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Household Access to Safe and Improved Drinking Water and Basic Sanitation in Wa Municipality

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ABSTRACT
The main objective of the study was to ascertain household access to safe and improved water and sanitation coverage in the Wa Municipality. A Sample of 230 households were randomly selected for household interviews, key informant interviews and participant observation. The study revealed that, there were adequate levels of improved water coverage (86%) were recorded to have access to improved water in the research community. However, the community was beset with extremely poor waste management practices. Some solid wastes were observed in some open spaces with poorly maintained gutters clogged with solid waste. Improved toilet facilities coverage were very low (6.9%) leading to an average number (58.3%) of households patronizing the few public toilet facilities in the community. Majority of the private toilets were also shared by more than three households (83.3%). The study recorded High levels of indiscriminate disposal of human excreta on open dump sites and bushes as well as the practice of open defecation. Due to this, high levels of water related diseases; particularly diarrhea (34.7%) was common among children under five years. The study revealed various unsatisfactory personal, domestic and environmental hygiene practices as the major cause of diseases in the community. These findings could serve as a baseline data for the community and city authorities for planning and effective management of the water and sanitation sector in order to protect public health and good environment quality.

Keywords: Access to improved water, Basic Sanitation, safety, water related diseases

Background

The human development report by UNDP (2006) indicates that, exclusion from clean water and basic sanitation destroys more lives than any war or terrorist act. It also reinforces the deep inequalities in life chances that divide countries and people within countries on the basis of wealth, gender and other markers for deprivation. This unfortunate situation of water and sanitation deprivation, whether viewed from the perspective of human rights, social justice or economic common sense, inflicts a damage that is indefensible (UNDP, 2006). The failure to provide safe drinking water and adequate sanitation services to all people is perhaps the greatest development failure of the 20th century. The most dangerous consequence of this failure is the high rate of mortality among young children from preventable water-related diseases (Gleick, 2002; Bartlett, 2003). The result is not surprising and yet it is shocking: millions of children die each year from these preventable diseases (UNICEF, 2008). While the international community mobilized to an impressive degree in preparing to respond to the potential threats of which the avian flu epidemic was one, it has turned a blind eye to an actual epidemic that afflicts hundreds of millions of people every day – inadequate water supply and sanitation (UNDP, 2006).

This failure in provide equal access to improved water and sanitation according to Bartram *et al*., (2005) thwarts progress towards achieving many of the Millennium Development Goals (MDGs) particularly relating to health and poverty, especially in Africa and Asia. The root of this unrelenting catastrophy lies in these two plain facts: four of every ten people in the world do not have access to even a simple pit latrine; and nearly two in ten have no source of safe drinking water (Bartram *et al.*, 2005). Safe water and adequate sanitation are basic to the health of every person on the planet, yet many people throughout the world do not have access to these fundamental needs. An important step towards resolving this global crisis is to understand its magnitude: how many people lack access to drinking-water and sanitation (WHO and UNICEF, 2006). The Millennium Development Goal (MDG) seven calls on countries to-halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation (WHO, 2008; Mara *et al*., 2007). According to the WHO/UNICEF Joint Monitoring Programmes for Water Supply and Sanitation (JMP), (2008), 2.5 billion people still remain without improved sanitation facilities and around 900 million people still rely on unimproved drinking-water supplies. Although these improvements are achievable, sanitation and drinking-water are not given high enough priorities by several donors and recipient governments alike (WHO, 2008). Population forecast suggests that, an additional 784 million people worldwide will need to gain access to improved drinking water sources for the MDG target to be met (WHO, 2008). From 1990 to 2006, approximately 1.56 billion people gained access to improved

drinking-water sources. Currently 87% of the world uses drinking-water from improved sources, as compared to 77% in1990. While the world is on track to meet the MDG drinking-water supply target by 2015 at the global level, many countries in sub-Saharan Africa and in Oceania are currently projected to miss MDG for the country targets, leaving significant portions of the population without access to improved drinking-water supplies (WHO, 2008). Improved drinking water coverage in sub-Saharan Africa is still considerably lower than in other regions. Nevertheless, it has increased from 49 percent in 1990 to 58 per cent in 2006, which means that an additional 207 million Africans are now using safe drinking water (WHO, 2008).

Accelerated progress is therefore needed especially, in Sub-Sahara Africa which is home to more than a third of those using unimproved drinking water sources for the MDG target to be met (WHO, 2008). Meeting the MDG sanitation target in Africa requires at least a quadrupling in the average number of people served over the past 16 years (WHO, 2008). In the nine years from 2006 to 2015 just over 400 million African people need to gain access to improved sanitation - more than the 354 million people in Africa that had access by 2006. Over the period 1990 – 2006, 146 million people in Africa gained access to sanitation. However the number of people without sanitation increased by 159 million, from 430 million in 1990 to 589 million people in 2006 and this was due largely to population growth and urbanization (WHO, 2008). Mid and low-income countries are experiencing the most unprecedented growth rates in their urban populations (Nwaka, 2008; Karn and Harada, 2002 and Songsore, 1999), arising from high natural births and rural-urban migration, causing overcrowding in cities (Bogrebon, 1997) without the corresponding capacity and resources to expand public provision of basic services such as water supply and sanitation (Redlinger*et al*., 2001; Keraita*et al*., 2003; Nordic African Institute, 2008; Totsuka *et al*., 2004) and this, has led to tens of millions of households in informal settlements in Africa and Asia having access to only overused and poorly maintained sanitation facilities (WHO and UN-Habitat, 2005) which, seriously compromises health (Andreasen, 1996; McMichael, 2000; Nyarko*et al*., 2004). Most urban poor households in low and mid-income countries depend on public toilets and latrines. There are also many urban families in large cities in Ghana (Accra-Tema, Kumasi, Takoradi and Tamale) that still do not have access to even these public facilities. Government statistics understate the severity of this problem. The reported presence of a latrine within premises does not connote access and use. Also the definition of access for those living within a distance of a public toilet is also misleading as the observed practice of wrap-and-throw or flying-toilet in Accra (Ghana) that is, defecation in some waste material (such as waste paper or a plastic bag) is widespread so also is open defecation which is a serious environmental health problem (Bogrebon, 1997; WHO and UN-Habitat, 2005).

Solid waste collection in many African cities leaves much to be desired (Redlinger*et al*., 2001). Lack of transport infrastructure coupled with poor collection of solid waste has led to this undesirable situation (Devas and Korboe, 2000; Amuzu and Leitmann, 1994). Only 10 to 30% of all urban households solid wastes are collected and services are inevitably most deficient for informal settlements (WHO and UN-Habitat, 2005; Redlinger*et al*., 2001). Households that lack these waste collections eventually tend to either dump their garbage on open plots, in low-lying areas, public spaces and rivers, or simply burn it in their backyards. Uncollected waste may also accumulate on streets, thus clogging the storm-water drainage system (Keraita*et al*., 2003). The sanitation and water supply situation is no different in Ghana (Keraita*et al*., 2003) - a country with a population of 24.5 million of which 49% reside in the urban settlements, improved sanitation coverage for the urban settlements stands at 15% and that for the rural settlements stands at 6%. Sixty nine percent of the urban population uses shared sanitation facilities, 8% uses unimproved sanitation facilities while the remaining 8% uses open defecation as their sanitation outlets. Thirty four percent of the rural population uses shared sanitation facility, 28% uses unimproved sanitation facility and 32% patronizes open defecation. The overall country data for sanitation stands at 10% for improved sanitation, 51% for shared sanitation facilities 19% for unimproved and 20% for open defecation (WHO and UNICEF, 2008). In terms of drinking–water, 90% of the urban settlement and 71% for the rural settlements are covered. In the urban settlements, 37% uses water source that is piped into their dwelling, 53% uses other improved source, and 10% uses unimproved water sources. In rural settlements, 4% of the population use water source that is piped into their dwelling, 67% uses other improved sources, and 29% uses unimproved sources. The overall country data stands at 80% improved, with 20% being piped water source into dwellings, 60% being other improved sources and 20% being unimproved sources (WHO and UNICEF, 2008). Less than 40% of the Ghanaian urban residents are served by a solid waste collection service and less than 30% by an acceptable household toilet facility (WHO, 2007). The urban poor in slums and squatter settlements are generally those who suffer most from the lack of infrastructure and collection services (Altaf, 1994; Karn and Harada, 2002) thus concentrating people and their waste in unfriendly environments (Crook and Ayee, 2006). These areas are often totally neglected by the authorities due to their illegal status (Redlinger*et al*, 2001). There is a growing incidence of slum development in Ghana (Ghanadistricts, 2006) characterized by

unplanned settlements where municipal authorities are unable to accompany the development with adequate services in the form of piped water supply, sewerage, drainage and collection of garbage (Tsiagbey*et al*., 2005). In 2001, the number of people living in slums in Ghanaian cities was estimated to be 4,993,000 and growing at a rate of 1.8% per annum. The slum areas are very pronounced in Accra, Sekondi-Takoradi, Tema, Tamale and Kumasi (Ghana districts, 2006).

