

# **Fostering sustainable water supply in urban and peri-urban areas of Ghana: the case of Ho Municipality**

J. E. Koku<sup>1</sup> & J.-E. Gustafsson<sup>2</sup>

<sup>1</sup>*Department of Geography and Resources Development, University of Ghana, Legon-Accra, Ghana*

<sup>2</sup>*Department of Land and Water Resources Engineering, Royal Institute of Technology, Stockholm, Sweden*

## **Abstract**

This paper examines the water management situation in the Ho Municipality of Ghana. It provides an overview of the country's draft water policy and its implications for water supply in the municipality. Also examined are households' adaptation strategies in accessing water in the face of water scarcity and their attendant socio-economic implications. Results show that households adopt several coping strategies to access water in times of scarcity/shortage. These come in two basic forms. One entails utilisation of alternative sources, namely sachet water for drinking purposes, while water from open wells/boreholes served cooking, washing and bathing purposes. The second involves adjustment in water use at the individual level, e.g. reduction in quantity of water used for different purposes as well as the number of times one had to take a bath in a day. These practices have serious implications for health and well being of residents. To sustain water provision in the municipality, the paper calls for diversification of water supplies. This could be accomplished, for example, through linking boreholes to piped-water and also through promotion of rain water techniques to supplement existing supplies.

*Keywords: water supply, peri-urban, urban, water scarcity, adaptations, Ho Municipality, Ghana.*



## 1 Introduction

The provision of safe, affordable and accessible potable water in urban and peri-urban areas had remained a challenge in Ghana. In recognition of the pivotal role played by water in sustaining life and health of its people, the government has implemented several strategies towards addressing the water needs of its citizens. Even though some of these strategies have yielded positive results, others have performed below expectation, depending on the implementation strategy put in place. Even in areas where initial results have been promising, the sustainability of the management strategy remains questionable.

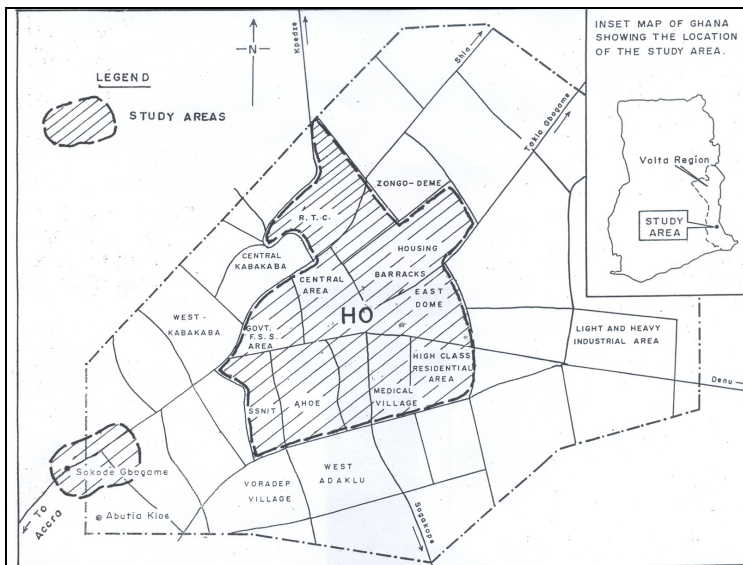


Figure 1: Map of the study area - Ho Municipality.

