GWCL, so that the CWSA could extend pro-poor water services to them.

Conclusions

The conclusions are organised under the various sections related to the research objectives and presented in the ensuing sub-sections. The focus has been on how the objectives were achieved in the contexts of the theories, conceptual framework and policy provisions.

Willingness and ability to pay for water

The first research objective was achieved by ascertaining the linkage between socio-economic characteristics of rural and peri-urban communities and willingness and ability to pay for water. The findings indicated that of the background characteristics of respondents as stakeholders, expressed in the conceptual framework, only household income was significantly related to willingness to pay for water. Age, sex, religion, marital status, education, occupation, household income and household size were not significant. However, there was a gap between theory and practice regarding how the income status of households in the communities was articulated with the tariff determinationprocess. For instance, it was found that the elements of the willingness to pay function used to support explanation of the consumer theory were not deliberately integrated to influence household willingness to pay for water in the study communities. In other words, the water tariffs were not pro-poor, despite services being extended to low income communities. In addition, services were not based on the appropriate technology for the socio-economic conditions of the communities. Furthermore, size and nature of household income flow (low and dependent on rained food cropping) did not match the daily or monthly payment for the expensive pipe-borne water. Finally, traditional believes in rural and peri-urban communities negatively impacted on willingness to pay for water. Accordingly, household willingness and ability to pay for water were lower in rural and peri-urban communities, compared to the urban areas.

Methods of water tariff determination

Research objective two, was achieved by being able to ascertain how water tariffs are determined. However, the methods of tariff determination were not suitable for rural and peri-urban communities connected to urban water systems. In other words, the lifeline model of water pricing which yields lower tariffs by considering only marginal cost of inputs and social weight was not applied. Rather, the factors in the automatic adjustment formula were based on the optimal model of water pricing related to the marginal cost pricing theory. These in addition to the failure to adopt low flat rates for rural and peri-urban communities meant that the tariff determination process was typically of the Utility Management Model or pro-urban.

Stakeholder interests in participatory tariff determination

The achievement of the third research objective was realised by linking the interests of the stakeholders to the participatory tariff determination process. The interest of the PURC in fair tariffs and adherence to its mandate of setting tariffs for urban water only, and that of GWCL in cost recovery, impeded the interests of rural and peri-urban communities in affordable water tariffs. The tariff regulatory methods and the policy frameworks that influenced them, under the Ministry of water Resources, Works and Housing, constituted the inputs from the secondary stakeholders‟ component of the conceptual framework of this study.Theinterests of PURC and GWCL also prevented the participation of Community Water Committees, from going beyond the power levels of non-participation and tokenism on the Arstein‟s ladder. In other words, community participation did not go beyond education and information on how to improve water tariff payment.

Effects of the water tariff determination process

The achievement of the fourth research objective concerning the effects of the methods of water tariff determination on water tariff payment was measured by annual water tariff payment performance of the communities. In the first place, service quality, which is a cost item in the formula for tariff calculation, and the water tariff level were found to be inversely related to willingness to pay for water. The persistence of annual water tariff arrears for rural and peri-urban communities confirmed that the abilities of households in the communities to pay the tariffs were less than the actual consumption levels. This also implies that thedetermined tariffs as input, resulted in unaffordable tariffs, rather than affordable tariffs in the verifiable indicators unit of the conceptual framework. This partly led to low willingness and ability to pay for water as the outcome.

Complementarities and synergies of the stakeholders

The conclusions under this section measure up to the achievement of the fifth objective, which focus on improving water tariff payment in rural and peri-urban communities connected to urban water systems. With reference to the provisions of the consumer theory and the associated function it was realised that the tariff conditions (P); expected services (R*); the economic conditions of rural and peri-urban communities, especially in terms of income and occupation (Y); and other explanatory factors, such age, sex, religion, marital status and household size (Z) make urban water service conditions unsuitable for rural and peri-urban communities. These were evidenced by the fact that rural and peri-urban areas depending on boreholes under the COM model, which is actually meant for them, had no problems of water tariff payment.

The affected communities therefore, do not enjoy their full rights to access safe water according to their basic needs, as contained in the National Water Policy of Ghana. In addition, even though the involvement of communities is consistent with the same policy provision for participation at the lowest level of society, the participatory processes failed to reach the best rungs of the Arnstein"s ladder. They were not authentic enough to reflect the roles of local people on improving water tariff determination and service conditions to promote willingness to pay.

Based on the alternatives suggested by the participants as part of the complementarities and synergies of stakeholder to address the identified problems, it is concluded that there are a myriad of pro-poor water tariff determination and participatory processes that could be used to improve water tariff payment in rural and peri-urban communities connected to urban water systems. However, the utility management model under which urban water services are provided operates in strict compliance to the statutory laws under which the GWCL was established. These are typically urban oriented, so it is not surprising that urban areas are able to pay their water tariffs better than rural and peri-urban communities served by GWCL.

There are also, relevant policy provisions to cater for the needs of the poor in general, as far as safe water services are concerned, however, these have been undermined in the practical businesses of urban water supply. Furthermore, the persistence of the problems of water tariff payment in the rural and peri-urban areas meant that, the interventions failed to account for the effectiveness of the applied models and theories in the explanation solutions to the realities of inability to pay urban water tariffs in rural and peri-urban areas. Accordingly, the alternatives that emerged as prospective ways of addressing the identified challenges constitute a grounded theory. In other words, the study suggests multi-factorial pro-poor community water services for improving water tariff payment in rural and peri-urban communities connected to urban water systems. This provides a hybrid model that integrates the roles of stakeholders in the urban-based UtilityManagement Model and the rural/small-town oriented Community Ownership and Management Model. It goes beyond the original features of these models to include aspects of extension of stakeholder roles, to include economic empowerment or poverty reduction strategies with a gender lens.

Recommendations

Based on the findings and conclusions, the following recommendations were made to address the identified problems of water tariff payment in rural and peri-urban communities connected to urban water systems. It particularly sought to address research objective six, which is about recommendations for improvement. Since the study assessed a participatory process, the recommendations targeted the identified stakeholders.

Recommendations for Ghana Water Company Ltd.

- GWCL should conduct baseline surveys for all rural and peri-urban communities connected to its services. The purpose should be for the identification of communities on which the company depends on for freshwater resources; household income sizes to determine ability to pay; and the availability of alternative sources of water. Apart from the possibilities of using such information for service differentiation, the data could also be made available to other stakeholders that wish to intervene in pro-poor water tariff and service conditions.
- For communities serving as sources of freshwater but with poor tariff payment records, alternative low-cost technology should be used to replace the treated surface piped water system. Given the separate plants, there could be authentic participation of the CWCs in tariff determination and collection for the respective areas. Communities with adequate groundwater resources but not constituting sources of water to the company should be delegated to the District Assemblies and CWSA.

- However, for water-scarce low-income rural and peri-urban communities connected to urban water services, there is the need for amendment of the Ghana Water Policy, so that affordable tariffs could be determined for such communities. This could also go along with poverty reduction livelihood improvement projects for women to improve their willingness and ability to pay for water.
- If unwillingness to pay is due to attitudinal factors other than poverty, effective training of Community Water Committees with incentives for tariff collection should be emphasised. There should be intention to enter into partnership through formal procedures and legally binding agreements between GWCL and the Committees. This would lead to a more effective stakeholder partnership.
- Partnership agreements between GWCL and the CWCs should incorporate existing water policies that consider safe water supply in the context of the socio-economic conditions of low-income rural and peri-urban communities.
- Also, in view of the fact that most households were not familiar with the actual methods of water tariff determination used by the company, publiceducation is required. This would help households to avoid negative water use behaviours that push consumption levels to higher tariff bracketsabove the lifeline block.
- With urban communities demonstrating ability to pay their tariffs adequately, and sometimes in excess, more enhanced forms of tariff collection such as the use of pre-paid meters could be tried for full cost recovery. However, the protection of the urban poor should be prioritised.

Recommendations for rural and peri-urban communities

- Rural and peri-urban communities facing problems of paying high urban water tariffs against their interests should appeal to their respective District, Municipal and Metropolitan Assemblies under the Ministry of Local Government and Rural Development, to enforce their rights to benefit from the COM model that is meant for them;

- Community Water Committees could negotiate for terms of tariff payment that are suitable for their economic conditions. For instance households in agrarian rural communities are usually monetised after the harvest season, but run out of the means of sustenance as soon as the tradable stocks are exhausted. They could therefore negotiate to pay annual water bills instead of the daily cash-and carry method leading to settlement of monthly bills. They could also lobby the Ministry of Water Resources, Works and Housing for the amendment of the National Water Policy, so that urban water tariff conditions could be made favourable to vulnerable low-income households in rural and peri-urban communities already connected to urban water systems.
- CWCs should ask for relevant information such as current tariff rates per unit of water, method of water tariff determination, how the method works to influence tariff, and penalties for non-payment of water tariffs from GWCL. The information obtained could then be used to educate households for positive water use behaviour.

Recommendations for PURC:

- The PURC should ensure that GWCL provides strategies for the effectuation of one of the PURC"s roles, related to the promotionof the rights of the poor to adequate amount of safe drinking water, and to support projects that aim at reducing the tariff burden on such groups.