Objectives

The main objective of the study is to analyse household access to safe and improved water and basic sanitation in the Wa municipality. Specifically, the study seeks to achieve the following objectives;

- Determine the number of households with access to improved drinking water
- Assess the number of households with access to improved toilet facilities
- Assess the number of households that uses unimproved toilet
- To establish the average distance covered to fetch water by households without indoor access to outline all the identifiable sanitation challenges and problems of the community.
- To quantify the number of households with adequate hygiene practices (washing of hands with soap after visiting the toilet, washing of hands prior to eating and food preparation, covering of drinking water containers and food).
- To quantify the number of households with access to municipal waste collection and disposal system and those that dispose off their solid waste at dump sites, streets, gutters and open places.

LITERATURE REVIEW

Water supply, sanitation and hygiene

Water supply and sanitation occasionally joined by hygiene are words that often appear together in speeches and pronouncements and indeed this trio belong together as the cornerstone of public health as well as social and economic well-being (Prüss*et al*., 2002; Thompson and Cairncross, 2002 and Forget, G. and Sanchez-Bain, 1999). The water and sanitation sector faces an enormous challenge to achieve the international development targets set by the United Nations (Vass, 2003). Improved water supply and sanitation is widely considered as the most important medical advance of the last 150 years (UNICEF, 2008). They are fundamental to what people can do and what they can become. They also serve as conditions for attaining wider human development goals (UNDP, 2006). Sanitation refers to the principles and practices relating to the collection, removal or disposal and treatment of human excreta, refuse, household wastewater, drainage of storm water and treatment of industrial effluent as they impact upon people and the environment (Langergraber*et al*., 2008).

An improved sanitation facility–(Flush or pour–flush to: -piped sewer system, septic tank, and pit latrine), Ventilated improved pit latrine, Pit latrine with slab, Composting toilet) – is defined as one that hygienically separates human excreta from human contact (WHO/UNICEF, 2008). Unimproved sanitation facilities include flush or pour-flush toelsewhere, pit latrine without slab or open pit, bucket, hanging toilet or hanging latrine and no facilities or bush or field defecation (WHO/UNICEF, 2008). Improved water source includes Piped water – (into dwelling, plot or yard), public tap/standpipe, tube well/borehole, protected dug well, protected spring and rainwater collection. Unimproved water sources include unprotected dug well, unprotected spring, Cart with small tank/drum , bottled water, a tanker-truck and surface water (river, dam, lake, pond, stream, canal and irrigation channels) (WHO/UNICEF, 2006). Sanitation, access to drinking water and better hygiene will accelerate progress toward two MDG goals: ―Reduce under five child mortality rate by 2/3 between 1990 and 2015 and by 2015 halve the proportion of people without sustainable access to safe drinking water and basic sanitation (World Bank, 2003). The United Nations Millennium Declaration (September 2000) confirmed the central role of water and sanitation in sustainable development and the major contribution expanded access to safe drinking water and adequate sanitation can make to poverty alleviation, hunger, gender equality, education, environmental sustainability and health (Nordic African Institute, 2008).

Need for Improved Water Supply and Sanitation

There is the need for improved water supply; hygiene and sanitation in that, on the average, human beings produce 1150 g of urine and 200 g of fasces per day. Thus, globally, about 500 million kg per day of human fasces are generated in urban areas and about 600 million kg in rural areas, producing a total of over one million tons per day. Most of this biodegradableorganic material is disposed of with very little or no treatment, thereby polluting the environment with organisms that are highly dangerous to human health. Pathogens enter the human body via contaminated drinking-water and contaminated food, via hands contaminated with faecal matter, and, in the case of some helminthic worm infections, directly through the skin. Ingestion of faecal pathogens can cause

diarrhoeal disease, cholera, intestinal worm infections and typhoid fever. Urinating into bodies of water perpetuates urinary schistosomiasis (Warner, 1998). The most effective way to break these cycles of disease is by improving sanitation coverage. This according to Billig *et al*., (1999) occurs through a variety of mechanisms. Of primary importance is the safe disposal of human faeces, thereby reducing the pathogen load in the ambient environment. Another is increasing the quantity of water which allows for better hygiene practices. Raising the quality of drinking water reduces the ingestion of pathogens, treating wastewaters discharged by sewer systems, and educating the populations at risk.

Effects of Inadequate Water Supply and Poor Sanitation

The effects of inadequate water supply and sanitation cannot be ignored. The economic, social, cultural, gender, health, environmental and income effects retard to a greater extent the full realization of human development of the affected persons (Kov*et al*., 2008). Diseases related to unsafe water, poor sanitation, and lack of hygiene are some of the most common causes of illness and death among the poor of developing countries (Bartram *et al*., 2005**).** These diseases fill half the hospital beds in developing countries (UNDP, 2006). Amongst the diseases related to unsafe water and sanitation are diarrhea, intestinal helminthes, guinea worm, skin diseases, cholera, trachoma and typhoid (Billig*et al*., 1999). Diarrhoea related diseases are the third leading cause of death from infectious diseases (WHO, 2008), a leading cause of Childs death (Boerma*et al*., 1991) and a major child health problem in developing countries (Genser*et al*., 2008). It is transmitted by ingesting contaminated food or drink, by direct person-to-person contact, or from contaminated hands (Ejemot*et al*., 2008). Diarrhoea is the passage of three or more loose or liquid stools per day, or more frequently than is normal for the individual (Bairagi*et al*., 1987 and Mertens*et al*., 1992). It is usually a symptom of gastrointestinal infection, which can be caused by a variety of bacterial, viral and parasitic organisms through the fecal-oral transmission (Keusch*et al*., 2006). Each year, estimated 4 billion people contract diarrhoeal diseases (Collins, 2008). Some two (2) million children die as a result of diarrhoea (Luby*et al*., 2004; Kosek*et al*., 2003). And these diseases account for 62.5 million Delayed Adjusted Life Years (World Bank, 2003). Diarrhoeal diseases are extremely common, killing about 1·8 million people a year. Eighty eight percent of this number dies because of poor access to water, hygiene and sanitation (Amokrane*et al*., 2007 and Woldemicael, 2001). Chronic diarrhoea can also result in child malnutrition, making them susceptible to other diseases and resulting in 860,000 deaths per year. Some 94% of diarrhoea casesaccording to Collins, (2008) are preventable through improved sanitation and water supply which according to Fewtrell*et al*. (2007) result in the isolation and or destruction of pathogenic material and, hence, a break in the transmission pathway.

Malaria

Malaria is a disease which can be transmitted to people of all ages (WHO, 2009). It is caused by parasites of the species *Plasmodium* that are spread from person to person through the bites of infected mosquitoes (Fewtrell*et al*., 2007). There are 300 million clinical cases (Collins, 2008) and 1 million deaths from, malaria recorded per year and this is as a result of poor sanitation and water supply (Dodson, 2003). In Africa and Latin America, malaria is often associated with poorly drained locations where the mosquitoes breed in clear standing water (WHO and UN-Habitat, 2005). Approximately, 40% of the world‘s population, mostly those living in the world‘s poorest countries, are at risk of malaria. Most cases and deaths are in sub-Saharan Africa. However, Asia, Latin America, the Middle East and parts of Europe are also affected (WHO, 2009). Three billion people, according to the World Health Organization (2009) are at risk of infection in 109 malarious countries and territories. A report by the World Health Organization (2009) on malaria indicates that, pregnant women are at high risk of this disease. Non-immune pregnant women risk both acute and severe clinical disease, resulting in up to 60% fetal loss and over 10% maternal deaths, including 50% mortality for severe disease. Semi-immune pregnant women with malaria infection risk severe anaemia and impaired fetal growth, even if they show no signs of acute clinical disease. An estimated 10 000 of these women and 200 000 of their infants die annually as a result of malaria infection during pregnancy. The socioeconomic impact of malaria includes an average loss of 1.3% annual economic growth in countries with intense transmission. When compounded over the years, this loss has lead to substantial differences in gross domestic product (GDP) between countries with and without malaria. Malaria traps families and communities in a downward spiral of poverty. Malaria‘s direct costs include a combination of personal and public expenditures on both prevention and treatment of disease. In some countries with a very heavy malaria burden, the disease may account for as much as 40% of public health expenditure, 30-50% of inpatient admissions and up to 60% of outpatient visits. Malaria has lifelong effects through increased poverty, impaired learning and decreases attendance in schools and the workplace (WHO, 2009)infants to the elderly, leading to decades of repeat infection. Victims liken the infection to having thorns in their eyes. For millions of people trachoma is a sure way to poverty (UNDP, 2006). As the disease progresses towards blindness, people lose their ability to work and depend on care from family members. Children are most

heavily infected and women are more vulnerable than men, with infection rates some three times higher, largely because they look after children (UNDP, 2006)