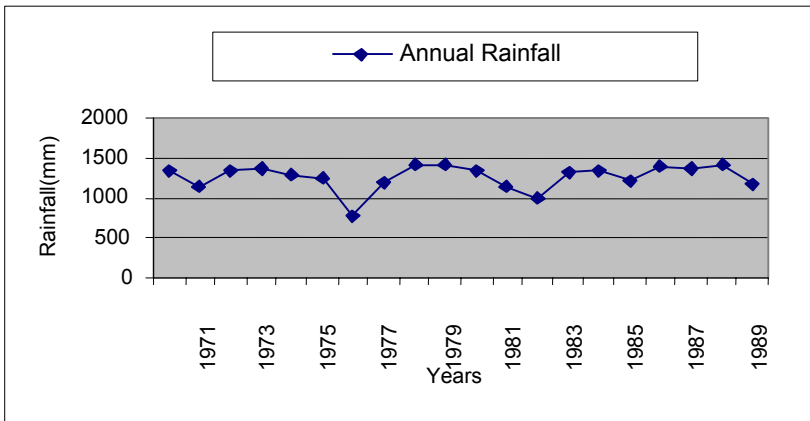
The Ho Municipality in the Volta Region of Ghana (Fig.1) of Ghana has had a long history of water shortage, despite the continued growth in its population over the past 16 years. For example, with a total population of 55,389 in 1984, the population of Ho has grown to about 235,331 in 2000 (Table 1). Consequently, such a growth has placed a compelling pressure on government to provide social amenities to meet the increasing population.

Of all the social services that merit attention in Ho, provision of water appears to be the most critical. Although the area is served with piped water, frequent interruptions and shortage in supply do occur and these have often been blamed on technical and managerial lapses. However, in other instances irregular rainfall which also affect the volume of water in the Volta River, from which the main water works derive its source. Annual rainfall patterns in the Ho and its surroundings have shown seasonal fluctuations over the years (Fig.2a).

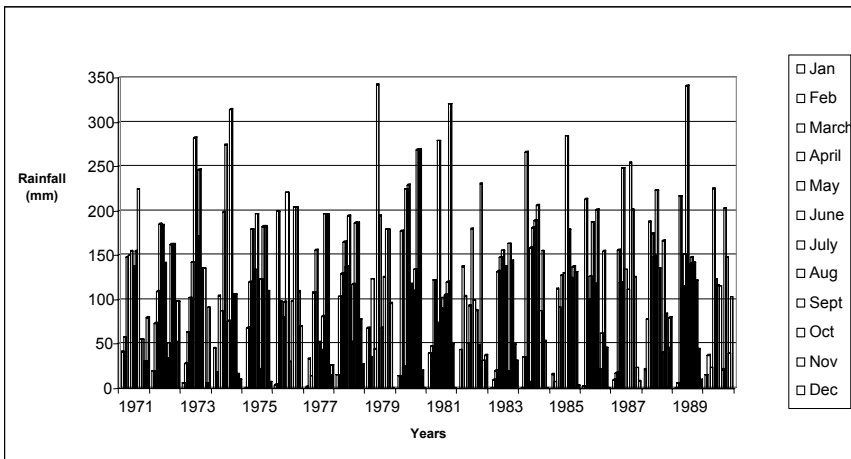
Table 1: Population distribution by gender (1984 and 2000).

Year	Gender		Total
	Male	Female	
1984	27,494	27,895	55,389
2000	113,436	121,895	235,331

Source: Ghana Statistical Service (1984 & 2000). Population and Housing Census Summary Reports.



(a)



(b)

Figure 2: (a) Total Annual Rainfall Distribution (mm) in the Ho Municipal Area (1971-1990); (b) Rainfall Distribution in Ho Municipal Area (1971-1990).



For example, rainfall data gathered between 1971 and 1990 has clearly demonstrated that apart from the major rainy season (March-July) when the greatest rainfall is received, November-February is characterized by low rainfall with figures rarely exceeding 100 mm (Fig.2b). Such situations have made the water situation more critical. Recently, the municipality has been earmarked to receive attention under the government's new water sector reform programme, given its position as a fast growing urban centre (Table 1). The choice of Ho municipality also derives essentially from the chronic water shortage that characterises the Municipality. A major aim of the new programme is to provide safe, affordable, accessible and reliable water to people on a sustained basis. While one would like to applaud such an initiative, it is useful to plan the future with reference to what had pertained in the past. In other words, fostering a sustainable new water supply and management strategy would require a critical examination of the nature of the previous management strategies to determine existing gaps that need to be addressed in the new strategy.