- It should also ensure that GWCL provides the services according to its mandate, so as not to mount avoidable water tariff pressure on rural and peri-urban communities.
- It should endorse and implement strategies for differentiated tariffs for low-income areas to which the extension of urban-piped water services is strategically unavoidable.

Recommendations for Government:

- There is the need to ensure that Utility Management and COM models are actually implemented for the target consumers respectively. This could be achieved by effective monitoring, evaluation and review of the roles of water sector organisations by the MWRWH.
- Direct subsidies on water tariffs should be re-introduced for rural and peri-urban communities to which urban water service extensions are unavoidable.
- The Ministry of Local Government and Rural Development should interlace with the Ministry of Water Resources Works and Housing for water policy amendments that are pro-poor. The MLGRD should also encourage NGOs and international donor agencies to partner with the MMDAs and the communities, for the planning and implementation of livelihood improvement projects, for the promotion of willingness and ability to pay for water.

Contribution to Knowledge

The justification for every academic research lies in the ability to fill an identified research niche, and this thesis is not an exception. In the first place, the clear separation of water delivery models for urban and rural areas in Ghana has often focused the attention of research on these two extremes. Accordingly, integrated water schemes involving rural, peri-urban and urban areas, which have very serious implications on the welfare of low-income areas have been underexplored.

Furthermore, the focus has often been on rural and urban areas, with very little or no picture of the situation of peri-urban communities in the water sector.This study has therefore, demonstrated that urban water service conditions are different from those of rural and peri-urban areas, and that unless some adequate conditions are provided, the welfare of rural and peri-urban areas under such schemes is under threat. In particular, with peri-urban areas being an interface between urban and rural areas, it generates curiosity as to whether their ability to pay for water services would be comparable to urban or rural areas. This study demystifies this by revealing that rural areas pay better than peri-urban communities.

In addition, despite the relevance of well-defined organisational roles and policy provisions that could avoid confusion regarding target beneficiaries of water supply schemes, research findings have not adequately linked actual practices to the policy provisions. This is particularly true of the case of extending urban water services to rural and peri-urban areas. Clear socio-economic differences exist, but the system treats all consumers as being equal. The challenges faced by such rural and peri-urban communities are therefore hidden, as they do not attract the attention of policy makers for redress. This study has revealed these gaps by indicating the differences between theory, policy and practice. It emerged with an adopted conceptual framework, which contributed to filling the theoretical and empirical gaps regarding how to improve water tariff payment in low-income communities connected to urban water systems.

Specifically, the institutional arrangement in the conceptual framework also provides information for updating Ghana‟s water sector institutional framework for policy and regulations. In other words, there is the lack of a comprehensive framework that explains institutional linkages for integratedurban, peri-urban and rural water service conditions. The conceptual framework developed in this study offers a solution to the problem.

Finally, it is among the few research endeavours that have investigated the relationship between payment of water tariffs and settlement types, and subsequently advocating for concurrent implementation of water services with poverty reduction schemes.

Suggestions for Future Research

The findings of this study have depicted some new potential areas for future research in related fields of study. In the first place, the alternative development strategy for pro-poor water services under urban water schemes developed in this study is a framework on its own, with scarce literature in terms of application. Further qualitative study is required to use prospective study designs to test the possibility of applying the framework. Once it is implemented, there arises the need for further research to evaluate the performance of the model. This could be achieved by using similar rural and peri-urban communities under urban water systems, but without such a project for the purpose of control experiment.

Furthermore, there are indications that water tariff is applicable on cost recovery basis under the COM model in the literature. However, some of the study communities that had low-cost water facilities managed under the COM model alongside urban-piped water services were not paying tariffs for the boreholes. They only contribute for maintenance and repairs. I therefore suggest that rural, small town and peri-urban communities under the COM model, which actually pay water tariffs should be identified. This would enable their tariff payment performance to be compared to those connected to urban water systems.

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APPENDICES

Appendix A: Structured Household Interview Guide

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Appendix A: Structured Interview Guide for Household Respondents on Improving Water Tariff Payment in Rural and Peri-urban Communities Connected to Urban Water Systems in Northern Ghana

To the prospective respondent:

This instrument is being administered for information leading to the award of a doctoral degree in Development Studies by the Institute for Development Studies, Faculty of Social Sciences, University of Cape Coast. It is therefore purely for academic purpose without any immediate intentions for practical applications or financial profit expectations. This means your candid and voluntary contribution would be treated as confidential and are necessary for the accuracy of the study results.

i. Date of interview: ……………………………………

ii. Region: ……………………………………..……..

iii. District: …………………………………………………

iv. Community: …………………………..………………..

v. Settlement type……………………………………….

vi. Telephone number of respondent: …………………….

vii. Name of interviewer: ………………………………….

Telephone number of interviewer: …………………….

Section A: Socio-economic Background of Respondents

1. Age of respondent: 18- 33 [ ] 34-49 [ ] 50- 65+ [ ]
2. Does your age influence your willingness to pay for improved standpipe water? No [ ] Yes [ ]
3. Sex of respondent: Male [ ] Female [ ]
4. Does your sex influence your willingness to pay for improved standpipe water? No [ ] Yes [ ]
5. Educational background: Illiterate [ ] Literate
6. Does your educational status influence your willingness to pay for improved standpipe water? No [ ] Yes [ ]

7. Employment status: Employed [ ] Unemployed [ ]
8. Occupation: No work [ ] Housewife [ ] Trading [ ] Farming [ ] Formal sector employee [ ]
9. Does your occupation influence your willingness to pay for improved standpipe water? No [ ] Yes [ ]
10. About how much do you earn in a month? GH¢ 445 or less [ ] GH¢446 or more [ ]
11. Does your monthly income influence your willingness to pay for improved standpipe water? No [ ] Yes [ ]
12. Religious affiliation: Christianity [ ] Islam [ ] Traditional [ ]
13. Does your religion influence your willingness to pay for improved standpipe water? No [ ] Yes [ ]
14. Marital status: Not married [ ] Married [ ]
15. Does your marital status influence your willingness to pay for improved standpipe water? No [ ] Yes [ ]
16. Household size: 3 or less [ ] 4 or more [ ]
17. Does your household size influence your willingness to pay for improved standpipe water? No [ ] Yes [ ]
18. Are you the household head? Yes [ ] No [ ]

Section B: Household experiences of Water Services and Tariff Imposition

19. Are you the household head? Yes [ ] No [ ]
20. What is your major source of drinking water? Private pipe connection [ ] Public standpipe [ ] Borehole [ ] Rainwater [ ]
21. 20.How many hours do the public standpipes of your community flow in a day? Less than 5 hours [ ] 5-12 hours [ ] More than 12 hours [ ]
22. 21.Are you willing to pay 20GHp as tariff per basin oftreated public standpipe water services? Yes [ ] No [ ]
23. 22.Which institution is responsible for water tariff collection in your community?
24. Ghana Water Company Ltd. [ ] Community Water and Sanitation Agency [ ]
25. District Assembly [ ] Community Water Committee [ ] No tariff collection [ ]
26. 23.How often do you pay for piped water at the standpipe? Pay-as-you fetch [ ] Each time the water facility is broken-down [ ] Monthly [ ]
27. 24.How much is your household willing to pay for a basin of treated public standpipe water? Less than 20Gp [ ] 20Gp or more [ ]
28. 25.What quantity of water does a person in your household need for good living in a day? Less than one basin [ ] One basin or more [ ]
29. 26.How much is actually spent on water per person in your household in a day? Less than 20Gp [ ] 20Gp or more [ ]
30. 27.What percentage of your income do you spend on public standpipe water each month? 4% or less [ ] 5% or more [ ]

31. Does tariff level determine your willingness to pay for water? No [ ] Yes [ ]
32. .Does the quality of services determine your willingness to pay for water? No [ ] Yes [ ]
33. Does your income level determine your willingness to pay water tariff? No [ ] Yes [ ]

Section C: Interest and Participation of Communities in Tariff Determination

	Research question	Options			Comment
RQ3	What are the interests of rural and peri-urban communities and other stakeholders in participatory water tariff determination?				
	Specific items on RQ3	Agree	Disagree	Undecided	
34.	Communities are interested in low affordable water tariffs				
35.	GWCL informs our Community Water Committee about tariff changes				
36.	The GWCL consults our Community Water Committee and the Chief on matters of tariff determination				
37.	No form of community involvement in water tariff determination is observed				

RQ= Research question; GWCL= Ghana Water Company Ltd.; PURC= Public Utilities Regulatory Commission

Thank you.

Appendix B: Observation Guide

UNIVERSITY OF CAPE COAST

INSTITUTE FOR DEVELOPMENT STUDIES

Observation Guide on Improving Water Tariff Payment in Rural and Peri-urban Communities Connected to Urban Water Systems in Northern Ghana

To the prospective respondent:
This instrument is being administered for information leading to the award of a doctoral degree in Development Studies by the Institute for Development Studies, Faculty of Social Sciences, University of Cape Coast. It is therefore purely for academic purpose without any immediate intentions for practical applications or financial profit expectations. This means your candid and voluntary contribution would be treated as confidential and are necessary for the accuracy of the study results.
Date: ………………………………… Region: ……………………………………….
District: ………………………………. Community: …………………………………..
Please in the table below, tick the applicable option or write the observation against the respective questions in the brackets or spaces provided along the rows.