Effects on Children

Water and sanitation deficits threaten all children (UNDP, 2006). Sanitation and hygiene are essential to child survival, development and growth. Each day some 6,000 children in developing and emerging countries die from lack of clean water supply and sanitation. Approximately 84 percent of the global burden of diarrhoeal disease affects children under five. In the case of Africa, the water and sanitation-related health burden for children under five is up to 240 times higher than it is in high-income countries (Nordic African Institute, 2008). An estimated 50% of cases of underweight or malnutrition in children are associated with repeated diarrhoea or intestinal nematode infections (Zarocostas, 2008). Illness in infancy can be associated with disadvantages that stretch from cradle to grave, including both cognitive and physical infirmities. Repeat bouts of diarrhoea before age one contributes to vitamin deficiency and malnutrition. Children who suffer constant water-related illness carry the disadvantage into school. These disadvantages include absenteeism, attention deficits and early dropout. (UNDP, 2006). According to the human development report (2006), children who suffer repeated bouts of infectious disease and diarrhoea are likely to reach adolescence and adulthood with reduced height. Premature mortality may be the most disturbing product of the water and sanitation deficit. Clean water and sanitation are among the most powerful preventative medicines for reducing child mortality (UNDP, 2006).Unclean water and lack of sanitation are directly implicated in the huge gulf in life chances at birth that separate children born in rich countries from children born in poor countries (UNDP, 2006). Of the 60 million deaths in the world in 2004, 10.6 million—nearly 20%—were children under the age of five. These fatalities accounted for a third of deaths in developing regions such as Sub-Saharan Africa and South Asia but for less than 1% in rich countries. Sickness episodes relating to water supply and sanitation represent the second largest cause of childhood death after acute respiratory tract infection. They claim the lives of 1.8 million children under the age of five each year (UNDP, 2006)

Effects on Girls Child and Education

For young girls the lack of basic water and sanitation services translates into lost opportunities for education and associated opportunities for empowerment. Young girls shoulder a disproportionate share of the costs borne by the household (UNDP, 2006). Although there are many different reasons for school drop-out among school girls, the lack of toilet facility at school is potentially one of the reasons (Eshelby, 2007). The impact tends to be more sensitive for secondary school students as the drop-out rate is higher than that of the primary school students. This can be explained by the fact that when the girls are getting older (puberty age), more privacy for toilet going is needed (Kov*et al*., 2008). The time and burden of collecting and carrying water is one explanation for the very large gender gaps in school attendance in many countries (Eshelby, 2007). For millions of poor households, there is a straight trade-off between time spent in school and time spent. The provision of safe water and sanitation facilities is a first step towards aphysical learning environment, benefiting both learning and health of children (UNICEF, 2008). Water-related diseases cost 443 million school days each year—equivalent to an entire school year for all seven-year-old children in Ethiopia. More than 150 million school-age children are severely affected by the main intestinal helminthes such as roundworm, whipworm and hookworm. Children with infections are twice as likely to be absent from school as those without. Even when infected children attend school, they perform less well: tests point to adverse effects on memory, problem- solving skills and attention spans (UNDP, 2006).

Effects on Women and the Environment

Time spent collecting water is substantial and is mostly a household chore borne by women (Okun, 1988). In most societies, women have primary responsibility for management household sanitation and health.Time spent collecting water reinforces time-poverty, disempowers women, lowers income (UNDP, 2006) and affect the socioeconomic and health conditions in many ways (Ghebremedhin, 1999).In areas where a large proportion of the population is not served with adequate water and sanitation, sewage flows directly into streams, rivers, lakes and wetlands, affecting coastal and marine ecosystems and fouling the environment (United Nations, 2003). Improved sanitation reduces environmental burdens, increases sustainability of environmental resources and allows for a healthier, more secure future for children (United Nations, 2003).Boli as a community is no exceptional, its has her share of this challenge.

Poor Sanitation and Poverty

The Millennium Development Goal 1 – eradicate extreme poverty and hunger – cannot be achieved if clean and adequate water supply and improved sanitation are ignored. Inadequate water supplies are both a cause and an

effect of poverty and their effects exacerbate the poverty trap (Sullivan *et al*., 2003). Poverty compounds the issue of water scarcity in many regions of the world causing a vicious cycle (Amokrane*et al*., 2007). Today, many of the 10 million childhood deaths each year are caused by diseases of poverty—diarrhea and pneumonia (Burström *et al*., 2005). In urban centres, the poor spend more on substandard housing (Marmot, 2002) and face health hazards due to lack of safe drinking water, sanitation, and exposure to industrial and air pollution. The combined effect of these factors is reduced lifespan; loss of income due to work days lost because of illnesses, and increased expenses on health care. The poor continue to remain in the poverty trap (Seeta, 2004; Amokrane*et al*., 2007).

Interventions to help meet the MDG target on sanitation and water supply.

In order to reach the MDG's and achieve sustainability in the field of wastewater management and sanitation (Langergraber et al., 2008), a new paradigm is clearly needed (SANDEC\ WSSCC, 2000 a). **Hygiene Promotion is recommended.** Hygiene refers to practices ensuring good health and cleanliness. Hygiene ranges from personal hygiene, through domestic up to occupational hygiene and public health. Today it is widely acknowledged that the provision of sanitation facilities and water supply is not enough to bring down morbidity and mortality rates (Lagardere, 2007). Hygiene education means helping individuals, families and communities to become aware of the link between poor hygiene behaviors and diseases. A good hygiene education programme provides information and understanding about those behavioral changes which bring the greatest health benefits, and proposes gradual improvements both in practice and hygiene facilities (WHO, 2008). The WHO (2004) defined the three key behaviors in hygiene - which can reduce diarrhoeal cases by up to 47% (Luby*et al*., 2004) - as follows: hand washing after defecation, the use and maintenance of latrines and keeping drinking water free from faecal contamination. These behaviors are indicated as having the greatest impact on people's health.

METHODOLOGY

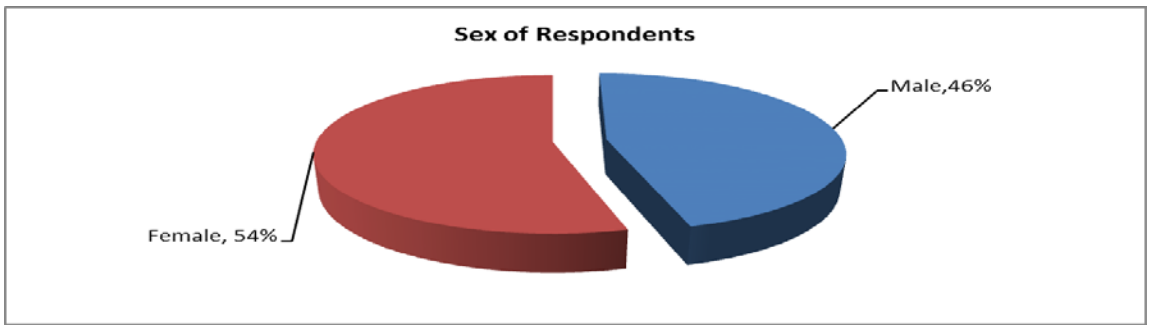
The Study uses a case study approach in its design. Global studies on water, sanitation and hygiene crisis uses household study to assess drinking-water, sanitation and hygiene practices at the household level. Household studies make use of either quantitative and qualitative data to categorized water as improved or unimproved (WHO and UNICEF, 2006; Whittington *et al*., 1993; Lagardere, 2007). Quantitative studies allow simplifying the reality in order to identify causes and distribution of parameters of interest (Lagardere, 2007). Accent is placed on an observation of the reality throughout non intrusive methods (Gove and Pelto, 1994). Qualitative techniques of research include interviewing key informants, focus group discussion, health walks, different types of systematic data collection and analysis and the direct observation of behavior (Smith and Marrow, 1996). It also used **Transect walk,** the key words for an effective health walk are look, listen and learn (Almedon*et al*., 1997). **Key informant interviews** were also employed**.** Women may be ideal key informants to discuss children's defecation habits (Lagardere, 2007; Almedon*et al*., 1997**).** According to previous studies, a sampling ratio of 75% of the total number of households offers a good representation of the population and to a tolerable level of accuracy. With this ratio, 230 questionnaires were administered taking into consideration the total households of the study community (boli)

RESULTS AND DISCUSSION

Demographic Characteristics

In my study community.Boli, most of the heads were (80.1) age between 25-55 (91.5%). Literacy levels were high in the community and weredepended on weather. Or not people have had formal education primary education (43.8%) and secondary education (32%) were high among the habitants. non-formal education as well as Islamic education (13.3% was also popular. which was also high for this community.