## **2 Objective and structure of paper**

This paper draws on findings from a survey conducted in the Ho Municipality of Ghana to discuss some issues of critical importance to the promotion of sustainable water supply in urban and peri-urban areas of Ghana. Although the thrust of the discussion will be on the Ho municipality and its environs, relevant references from other parts of Ghana and elsewhere will be drawn upon. This will enhance the readers understanding of the problem as it relates to the larger national context. The paper is organized under six sections. First, a brief background introduction is offered. This is followed by an outline of data sources and research methods used. A third section, which represents the main body of the paper, provides an overview of Ghana's Draft Water Policy and its implication for the water supply situation in Ho Municipality. The fourth section examines households' adaptation strategies in accessing water in the face of scarcity and their socio-economic implications. The fifth section discusses some alternative ways of promoting sustainable water delivery in the Ho Municipal area with focuses on the three cardinal concerns, i.e.—economic, social and environmental—which form the pillars of sustainable development. Lastly, a summary and some concluding remarks are offered.

## **3 Data and research methods**

Data for the paper were derived from both secondary and primary sources. The secondary data were generated from published materials—selected reports and journal articles that touched upon the theme of the paper. The primary data, on the other hand, came from questionnaire survey and in-depth interviews held in Ho Municipality and Sokode Gbogame (Fig.1). To facilitate the primary data collection, simple random sampling [1,2] was adopted to select a total sample size of 144 respondents from 72 households. From each household two persons including at least one female (where possible) were selected. The breakdown of



this is as follows: 94 respondents from 47 households in Ho and 50 respondents from 25 households in Sokode Gbogame. The choice of simple random sampling in this case was considered appropriate, as the communities under review are homogenous in terms of the water crises they face. The sex composition of these was: 81 males and 63 females. The study design also took into consideration the fact that some of the respondents may, for some reason, not feel disposed to fill in the questionnaire themselves. The administration of the questionnaire thus took the form of interviews, as opposed to self-administration. Further, as a general guiding principle the survey was restricted to respondents above 17 years of age. The underlying reason was they were old enough to provide relevant responses to the issues addressed by the study. Lastly, in addition to the questionnaire survey carried out in the communities in-depth interviews were also carried out with some key government officials in the municipality, by virtue of their work, are well informed about the subject of the study.

#### **4 Overview of the national water policy: implications for water supply situation in the Ho Municipality**

Ghana has recently drafted a new water policy for streamlining operations in the water sector [3]. Policy recognizes the fundamental right of all people without discrimination to safe and adequate water to meet basic needs. It's major objectives include first, provision of improved access to potable water, and second, ensuring that water resources are managed and developed in a manner, which as first priority safeguards that the entire population, particularly the poor and vulnerable, will have access to adequate and safe water supply.

A number of institutional reforms to make water delivery more effective are being considered under the new policy. Key among them was to separate rural supply from the urban supply. Unlike in the past where rural and urban water supply was placed largely under the Ghana Water and Sewerage Corporation (GWSC), urban areas will now be served by the newly constituted Ghana Water Company Limited (GWCL), while rural areas will benefit from Community Water and Sanitation Agency (CWSA). By this the policy seeks also to ensure sustainable provision of and access to potable water to rural communities that will contribute towards the capital cost and ensure payment for normal operation, maintenance and repair cost of their facilities. This separation had raised questions among sections of the citizenry as to why sanitation was only tagged only to rural supplies to the exclusion of urban supplies. Some critics have therefore held that because the sanitation component is less profitable, the policy failed to incorporate into urban water delivery, which is mostly geared towards cost recovery and profits. While this criticism would remain largely debatable, one would have expected sanitation services to be incorporated in to the urban supplies since sanitation situations in some urban and peri-urban areas of Ghana are in deplorable situation. In all cases, sustainability has been given recognition as a critical issue. With respect to the rural supplies, sustainability is to be ensured through effective community ownership and management of the



facilities, active participation of women, public sector facilitation, sustainability and efficiency of the urban supplies is expected to result from public-private partnerships.

