



A Review of water Charges: Customers' Perception of The Quality of The Levels of Service in Ghana, The water Charges And Their willingness To Pay For Improved Services

Blankson-Darku D.N.A^{1*}, Faustina Gyabaah²,
Anna Amankwah-Minkah³, Prodeo Y. Agbotui⁴

¹Ghana Water Company limited Dome District-Ghana

²Department of Civil Engineering,, Bolgatanga Polytechnic, P. O. Box 767 Bolgatanga,
Upper East Region, Ghana

³Department of Civil Engineering,, Bolgatanga Polytechnic, P. O. Box 767 Bolgatanga,
Upper East Region, Ghana.

⁴Department of Civil Engineering, Accra Technical University, Barnes Rd, Accra

Received 08 Apr, 2017; Accepted 20 Apr, 2017 © The author(s) 2017. Published with open access at www.questjournals.org

ABSTRACT: *The trade-off between full cost recovery and providing the urban poor with potable water in the right quantity, quality and at affordable prices is ever increasing especially in African countries. Ghana, not being an exception continues to struggle in its efforts to provide safe drinking water to the urban populace and Ghana Water Company Limited (GWCL), the urban water service provider stands at the centre of this ordeal. The company has been criticised for being inefficient in its management of the urban water supply due to various reasons - technical, financial and political. This report reviews the water supply management in Ghana. It further investigates by way of a survey, the perception of consumers in Ghana of the quality of the levels of service offered them regarding water quality, quantity and reliability, as well as the affordability and willingness to pay for improvements in the water services rendered by the GWCL. The survey came up with one hundred and thirty-four (134) valid respondents – 56 directly handed out printed questionnaire respondents and 78 online respondents. The survey results show that most customers perceive the water quality and reliability of the service received as being average and above, although over 78% of them have their water supply interrupted at least once every week. The quantity of water received is shown as not being adequate, since 54% of customers resort to other sources of water to supplement public supply. Even though the water quality is rated as good, customers rarely drink water from this service, as 66.4% of them prefer drinking sachet or bottled water. Most consumers (63.4%) think the current water prices are high and only about 3% are willing to pay more to achieve full cost of water service and for a significant improvement to the supply system. The water supply situation in Ghana should be recognized as a national issue and given higher priority. Major reforms need to be made in both policy and practice if the levels of service are to match up to internationally accepted standards. This would bring significant public health improvements and service improvements to wider Ghanaian society.*

Keywords: *Consumers, Quality, Water, Perception, Willingness*

I. INTRODUCTION

In the past water was regarded as a cheap and abundant resource. But now, with much larger communities requiring service, and as water resources are becoming increasingly scarce, costs need to be recognized and mechanisms for charging in an equitable way need to be introduced [1]. The treatment of water as an economic good was catalysed by the Dublin Statement issued from the International Conference of Water and the Environment (ICWE) in 1992, which included within it the principle that, “Water has an economic value in all its competing uses and should be recognized as an economic good” [2]. This same idea was adopted by the United Nations Conference on Environment and Development shortly afterwards in June, 1992 in Rio de Janeiro with the emanation of the Agenda 21 which stated that “Integrated water resources management is based

on the perception of water as an integral part of the ecosystem, a natural resource and a social and economic good, whose quantity and quality determine the nature of its utilization” [3]. However, before United Nations Conference on Environment and Development in 1992, water had been recognized as an economic good for many centuries throughout Europe and the early United States. This was evidenced by private water supply companies thriving in a wide variety of settings and also with the OECD completing study on the pricing of water services in Member countries 1987 [1][4]

There have been arguments by some sectors/interest groups that water cannot be treated like other economic goods because of its unique characteristics, and also for the need to treat water as a human right because of its essentiality to life and irreplaceability[5][6]. Water pricing has however been identified as an important way of addressing these values which include improving water allocation and encouraging users to conserve scarce water resources; and the design of various pricing schemes can be used in meeting many other objectives besides these [7]. Indeed, [8] in *The New Economy of Water* also highlights how these phenomena has also changed the way water has been treated.

In the economic value concept, there is the wide move towards focusing on preferences and needs of water consumers, as well as their ability and willingness to pay for water services [9]. As established by the [10], consumers' general attitudes towards government policy in the water supply sector and their sense of entitlement to free government services, significantly influenced their willingness to pay values. Therefore, the issue of the monetary value of water resources, and for that matter water supply cannot be dealt in isolation, and considerations of equity, affordability, water quality and public health must be regarded. The inclusion of a water access target in the Sustainable Development Goals – achieve universal and equitable access to safe and affordable drinking water for all – is a recognition of the importance of safe water supply in reducing poverty in the developing world [11].

The Ghana Water Company Limited is a drinking water supply only company, and is the sole water utility provider mandated to supply potable water for domestic, institutional, and commercial purposes in the urban and peri-urban communities of Ghana [12]. Currently it is not achieving its aim to recover the full economic value of its services and is unable to serve customers with constant supply of water. The company has over the years faced some challenges in the light of inadequate water supply to its customers. This has led to rationing of water in some instances. According to the Ministry of Water Resource, Water and Housing (WRWH), the rapid pace of urbanization has outstripped the capabilities of GWCL to cope with the increasing demand for water for domestic use, industry and commerce. With a current population of about 25 million [13], only about 60% of the people of Ghana have access to safe and potable water [12]. In another instance the [14] demonstrate/or assert about 60% of the urban population, have no direct access to piped water, but rely on vendors. Water tanker operators serve as secondary providers, buying piped water from GWCL and selling either to tertiary vendors or directly to consumers. This has serious economic and public health challenges for the urban populace of the country as the Public Utility Regulatory Commission (PURC) regulates the price at which the tankers purchase the water from GWCL but not how much they resell to consumers.