	Observations about	**water tariff**	**Collection**	
1	Are tariffs collected at the site of the stand pipes as water is drawn?	Yes [ ]	No [ ]	Other (Specify)
2	If yes to question 2 above, how much do they pay for what quantity of water?	(Specify):		
3	Who is responsible for water tariff collection?	Ghana Water Company staff [ ]	Community Water Board representative [ ]	Any person selected by the community [ ]
4	Which people are mostly fetching and paying for the water?	Women [ ] Girls [ ] Men [ ] Boys [ ]	Women and Girls [ ] Girls and Boys [ ]	Women and Men [ ]
5	Are all those who fetch the water actually paying the right amount charged?	Yes [ ]	No [ ]	Specify reasons for those not paying:

6	Identify the other sources of drinking water in the community	Number of improved sources e.g. Boreholes: [ ] Protected wells hand dug wells: [ ] Rainwater Harvesting systems: [ ]	Number of unimproved sources, e.g. Unprotected wells: [ ] Dams: [ ] Rivers: [ ]	Identify the provider(s) of each of the other improved sources of drinking water specified: How many of the improved sources are presently not serviceable? Borehole [ ] Protected hand dug well [ ] Rain water harvesting system [ ]
7	Do users pay tariff for the other improved sources of water, such as boreholes?	Yes [ ]	No [ ]	Describe the conditions of tariff payment and the receiver of the tariff (if any):
8	Interview one user at the improved sources and another at the unimproved sources about why they use the sources instead of the public stand pipes of GWCL.	Response for the improved source: Response for the unimproved source:		
	Observations about services/infrastructure	The nature of water		
9	What is the total number of public stand pipes observed in the community? [ ]	Of the total number, how many are serviceable? [ ]	How many are broken-down? [ ]	Number of disconnected stand pipes [ ] Reason for disconnection:
10	Do people queue at the stand pipes for long in order to draw water?	Yes [ ]	No [ ]	What is the reason for the queuing (if any)?
11	What is the number of	1-2 days in a	3-4 days in a	5-6+ days in a

	days of pipe flow in the community?	week [ ]	week [ ]	week [ ]
12	What are your observations about the quality of the water?	Colour: Good [ ] Moderate[ ] Bad [ ]	Smell: Good [ ] Moderate[ ] Bad [ ]	Taste: Good [ ] Moderate[ ] Bad [ ]
	Sanitary practices	**that could**	**pollute**	**water sources**
13	How do households store their solid wastes?	In dust bins [ ]	Backyard dumping [ ]	Others (specify):
14	What are the observed methods of household waste disposal?	Use of public waste containers [ ]	Use of open dump site [ ]	Backyard burying or burning [ ] Others (specify):
15	Which institutions are responsible for the public solid waste services in the community?			
16	Are there observed cases of indiscriminate defecation in the community?		Yes [ ]	No [ ]
17	What are the places of convenience in the community?	Household latrines [ ]	Community owned latrines [ ]	District Assembly latrines [ ] Others:
18	What is your general observation of the sanitation of the community?	Good [ ]	Average[ ]	Bad [ ]

Appendix C: Interview Guide for GWCL Officials

UNIVERSITY OF CAPE COAST
INSTITUTE FOR DEVELOPMENT STUDIES
Interview Guide for Ghana Water Company Ltd. Officials on Improving Water Tariff Payment in Rural and Peri-urban Communities Connected to Urban Water Systems in Northern Ghana

To the prospective respondent:

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Section A: Respondent's profile

Date of interview: …………………………………………………………………
Location: ………………………………………………………
Institution: ……………………………………………………………………………
Designation of the respondent:
……………………………………………………
Sex of respondent: .... Telephone number:
…………………………
Name of interviewer:
…………………………………………………………………
Telephone number of interviewer:
…………………………………………………

Section B: Choose the most appropriate option for the specific items under the research questions in the table below:

	Research questions	Options			Detailed answers to probing questions on the specific items
RQ2	What are the methods of water tariff determination for rural and peri-urban communities connected to urban water systems?				
	Specific items on RQ2	Agree	Disagree	Undecided	
1	It is the PURC that provides a formula for the calculation of				

	urban water tariff				
2	It is the various branches of GWCL that determine the tariff for their service areas				
3	Generally, the formula used is based on the optimal marginal cost pricing of water				
4	The GWCL is able to determine separate tariffs for rural and peri-urban communities using a lifeline model of marginal cost pricing				
5	GWCL's services target urban communities and so no differentiated tariffs for rural and peri-urban communities connected to the water systems				
6	Differentiated tariff forms such as increasing block tariff and low flat tariff rates are used for rural and peri-urban communities.				
RQ3	What are the interests of rural and peri-urban communities and other stakeholders in participatory water tariff determination?				
	Specific items on RQ3				
7	GWCL is interested in tariffs that cover all costs and generate profit				
8	PURC ensures balance between GWCL and community interests in the tariffs rates				
9	Communities are interested in low affordable water				

	tariffs				
10	Civil Society Organisations are interested in fair tariffs that promote equal access to water by rural people				
11	GWCL sometimes consults the Community Water Committees or the Chief and Elders before imposing water tariff on rural and peri-urban water services				
12	The GWCL meets with Community Water Committees and Chiefs to discuss issues on tariff				
13	There is a partnership between representatives of the communities, the GWCL and other stakeholders that addresses issues of water tariff determination				
14	GWCL allows Community Water Committees to determine and collect tariffs independently				
15	Women's interests are considered in the participatory tariff determination process				
16	Generally, in the participatory tariff determination process GWCL considers the socio-economic characteristics of rural and peri-urban communities (e.g. size and nature of household income flow				
17	There is no form of community				

	involvement in water tariff determination				
RQ4	What are the effects of the water tariff determination process on water tariff payment in the communities?				
	Specific items on RQ4				
18	The level of participation of communities in the determination process encourages adequate water tariff payment				
19	There are water tariff arrears because rural and peri-urban communities are not able to pay adequately				
20	Services are sometimes disconnected because some communities owe high water tariff arrears				
21	Aspects of service quality such as the number of days or hours of pipe flow are minimised for areas with poor tariff payment performance				
22	Inadequate water tariff payment affects the aim of providing safe water to communities				
RQ5	How do the complementarities and synergies of stakeholders contribute to improvement of water tariff payment in rural and peri-urban communities connected to urban water systems?				

	Specific items on RQ5				
23	A stakeholder partnership has been formed comprising GWCL, a private sector partner, the civil society/MGOs and Community Committees				
24	The partnership formation was initiated by GWCL				
25	The partnership aims to improve water tariff payment in rural and peri-urban communities				
26	The partners have defined roles according to their interests and capabilities				
27	The partnerships addresses issues of rural and peri-urban community water tariff determination and nature of services				
28	The partnership seeks to improve water tariff payment improving the income generating abilities of women				
29	The partnership improves community ownership of the water system				
30	Some aspects of the partnership agreement include (Specify)				
31	Procedures for monitoring, evaluation, feedback and review of conditions of partnership on matters of tariff imposition and payment include (Specify)				

32. Give reasons why GWCL should continue providing water services to rural and peri-urban communities, despite the services of the CWSA and District Assemblies for such communities…………………………………………

33. If GWCL must continue services to rural and peri-urban communities, suggest alternative ways of improving the water tariff payment through stakeholder partnership………………………………………………………………

Section C: If subsidies influence the water tariffs customers pay, kindly help to complete the table below by indicating which of the customer categories are reached or not reached by the various types of subsidies

Type of subsidy	Rural and peri-urban households	Urban poor households	Urban households with private connections	Urban households connected to public standpipes	Urban commercial/ industrial users
Direct subsidy	Reached [ ] Not reached [ ]	Reached [ ] Not reached [ ]	Reached [ ] Not reached [ ]	Reached [ ] Not reached [ ]	Reached [ ] Not reached [ ]
Cross-subsidy	Reached [ ] Not reached [ ]	Reached [ ] Not reached [ ]	Reached [ ] Not reached [ ]	Reached [ ] Not reached [ ]	Reached [ ] Not reached [ ]

Section D: Aspects of Service Quality

Kindly help to complete the table below on aspects of water service quality which could influence customers' willingness to pay for water:

Element of service quality	International standard for safe surface water	Actual state	GWCL's target for treated water	Remark
Water quality:				
Electricity conductivity	900 Microsiemens/cm			
pH value (acidity/alkalinity)	7			
Turbidity	Less than 1 nephelometric unit (NTU)			
Phosphorous	0.1mg/L			
Nitrate nitrogen	10mg/L			
Nitrite nitrogen	0.1mg/L			
Fecal bacteria	200 Colony Forming Units (CFU)/100ml			
Colour	Colourless			
Taste	Tasteless			
Odor	Odorless			
Service delivery conditions				
Average number of days of tap flow per week				
Average number of service hours per day				

Thank you.