By and large, the policy reforms as outlined above would have implications for access and delivery of water in most urban and peri-urban areas of Ghana. Households in the Ho Municipal Area have several water sources on which the inhabitants depend. Chief among them is piped water, which mainly serves the core area. But there are also other water facilities like boreholes, roof catchments, and hand-dug/drilled wells provided by the Volta Rural Water and Sanitation Project [4] as part of the Community Water and Sanitation program in the fringe communities. However, respondents identified piped water (73.7%), hand-dug wells (22.2%) and boreholes (4.2%) as major sources on which people depend for their water needs. While these sources have served domestic and other water requirements for the increasing population they hardly meet the needs of the growing population and have thus remained inadequate. Even where provision is made available through expansion in the urban supply, the probability of costs and tariffs increasing beyond the reach of the poor is high. It is generally accepted that now that people's ability to opt for water delivery services depends on several factors among which income/economic status is a major determinant. Affordability of water under the new reforms where cost recovery is likely to override other interests would result in a situation where residents would be denied access since most of them earn low incomes. Apart from the few public servants and those business men/women, who may fall under what one might categorize as high-income group, most service beneficiaries earn very paltry incomes. The survey revealed that apart from a small proportion (34.7%) that indicated earning incomes of more than GHC 1.000.000 (Approx \$100), majority earn less than 750.000.000 (Fig 3), which is equivalent to \$75.

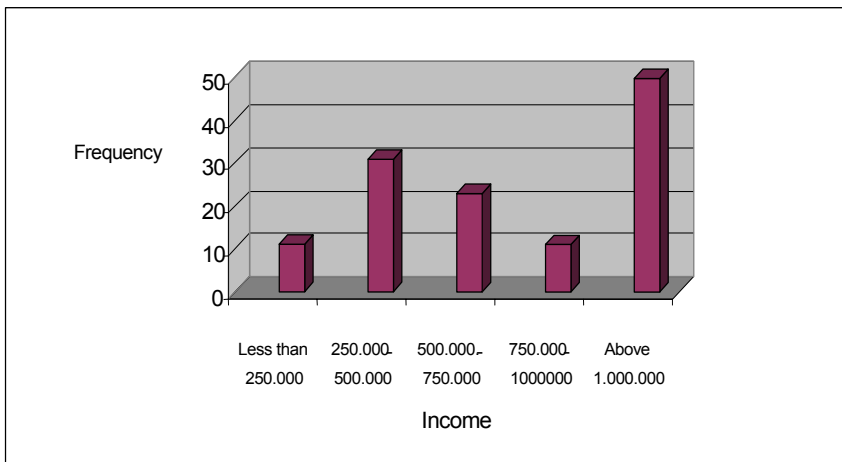


Figure 3: Estimated monthly income of respondents.

However, it appears a significant proportion of household income is spent on water, which might have implications for future access. In this regard, a closer look at the proportion of income spent on water will be insightful as it would help assess whether poor households would continue meeting their water charges or not and the implications that are likely to arise as a result. To facilitate such an assessment, knowledge on income and expenditure on water was considered to be vital. As a result, respondents were asked to indicate how much they pay for a 50-litre container (bucket/bowl) of water drawn from publicly installed piped water. Results show for example that of the incomes earned, majority pay between GHC 150,000-300,000 for a 50-litre bucket of water. It further also showed that family sizes in the area range from a minimum of four persons to as high as fifteen, with majority (58.2%) having family sizes of between 5 and 9. Now, relating this to the generally accepted 50-litre/day water required to maintain an average person [5], would imply that for a family with a minimum size of 5 persons, GHC 22,500 will be spent on water assuming that GHC150 is charged for a 50-litre quantity of water. This could become worrisome to persons with meager monthly incomes, as it would imply spending a significant proportion of their monthly income on water, leaving as a result little for other basic household necessities—i.e. food, health etc. It also further raises questions as to whether households' patronage of the water services can be sustained. Where households in peri-urban areas are incapable of meeting water needs for reasons relating to higher charges, the tendency to resort to unhygienic water resources becomes rife with its attendant problems. This would erode the benefits envisaged under the reform unless efforts are made to address such concerns.