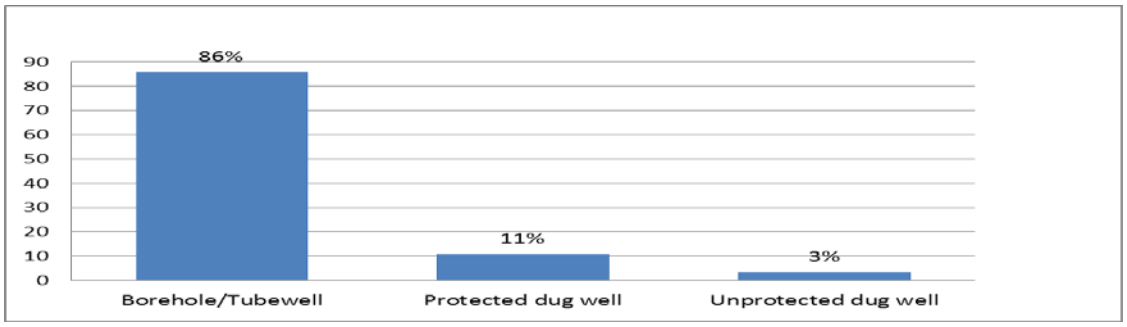
Figure 1: Gender Distribution of Respondents



Source: Field Survey, 2012.

A total number of two hundred and thirty respondents were interviewed during the data collection stage of this survey. Out of this number, fifty-four percent (125 respondents) were females whiles the remaining forty-six percent representing 105 participants were males. With respect to marital status, one hundred and sixteen respondents representing about 50 percent of total respondents were identified to be married. Twenty eight percent were identified to be single whiles the remaining twenty-one percent of the total respondents were identified to be widowed. The minimum and maximum age thresholds of respondents ranged between 20 years to 69 years. Predominantly the respondents ranged between the ages of twenty to forty-nine. Out of the two hundred and thirty respondents, sixty-three of them representing twenty-seven percent of respondents ranged between 40 to 49 years. Closely followed was 20 to 29 years making up twenty-four percent of total respondents. The least age group-60 to 69 made a respondent coverage of fourteen percent.

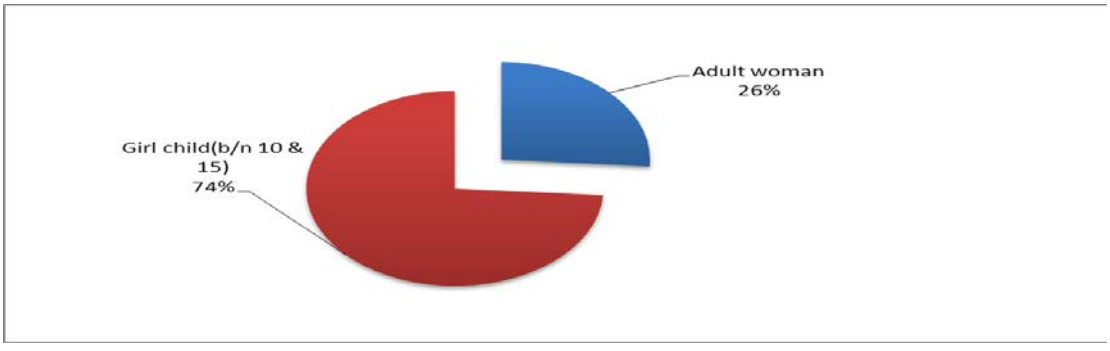
Figure 2: Source of drinking Water



Source: Field Survey, 2012.

Due to the rural nature of the study area, the predominant source of water for drinking and other household chores was identified to be borehole/tubewell water. The study revealed that eighty-six percent (197) of respondents have access to and use this source of water. Eleven percent of the total respondents also identified protected dug well whiles the remaining three-percent of respondents identified unprotected dug well as their main source of drinking water.

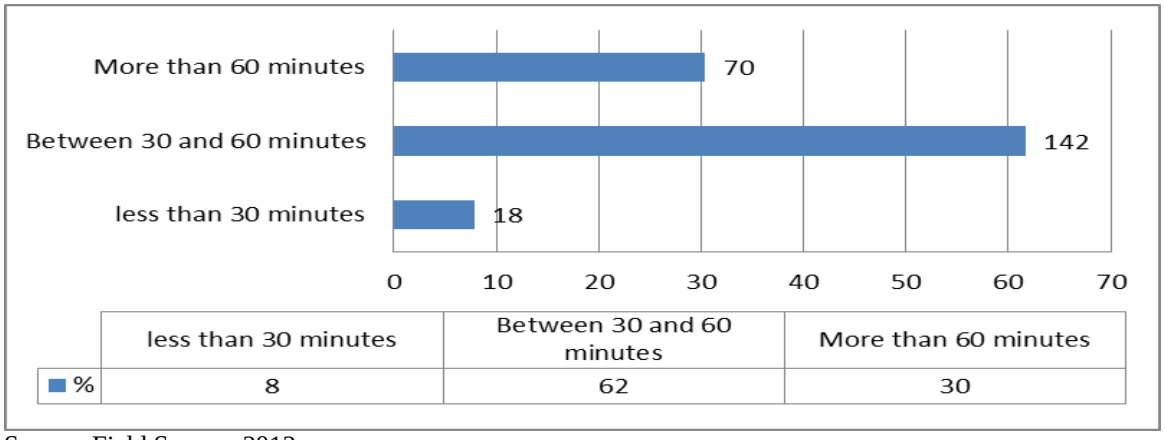
Figure 3: Responsibility of Water Fetching



Source: Field Survey, 2012.

The assertion that females are responsible for water fetching was firmed up based on the revelation of the study. According to seventy-four percent of respondents, girls between the ages of 10 and 15 are entrusted a core household duty of water fetching. Adult women were also identified by twenty-six percent of the respondents as also active participants in water fetching for households. This certainly re-affirms the social and cultural setting of a traditional northern community.

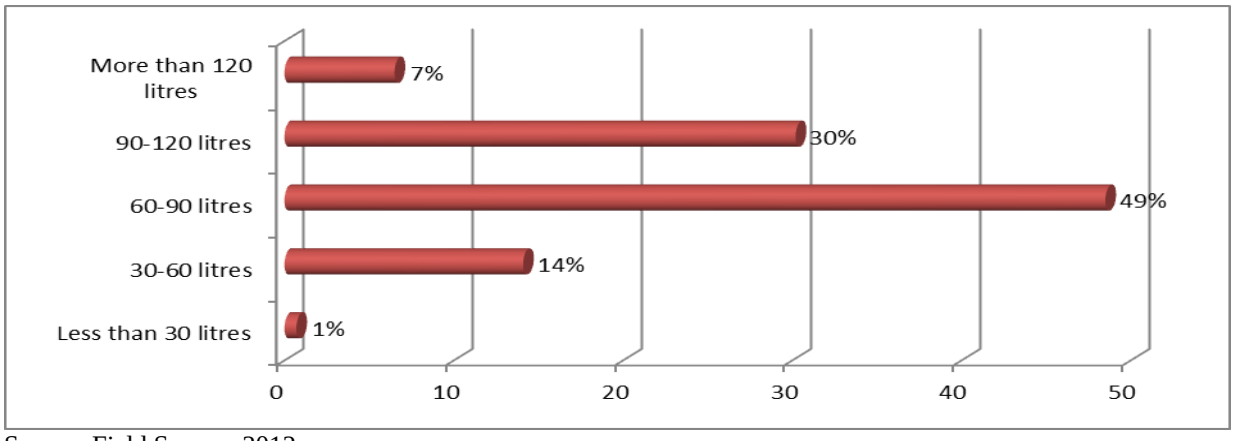
Figure 4: Approximate Duration to Access Water



Source: Field Survey, 2012.

Measuring the time duration household's use to access water was one of the interest areas in the study. According to the study thirty percent (70) of respondents access water by spending over sixty minutes. However, 142 respondents representing sixty-two percent of respondents said they spend between half an hour and one hour to access water. Only eight percent of respondents were privileged to access water within just thirty minutes. It is worth noting that majority of the respondents spend more time accessing water which might be accounted by the limited number of boreholes and it's spatial distribution in the study area.