The present unsatisfactory level of service has been attributed to the inability of GWCL to raise enough revenue to finance much needed capital investment projects [12]. Over the years, however, the approved tariffs have not been cost reflective [12]. Issues of inadequacy of tariff to carry out urgent repairs of assets, low operating cost coverage ratio (OCCR) and rising energy costs have all coupled in the low performance of the company. Other challenges include production losses, billing and collection, illegal activities by consumers and metering and accounting for water.

This has resulted in a public perception of a poorly performing company [12]. Issues of customer satisfaction in terms of water quality and quantity, in particular relating to public health concerns are in question. In light of this, the Public Utility Regulations Commission (PURC), which is the utility regulator, has come under scrutiny by the general public with regard to the price at which the current service is charged. The affordability as well as willingness of consumers to pay for this has also been in question. [15] and [16] established that existing service characteristics, the price of the improved service and a number of socio-economic factors are important determinants of the willingness to pay attitude of consumers.

This research will therefore explore customer views on water cost and quality in the Accra East region of GWCL. This is important in understanding the perception of water customers in the region.

II. MATERIALS AND METHODS

2.1 Research Approach

The research adopts an empirical and a quantitative approach. Quantitative research involves using a structured method such as a survey to collect hard facts and data [17][18] explain that such data can be used to

answer questions about relationships between measured variables in order to explain, predict and control any phenomena being researched.

In this research, quantitative data collected was analyzed using Statistical Package for the Social Sciences (SPSS) to support the discussions and arguments related to levels of service and customer satisfaction of water services provided by the Ghana Water Company Limited (GWCL).

2.2 Research Design and Data Collection

This research used a blend of exploratory and descriptive method [19]. In the exploratory method, a process of exploration or probe is used as the methodological processes since existing literature are reviewed to inform the research process. In addition, the descriptive method used in this research was the use of GWCL as a case study to assess the levels of service and customer satisfaction of water services provided.

2.2.1 Data Collection Technique

Both primary and secondary data collection were used for this research since a good fusion of both methods gives a range of sources needed to produce high quality research outputs [20]. The primary data collection was done through questionnaires which were distributed among (potential) customers of the GWCL. This was done via two different sources – the first was hardcopy questionnaires which were printed and distributed to customers by meter readers who work in the field. The second was by circulation of the questionnaire via the internet (online survey). The questionnaire was created using google forms and the link was circulated via email and social platforms. In the online survey, respondents were encouraged to share the link with other friends which gave it a snowball sampling tool effect [21] increasing the number of respondents. Secondary data was obtained from the offices of Ghana Water Company Limited and publications from literature.

2.2.2 Questionnaire design

The questionnaires sent out to prospective respondents were developed with structured questions based on the theoretical framework of the research. It contained two parts:

Part one was to ascertain the social status of respondents – age, sex, education and income were some of the information required. Part two dwelt more on the research questions, probing respondents' views on water quality, quantity, reliability and cost of water services among others. All the queries were single multiple choice questions, which makes it seem easy to fill out in just a couple of minutes and also convenient for later collation and analyses. Respondents were however urged to fill the either the online or hardcopy forms just once to avoid multiple entries.

2.2.3 Sample Selection and responses

The research was aimed primarily at GWCL customers and the survey was conducted predominantly in the Accra East region designation of the company. The hard copy questionnaires were distributed in this region as it was the most accessible due to prior familiarization of that region, which is the largest of all the demarcated areas of the company and with the highest number of customers. A total of one hundred and thirty-six responses were received - fifty six (56) ground responses and seventy eight (78) online responses. With the online survey, the questionnaire jumps right to the end as soon as a respondent indicates that his or her house not serviced by water from Ghana Water Company, making sure that relevant responses are those from customers of the company only.

2.3 Research analyses

The primary data collected from the survey was collated and analyzed using the Statistical Package for Social Science (SPSS v.23) software. SPSS is considered a proven tool which is widely used for systematic and reliable statistics in social science. The two surveys (hardcopy questionnaires and online survey) were analysed separately, and since there was little disparity between them, they were fused to get one sample.

III. RESULTS

3.1 Water Quantity and Reliability

Customers' response for the reliability of the water service is as shown in figure 3.1. The largest proportion of respondents (43.28%) perceive the service to be on average while 13.43% and 1.49% of them perceive it to be low and very low respectively. Conversely, a higher proportion of 33.58% perceive it to be high, and 8.21% see it to be very high.

The issue of how often the water from the taps go off as presented, produced the result in figure 3.2 – 21.64% of respondent never having interruptions in flow and 20.97% having the taps go off more than three times in a week. The highest number of respondents, a ratio of 23.13% had their taps going off twice a week.

Because of this issue of water going off, over 76% of customers surveyed make use of water storage tanks or reservoirs in their homes (Figure 3.3) whiles 54.5% of customers resort to other forms of additional water supply (Figure 3.4)