## **5 Households' water utilization and adaptation to water scarcity: some socio-economic and public health implications**

Adaptation to resource scarcity has been a subject of discussion in recent times [6–8]. Governments and policy makers in the developing world have preoccupied themselves with scarcity/access to resource components such as land, water, forestry etc. In sub-Saharan Africa resource users have adopted ways of adapting to resource scarcity at various levels, namely—household, regional and national levels. In Ghana, the water sector is one resource area where such adaptations have found the greatest expression. In periods of water crises—whatever the cause and situation—people's access are affected, compelling them to alter their normal water handling practices. In response to the crisis, it is common to encounter situations where people develop strategies either to have access to alternative sources of water or to economize the use of the little they have. These may entail exploration and utilization of alternative sources, altering of individual water handling practices so as to minimize waste of the resources or preserve the little available. Adjustments such as reductions in the quantity of water use per day or development of multiple use of water at the household level are illustrative of the point. In particular, the latter practice—i.e. involving



multiple use of water at the household level—is common in urban and peri-urban low income settlements where waste water (i.e. grey water) from washing of clothes (laundry) is used to flush water closets (WCs) instead of using clean water for such purposes. In the same vein, it is also common to encounter a situation where such waste water is used to wash plates in the first instance before using clean water to rinse it. This is meant to economize on the use of the clean water available for bathing, cooking and other purposes.

Notwithstanding the above, it is equally worth acknowledging at this point that following massive health education in Ghana, there is a noticeable hygienic water handling practice amongst residents of low income settlements, where water from perceived unwholesome sources is boiled for drinking purposes. While these practices have serious implications for health and personal hygiene they nevertheless demonstrate how households behave when faced with a water crises situation. The lessons from such coping strategies, whether rational or otherwise, are useful in sensitizing health and development planners to the risks faced by such vulnerable groups. The scare water situation experienced by people in the study area as a result of the factors noted earlier had placed households under severe pressure especially when access to piped water cannot be guaranteed due to factors identified earlier. Under such circumstances, households adopt several ways of sourcing water. However, the adaptations vary in relation to the purpose for which water is required—i.e. water for cooking, washing/bathing and drinking. In the sections below, attempts will be made to explain the various adaptations as they relate to these three purposes.

### 5.1 Adaptation strategies for accessing water for drinking purposes

Drinking water is one key requirement that households cannot dispense with. In a major rainy season (March-July) it is easy for households in the study area to access water for drinking, cooking and washing/bathing, since interruptions in supply of piped water do not occur frequently. However the same cannot be said of the dry season (November-February), when water is generally scarce. Faced with water shortages, households within the Ho Municipality adopt several strategies to cope with the scarce water situation. Among the major strategies pursued to get access to drinking water are purchase of sachet water (commonly referred to as *pure water* in Ghana), use of stored water, reliance on open wells and boreholes. Of these, reliance on sachet water appears to be most prevalent (Table 2).

Results of the survey indicated the almost half of the respondents (44%) rely on sachet water to meet their drinking water needs; 14 % resort to the use of stored water, while a few others also rely on open wells as source of drinking water.