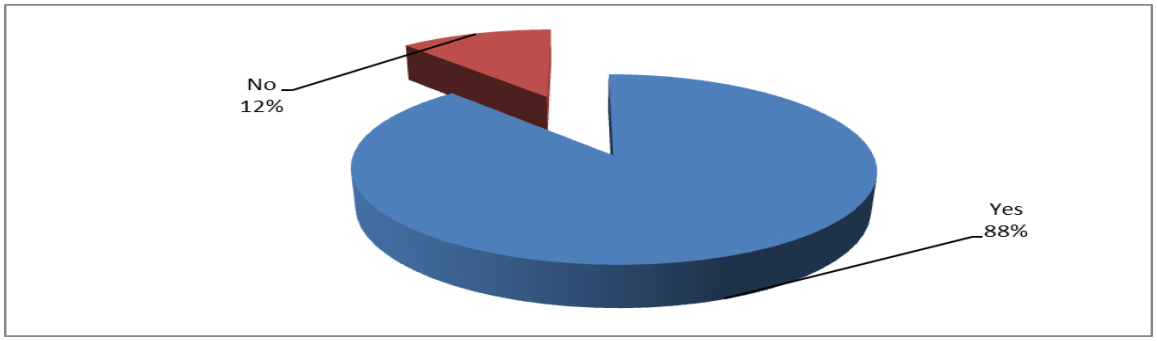
Figure 5: Quantity of water used daily



Source: Field Survey, 2012.

According to the study, only seven percent of community members have access to more than 120 liters of water for daily consumption. Again, one percent of respondents also said they have access to less than thirty liters for daily usage. However, forty-nine percent of total respondents, the study reveals, uses 60-90 liters of water per day whiles 30% and 14% uses 90 to 120 liters and 30 to 60 liters respectively. A more detailed analogy of the study area shows that more than 90% of community members use more than thirty liters of water on daily basis.

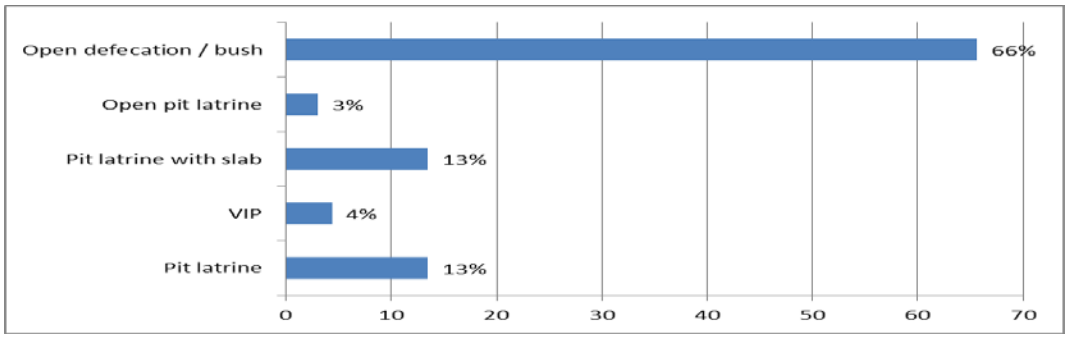
Figure 6: Water Treatment and how it's done



Source: Field Survey, 2012.

Water treatment is crucial in eliminating water borne diseases particularly in communities without treated water. The study revealed that two hundred and three respondents representing 88% of total respondents carry out water treatment for any form of water meant for household consumption. Impressively only twelve percent of respondents revealed that they don't carry out water treatment before usage; considering the rural nature of community.The response to the method or approach employed in the treatment of the water, an overwhelming eighty-seven percent identified boiling-which is a more traditional and cost effective way of water treatment. The remaining thirteen percent of respondents on the other hand resorted to the use of water filter.

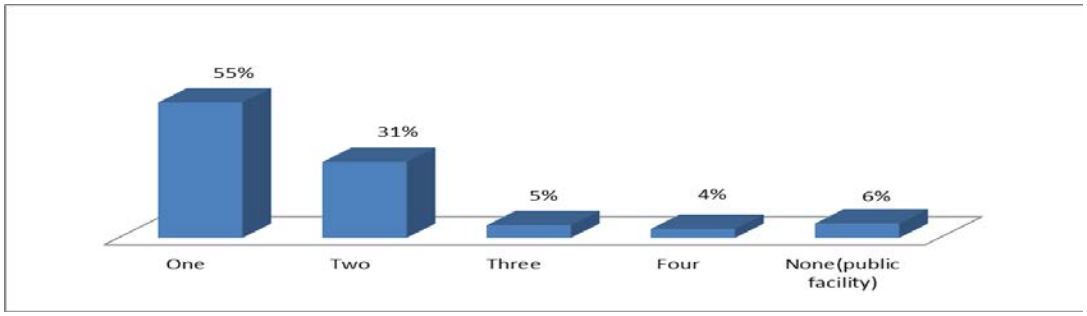
Figure 7: Toilet facilities used by households



Source: Field Survey, 2012.

Proper disposal of human excreta in every human settlement is crucial for ensuring the health of community members. According to the study various facilities were identified as places of convenience for respondents. Traditional pit latrines, open pit latrine and the modified pit latrine with slabs were identified by thirteen percent, three percent and thirteen of respondents respectively as facilities used by their households. Four percent of total respondents said they had access to VIP toilet facilities. Interestingly, an overwhelming sixty-six percent of respondents said they had open defecation. This is of great concern particularly to ensure effective public health and mitigate the likely spread of diseases.

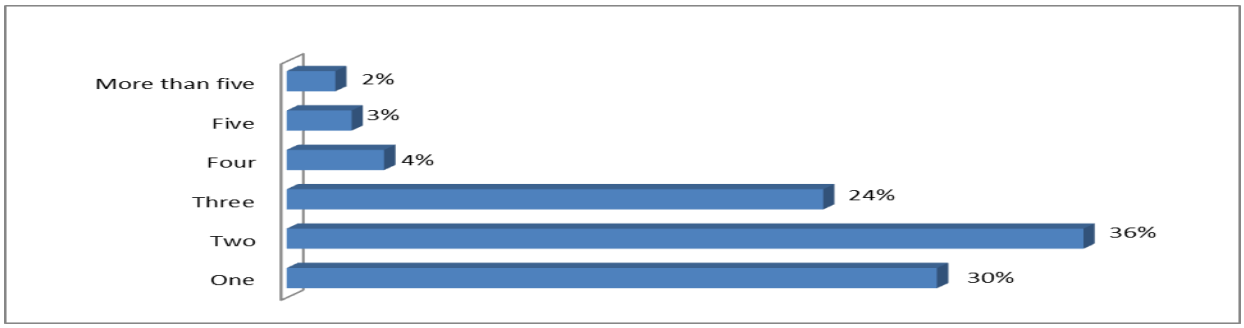
Figure 8: Number of Toilet facilities in House



Source: Field Survey, 2012.

The availability of toilets in every house is a pre-condition for promoting sanitation and hygiene. The study revealed that seventy-five interviewers representing fifty-five percent of respondents had just one toilet facility in a house which contains several households. Thirty-one percent, five percent and four percent of the total respondents had two, three and four toilets respectively. This simply implies more respondents have access to less toilet facilities. Six percent also identified the public toilet as their only option to a place of convenience.

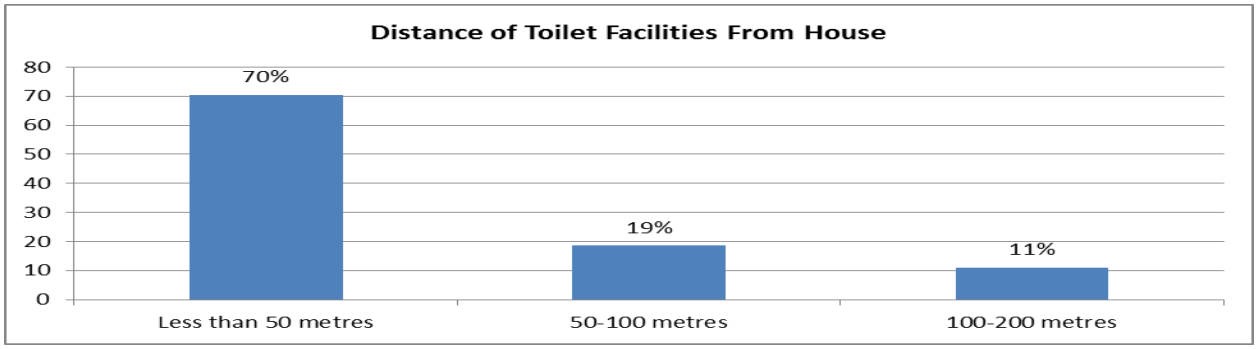
Figure 9: House hold use of Toilet facilities



Source: Field Survey, 2012.

An assessment of the number of toilet facilities each household has access to during the study also revealed that a combination of sixty-six percent of respondents have a ratio access of toilets between one and two. Twenty-four percent (33 respondents) said their households have access to three toilets. Two percent of respondents had access to more than five toilets. This analogy follows the pattern which demonstrates that high number of respondents has less access to toilet facilities and least number of respondents has access to more toilet facilities within the household level.