Appendix D: Focus Group Discussion Guide

UNIVERSITY OF CAPE COAST
INSTITUTE FOR DEVELOPMENT STUDIES
Semi-structured Focus Group Discussion Guide for Community Water and Sanitation Committees on Improving Water Tariff Payment in Rural and Peri-urban Communities Connected to Urban Water Systems

To the prospective respondent:

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Date of interview: ……………………………………………………………………….

Region:…………………………… District:………………………………………

Community:…………………………………………………………

Group type: ……………………………………………………………………………….

Number of males [ ] Number of females [ ]

Telephone number of focus group leader: ……………………………………………

Section A: Community Participation in the Tariff Determination Process

1. Which of the following organisations do you identify to be associated with public piped water tariff determination process?
   The Ghana Water Company Limited [ ]
   Public Utilities Regulatory Commission [ ]
   Both of the organisations above [ ]
2. What is the composition and functions of the Community Water and Sanitation Committee in this community?
3. How is the Committee involved in the tariff determination process?
4. Do the views of the Committee actually reflect in the final tariff that is imposed on water services in this community? (Give reasons)
5. Do you think that your community and other rural and peri-urban communities are charged lower tariffs by the GWCL than households in the urban towns? (Give reasons)
6. What is the general perception of households in your community about amount they pay as water tariff every month?
7. What are usually the expectations or interests of your Committee in the water tariff determination process? (Probe for whether the interests are met).
8. Do you think that the participation of your Committee in water tariff related issues influences the willingness of households in your community to pay water

tariffs? (Probe for participants' perception of how their participation influence confidence in the tariff and the associated payment performance by households in the community)

Section B: Factors Influencing Household Water Tariff Payment in Rural and Peri-urban Communities

9. Rank the factors in the table below (by voting) in terms of their influence on inadequate tariff payment by households in the community (Probe for additional factors).

Reasons for inadequate tariff payment	Options
Poverty/Low income	Strongly agree [ ] Agree [ ] Disagree [ ]
Illiteracy	Strongly agree [ ] Agree [ ] Disagree [ ]
Traditional belief	Strongly agree [ ] Agree [ ] Disagree [ ]
Availability of other unimproved sources of water in the environment	Strongly agree [ ] Agree [ ] Disagree [ ]
Women are solely responsible for tariff payment, but they are poor	Strongly agree [ ] Agree [ ] Disagree [ ]
The tariffs charged by GWCL are higher than what the average household in the community can afford	Strongly agree [ ] Agree [ ] Disagree [ ]
The GWCL does not emphasise on tariff payment by households in the community	Strongly agree [ ] Agree [ ] Disagree [ ]
GWCL does not cooperate with the Water and Sanitation Committee for tariff collection, many households are able to escape payment	Strongly agree [ ] Agree [ ] Disagree [ ]
Households do pay the tariffs, but the local tariff collectors fail to account to GWCL	Strongly agree [ ] Agree [ ] Disagree [ ]

10. What are the effects of the nature of water tariff payment on the socio-economic lives of households in your community?

Section C: The Synergies and Complementarities of Stakeholders in Project Designs for Improving Water Tariff Payment (NB: Where there is no such partnership as described in the specific questions, participants should answer the questions according to how they wish the partnership should have been working)

11. Is there any partnership with a stakeholder composition beyond the GWCL and the Community Committees in relation to water tariff determination and collection? (Probe for the name of the partnership, the stakeholders and the main purpose)
12. How was the partnership formed? (Probe for the initiator or lead agency, the specific objectives, the roles of the various stakeholders and other aspects of the partnership agreements).
13. What practical achievements do you identify regarding the activities of the various stakeholders in the implementation of their roles as contained in the partnership agreement, so far as water tariff payment is concerned?
14. From the list of items in the table below, indicate how far you agree regarding the specific problems of households which the partnership projects addresses for improving willingness to pay water tariff.

Specific household problems for project intervention to promote household willingness to pay water tariffs	Options	Participants' suggestion for intervention
Cannot afford contribution for standpipe connection and so has no access to the piped water	Strongly agree [ ] Agree [ ] Disagree [ ]	
Cannot afford private household connection to piped water and so depends on standpipe	Strongly agree [ ] Agree [ ] Disagree [ ]	
Is disconnected from standpipe services because it could not pay tariff adequately	Strongly agree [ ] Agree [ ] Disagree [ ]	
Is disconnected from private household pipe because it could not pay tariff adequately	Strongly agree [ ] Agree [ ] Disagree [ ]	
Is connected to standpipe but cannot pay the tariffs regularly	Strongly agree [ ] Agree [ ] Disagree [ ]	
Is connected to private household pipe but cannot pay the tariff regularly	Strongly agree [ ] Agree [ ] Disagree [ ]	

15, What do you think should done during the partnership project implementation to ensure efficiency and sustainability of the activities for promoting willingness to pay water tariffs in your community?

Appendix E: Questionnaire for PURC Offcials

UNIVERSITY OF CAPE COAST

INSTITUTE FOR DEVELOPMENT STUDIES

Appendix E: Questionnaire for Officials of Public Utilities Regulatory Commission on Improving Water Tariff Payment in Rural and Peri-urban Communities Connected to Urban Water Systems in Northern Ghana

To the prospective respondent:

This instrument is being administered for information leading to the award of a doctoral degree in Development Studies by the Institute for Development Studies, Faculty of Social Sciences, University of Cape Coast. It is therefore purely for academic purpose without any immediate intentions for practical applications or financial profit expectations. This means your candid and voluntary contribution would be treated as confidential and are necessary for the accuracy of the study results.

i. Date of interview: ……………………………………
ii. Region: …………………………………..……..
iii. District: ………………………………………………
iv. Community: ………………………..………………..
v. Settlement type……………………………………….
vi. Organisation ……………………………………………
Telephone number of interviewee …………………….

SECTION A: WATER TARIFF DETERMINATION

SN	Question	Options(Please tick one option)			Any comment
1.	The PURC determines public urban water tariffs by formula	Agree	Disagree	Undecided	
2.	The formula is based on the optimal model of tariff determination	Agree	Disagree	Undecided	
3.	Public water utilities can submit proposals to the PURC for tariff adjustments	Agree	Disagree	Undecided	
4.	The PURC involves other stakeholders to emerge with final approved tariffs	Agree	Disagree	Undecided	
5.	The PURC regulates tariffs for urban utilities only	Agree	Disagree	Undecided	
6.	The PURC is aware that some rural and	Agree	Disagree	Undecided	

	peri-urban communities are connected to urban water systems				
7.	PURC has differentiated water tariffs for rural and peri-urban communities connected to urban water systems	Agree	Disagree	Undecided	
8.	PURC has a policy regulation for utilities that extend urban water systems to rural and peri-urban areas	Agree	Disagree	Undecided	
9.	PURC monitors water utilities to ensure compliance to non-urban water tariff regulatory provisions	Agree	Disagree	Undecided	
10.	Rural and peri-urban Community Water Committees are involved as stakeholders in tariff determination	Agree	Disagree	Undecided	
11	Traditional leaders are involved in water tariff determination	Agree	Disagree	Undecided	
12.	Civil society/NGOs are stakeholders in water tariff determination	Agree	Disagree	Undecided	
13.	Funding agencies are stakeholders in water tariff determination	Agree	Disagree	Undecided	
14.	Water consumers are stakeholders in water tariff determination	Agree	Disagree	Undecided	
15.	Consumer Protection Agency is a stakeholder in water tariff determination	Agree	Disagree	Undecided	
16.	The interest of the PURC is to ensure fairness in water tariff imposition	Agree	Disagree	Undecided	
17.	The water tariff determination process is fair to rural and peri-urban areas connected to urban water systems	Agree	Disagree	Undecided	
18.	PURC is not concerned about the interests of rural and peri-urban	Agree	Disagree	Undecided	

	areas connected to urban water systems because they are not covered by urban utility tariff conditions				
19.	Civil Society Organisations/NGOs sometimes advocate for affordable water tariff determination methods for rural and peri-urban communities connected to urban water systems	Agree	Disagree	Undecided	
20	Examples of NGOs/ and Civil Society Organisations that ever advocated for affordable water tariffs for rural and peri-urban areas are:				
21.	An example of a water tariff determination method for rural and peri-urban areas under urban water systems is				
22.	The present water tariff per unit of water is	Amount... .... Unit.........			
23.	The present percentage adjustment in water tariff is				
23.	The specific volumetric method of domestic water tariff determination is	Increasin g block tariff	Decreasing block tariff	Others	

SECTION B: RECOMMENDATION

24. If the tariff regulatory roles of the PURC do not cover the interests of rural and peri-urban communities connected to urban water systems, what policy recommendation would you suggest?
....
....

Thank you.