This shows quite clearly that consumers within the municipality have rated the quality of sachet water and piped water supplied in the municipality as good. Such ratings have often been premised on perceived attributes of good water. Among the attributes of good drinking water distinguished in the water management literature are color, smell, taste and freshness [9]. These four physical properties are generally regarded as critical for selecting water for





drinking and cooking. Preference for sachet water and open wells as enumerated by the respondents is informed by the belief that they do possess such attributes. For example, asked to enumerate qualities of good drinking water, the respondents identified clarity, colorless, tasteless, treated, odorless sweet, hygienic, as major attributes of a good drinking water, which confirms the general observations noted in the literature. Therefore in periods of water scarcity when piped water which does possess the same qualities is difficult to get, they would prefer to purchase sachet water as good supplement.

Table 2: Adaptation strategies in water used for drinking purposes.

Strategies for accessing water for drinking purposes in the periods of scarcity.	Frequency	Percent
<i>Reliance on Sachet water</i>	31	44
<i>Reliance on Stored water</i>	14	20
<i>Reliance on Open wells</i>	9	13
<i>Borehole water</i>	2	03
<i>No Change in strategy</i>	9	13
<i>Others</i>	6	07
Total	71	100

Source: Field Survey, 2006.

However, it would be equally useful at this point to devote some attention to some risks associated with its consumption. The use of sachet water has recently emerged as an important sub-sector of the urban water delivery system which is in vibrant operation in urban areas of Africa, but has received little attention in research [10,11] and policy discussions. In Ghana, the sachet water (0.5 litre of water packed in plastics) popularly referred to as *pure water*, is consumed not only by the lower class but also popular among the upper and middle social class. In the Ho Municipality as in most urban areas of Ghana, the supply shortfall in household drinking water supply coupled with the poor quality and inefficiency of the public water delivery system has given rise to increasing dependence on sachet water for domestic consumption. Consequently, there are many sachet water producing industries located in various parts of the country. For instance in a peri-urban areas of Accra, one can identify over 100 different brands of sachet water on sale in the markets and by vendors most of whom are operating illegally without appropriate permission from quality assurance agencies such as the Ghana Standards Board. While the introduction of Sachet water industries in the water sector could be a way of supplementing existing arrangements for piped water delivery, the quality of these products has often not been monitored to ensure public health safety and good practice within the sector.



Given the increasing reliance on sachet water in urban and peri-urban areas of Ghana some scientists have carried out studies on the quality of such water in some parts of the country. Results from a few of these studies suggest that the operations of the sachet water sector merits critical attention as most of the so-called *pure water* sold in urban communities such as Kumasi and Cape Coast are of doubtful quality [10,11] and yet consumed by a large proportion of the urban dwellers. For example the Kumasi study which focused on bottled water, sachet water and hand-filled hand-tied bagged water showed that heterotrophic bacteria were found in all three types of water with TVCs per millilitre ranging from 1 to 460 for bottled water,  $2-6.33 \times 10^5$  for factory-bagged sachet water and  $2.33 \times 10^3-7.33 \times 10^{12}$  for hand-filled hand-tied bagged water [11]. Although, none of the microbial indicators of faecal contamination were detected in bottled water, 4.5% of the factory-bagged sachets contained total coliforms and 2.3% faecal coliforms, and 42.5% of the hand-filled hand-tied bags contained total coliforms, 22.5% faecal coliforms and 5% enterococci. So far, no known rigorous and systematic study of the quality of sachet water produced and consumed in the Ho Municipality and its surrounding has been carried out. The same can be said of the piped water supplied in the area. The above findings suggest that the quality of water delivered by private companies (i.e. the bottled and the sachet water) needs a critical examination, if public health standards are to be promoted.

Table 3: Adaptation strategies in water use for cooking purposes.

Adaptations strategies for accessing water for cooking purposes	Frequencies	Percent
<i>Open Well</i>	26	18.1
<i>Sachet water</i>	5	3.5
<i>Stored water</i>	14	9.7
<i>Boiled Stream water</i>	2	1.4
<i>Borehole water</i>	5	3.5
<i>No change in strategy</i>	17	11.8
TOTAL	69	100

Source: Field Survey, 2006.