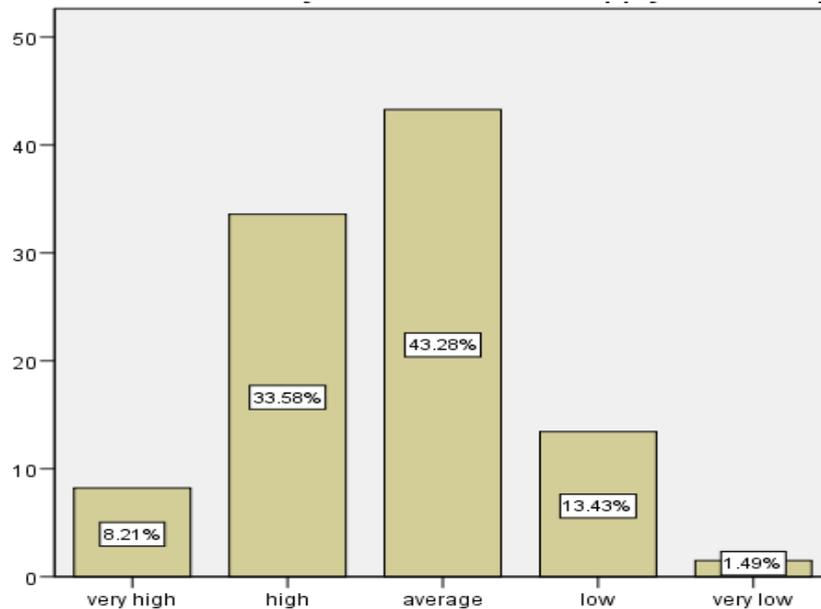


Figure 3.1: Proportion of respondents on how reliable they perceive the water service

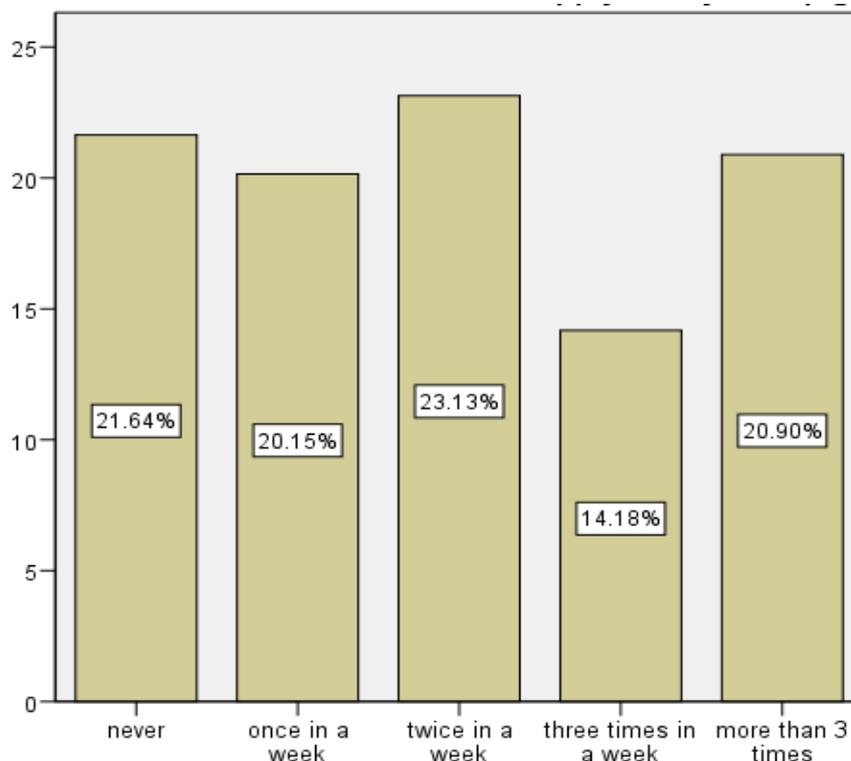


Figure 3.2: Customers' response on how often their water service goes off

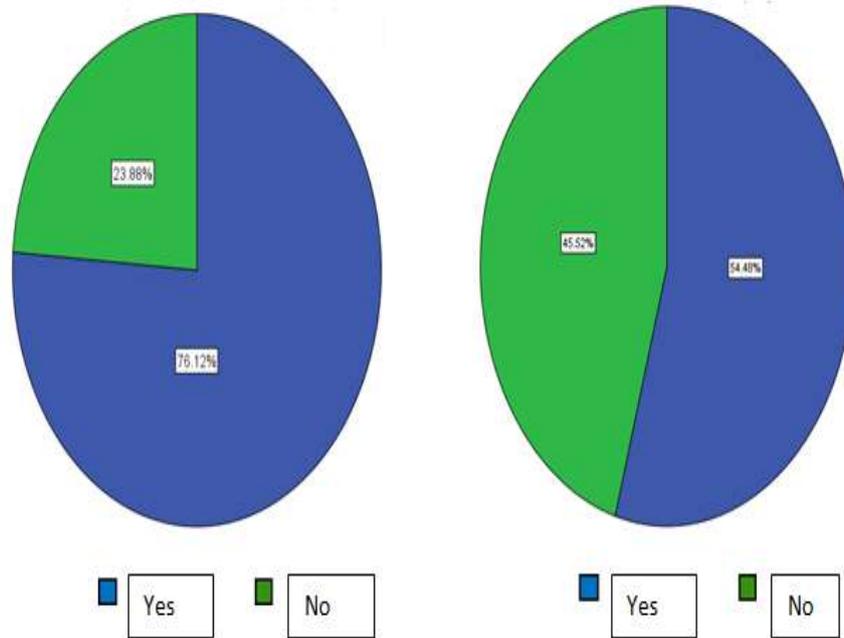


Figure 3.3: Proportion of respondents who use water tanks other

Figure: 3.4: proportion of people who buy sources of water

3.2 Water quality

The customers' perception and concern regarding the quality of water that they receive is varied. A majority of 58.96% of respondents perceived the quality of water to be average, while 28.36% and 3.73% think it to be high and very high respectively. On the other hand, a minority of respondents find the quality of water to be low and very low, 5.97% and 2.99% respectively (Figure 3.5)

However, only a meagre percentage of 3.73% of the respondents would drink water from the tap (Figure 3.6). None of the respondents who adjudge the quality to be very high actually drinks water from the tap although 40% of them claim they would drink it (Table 3.1). Of those who find the quality to be high and average respectively, 5.26% and 2.53% of them actually drink water from the taps as compared to 47.37% and 30.38% of them who claim would drink it (Table 3.2). Most of the respondents preferred drinking bottled water (29.85%) or sachet water (66.42%).