Appendix F: Questionnaire for Officials of WRC

UNIVERSITY OF CAPE COAST
INSTITUTE FOR DEVELOPMENT STUDIES
Questionnaire for Officials of Water Resources Commission on Improving Water Tariff Payment in Rural and Peri-urban Communities Connected to Urban Water Systems in Northern Ghana

To the prospective respondent:
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i. Date of interview: ………………………………………
ii. Region: …………………………………………..……..
iii. District: ………………………………………………
iv. Community: …………………………..………………..
v. Settlement type…………………………………………
vi. Organisation ……………………………………………
vii. Telephone number of interviewee ……………………

SN	Question	Options (Please tick the appropriate option)			Any other comment
1.	How are freshwater sources in rural and peri-urban communities acquired and used by urban water companies?	Through water use rights granted by the WRC	By agreement between traditional leaders and the water companies	Others (Specify)	
2.	What are the causes of conflict between the water resource owning communities and the water companies?	Problems of financial compensation for the use of the resources	Failure to extend treated water services to the communities	Problem of tariff imposition on the resource owning communities	
3.	Given that the District Assemblies and the CWSA are committed to rural and small town water services, must GWCL still	Yes	No	Reason for answer	

	extend services to water resource owning communities?				
4.	What principle of your institution is implemented to ensure that urban water companies serving low-income water resource owning communities impose fair tariffs?				
5.	Are the water companies actually giving special treatment to such communities in terms of tariff imposition?	Yes	No	Reason:	
6.	What roles does your institution play in the water resource communities to ensure good water quality?				
7	What stakeholder interventions would you suggest for water resource communities that face difficulties in paying water tariffs to GWCL?				

Thank you

Appendix G: Interview Guide for Health Officials

UNIVERSITY OF CAPE COAST
INSTITUTE FOR DEVELOPMENT STUDIES
Interview Guide for Health Officials on the Health Effects of Inadequate and Poor Quality of Potable Water

To the prospective respondent:
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i. Date of interview: ……………………………………………
ii. Region: …………………………………………..……..
iii. District: …………………………………………………
iv. Community: …………………………..………………..
v. Settlement type…………………………………………….
vi. Organisation ………………………………………………
vii. Telephone number of interviewee …………………….

Diseases related to Inadequate Use of Water

Aspect of inadequate water use	Possible disease	Affected body part	Effect	Level of prevalence (Percentage of population in the region or rank as high, low, moderate)	Most affected settlement type (i.e. urban, peri-urban or rural)
Not drinking enough water					
Not bathing regularly					
Not washing hands before eating					
Not washing dishes					
Not mopping floors of rooms					
Not washing clothing regularly					
Not brushing teeth					

Diseases related to Poor Water Quality

Disease	Causal organism	Associated aspect of poor water quality	Level of prevalence	Most affected settlement type (i.e. urban, peri-urban or rural))

Thank you.

Appendix H: Questionnaire for District Assembly Officials

UNIVERSITY OF CAPE COAST
INSTITUTE FOR DEVELOPMENT STUDIES
Questionnaire for District Assembly Officials on Improving Water Tariff Payment in Rural and Peri-urban Communities Connected to Urban Water Systems in Northern Ghana

To the prospective respondent:
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i. Date of interview: ……………………………………
ii. Region: …………………………………………..……..
iii. District: …………………………………………………
iv. Community: ………………………..………………..
v. Settlement type…………………………………………
vi. Organisation ……………………………………………
vii. Telephone number of interviewee ……………………

SN	Question	Options (Please tick the Appropriate option)			Any other comment
1.	Which settlement types do you target in potable water services?	Urban	Peri-urban	Rural	
2.	Which of these do you adopt for water delivery services?	Treated surface water piped system	Groundwater piped system and boreholes	Protected wells	
3.	What factor(s) influenced the choice of the delivery systems above?	Low capital cost, ease of operation and affordability of services	Participation of the target beneficiaries in the decision making process	Ability of local users to repair and maintain	
4.	What are the conditions of	Payment of tariff on monthly or	Users contribute for	Tariffs are imposed but	

	payment for services?	cash-and-carry basis	maintenance and repairs only	borehole communities do not pay	
5.	Who are the stakeholders in water tariff determination for small town and rural water supply?	District/Municipal/ Metro Assemblies	Traditional leaders and Community Water Committees	Funding Agencies	
6.	How are the water tariffs determined?	By formula	Consultative bargaining	Only traditional leaders and Community Committees determine and collect tariffs	
7	The present water tariff per unit of water is	Amount.......... Unit...............			
8	Who is the final recipient of community water tariffs from boreholes and small town water systems?	District Assemblies	Community Water Committees	Tariffs are retained by the water Committees for systems management	
9	Do rural and peri-urban communities find it difficult to pay for the low-cost water services?	Yes	No	Undecided	
10	What specific aspect of the	It is determined based on a life line	The local people	The water facilities are	

	water tariff for low-cost water systems makes it pro-poor?	model	themselves participate in tariff determination according to their ability to pay	directly state funded or by donor assistance. So they are highly subsidized or free of tariff	
11	How do the communities contribute towards the provision of the water facilities?	The Assembly raises revenue from the local people	Communities contribute a percentage of the capital cost (Specify……)	There is no form of community involvement	
12	Are you aware that some rural and peri-urban communities are connected to urban water services of the Ghana Water Company Ltd?	Yes	No	Undecided	
13	What is the reason for the extension of urban piped water services to rural and peri-urban areas despite the role of your institution in providing for their water needs?				
	Does your	Yes	No	Specify	

	institution have any interest in the continues relationship between GWCL and rural/peri-urban areas in water supply issues?				
14	What role does your institution play to ensure that rural and peri-urban communities connected to services of GWCL get fair treatment in terms of tariff payment or according to your interest?				
15	Should GWCL continue to serve rural and peri-urban communities that face problems of inadequate access to water because they cannot pay the tariffs	Yes	No		
16	What suggestion				

	would you make for improvement in stakeholder participation if GWCL must continue to serve low-income rural/peri-urban communities facing tariff payment problems?		
17	If GWCL should discontinue services to low-income communities due to inability to pay water tariffs, what alternative would you suggest?		

Thank you.

Appendix I: Questionnaire for CWSA Official

UNIVERSITY OF CAPE COAST

INSTITUTE FOR DEVELOPMENT STUDIES
Questionnaire for Community Water and Sanitation Agency Officials on Improving Water Tariff Payment in Rural and Peri-urban Communities Connected to Urban Water Systems in Northern Ghana

To the prospective respondent:
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i. Date of interview: ……………………………………
ii. Region: ……………………………………..……..
iii. District: ……………………………………………
iv. Community: ………………………..………………..
v. Settlement type……………………………………….
vi. Organisation ……………………………………………
vii. Telephone number of interviewee …………………….

SN	Question	Options (Please tick the Appropriate option)			Any other comment
1.	Which settlement types do you target in potable water services?	Urban	Peri-urban	Rural	
2.	Which of these do you adopt for water delivery services?	Treated surface water piped system	Groundwater piped system and boreholes	Protected wells	
3.	What factor(s) influenced the choice of the delivery systems above?	Low capital cost, ease of operation and affordability of services	Participation of the target beneficiaries in the decision making process	Ability of local users to repair and maintain	
4.	What are the conditions of payment for services?	Payment of tariff on monthly or cash-and-carry basis	Users contribute for maintenance and repairs only	Tariffs are imposed but borehole communiti	

				es do not pay	
5.	Who are the stakeholders in water tariff determination for small town and rural water supply?	District/Municip al/ Metro Assemblies	Traditional leaders and Community Water Committees	Funding Agencies	
6.	How are the water tariffs determined?	By formula	Consultative bargaining	Only traditional leaders and Communit y Committee s determine and collect tariffs	
7	The present water tariff per unit of water is	Amount.......... Unit................			
8	Who is the final recipient of community water tariffs from boreholes and small town water systems?	District Assemblies	Community Water Committees	Tariffs are retained by the water Committee s for systems manageme nt	
9	Do rural and peri-urban communities find it difficult to pay for the low-cost water services?	Yes	No	Undecided	
10	What are the reasons for any difficulties in tariff payment?				
11	What specific aspect of the water tariff for low-cost water systems makes it pro-poor?	It is determined based on a life line model	The local people themselves participate in tariff determination according to	The water facilities are directly state funded or by donor	

			their ability to pay	assistance. So they are highly subsidized or free of tariff	
12	How do the communities contribute towards the provision of the water facilities?	The Assembly raises revenue from the local people	Communities contribute a percentage of the capital cost (Specify……)	There is no form of community involvement	
13	Are you aware that some rural and peri-urban communities are connected to urban water services of the Ghana Water Company Ltd?	Yes	No	Undecided	
14	What is the reason for the extension of urban piped water services to rural and peri-urban areas despite the role of your institution in providing for their water needs?				
	Does your institution have any interest in the continues relationship between GWCL and rural/peri-urban areas in water supply issues?	Yes	No	Specify	
15	What role does your				

	institution play to ensure that rural and peri-urban communities connected to services of GWCL get fair treatment in terms of tariff payment or according to your interest?			
16	Should GWCL continue to serve rural and peri-urban communities that face problems of inadequate access to water because they cannot pay the tariffs	Yes	No	
17	What suggestion would you make for improvement in stakeholder participation if GWCL must continue to serve low-income rural/peri-urban communities facing tariff payment problems?			
18	If GWCL should discontinue services to low-income communities due to			

	inability to pay water tariffs, what alternative would you suggest?		
19	What are your roles in community sanitation services?		
20	What is the link between your sanitation services and the quality of freshwater resources?		
21	In what ways does your institution collaborate with GWCL for the control of freshwater pollution?		
22	What challenges do you face in sanitation management for the prevention of freshwater pollution at the community level?		