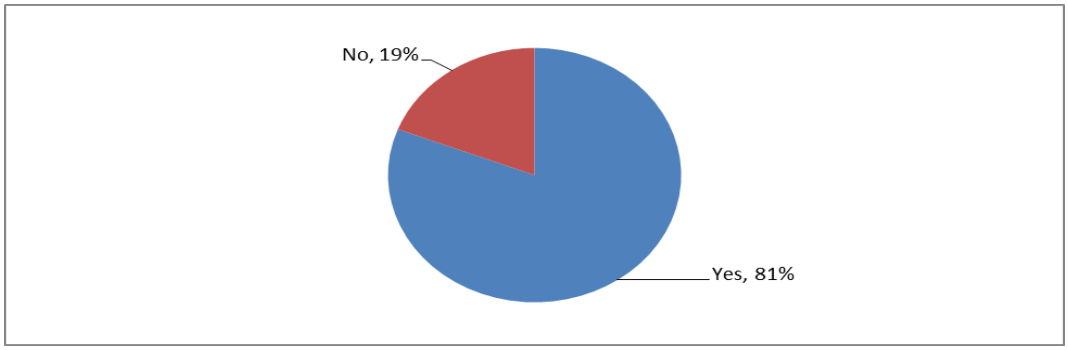
Figure 10: Distance of toilet from Household



Source: Field Survey, 2012.

According to the study, seventy percent of respondents revealed that they access toilets within fifty meters. Nineteen percent accessed toilets between fifty to one hundred meters while eleven percent access toilets within a distance of one hundred meters to two hundred meters. Though the study revealed that community members have less distance to access toilet facilities, it also brought to fore that most community members resort to “free range” or open defecation. One other fact accounting for this situation might be the limited availability of structured places of convenience in the community.

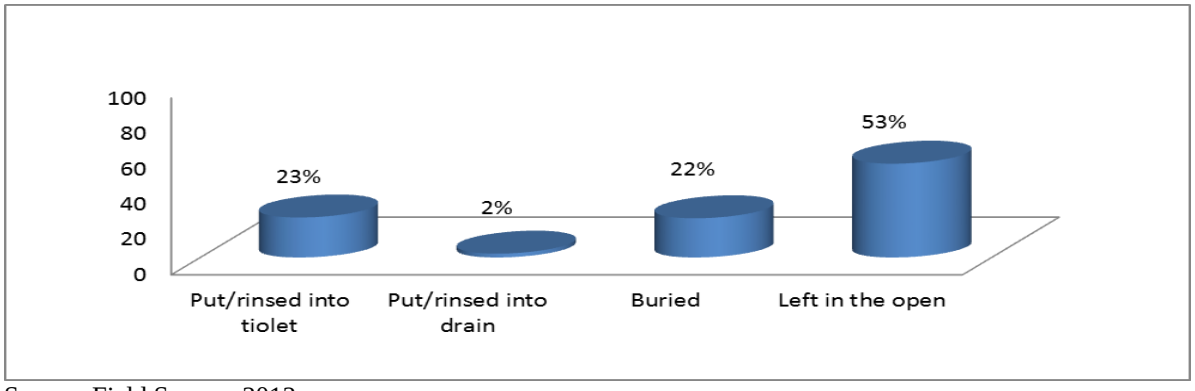
Figure 11: Do you wish to own your toilet and How?



Source: Field Survey, 2012.

Possession of one's own toilet facility is most the ideal and adorable way of minimizing contraction of some infections. The study revealed the overwhelming desire of eight-one percent (186 respondents) to personal own places of convenience. Nineteen percent of these respondents thought otherwise. In a bid to know how participants would want to own their personal toilets, fifty-five percent of respondents said this could be possible if philanthropist provides support or initiate this desire. Thirty percent of these respondents on the other hand identified the government to be in pole position to support in community members establishing personal places of convenience. Household contribution was identified by fifteen percent of respondents.

Figure 12: Disposal of children's stool



Source: Field Survey, 2012.

Household sanitation and hygiene has a direct impact on the health status of household members and on a large scale the entire community health status. The proper disposal of stool is crucial in minimizing the spread of infection and disease particularly cholera and diarrhea. According to the study fifty-three percent of respondents do not properly dispose stool which will certainly have serious ramifications on the health of community members. Per the graph a combination of forty-seven percent resorts to rinsing stool into toilet and drain as well as burying. These disposal approaches seems not to be the best option but rather better than the open disposal approach.

DISCUSSION

Household demographics

The high percentage of males as household heads in the predominantly Muslim community might be due to the practice of the Muslim faith, which does not allow women to head households in the presence of an adult male. Also, women tend to have lower status or less powerful, translating into the reinforced dominant beliefs about status and competency which always favors men. In this community, men are always expected to be responsible for protecting and sheltering women. These findings were found to be in agreement with those made by Ridgeway and Smith-Lovin (1999), Lewis (1993) and Salamone (2007). Other factors were migration to urban centers, which has been found to reduce the number of males in households in this locality because of search for better employment opportunities (Ngorima, 2008). However this was found to be non-existent as the study community which rather served as suitable center for migrants from Northern Ghana and largely due to the fact that the community is the origin of Islam. The high percentage of Muslim in the community is as a result of resettlement of the residents mostly from northern part of the country. The age distribution of most household

heads was found to be between 25 and 55 years. This indicates that the population within this community is young and thus falls within the economically active group (GEMA, 2006). The Government of Ghana/Ministry of Local Government and Rural Development, (1996) classify this area as low income urban settlements. This is particularly true as the research found most household heads to be earning low incomes - between 100 GH¢ to 200 GH¢. These low income levels are mostly associated with the household heads that are employed in the informal sector, due to their inability to pursue higher education. According to the International Labour Organization (2004), the informal sector employees seldom attract substantial income to cater for these apartments that serve as dwelling places for large households – mostly in Muslim dominated households. Most of the houses which contain these single room apartments are in poor conditions, often lacking private toilets, drainage systems, good water supply and better waste disposal options.

Household water supply

The high percentage of households using pipe borehole, dug well in this community might be due to the fairly extensive water supply network provided by the Boli- Oyarifa -Teiman Water and Sanitation Development Board CWSA (2000). We found extensive borehole supply throughout the community putting them in a good position to access water. Compared to that of the municipality's (82.5%) and national (80.1%) pipe borne water coverage, Boli had no coverage though most households surveyed use pipe borne water, the ratio of private tap connections at the household can be found in Boli. This might be due to the low income levels of most of the households surveyed which practically makes it a less favored alternative. Connecting private pipe water by low income earning households according to earlier studies will lead to reduced spending on other essential goods, such as food (Lloyd and Bartram, 1991; Cairncross and Kinnear, 1992; Howard, 2002). Another reason for the low private connections might be due to the poor spatial layout, which might be causing neglect by authorities to provide such services. The spaces required for these extensions have been heavily built upon by dwellers. Other water sources outlined by previous studies (Whittington *et al*., 1991; Gelina s*et al*., 1996; Rahman *et al*., 1997 and Tatietse and Rodriguez, 2001), which include, protected springs and rivers, were non-existent in this community. Alternative water sources however observed in the communities include, pipe water purchased from neighbouring homes and well water. Reasons for households purchasing water from unprotected well include the discontinued provision of public stand pipes in the community by Water and Sanitation Development Board. Of the households that uses well water, high percentage (69.2%) draw water from unprotected sources. This observation can be explained in part by the free access or the relatively cheap prices paid for drawing water from this water source, compared to pipe borne water purchases.

Improved water and Distance covered to water sources

Improved water coverage of 94% (both pipe borne and improved well water sources) was recorded in the municipality's which is higher than the national coverages. Due to the on-plot (yard) and household connections (dwelling) to the municipal water supply network, almost half of the households need not walk more than 10 meters to the taps or on-plot well water source. Households that purchased water from neighboring homes and those that draw well water also need not walk more than half of a kilometer to access water. According to Esrey*et al*. (1985), significant health gains accrue by ensuring access to an improved water source within 1 kilometer of the user's house. Further significant health gains are accrued once water supply is delivered _on-plot' through taps (Howard and Bartram, 2003).

Responsibility of water fetching

The impact of inadequate water supply is mostly felt by women particularly girls due to the time spent collecting water. The responsibility rests almost entirely on women as men seldom engage themselves in household chores (Devas and Korboe, 2000 and Ngorima, 2008). Green and Baden (1995) cite numerous examples from World Bank documents about women's sole responsibility of providing, managing and safeguarding water for use by the family in most African societies. The present study also underpins the assertion that women were mainly responsible for almost all household chores particularly water fetching and waste management. Women's strategic interest in water is concentrated primarily in having access to convenient, reliable, and safe sources close to the homestead. These interests when achieved will result in a lot of time and energy saved to the water fetching (Green and Baden, 1995). The extensive water coverage – short distances (< 100 meters) between water sources and homesteads - within the community however might reduce the time and energy spent by women collecting water compared to those made elsewhere (Ngorima, 2008; Ghebremedhin, 1999).