It is worth noting also that, although over 76% of the respondents use domestic water tanks or reservoirs in their houses (Figure 5.7), a significant portion of 31.34% of them never wash the water tanks (Figure 5.8).

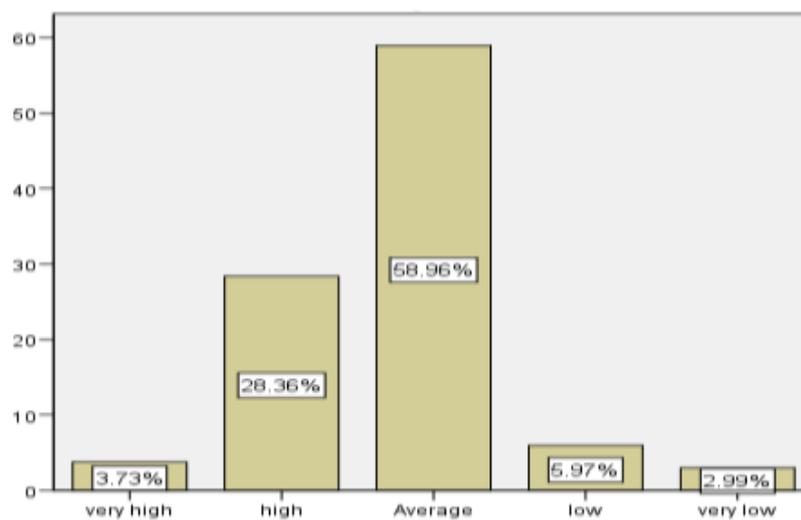


Figure 3.5: Customers' response on their perception of the quality of water they receive

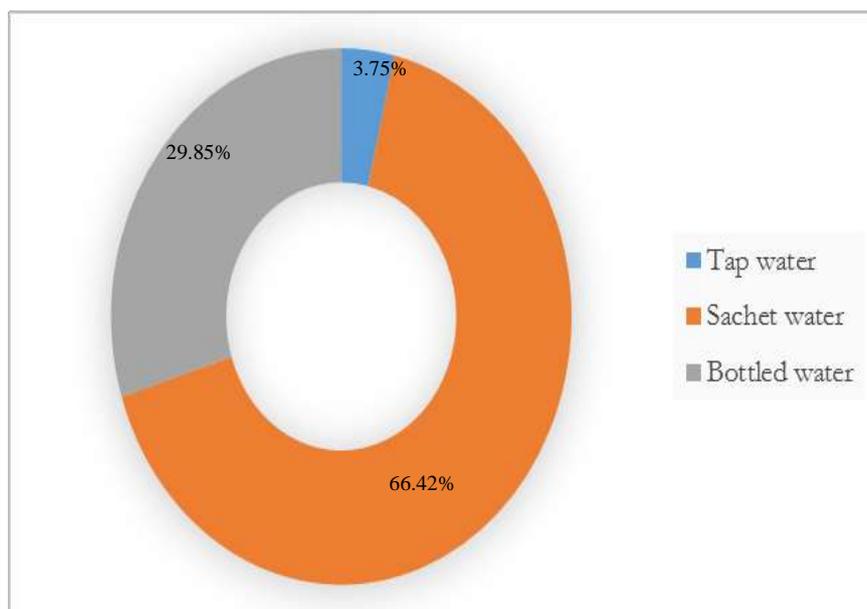


Figure 3.6: Respondents on what type of water they drink predominantly

Table 3.1: Respondents' view on the quality of water provided and whether they would drink it or not

		Would you drink water from this service?		Total
		yes	no	
How would you rate the quality of the water provided by the water company to your household?	very high	2 (40%)	3	5
	high	18 (47.4%)	20	38
	Average	24 (30.4%)	55	79
	low	1	7	8
	very low	2	2	4
Total		47 (35%)	87	134

Table 3.2: Respondents' view on the quality of water provided and the type of water they actually drink

		What form of water do you predominantly drink?			Total
		tap water	sachet water	bottled water	
How would you rate the quality of the water provided by the water company to your household?	very high	0	1	4	5
	high	2 (5.3%)	25	11	38
	Average	2 (2.5%)	58	19	79
	low	1	1	6	8
	very low	0	4	0	4
Total		5	89	40	134

3.3 Current water charges

The majority of customers find the current water prices to be high and that is over 63% of respondents (Figure 3.7). 33.58% find it to be average while almost 3% find the prices to be low. In this respect, over 76% of respondent think they spend between 0 and 10% of their household income on water and almost 6% spend more than 20% of the household income on water supply (Figure 3.8).

The current water charges, is considered by most customers (76%) as compelling them to keep an eye on their use and conservation of potable water since 50% of them think conservation over the construction of new infrastructure is an effective way of solving water quantity problems.