## 5.2 Adaptation strategies for accessing water for cooking purposes

Consumers' choice of alternative water sources for cooking purposes is fairly close to that pursued for drinking purposes. For example, the study revealed that households resort to boreholes, use of sachet water, and stored-water *inter alia* to meet their water requirements for cooking (Table 3) in times of water scarcity—i.e. the periods between November and February.

Of the options noted, reliance on open wells appears to be the most prevalent. Twenty-six (18.1%) of the 69 responses had identified open-wells as an alternative water source for domestic cooking in periods of scarcity (Table 3).



Other practices such as use of storage of water (notably rain water), purchase of sachet water, reliance on boreholes amongst others are also considered. However, these do not seem to be popular compared to reliance on well water.

### 5.3 Adaptation strategies for accessing water for bathing/washing purposes

Singh et al, [9] have discussed some attributes that consumers, notably women consider while searching for alternative water sources for washing or bathing purposes. They observed among other issues that the water qualities regarded as important for washing and cleaning generally arise from a subjective evaluation of the cleaning capacity, besides clarity of the water itself. They noted in particular that the cleaning capacity in turn is linked to the quality of ‘softness’ of water [9]. In general good quality water for washing clothes is expected to give a good lather and cause no discolouration. Similarly, water for bathing is often associated with qualities such as clarity, cleanliness as well as accessibility and availability. It comes therefore as no surprise when people prioritize surface water over groundwater for laundry purposes. The choice of water source for washing/bathing follows a pattern that is similar to that adopted for cooking discussed earlier (cf. Table 4). Results from the questionnaire survey suggest here again that dependence on open well was the most popular, representing 46.4% of the strategies pursued to access water for bathing purposes in times of scarcity. However, the study also revealed other strategies that have been adopted at a personal level (cf. Table 4). Some of these include, bathing once a day (15.9%) and washing once a week (7.2%).

Table 4: Adaptation strategies in water use for bathing/washing purposes.

Adaptation strategies for accessing water for bathing/washing purposes	Frequencies	Percent
<i>Open wells</i>	32	46.4
<i>Fetch water from streams</i>	3	4.3
<i>Use piped water</i>	8	11.6
<i>Borehole water</i>	9	13.0
<i>Bath once a day</i>	11	15.9
<i>Wash once a week</i>	5	7.2
<i>Other</i>	1	1.4
Total	69	100

Source: Field Survey, 2006.

While these practices appear to be less pronounced given the proportion of respondents that engage in such strategies they have serious implications for health and personal hygiene. Dependence on open wells is an age-old practice that is commonly associated with rural areas in Ghana. However, it is gradually gaining popularity in urban and peri-urban areas; given the unreliable nature of



potable water service provision is such areas. This observation is supported by recent studies in the New Juabeng Municipality in the Eastern Region of Ghana [12] where problems of water shortage are equally pronounced. However, it could be argued at this point that, the preference attached to open wells as an alternative source of water is indicative of some perceived benefits associated with it. The most easily identifiable reasons may relate to the fact that (i) its technology is widely-known, (ii) it is often located within easy reach of many in the communities and (iii) that it is cheaper to construct compared to other alternative modern water sources such as boreholes fitted with pumps. This notwithstanding, it is important to note that the overall sustainability of opens wells requires not only its ability to yield water for the satisfaction of people's water needs—i.e. it must be broadened to encompass basic hygienic practices that need to be adhered to guarantee a good quality of water. Regrettably, this is not the case in many communities as most wells are cited in public places in communities and open to everybody's use, thus exposing them to the risk of biological contamination.