Water use sufficiency

Factors such as poor reliability, cost and distance between a water source and the home may all lead households to depend on less safe sources and reduce the volume of water used for hygiene purposes. Due to the extensive water supply and the religious rites associated with Islam, where water is used exclusively as an agent of purification especially before prayer which an observant Muslim must offer five times daily (Keddie, 1990; Luby*et al*., 2004)), daily sufficiency of water for almost all households in the community is assured. Muslim households in Boliwere found to be using more water compared to non-Muslim households.

Water shortage and quality in the community

The inability of some water metered households to pay their water fees to the Water and Sanitation Development Board has resulted in their disconnection from the municipal water supply network. Also, technical problems in the supply network might have resulted in the water shortages recorded during the study. However, those households with well water sources had the least disruption in their water supply – this finding is in agreement to that made by Devas and Korboe (2000). Most households were assertive on receiving dirty pipe borne water soon after water scarcity periods. This pollution could have occurred during storage and transportation through the supply network (Shiffman*et al*., 1978; Totsuka et al., 2004). Whilst some studies have found other methods of disinfecting drinking water which includes solar disinfection (Conroy *et al*., 2001; Clasen*et al*., 2005), none of the households visited uses any scientific method of disinfection except 3.3% who reported treating their drinking water (mostly well water) by boiling. Considering the low level of drinking water treatment in the study community it comes as no surprise that diarrhoea incidence in children under five were very high (92.5%).

Incidence of diarrhea in children under five

Illness as reported in this study does not necessarily constitute clinically confirmed cases but were rather merely reported by respondents. Due to various social and public awareness reasons, few of the respondents might have, given vague or even exaggerated figures while reporting on morbidity which may have caused deviations from the real situation. Nevertheless, result obtained seems adequate enough to reveal the health conditions of this community. According to Curtis *et al*. (2000), some causes of diarrhoea may be due to errors of metabolism, chemical irritation or organic disturbances but majority are due to water and sanitation. The lack of treatment of drinking water by most households, the quality of water source and other factors which include quantity of water, availability of toilet facilities, housing conditions, level of education, economic status of households and general sanitary conditions (personal or domestic hygiene) surrounding homes might have contributed to the high incidence of diarrhoea in children under five years in the community (Timaeus and Lush, 1995). Incidence of diarrhoea in this age group was prioritized due mainly to their vulnerability, high levels of exposure and weakly developed immunity system. Significant relationships ($p = 0.041$) was established between diarrhoea and water source. Though higher incidence rates were recorded mainly in households that use well water, some considerable level of disease was also recorded in households that uses pipe borne water. This observation could be due partly to the possible contamination of the well water sources, majority of which are unprotected. Unwashed fingers might have served as transmission routes for the diarrhoea disease of water in storage as this practice was very prominent in most households of the community (Sur *et al*., 2004).

Though quantities of water used by households were enough for household chores and hygiene, high levels of diarrhoea was nevertheless recorded. Esrey*et al.* (1985; 1991) attempted to distinguish the importance of water quantity from water quality in a review of 67 studies in 28 countries and concluded that improvements in water availability were probably more important than in water quality. According to Cairncross and Valdmanis (2004), the fact that some diarrhoeal diseases are still prevalent in communities with a high level of water supply service indicates that water supply alone cannot completely prevent them. This is particularly true for the present study as quantities of water used by households were sufficient. When water is freely available at close range, hand-washing becomes more frequent (Curtis *et al*., 2000). Though high levels of hand washing after visiting the toilet, before eating and before visiting the mosque were recorded, hand washing before preparing food and hand washing with soap after visiting the toilet were poorly practiced. Many households food preparers do not wash their hand and as such might have served as additional sources for the high incidence of diarrhoea observed. As has been observed in other studies (Luby*et al*., 2004), the elderly in the Moslem home in the study community after defecation, rarely used toilet paper for anal cleansing, instead they routinely rinse their anus with water from a pitcher. Children under five years in the study community rarely washed their hands after contact with stools. This according to Luby*et al*. (2004) cannot help in interrupting the transfer of pathogens between their hands to the mouth. In many instances it is mothers or caretakers who undertake this activity of anal cleansing but most were found not washing their hands thereafter. Han *et al.* (1986) showed that hands readily became contaminated after defecation, even with the use of toilet paper. Wilson *et al.* (1991), Pinfold *et al.* (1996) and

Hoque*et al.* (1996) reported reductions in diarrhoea incidence through the promotion of hand washing. The low levels of soap use in hand washing after each visit to the toilet in the study community (10.9%) may be as a result of the low household incomes. According to Curtis *et al*. (2000), Huttly*et al.* (1994) and Kaltenthaler*et al.* (1991), it is not reasonable to expect hand-washing with soap on every conceivable occasion due to cost of soap which limits hand washing by the family in many settings. Boot and Cairncross (1993) suggest that the agent of hand washing may be less important than the time spent cleaning hands, as some effort is required to remove adhered particles. Kaltenthaler*et al.* (1991) also reports that hand washing with soap is an intervention that appears to be both highly effective, reducing diarrhoea incidence by 27%. Significant association was therefore established between diarrhoea and washing of hands with soap after visiting the toilet ($p = 0.001$). That is, households that did not use soap in washing their hands after toilet visits were much more susceptible to diarrhoea attacks.

An intervention study by Khan (1982), Han and Hlaing (1989) and Shahid*et al.* (1996), reduced the incidence of diarrhoeas through hand-washing with soap after defecation and before ingesting food .The epidemiological links between diarrhoea and regular consumption of prepared food from street vendors have been amply demonstrated in the literature. Factors such as poor sanitation around vended foods, cooking and handling of such foods at ambient temperature for prolonged hours and handling of the food with dirty hands make the food from vendors dangerous and a health risk to consumers (Kanton, 2007). Food vending as seen from the results is a thriving business within the study community. The unhygienic conditions surrounding the preparation and vending may also contribute to the high levels of diarrhoea incidence in both children – especially school children where they have to buy vended food on their way to school due to the inability of their mothers to cook for them before school hours. Though no records of association between food intake and diarrhoea was taken to ascertain this fact, studies by Esrey and Feachem (1989) reported the presence of fecal indicator bacteria in food – another possible explanation of the high incidence of diarrhoea in children less than five years in the study community.

Waste water disposal and incidence of Malaria

According to Keraita*et al*. (2003), about 90% of urban wastewater in developing countries remains uncollected. This is particularly true for the community as all types of domestic waste water from most households run past in the few poorly maintained open gutters and streets before being finally discharged either into surface roadside drains. From the study, it was observed that the way-side food vendors have turned the few badly maintained gutters along major streets into dumping sites for food residues. Some mothers within households also mix household refuse with waste water and throw these into nearby gutters thus clogging them in the process. The stagnant pools of wastewater, together with overgrown weeds and improper disposal of empty cans and jars create suitable sites for mosquito breeding (Salvato, 1992). Poor housing conditions which includes defective windows creates entry ways for mosquitoes and this also in part may be contributing to the high levels of the disease. Considering the income status of most households, daily preventive methods for malaria – the use of insecticide mosquito treated bed nets and prophylactics – might be in minimal use, putting the household members at greatest risk of contracting the malaria disease. It is therefore not surprising that high levels of the malaria diseases were recorded in the community.

Household and community sanitation

The absence of bucket/pan latrine in Boli is due to the phasing out of this latrine option by city authorities. According to Keraita*et al*. (2003) this is to prevent the emptying of fecal matter by private, unlicensed night-soil carriers, from dumping the contents into drains, streams and nearby bushes. Almost 60% of the households in the community are without an on-plot toilet and as such, public toilets and open defecation are the only alternatives they had. Within the community, there are three (2) public toilets, each with about four (4) squat-holes, to serve 1,080 inhabitants (i.e. about 90 people per squat-hole). According to some key informants the ever-increasing patronage of the public toilets is due to the sole use of some on-plot toilet facilities by landlords and their households. It takes an average of 1 year for each toilet pit in Bolito fill, dependent on pit volume and the number of people using it. This varies between 10 years or more in high income areas to 3 months in low income areas (International Water and Sanitation Center, 2006). Thus, considering the low income status of this community and the high household numbers and sizes, the fill-up rate of most of the on-plot pit latrine is rapid. The affected households are left with no space to construct new latrines making public toilets an inevitable option.