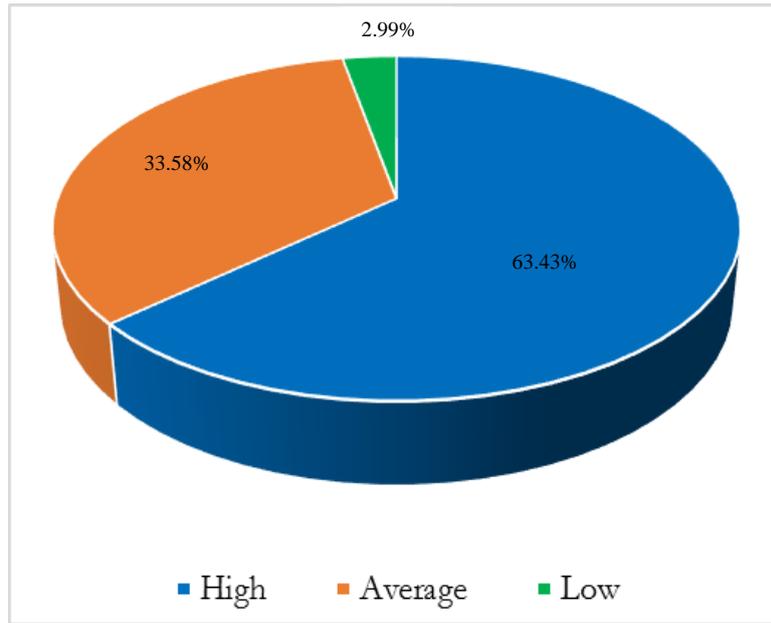


Figure 3.7: Perception of current water charges

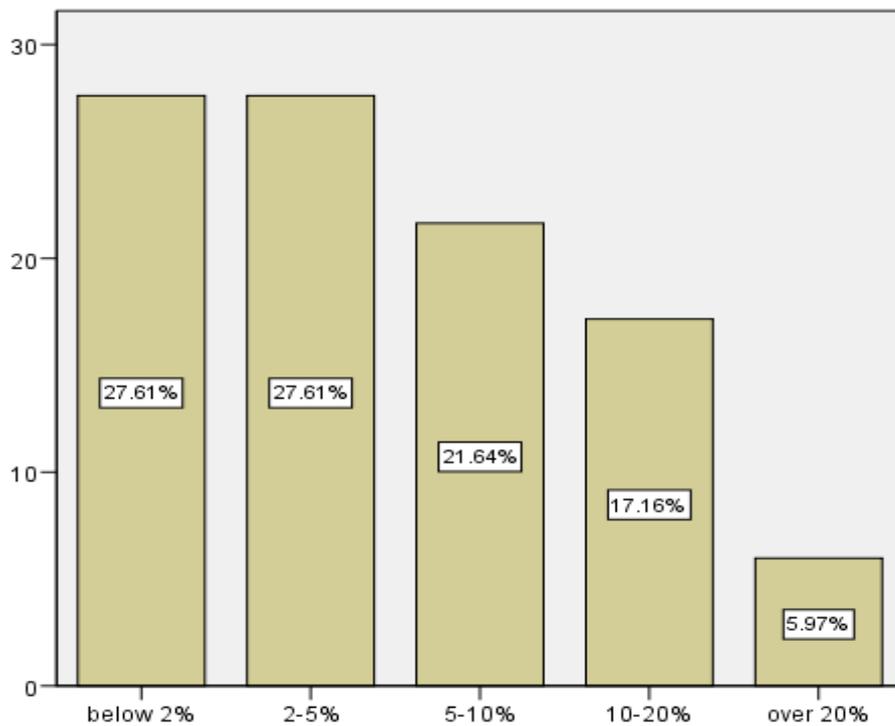


Figure 3.8: Percentage of household income respondents spend on water bills

3.4 Willingness-to-pay

In parallel with the perception of the current water prices, most customers, that is 74.6% are willing to pay the minimum option given of 0 – 10% more for improvement of services rendered. This obviously leads to a minimum of 3% willing to pay between the maximum of between 20 and 30% more for service improvements (Figure 3.9). In another vein, it is the customers who rate reliability and the water quality to be average and above that are more willing to pay for further improvement in the service provision (See Tables 3.3, 3.4 and 3.5).

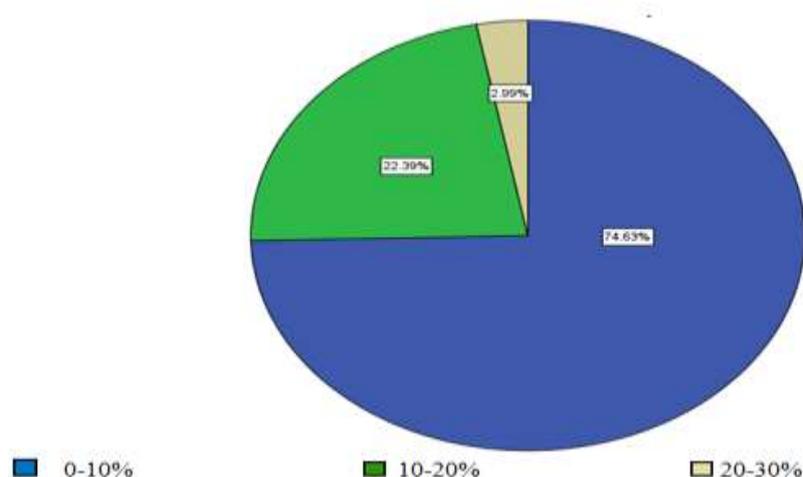


Figure 3.9: How much more customers are willing to pay for service improvements

Table 3.3: Willingness to pay for improved services and perception of current water rates

		How much more are you willing to pay for the improvement of the water supply service to you?			Total
		0-10%	10-20%	20-30%	
What do you think about the current water rates charged compared to your household income?	high	68	15	2	85
	normal	31	13	1	45
	low	1	2	1	4
Total		100	30	4	134

Table 3.4: Willingness to pay for improved services and rating of reliability of current services

		How much more are you willing to pay for the improvement of the water supply service to you?			Total
		0-10%	10-20%	20-30%	
How reliable would you rate this water supply service to your household?	very high	7	3	1	11
	high	34	9	2	45
	average	42	15	1	58
	low	15	3	0	18
	very low	2	0	0	2
Total		100	30	4	134

Table 3.5: Willingness to pay for improved services and rating of quality of water provided

		How much more are you willing to pay for the improvement of the water supply service to you?			Total
		0-10%	10-20%	20-30%	
How would you rate the quality of the water provided by the water company to your household?	very high	4	1	0	5
	high	28	7	3	38
	Average	58	20	1	79
	low	8	0	0	8
	very low	2	2	0	4
Total		100	30	4	134

IV. ANALYSES AND DISCUSSION

4.1 Levels of service

Adequate water quality and quantity are essential to hygiene, and hence the public health and well-being of all communities [22]. According to the sector ministry, MWRWH, in 2010, only a quarter of residents in Accra received continuous water supply throughout the week, while about a third receive water about 12 hours a day. One-third of residents also receive supplies only two days in a week, while one-tenth receive no supplies at all.