Appendix J: Ghana Water Sectro Reforms

Chronology of Major Changes in Ghana's Water Sector
Appendix J, continued

Year	Water Sector Event, Policy, Regulation or Law	Target
1994	Establishment of Environmental Protection Agency under the Ministry of Environment and Science to ensure that water operations would not cause harm to the environment, and human activities on the environment do not affect the quality of natural water sources.	National
1996	Establishment of Water Resources Commission (WRC) for the regulation and management of natural water resource utilization, under the Water Resources Commission Act No. 552 of 1996.	National
1998	Community Water and Sanitation Agency established to be responsible for the management of rural and small town water supply systems, hygiene education and provision of sanitary facilities, under the Community Water and Sanitation Agency Act No. 564 of 1998.	Small towns and rural areas
1999	GWSC was converted to the Ghana Water Company Limited (GWCL) under the Statutory Corporations (Conversion to Companies) Act 461 of 1993 as amended by LI 1648, on 1st July 1999, to be responsible for urban water services.	Urban towns
2004	Preparation of National Water Policy commenced.	National
2006	Five year management contract awarded to Aqua Vitins Rand Ltd. (2006-2011).	Urban
2007	National Water Policy fully developed and launched in 2008	National

Source: Updated from WaterAid Ghana (2005); MWRWH (2007); GWCL (2012a).

Appendix K: Coordinates of Standpipes

Region	District	Communities	Latitude	Longitude	Accuracy
Northern	Sagnarigu	Maleshegu (rural) 3 pipe	9◦28'59.18"N 9◦28'53.74"N 9◦28'52.12"N	0◦52'59.47"W 0◦52'53.8"W 0◦53'10.25"W	3m. F 3m. F 3m. Dc
		Vitting (peri-urban) 1 pipe	9◦23'5.52"N	0◦48'17.91"W	3m. F
		Yilonayili (rural) 2 pipes	9◦32'48.7"N 9◦32'54.13"N	0◦50'15.72"W 0◦50'15.64"W	10m. F 6m. F
		Gbolo (rural) 2 pipes	9◦26'36.95"N 9◦26'16.94"N	0◦52'9.16"W 0◦51'54.45"W	3m. F 9m. Dc
		Zagyuli (peri-urban) 2 pipes	9◦28'18.74"N 9◦28'13.04"N	0◦50'48.23"W 0◦50'47.71"W	8m. F 3m. Dc
		Kpalsi (rural) 1 standpipe	9◦26'21.84"N	0◦52'33.43"W	4m. Dc
	Tamale Metropolis	Dungu (rural) 2 pipes	9◦22'50.01"N 9◦22'44.17"N	0◦52'33.44"W 0◦52'24.82"W	4m. F 3m. Dc
		Jakarayili peri-urban) 2 pipes	9◦24'20.8"N 9◦24'18.35"N	0◦49'6.25"W 0◦49'8.63"W	3m. F 3m. Dc
		Dohinayili (peri-urban) 2 pipes	9◦23'39.31"N 9◦23'35.84"N	0◦49'47.33"W 0◦49'43.88"W	9m. Dc 10m. Dc
		Bilpeila (Peri-urban) 2 pipes	9◦23'14.81"N 9◦23'22.53"N	0◦50'25.13"W 0◦50'16.3"W	3m. F 3m. F
		Kakpayili (urban) 3 pipes	9◦22'43.92"N 9◦22'36.2"N 9◦22'40.25"N	0◦50'38.63"W 0◦50'33.36"W 0◦50'34.47"W	9m. F 4m. F 9m. Dc
	Kumbungu District	Tibung (rural) 3 pipes	9◦34'29.13"N 9◦34'24.31"N 9◦34'28.45"N	1◦3'52.12"W 1◦3'42.38"W 1◦3'44.17"W	4m. F 4m. F 5m. F
		Satani (rural) 2 pipes	9◦37'37.85"N 9◦37'40.19"N	0◦55'27.15"W 0◦55'33.28"W	10m. F 7m. F
		Zugu (rural) 2 pipes	9◦34'39.29"N 9◦41'59"N	0◦56'9.32"W 0◦56'15.12"W	3m. Dc 3m. F
		Voggu (rural) 3 pipes	9◦31'28.88"N 9◦32'0.28"N 9◦31'52.05"N	1◦2'41.14"W 1◦2'11.18"W 1◦2'5.53"W	4m. F 9m. F 6m. Dc
		Gbulung (rural) 2 pipes	9◦29'17.0"N 9◦24'10.45"N	1◦0'32.28"W 1◦0'41.62"W	14m. F 10m. F
		Cheshegu (rural) 2 pipes	9◦27'31.03"N 9◦27'28.92"N	0◦57'13.16"W 0◦57'24.89"W	9m. F 4m. F
Upper East Region	Bolgatanga Municipal	Kumbusco (Peri-urban)	10° 47' 57.58" N	0° 49' 23.88" W	Dc

		1 pipe			
		Zaare (peri-urban) 1 pipe	10° 48' 48.20" N	0° 51' 53.80" W	F
		Atulbabisi (rural) 1 pipe	10° 47' 16.66" N	0° 51' 2.92" W	F
		Bulunko-Yorogo (rural) 1 pipe	10° 49' 52.59" N	0° 50' 5.74" W	F
		Yarigabisi (peri-urban) 1 pipe	10° 46' 26.95" N	0° 49' 31.92" W	F
		Gambibgo (rural) 1 pipe	10° 46' 9.52" N	0° 50' 5.25" W	F
		Zuarungu-Daboo (rural) 1 pipe	10° 47' 30.77" N	0° 47' 31.58" W	Dc
		Tanzui (rural) 1 pipe	10° 47' 30.77" N	0° 51' 46.33" W	F
	Bongo District	Gowrie (rural) 1 pipe	10° 51' 35.53" N	0° 50' 44.27" W	F
		Tindongo (peri-urban) 1 pipe	10° 54' 20. 6" N	0° 48' 47.37" W	F

Interpretation: F= functioning; Dc= Disconnected.

Appendix L: Water Quality

Water Quality in Northern and Upper East Regions

Element of water service quality	International standard for safe surface drinking water	Actual state	GWCL's target for treated water
Electricity conductivity	900 Microsiemens/cm	NR: 112.1 ms/cm UER: 136	1,000 ms/cm 1,000ms/cm
pH value (acidity/alkalinity)	7.0-8.5	NR:6.6 UER: 7	6.5-8.5
Turbidity	Clear or less than 1 nephelometric unit (NTU)	NR:3.06 NTU UER: 1.70NTU	0-5NTU
Phosphorous	0.1mg/L	NR: 0.24 UER: 0	-
Nitrate nitrogen	10mg/L	NR: 8.97 UER: 1.3	0-10
Nitrite nitrogen	0.1mg/L	NR: 0.013 UER: 0.002	0-3
Fecal coliforms	200 Colony Forming Units (CFU)/100ml	NR:-0 CFU/100ml UER: 0 CFU/100ml	UER: 0 CFU/100ml
Colour	Colourless or <5 Hazen Units (HU)	NR: 1.23 HU UER: 5 HU	<5 HU 5-15 HU
Taste	Unobjectionable	NR: Tasteless UER: Tasteless	Tasteless
Odour	Unobjectionable	NR: Colourless UER: Colourless	Colourless

Source: This study, 2015.

Appendix M: Features of the Study Area

Appendix M: Major Features of the Study Area

Dominant feature	District/Region				
	Tamale Metropolis/ Northern Region	Sagnarigu District/ Northern Region	Kumbungu District/ Northern Region	Bolgatanga Municipal/ Upper East Region	Bongo District/ Upper East Region
Population	District: 223,252 Urban:80.8% Rural: 19.2% Males: 49.8% Females: 50.2%	District: 148,099 Urban: 63.2% Rural: 36.8% Males:50.7% Females: 49.3%	District: 39,341 Urban:- Rural: 100% Males:50.04% Females:49.96 %	District: 131,550, Urban: 49.8 Rural: 50.2% Males: 48% Females: 52%	District: 84,545 Urban: 6% Rural: 94% Males:47.7% Females: 52.4%
Household size	District: 6.3 Urban:6.2 Rural: 7	District: 6.3 Urban: 6.3 Rural: 6.3	District: 9.5 Urban- Rural: 9.5	District: 5 Urban: 4.4 Rural: 5.5	District: 5.5 Urban: 4.4 Rural: 5.6
Literacy levels of persons 11 years and older	None literate: 40% Literate: 60%	None literate: 39.8%) Literate: 60.2%	None literate: 74% Literate: 26%	None literate: 64.6% Literate:35 %	None literate: 47.7% Literate:52.3%
Major Occupation	Services and sales District:33% Males: 16.5% Female: 50.3%	Services and sales District: 27.0% Males: 12.4% Females: 43.3%	Skilled agricultural forestry and fishery District: 88.3% Males: 94.4% Females:82.2 %	Skilled agricultural forestry and fishery District:37. 7% Males: 39.8% Females:33 .8%	Skilled agricultural forestry and fishery District: 72.6% Males: 75.5% Females:70.3%