## **6 Alternative ways of promoting sustainable water delivery in the Ho Municipality**

Achieving sustainable water supply in the Ho municipality calls for a sober reflection on water sources that will satisfy social, economic and environmental concerns, which are generally accepted to constitute the three pillars of sustainable development. However, current practices in water provision, not only in Ho but also in most parts of Ghana, do not seem to consider all three aspects in equal measure. In most instances, emphasis is placed on economic feasibility of water supplies to the neglect of social and environmental sustainability. In the Ho Municipality, piped water stands out as the most preferred water source, and has therefore received premium over other sources. While this water source could be justified on the grounds of it being cleaner, safer and healthier, its production and sustainable maintenance requires a much higher capital injection related to other sources. To recover costs therefore there is the tendency to raise charges in such a way as to satisfy both the producer and the consumer. The pursuit of this management strategy is often assumed to be the best to keep water producers in business. However, experience shows that this has often brought in its wake problems, since relevant social concerns such as consumer preference and continuous patronage are largely ignored. For instance, consumer's continuous patronage of a particular water source is often weighed against affordability and also tied to income. As such in situations where households consider themselves incapable of coping with increasing charges, shifts to alternative sources becomes a more compelling option.

The study demonstrated that households' apart from piped water have considered open wells and boreholes as alternative sources of water to meet basic water requirements. In view of the scarce water situation that besets the municipality, it would seem desirable if consideration could be given to augmenting the piped water system with other sources. That is, where technical



and hydro-geological conditions would permit, one option could be to combine borehole with piped water. For example, in areas where salinity levels are considered low, boreholes could be sunk and connected to feed the piped network. This strategy has been considered in some parts of southern Tanzania as a useful way of supplementing existing piped water sources to serve households in urban and peri-urban areas [13]. Another source is the use of rainwater. Although rainwater has not been identified in the study as an important water source, it is increasingly being recognised as a vital supplement to piped water supply in urban areas [14]. Rainwater harvesting is a technology used for collecting and storing water from rooftops, the land surfaces, steep slopes, road surfaces or rock catchments using simple techniques such as pots, tanks and cisterns as well as more complex techniques such as underground check dams [15,16]. This technology is not new in Ghana. It has served as useful sources of water for rural households. However, it has largely been ignored in considering alternative water sources for urban consumption. Its promotion in Ho municipality could help supplement the piped water system. Zhu et al [14] have outlined its benefits noting amongst other things that it is convenient as it provides water at the point of consumption. Moreover, its adoption in the study area could allow family members have full control of their system (ibid), which greatly reduces operation and maintenance problems.

## 7 Summary and concluding remarks

This paper which is sectioned into seven parts examined the water management situation in the Ho Municipality of Ghana. It provides an overview of the country draft water policy and its implications for the water supply situation in the municipality. Using this as the context it examined households' adaptation strategies in accessing water in the face of water scarcity and some socio-economic implications and outlines some alternative ways of promoting sustainable water delivery in the Ho.

A number of issues emerged from the study. The first of interest to note is the fact that, although the municipality is served with piped water, it is fraught with water crises with frequent interruptions. This occurs not only in the wet season and sometimes in the dry season. Households in periods of scarcity have therefore had to resort to several adaptation strategies to cope with the problem of scarcity. The adaptations have come in two basic forms. The first entails consideration of alternative water sources, namely: reliance on sachet water for drinking purposes, whilst water from open wells and boreholes are used for cooking and washing and bathing purposes. The second involves adjustment in water use strategies at the individual level. These include reduction in quantity of water used for different purposes as well as the number of times one had to take a bath in a day. These coping strategies have serious socio-economic implications for individuals as well as households. For example, most of these water sources attract charges that are fairly high, relative to the low income levels of residents. In such circumstances it is most unlikely that individuals and households would be able to access adequate quantities of water to meet their



basic requirements. Even if adequate access would not constitute a constraint, the growing population trend in the municipality would require consideration of alternative sources that could supplement existing supplies. In light of this, it is recommended that water supply in the municipality be sustained by diversify sources to include for example linking boreholes to the piped water and also through the promotion of rain water harvesting techniques.

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