4.1.1 Water quantity and reliability

It is known that not all the urban populace in Ghana, (and more especially the capital Accra) is served by the water company [12]. This could be inferred from the large proportion of respondents who resort to the purchase of water from other sources although they are connected to the water supply system. With a large proportion of respondents rating the reliability of the service provided above average, it may seem the company is on the right track in the eyes of consumers who are provided with water. Due to issues such as inadequate pipe capacity, inadequate production, over-aged distribution network and unpredictable power outages, the water company implements a rationing system to distribute limited piped water resources within the city of Accra [23]. In this regard, most consumers make use of storage reservoirs in their homes as buffer so they are not affected when the taps go off.

There are respondents whose taps go off twice to three times in a week and still rate the service as reliable. It could be concluded that such customers' levels of expectation are low and they have become resigned to the poor situation. They are also familiar with the water company's rationing schedule and know the particular days or time that they are served and can plan towards it. Due to the unreliable distribution system, pipe burst and leakages are very often the order of the day [12] and supply interruptions are inevitable. Rating reliability average and above (most of respondents) matches with the high number of respondents who use water tanks in their homes, therefore the inevitable supply interruptions sometimes are not noticed due to the buffer offered by these domestic reservoirs.

4.1.2 Water Quality

Access to good quality drinking water is a challenge in most towns and cities in Ghana and households have for years depended on other sources of water to supplement their activities [24]. Also it is realized that most of respondents do supplement supply from the water company with other sources but then still rate the quality of the water from GWCL as average and above. According to GWCL, water quality at treatment points is very good, but may get contaminated during transmission due to broken pipes that allow intrusion [14]. GWCL rates its water quality compliance over the recent years as 95% [12] compared to an average 99.96% compliance level of UK water companies [25]. It could be argued that respondents cannot accurately determine the quality of the water they receive since it is not just what the normal senses perceive. However, it is a good thing for consumers to have this perception. The regularity of washing and disinfecting water tanks also affects the quality of water that consumers store in their various homes.

Due to the rationing of water to meet demand, the gap in water services has been filled by private water vendors who sell water either straight from their tap (filling jerry-cans and even tanker trucks), or packaged as sachets with varying degrees of filtration or disinfection [26]. As noted by the MWRWH, the use of same tanker trucks to supply drinking water and raw water for construction presents quality challenges to those who rely on such services for drinking water. Packaged water can be found virtually anywhere in Accra with hawkers selling them in slow moving traffic in the middle of the streets making them more readily available. The sachet water, sold in sealed 500ml plastic sleeves is cheaper than bottled water and therefore more preferable.

Previous works have raised concerns about the quality of sachet water [27][28][24] and its potential of transmitting water borne diseases due to the presence of infective stages of pathogenic parasitic organisms and some heavy metals. Worth noting is that not every study has found sachet water unwholesome. [29] and [26] argue the contrary, stating that very few studies have incorporated a study design with a sufficient sample size, geographic coverage, or general scientific rigour needed for broad conclusions about quality. They further argue that these sachets extend drinking water coverage deeper into low-income areas, essentially serving as an inadvertent safe storage vehicle, whether purchased on the street for immediate consumption or in bulk for home use, therefore potentially introducing a health benefit over stored tap water. [23] found that neighborhood rationing exerts a strong effect on a household's likelihood of buying sachet water, and its use is also associated with higher levels of self-reported overall health in women, and lower likelihood of diarrhea in children. Moreover, he states the possibility that the benefit is psychological and linked to sachet water's status as "pure water" (as it is commonly called in Ghana), and this gives sachet water that social appeal.

In reference to the survey, some consumers claim they will drink water from the taps (35% as seen from Table 5.1) but only 3.5% actually do, as the majority of respondents choose packaged water most probably more because of its easy availability than higher quality

4.2 Water price and willingness to pay

International bodies such as the United Nations and World Bank have advocated for consideration of the poor in society in the setting of water prices [30]. Accordingly, the [31] in their “Social policy and strategy for water regulation” document deal with issues of pro-poor water supply. The price of water has always been an issue of national debate and it was in the heat of a water price increase by the PURC that this survey was undertaken, therefore it was expected, for majority of respondents to perceive water prices as high. Among these respondents however, almost 71% of them spend between 0 and 10% of their household income on water (which includes purchase from private vendors). A study by [32] on two low income communities in Ghana, revealed that households spent an average of 15% of their income on water. In a recent study on Accra, [26] states that “residents are already paying four times more for water by volume than New Yorkers” – slum residents pay vendors up to eight times the local public utility and up to twenty times in dry periods. It can therefore be agreed with [33] who also carried out a similar study in Nigeria and inferred that it is clearly erroneous to argue that the population cannot afford to pay for water since most people are already paying high prices for water from the vending system for service which is inferior to that which could be provided by a well-run piped distribution system.