Dominant feature	District/Region				
Major feature	Tamale Metropolis/ Northern Region	Sagnarigu District/ Northern Region	Kumbungu District/ Northern Region	Bolgatanga Municipal/ Upper East Region	Bongo District/ Upper East Region
Mean annual household income per capita	Urban (all urban areas in Ghana: GHC 494 Rural (all rural savannah): GHC 232	Urban (all urban areas in Ghana: GHC 494 Rural (all rural savannah): GHC 232	Urban (all urban areas in Ghana: GHC 494 Rural (all rural savannah): GHC 232	Urban (all urban areas in Ghana: GHC 494 Rural (all rural savannah): GHC 232	Urban (all urban areas in Ghana: GHC 494 Rural (all rural savannah): GHC 232
Poverty Incidence	50.4% (All districts in Northern	50.4% (All districts in Northern	50.4% (All districts in Northern	44.4% (All districts in Upper East	44.4% (All districts in Upper East

	Region)	Region)	Region)	Region)	Region)
Major source of drinking water	Pipe-borne outside dwelling District: 41.4% Urban:45.2% Rural: 23.3%	Pipe-borne water inside dwelling District: 40.1% Urban: 44.7% Rural: 32.4%	Dugout/Pond/ Lake/Dam/ Canal District: 27.6% Urban: - Rural: 27.7%	Bore-hole/Pump/ Tube well District: 46.2% Urban: 22.4% Rural; 75.7%	Bore-hole/Pump/ Tube well District: 76% Urban:75.5% Rural: 76.1%
Social system	Patriarchy	Patriarchy	Patriarchy	Patriarchy	Patriarchy
Major water resources	Few seasonal streams	High underground water table, Kpene and Kanvilli-Kpawumo dams	The White Volta River and numerous streams and tributaries	White Volta, Red Volta and Sissili Rivers	The Via Dam
Dominant feature		District/Region			
Dominant religion	Islam District: 90.5% Males: 90.7% Females: 90.2%	Islam District: 83.5% Males: 84.1% Females: 82.8%	Islam District: 96% Males: 95.3% Females: 95.8%	Christianity (Catholic) District: 35.2% Males: 32.8% Females: 37.4%	Traditional worship District: 44% Males: 47.7% Females: 40.8%
Study communities in focus	Dungu, Jakarayili-Kukuo, Dohinayili, Bilpeila, Kapkayili	Maleshegu, Vitting, Yilonayili, Gbolo, Zagyuli, Kpalsi	Tibung, Satani, Zugu, Voggu, Gbulung, Cheshegu	Kumbusco, Zaare, Atulbabisi, Bulunko Yorogo, Yarigabisi, Gambibgo, Zuarungu Daboo, Tanzui	Gowrie, Tindongo

Source: GSS (2008/2012/2014).

Appendix N: Automatic Adjustment Formula

Automatic Adjustment Formula (AAF) for Water Tariff Determination

1. Projected Total Local Cost (excluding Labour Cost) (LoCt+1) = GTt1*(LoCt)*(A12*(α3)

2. Projected Labour Cost (LaCt+1) = (GTt*(LaCt)*(A24*(α)

3. Projected Depreciation (Depnt+1) = GTt*((LDepnt5)*(α)+ (FDpen *([7]))

4. Projected RoRANFA (RoRANFAt+1) = GTt*(RoRANFAt)*(α)

5. Projected Fuel Cost (FuCt+1) = (GTt*(FuCt8)*(FP9))

6. Projected Water Treatment Chemicals Cost (WTCCt+1) = (WTt10*(WT *( )

7. Projected Electricity Cost (ELC) = WTt*(ECFt+111).

The interpretations provided by PURC (2011, p.2 & 3), regarding the components of the formula above are as follows:

1. "Total Local Cost excluding Labour Cost (LoC): This includes Bank Charges, Materials, Transport & Travel, Repairs & Maintenance, Rent, Rates & Insurance, other Operating Cost, Central Services, Medical Services, Cost of Transmission Losses, Cost of Distribution Losses, Customer Service Cost and Return on Average Revalued Net Fixed Assets

2. Labour Cost (LaC): This is made up of Salaries and Related Expenses

3. Depreciation (Depn): This includes Depreciation directly and indirectly related to Generation/ Production, Transmission and Distribution Assets

4. Fuel Cost (FuC): This covers the Cost of Light Crude Oil in the case of electricity generation from thermal sources and Water Abstraction Fee in the case of electricity generation from hydro sources

5. Water Treatment Chemicals Cost: This includes all Chemicals needed in the production and analysis of water including Chlorine Gas, Aluminium Sulphate etc

6. Energy Cost. This includes cost of electricity directly related to the production/supply of water".

Where:

"GTt+1 Projected Generation Tariff/Charge (GHp/kWh) for Next Quarter

GTt Base Generation Tariff/Charge (GHp/kWh) as Gazetted by PURC (June 01, 2010)

LoCt Base Total Local Cost (excluding Labour Cost, Depreciation & RoRNFA) as Proportion of Generation Charge

LaCt Base Labour Cost as Proportion of Generation Charge

FuCt Base Fuel/Water Cost as Proportion of Generation Charge

FP Projected Average LCO Index Defined as FPt+1/FPt18

LDepnt Base Local Depreciation as Proportion of Generation Charge

FDepnt Base Foreign Depreciation as Proportion of Generation Charge

RoRNFAt Base Return on Re-valued Net Fixed Assets as Proportion of Generation Charge" (PURC, 2011, p.7).

Appendix O: Sample Tariff Statement

A page of an annual water tariff statement bearing the name of a collection agent for Yilonayili- a rural community under Tamale Metropolis.

GHANA WATER COMPANY LIMITED

AQUA VITENS RAND LIMITED

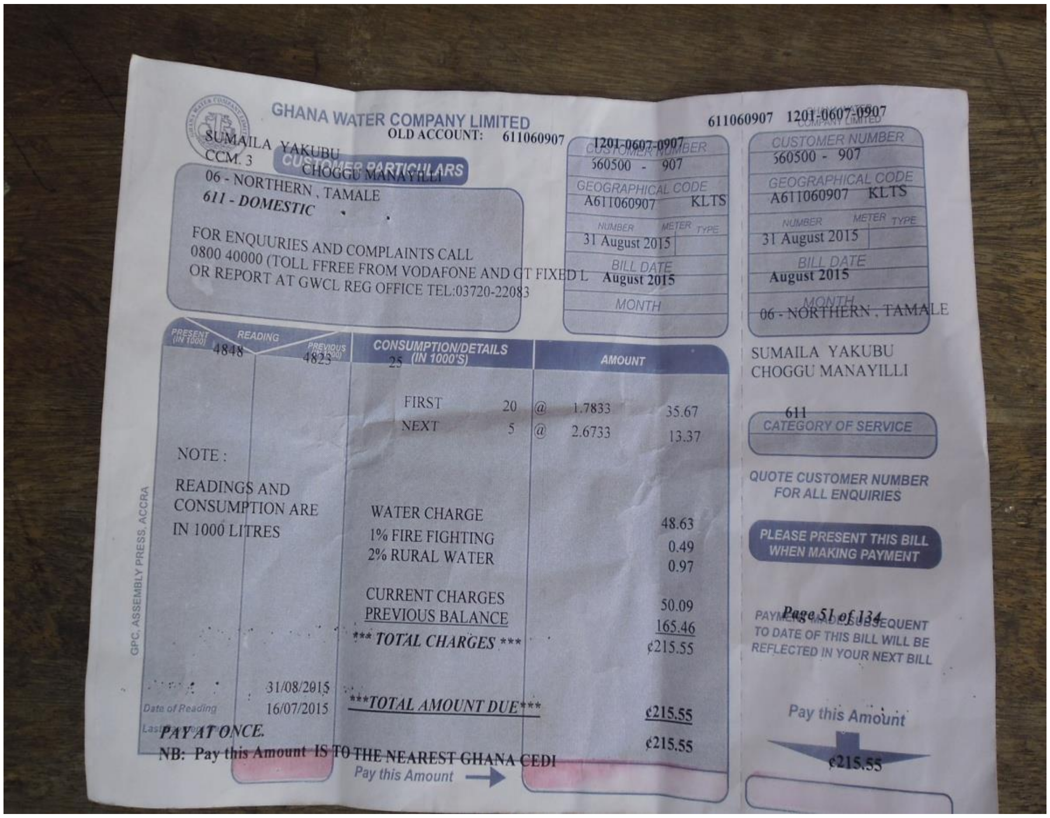
CUSTOMER DETAILS	STATEMENT OF ACCOUNT	DISTRICT
SEIDU FUSEINI		TAMALE MUNICIPALITY
SERVICE CATEGORY		CUSTOMER NUMBER
-		120102020037
		STATEMENT DATE
		31/10/2015