Open defecation

Though, none of the households visited in the community reported using the open defecation option, the practice was nonetheless observed along the major drainage systems. A fraction of the about 80% households without private toilets could be those who indulge in the open defecation practices in gutters, on dumpsites and open spaces. Increases in fees paid per use of the public toilets - currently fees for public toilets are being charged at 50 GH pesewas for adults and 40 GH pesewas for children. According to Devas and Korboe (2000) this can represent a significant slice of household income. For example, for a family size of five, using the facility only once a day, the cost would represent at least 10 per cent of a basic wage. The discontinued use of the facility by children, too many users, poorly maintained facilities, declined standards and long distances (mostly about half of a kilometer or more) that household without private toilets will have to cover during visits to public toilets could be contributory factors to the open defecation practices by adults and children alike in the community (Devas and Korboe, 2000; Keraita*et al*., 2003).

Disposal of children faeces

For the fear that children might fall into the toilet (Adeniyi, 1973), most household with private toilets tend to discourage children under five years from directly using the facility (Mertens*et al*., 1992; Esrey and Habicht, 1986). Their faeces are later disposed off in the toilet. Those households without private toilets dispose off the faeces of their children under five years in plastic bags and household waste containers which normally end up in gutters, open spaces and communal waste dumping sites. Faeces left lying on the ground, thrown on a heap or outside the compound near the home or in living areas was found to be associated with increased incidence of diarrhoea. The excreta can contaminate water sources, which can be drunk directly or used in food preparation. Baltazar and Solon (1989) found a 64% increase in pathogen positive diarrhoea in families where children‘s faeces were inadequately disposed off. Mertens*et al.* (1992) also reported that unsafe faeces disposal was associated with a 54% greater diarrhoea risk in Sri Lanka and deduced that if such practices were reduced from 91% to 50% of the population then 12% of diarrhoeal episodes could be prevented. Verhagen and Ryan (2008) states that, the sanitation problem extends well beyond the point of defecation where the effects are manifested over a wide area which is especially true for poor urban areas. Considering the faecal contamination of most parts of the study community from both human and animal source - livestock raring is a major occupation for many households in community - it only becomes inevitable that children will pick high infective doses of diarrhoea causing organisms during playing and exploration. High incidences of diarrhoea in children as observed in the study community may be explained by the fact that, children have a drive to play and explore, they are in close contact with the ground, they have little appreciation of hygiene and as such are more likely to come into contact with excreta, the primary source of diarrhea disease (Agha, 2000; Curtis *et al*., 2000).

Shared and unshared sanitation facilities

Almost all the private latrines in houses are shared between two or more households who reside in a single house. Just a few of the households do not share their toilet facilities with other households. According to the UN-Millennium projects (2005), all shared sanitation facilities are considered unimproved whiles those that are not shared are improved. The improved coverage are due to, the usage of the facility solely by the landlord‘s household even in houses that are inhabited by many households as well as single inhabited dwelling places.

Waste management

The main waste collection methods employed in the community are house-to-house, communal waste container systems and dump sites (Mensah, 2005). However, due to the low incomes of most households, house-to-house waste collection is very minimal in the study community. Communal dump site has therefore become the preferred option for household waste disposal. The few communal waste skips provided to reduce the waste that remains in the environment are emptied infrequently considering the high volumes of solid waste generated. This causes waste to flow over, littering the environment in the process. Communal waste skip to most of the residents could partly solve the large volumes of waste in the environment if they were frequently emptied but they were also worried about the on-going pay-to-dump scheme for this disposal option (being charged GH20p per dump). According to Addo-Yobo and Ali, (2003) Cotton *et al*. (2002) there is lack of willingness to pay for such services and in most cases these initiatives of pay-to-dump have routinely failed. This scheme might therefore be causing low income earning households in the study community to refrain from using the skips and resort to dumping of waste in any available open space, gutters, yards, as are already prominent in the study community. During rarely organized clean up campaigns, waste that are removed from clogged gutters are left on the shoulders of the streets, thus finding their way back into the same gutters from which they were taken.

CONCLUSION AND RECOMMENDATION

The Boli community has not been adequately catered for in the provision of improved water coverage (Bore Hole Water and Unprotected Wells). Though most households use Bore hole/Tube well water for drinking and other domestic chores. Bore holes and Tube wells are very few in the community, because most of them have broken down, and have not been repaired by the Municipal Assembly. As a result, a lot of them decide to go for protected and unprotected wells. However, the practice of hand washing by children after defecation is poorly practiced. The community under study lacks adequate water and improved sanitation. Few of the households have private toilet facilities which are mostly shared between two or more households. Over 70% of the population uses the few patronized public toilets which lack frequent maintainace. Lack of adequate sanitation has resulted in high levels of open defecation practices and indiscriminate disposal of children's faeces in open places. As a result, diarrhea among children under age five and malaria is very prevalent.

Recommendation

- A case-control study should be undertaken to examine in detail diarrhea incidences in children less than five in the study community.
- Microbiological and physicochemical properties of wells should be examined to determine their influence on prevalent diseases in the community.
- With regard to the absence of open access for the installation of more sanitation facilities in the houses of the study community, communal latrines should be installed and managed by private operators.
- Massive Media Campaigns that borders on the benefits obtained from acceptable sanitation and hygienic practices should be embarked upon by the local authorities.
- Government should provide clear policy guidelines that will place urban sanitation on a higher profile.

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APPENDIX

Annex 1: Analysis Table

Number of Households in House		
Houses	Households	Valid Percent
1	95	33
2	100	34
3	55	19
4	21	7
5	7	2
6	4	1
7	2	1
8	2	1
9	1	0
10	2	1
11	2	1
66	291	100

Average size of Household		
	Frequency	Valid Percent
1	3	1
2	2	1
3	14	5
4	24	8
5	54	19
6	44	15
7	29	10
8	26	9
9	23	8
10	30	10
11	8	3
12	6	2
13	5	2
14	4	1
15	8	3
18	3	1
20	5	2
21	2	1
34	1	0
Total	291	100

Type of community		
Community	Frequency	Valid Percent
Rural	230	100

Sex of respondent		
Sex	Frequency	Valid Percent
Male	105	46
Female	125	54
Total	230	100

Marital Status		
Status	Frequency	Percent
Single	65	28.3
Married	116	50.4
Widowed	49	21.3
Total	230	100

Age Range of Respondent		
Age Range	Freq	Percent
20-29	55	24
30-39	43	19
40-49	63	27
50-59	37	16
60-69	32	14
Total	230	100

Main source of DRINKING WATER for household members		
Source	Freq.	Percent
Borehole/Tubewell	197	86
Protected dug well	25	11
Unprotected dug well	8	3
Total	230	100

Whose responsibility is to fetch water		
Person	Frequency	Valid Percent
Adult woman	60	26
Girl child(b/n 10 & 15)	170	74
Total	230	100

Approximately how long does it take to go there, get water, and come back		
Time	Frequency	Percent
less than 30 minutes	18	8
Between 30 and 60 minutes	142	62
More than 60 minutes	70	30
Total	230	100

How much water do you use in a day		
Quantity	Frequency	Valid Percent
Less than 30 litres	2	1
30-60 litres	31	14
60-90 litres	117	49
90-120 litres	63	30
More than 120 litres	17	7
Total	230	100

Do you treat the water in any way to make safer before drinking		
	Frequency	Valid Percent
Yes	203	88
No	27	12
Total	230	100

What specifically do you do to make the water safer for drinking		
	Frequency	Valid Percent
Use water filter	27	13
Boil	176	87
Total	203	100

What kind of toilet facility do members of your household use		
	Freq.	Percent
Pit latrine	31	13
VIP	10	4
Pit latrine with slab	31	13
Open pit latrine	7	3
Open defecation / bush	151	66
Total	230	100

How many toilet facilities are in this house		
	Frequency	Valid Percent
One	75	55
Two	42	31
Three	7	5
Four	5	4
None(public facility)	8	6
Total	137	100

How many household use the toilet facility		
	Frequency	Valid Percent
One	40	30
Two	49	36
Three	33	24
Four	6	4
Five	4	3
More than five	3	2
Total	135	100

How far is the facility from the household		
	Frequency	Valid Percent
Less than 50 metres	95	70
50-100 metres	25	19
100-200 metres	15	11
Total	135	100

Do you wish to own your own toilet		
	Frequency	Valid Percent
Yes	186	81
No	44	19
Total	230	100

How do you intend to own your own facility		
	Frequency	Valid Percent
Household contribution	27	15
Government support	56	30
Philanthropists	103	55
Total	186	100

How do children defecate or how do you dispose of children's stools in this house		
	Frequency	Valid Percent
Put/rinsed into toilet	52	23
Put/rinsed into drain	5	2
Buried	51	22
Left in the open	122	53
Total	230	100