A well-run piped distribution system requires the operator to be able to recover the full cost of the services provided. GWCL has reported it is not able to recover even its Operation and Management cost, therefore the way to full cost recovery seems bleak. It is in this light that the PURC recently granted a 62.9% increase in water tariffs. In general, respondents' willing to pay for improved services from the water company seem to be on the low probably because of several reasons. Firstly, as mentioned earlier, the study coincided with ongoing protests against the implementation of an increase in tariffs and this could be a reaction in that regard. Overall evidence available shows that the amount that households are willing to pay for improved water services varies widely [32]. It is highly possible therefore that the majority of respondents (in the 0% to 10% bracket) will have varying options of how much they are willing to pay for improvement - although there are some who are willing to pay nothing - from verbal confirmation.

[34] verifies that willingness-to-pay is strongly influenced by the reliability or level of service. Customers are willing to pay when they receive more reliable water access and this can be seen from Tables 5.5 and 5.6 where it is those respondents who rate the levels of service to be average and above that are willing to pay more for improved services – some even in the third bracket of between 20% and 30%. Low income urban residents are willing to pay far more for a reliable piped water while households which already enjoy better services are willing to pay high amounts to avoid service deterioration [32]. From the survey this can be evident in part from the Tables 5.5 – 5.7. The latter however does not seem to hold as respondents appear to follow Hensher's evidence of willingness to pay being influenced by the perceived levels of service.

4.2.1 Research and Development

Research and development has enabled water companies in many developed countries to incorporate modern technology in the provision of water supply. Investment in modern technology can be a great asset in the management of water supply by GWCL to curb instances of technical and financial inefficiencies. Areas such as leakage control and repairs as well as billing and collection can be significantly improved by technology. Various regular researches such as customer dynamics should be conducted by almost all the stakeholder bodies in the water industry and this provides much needed data and information on which stakeholders use in the management of the water industry. Also to be involved should be the regular assessment of the condition of the infrastructure and non-infrastructure assets and use of econometric models to determine future capital investment requirements to maintain the condition of the assets.

4.2.2 Finance

From the research outcomes, there is every reason for GWCL to improve its operational efficiency and at the root of this is funding. In the UK, operating expenditure currently accounts for around 40% of customers' bills and capital maintenance expenditure currently accounts for around 30% of customers' bills [25] compared to GWCL where the amount of money realized from customers' bills cannot even cover for Operation and Management expenditure [12]. A lot of customers are in arrears (for years) to the water company with majority of these being governmental institutions. Compounding this is the fact that the operating cost of the company has been significantly increasing over the years due to the government's new policy on grants and loans

guaranteed for projects, the rising cost of energy (which currently constitutes 45% of operating expenditure), and the rapidly depreciating value of the cedi currency [12].

4.2.3 Privatization

The GWCL has undergone some form of privatization (management contract) in the year 2006 – 2011. The 5-year contract (with a possibility for extension) for management and operation of 80 urban water systems was financed by a World Bank grant and was awarded to an international public sector joint-venture, Aqua Vitens Rand Ltd (AVRL), through an international competitive bidding process [10] [35] with the overall objective “to restore GWCL to a sound financial footing and make a significant improvement in the commercial operations of the company” [14]. The performance-based management contract can be best described as a hybrid where asset ownership and investment responsibilities remained with the GWCL while the operation and maintenance of the urban water systems was transferred to AVRL, for a monthly fee, and bonus payments for achieving or exceeding contractual targets [35]. The major areas of major concerns included: (a) widespread water leakage and wastage; (b) chronic water shortages and intermittent supply; (c) poor cost recovery; (d) high energy consumption; (e) low water quality; (g) low utilization capacity; and (g) poor operating pressures. By the end of the contract period most of the objectives were not realized and the contract was abrogated.

On the other hand, unlike Ghana, the UK's privatization scheme has transformed the water supply industry in all aspects and stands as a symbol of emulation. Pre and post privatization challenges with regard to economic and environmental regulation, franchising, setting price limits and criticism of policy proposals were all encountered and tackled accordingly.

[36], identifies the lack and absence of context, task specificity and creative adaptation as reasons for the failure of the management contract, because these address core and critical political, social, cultural, and economic issues responsible for building hospitable environments for externally imposed market type reforms. [35] also identifies the unclear objectives and responsibilities of parties and unreliability of before-and-after data for analysis as issues that hindered the success of the management contract.

V. CONCLUSION

5.1. Conclusion

It can be concluded from the survey and from reports that although some customers seem to be satisfied with the level of service being provided by the GWCL, the company cannot be said to be technically and financially efficient. Most parameters or indicators do not meet internationally approved standards nor that of the national regulator, PURC - therefore, more needs to be done to get to that cutting edge.

Even with the current tariffs, consumers perceive the current charges higher than they are willing to pay for. The full recovery cost of water services in this regard is far from being achieved since the PURC due to subtle political issues prioritize sentiments of civil society of the achievement of full cost recovery. Consequently, it can also be concluded that internationally acceptable levels of service cannot be achieved in the medium or long term because under current arrangements the GWCL cannot gain a financial position to efficiently supply consumers. This, as mentioned earlier has public health implications and therefore becomes a matter of national interest.

REFERENCES

- [1]. Rogers, P., de Silva, R., & Bhatia, R. (2002). Water is an economic good: How to use prices to promote equity, efficiency, and sustainability. *Water Policy*, 4, 1-17.
- [2]. United Nations-International Conference on water and the environment, 1992, Guiding Principle No.4
- [3]. United Nations. (1992). United Nations Conference on Environment and Development A/CONF.151/26 (Vol.1). The Rio Declaration. Rio de Janeiro: U.N. Retrieved from <http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm>
- [4]. OECD. (1987). *Pricing of Water Services*. Paris: .
- [5]. Savenije, H. (2001). Why water is not an ordinary economic good. IHE Delft : Value of Water Research Report Series No. 9.
- [6]. Anderson, K. M., & Gaines, L. J. (2009). International water pricing: An overview and historic and modern case studies. 249, 265
- [7]. Dinar, A., & Subramanian, A. (1997). *Water Pricing Experiences: An International Perspective*. Washington DC: World Bank Technical Paper No. 386.
- [8]. Gleick, P., Wolff, G., Ghalecki, E., & Reyes, R. (2002). *The New Economy of Water: The Risks and Benefits of Globalization and Privatization of Fresh Water*. Oakland: Pacific Institute.
- [9]. Mugabi, J., & Kayaga, S. (2010). Attitudinal and socio-demographic effects on willingness to pay for water services and actual payment behaviour. *Urban Water Journal*, 287-300.