DATE	TRANSACTION DETAILS: Type	Receipt Number / Document Ref. No.	Payment Type	DEBIT	CREDIT	BALANCE
11/12/2009	PAYMENT	A0846665	CASH		(58.00)	(58.00)
11/01/2010	PAYMENT	A0849679	CASH		(70.00)	(128.00)
22/01/2010	PAYMENT	A0851578	CASH		(40.00)	(168.00)
15/02/2010	PAYMENT	X2231467	CASH		(100.00)	(268.00)
	PAYMENT	X2231468	CASH		(30.00)	(298.00)
12/03/2010	PAYMENT	X2233698	CASH		(112.00)	(410.00)
08/04/2010	PAYMENT	X2239028	CASH		(79.00)	(489.00)
16/04/2010	PAYMENT	X2241875	CASH		(70.00)	(559.00)
18/05/2010	PAYMENT	X2136527	CASH		(120.00)	(679.00)
08/06/2010	PAYMENT	X2142533	CASH		(67.00)	(746.00)
24/06/2010	PAYMENT	X2145509	CASH		(32.00)	(778.00)
22/11/2010	PAYMENT	X2459064	CASH		(44.00)	(822.00)
13/12/2010	PAYMENT	X2464078	CASH		(58.40)	(880.40)
20/12/2010	PAYMENT	X4284630	CASH		(142.00)	(1,022.40)
31/12/2010	PAYMENT	X2467964	CASH		(41.00)	(1,063.40)
22/02/2011	PAYMENT	X2648872	CASH		(56.00)	(1,119.40)
28/02/2011	WATER CHARGE			2,111.20		991.80
10/03/2011	PAYMENT	X2653036	CASH		(57.00)	934.80
31/03/2011	WATER CHARGE			55.49		990.29
06/04/2011	PAYMENT	X2832204	CASH		(98.40)	891.89
30/04/2011	WATER CHARGE			96.12		988.01

Page 1 of 5

Appendix P: Sample of an Urban Household Water Bill

Water Bill for a Private Domestic Connection



GHANA WATER COMPANY LIMITED
OLD ACCOUNT: 611060907
SUMAILA YAKUBU
CCM. 3 CHOGGU MANAYILLI
CUSTOMER PARTICULARS
06 - NORTHERN , TAMALE
611 - DOMESTIC

FOR ENQUURIES AND COMPLAINTS CALL
0800 40000 (TOLL FFREE FROM VODAFONE AND GT FIXED L
OR REPORT AT GWCL REG OFFICE TEL:03720-22083

CUSTOMER NUMBER 1201-0607-0907
560500 - 907
GEOGRAPHICAL CODE
A611060907 KLTS
NUMBER METER TYPE
31 August 2015
BILL DATE
August 2015
MONTH

PRESENT READING (IN 1000'S)	PREVIOUS READING	CONSUMPTION/DETAILS (IN 1000'S)				AMOUNT
4848	4823	25				
		FIRST	20	@	1.7833	35.67
		NEXT	5	@	2.6733	13.37
		WATER CHARGE				48.63
		1% FIRE FIGHTING				0.49
		2% RURAL WATER				0.97
		CURRENT CHARGES				50.09
		PREVIOUS BALANCE				165.46
		*** TOTAL CHARGES ***				¢215.55
Date of Reading	31/08/2015					
Last	16/07/2015	***TOTAL AMOUNT DUE***				¢215.55

NOTE :
READINGS AND CONSUMPTION ARE IN 1000 LITRES

PAY AT ONCE.
NB: Pay this Amount IS TO THE NEAREST GHANA CEDI ¢215.55
Pay this Amount

GPC, ASSEMBLY PRESS, ACCRA

611060907 1201-0607-0907
COMPANY LIMITED
CUSTOMER NUMBER
560500 - 907
GEOGRAPHICAL CODE
A611060907 KLTS
NUMBER METER TYPE
31 August 2015
BILL DATE
August 2015
MONTH
06 - NORTHERN , TAMALE
SUMAILA YAKUBU
CHOGGU MANAYILLI
611
CATEGORY OF SERVICE
QUOTE CUSTOMER NUMBER FOR ALL ENQUIRIES
PLEASE PRESENT THIS BILL WHEN MAKING PAYMENT
Page 51 of 134
PAYMENTS MADE SUBSEQUENT TO DATE OF THIS BILL WILL BE REFLECTED IN YOUR NEXT BILL
Pay this Amount
¢215.55

Appendix Q: Water Quality Testing Procedure

How Piped Water Was Handled and Tested

GHANA WATER COMPANY LIMITED

Main Bankers: GCB Bank Limited
Societe Generale Ghana
National Investment Bank

My Ref. No.:..

Your Ref. No.:......................................

Regional Office
Post Office Box 24
Bolgatanga – Ghana
West Africa

27 September, 2016

HOW WATER SAMPLES WERE OBTAINED

The laboratory is fed with a pipeline connected to the treated or final water line.
This final water in this pipeline is continuously flowing.
With the exception of microbiological test, samples are fetched into a beaker and analysed with appropriate instrument and/or reagent.
For microbiological test, the tap is allowed to flow for some time and then closed. The tap is disinfected by flaming it. Samples are collected into sterilized media and incubated.

Registered Office: 28th February Road, (Near Independence Square)
Telephone: 233-302-666781-7 Fax: 233-302-663552 Telegrams: DIRWAT
Website: www.gwcl.com.gh E-mail:info@gwcl.com.gh

CURRICULUM VITAE

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Education and Qualifications:

2013 to 2016: Awaiting results for Doctor of Philosophy (Ph.D-Development Studies), Institute for Development Studies, University of Cape Coast, Cape Coast; 2011: MPhil (Development Studies) University for Development Studies, Tamale; 2001-2005: BA (Integrated Development Studies) University for Development Studies (UDS), Navrongo Campus; 1998: Post-secondary Teacher's Certificate A-Three Year, Tamale College of Education, Tamale; 1994/1992: GCE A Level/GCE O Level, Ghana Senior High School, Tamale.

Work Experience

2012 to date: Lecturer at the Department of Environment and Resource Studies (DERS), Faculty of Integrated Development Studies (FIDS), UDS, Wa Campus. 2006-2011: Senior Research Assistant at DERS, FIDS, UDS. 1998-2006: Principal Superintendent Teacher at Ghana Education Service, Tamale. 2006-2008: Field Coordinator at Miidan Educational Trust, Wa (Part-time).

Specialisation: Development Studies (Environment and Development)

Research Experience*:*

2011-2012: Research consultant and Team Leader for the evaluation of the Tackling Educational Needs Inclusively (TENI) project in the Jarapa and Lawra Districts, sponsored by the Voluntary Services Overseas (VSO) and Associates for Change (AFC).

Publications:

Bukari, F.I.M., Kendie, S.B, Sulemana, M. & Galaa, S.Z. (2017). The effects of chieftaincy and land conflicts on the socio-political development of Northern Ghana. *International Journal of Social Science Research, 5* (1), 101-119.

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Abagre, C.I. & **Bukari, F.I.M.** (2013).Promoting affirmative action in higher education: a case study of the University for Development Studies bridging programme. *Journal of Education and Practice, 4* (9), 19-28.

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Mphil Thesis

Bukari, F.I.M. (2011). *An assessment of the* tri-sector partnership model *in propoor water tariff collection at Dalun, Northern Region Ghana*. A master thesis. Tamale, Ghana: University for Development Studies.

Conference Paper Related to Thesis

Anokye, N.A., **Bukari, F.I.M.** & Kendie, S.B. (2016). *Rethinking participatory water tariff determination and service conditions in the context of Ghana's water policy for non-urban Northern Ghana.* International Conference on Reflections in Development Studies: Labour and Public Service Market-led Reforms. Cape Coast, Ghana: Institute for Development Studies, University of Cape Coast, 3rd to 6th June 2016.

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FACULTY OF SOCIAL SCIENCES
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Fax: *03321-32982*
Website: http://ucc.edu.gh
Email: ids@ucc.edu.gh

Post Office Box 01
University of Cape Coast
Cape Coast

Our Ref: IDS/40/Vol. 4/153
Your Ref:

Date: 17th August, 2015

TO WHOM IT MAY CONCERN

LETTER OF INTRODUCTION

We write to introduce to you **Francis Issahaku Malongza Bukari** a student pursuing **Ph.D (Development Studies)** programme with Registration Number SS/DSD/13/0003 at the Institute for Development Studies, University of Cape Coast.

Mr. Bukari is writing his thesis on the topic: "***Improving Water Tariff Payment in Rural and Peri-Urban Communities connected to Urban Water Systems in Northern Ghana***".

We shall be grateful if you can accord him all the necessary assistance he requires for his thesis.

Thank you.

Yours faithfully,

Betty K. Addo-Nkrumah (Mrs.)
....
Assistant Registrar
INSTITUTE FOR DEVELOPMENT STUDIES
UNIVERSITY OF CAPE COAST
CAPE COAST

cc: Director, IDS, UCC.