- [10]. World Bank. (2004). Project Appraisal Document on a proposed credit in the amount of \$103million to the Republic of Ghana for an Urban Water Project and Urban 2. Washington DC.: World Bank.
- [11]. Kirkpatrick, C. (2006). An empirical analysis of state and private-sector provision of water services in Africa. *The World Bank Economic Review*, 20(1), 143-163.
- [12]. Ghana Water Company Limited. (2015). Proposals for review of aggregate revenue requirement and tariff.
- [13]. Ghana Statistical Service (GSS, 2015). Ghana living standard survey report, Published by Ghana Statistical Service, Accra.
- [14]. Ministry of Water Resource, W. a. (2009). Water and Sanitation Sector Performance Report.
- [15]. Perez-Pineda, F. (1999). Estimating the willingness to pay for water services in developing countries: A case study of the use of a contingent valuation survey in El Salvador, Central America. PhD Thesis. Purdue University.
- [16]. Casey, J., Kahn, J., & Rivas, A. (2006). Willingness to pay for improved water service in Manaus, Amazonas, Brazil. *Ecological Economics*, 58, 365-372.
- [17]. Neuman, W. (2005). *Social research methods: Quantitative and Qualitative approaches*. Boston: Allyn and Bacon.
- [18]. Leedy, P., & Ormrod, J. (2002). *Practical research: planning and design*. Merrill Prentice Hall.
- [19]. Kothari, C. (2004). *Research methodology: Methods and techniques*. New Age International.
- [20]. Smith, E. (2011). *Combining primary and secondary data: opportunities and obstacles*. The University of Birmingham.
- [21]. Franklin, S., & Walker, C. (2003). *Survey methods and practices*. Ottawa: Statistics Canada, Social Survey Methods Division.
- [22]. Howard, G., & Bartram, J. (2003). *Domestic Water Quantity, Service Level and Health* World Health Organisation, Geneva.
- [23]. [23] Stoler, J., Weeks, J., & Appiah Otoo, R. (2013). Drinking Water in transition: A multilevel cross-sectional analysis of sachet water consumption in Accra. *PLoS ONE*, 8(6), e67257.
- [24]. Addo, K., Mensah, G., Bekoe, M., Bonsu, C., & Akyeh, M. (2009). Bacteriological quality of sachet water produced and sold in Teshie-Nungua suburbs of Accra, Ghana. *African Journal of Food Agriculture Nutrition and Development*(9), 1019-1030
- [25]. Consumer Council for Water. (2015). *Delving into Water: Performance of the water companies in England and Wales 2010-11 to 2013-14*.
- [26]. Stoler, J., Fink, G., Weeks, J., Appiah Otoo, R., Ampofo, J., & Hill, A. (2012). When urban taps run dry: Sachet water consumption and health effects in low income neighborhoods of Accra, Ghana. *Health & Place*, 18(2), 250-262.
- [27]. Orisakwe, O., Igwilo, I., Afonne, O., Maduabuchi, J., Obi, E., & Nduka, J. (2006). Heavy metal hazards of sachet water in Nigeria. *Archives of Environmental & Occupational Health*, 61(5), 209-213.
- [28]. Kwakye-Nuoko, G., Borketey, P., Mensah-Attipoe, I., Asmah, R., & Ayeh-Kumi, P. (2010). Sachet drinking water in Accra: the potential threats of transmission of enteric pathogenic protozoan organisms. *Ghana Medical Journal*, 41(2).
- [29]. Egwari, L., Iwuanyanwu, S., Ojelabi, C., Uzochukwu, O., & Effiok, W. (2005). Bacteriology of sachet water sold in Lagos, Nigeria. *East African Medical Journal*, 82, 235-240.
- [30]. Komives, K., Foster, V., Halpern, J., Wodon, Q., & with support from Abdullah R. (2005). *Water, Electricity, and the Poor*. Washington, DC: The World Bank.
- [31]. Public Utilities Regulatory Commission (PURC); *Socila Policy and Strategy for Water Regulation*, February, 2005. <http://www.purc.com.gh/purc/sites/default/files/socialpolicy.pdf> (Date Accessed; 04-04-2017)
- [32]. Nyarko, K., Odai, S., & Fosuhene, K. (2006). Optimizing social inclusion in urban water supply in Ghana. First SWITCH Scientific Meeting. University of Birmingham, UK
- [33]. Whittington, D., Lauria, D., & Mu, X. (1991). A study of water vending and willingness to pay for water in Onitsha, Nigeria. *World Development*, 19, 179-198.
- [34]. Hensher, D., Shore, N., & Train, K. (2005). Households' willingness to pay for water service attributes. *Environmental & Resource Economics*, 32(4), 509-531.
- [35]. Ameyaw, E., & Chan, A. (2013). Identifying public-private partnership (PPP) risks in managing water supply projects in Ghana. *Journal of Facilities Management*, 11(2), 152-182.
- [36]. Zaato, J. (2014). "Look before you leap": Lessons from urban water sector reforms in Ghana. *Journal of Asian and African Studies*, 50(6), 683-701.