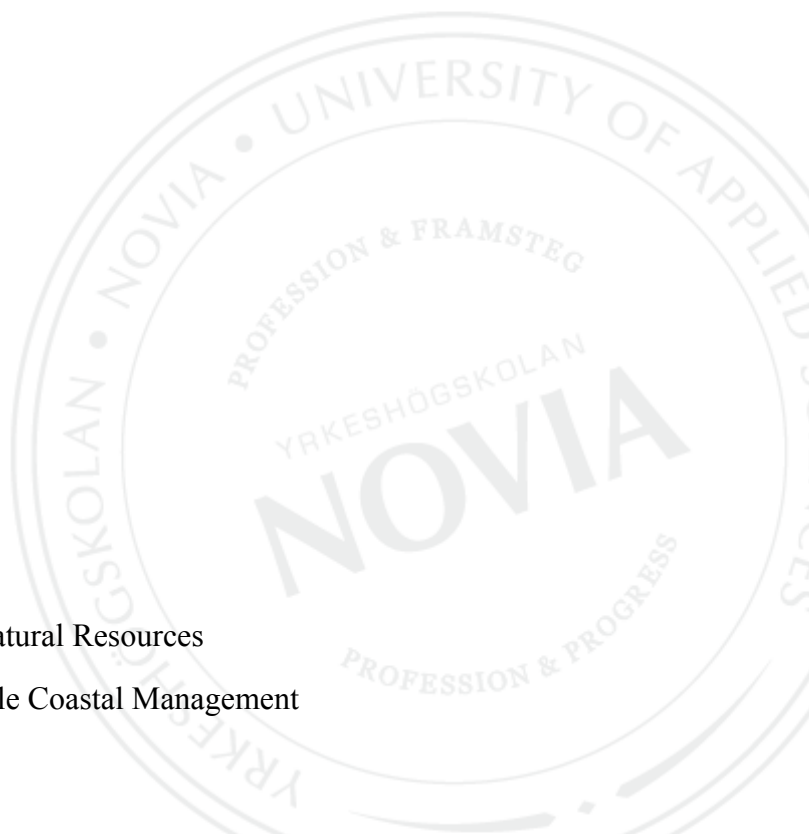# Assessing Environmental Sanitation in Peri-Urban Communities in The Tamale Metropolis, Ghana

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BACHELOR'S THESIS

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Date May 2018 **Number of pages** 35 **Appendix** 1
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The aim of the study was to examine the prevailing environmental sanitation conditions with regard to access to water, water use, sanitation and access to toilets of households within the selected communities in the Tamale metropolis in Ghana. A cross-sectional study design was used to conduct the research. Data was gathered through the use of a questionnaire and face-to-face interviews with some participating households. A total of 379 households participated in the study. Majority of households in the study had access to improved source of drinking water.

Two-thirds of households had improved toilet facilities. Generally, households had good domestic environmental sanitation conditions but it also emerged that the households were deprived from full range of access to the most essential environmental sanitation services. Therefore, the inadequate level of service to the study area could be seen as opportunity for further focused improvements towards universal access to improved environmental sanitation

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1 Introduction

Safe drinking water, sanitation and good hygiene are fundamental to health, survival and development (WHO/UNICEF,2006). Nonetheless, 1.1 billion people in the world lack access to improved water supplies and 2.6 billion people lack adequate sanitation (Moe et al.,2006). Unsafe water, inadequate sanitation, and insufficient hygiene practices account for an estimated 9.1 percent of the global burden of disease and 6.3 percent of all deaths, according to the World Health Organization (WHO) (Prüss-Üstün et al.,2008).This situation has been made acute with rapid urbanization especially in developing countries in Africa, global statistics have highlighted the alarming rate of urbanization in developing countries where there the urban population is expected to double from 2000 to 2030(UNFPA,2007).With this increasing urbanization comes the ecological and sanitary consequences often associated with the growth and the implications they may have on human health and wellbeing (Esrey,1996).

According to the 2014 MDG update from the World Health Organization (WHO) and United Nations Children's Emergency Fund (UNICEF), the world has met the 2015 goal for improved water but will miss the goal for improved sanitation coverage by half a billion people. Most of the population without access to improved sanitation and improved water is in south-eastern Asia and Sub Saharan Africa. While most places without improved drinking water are rural, lack of sanitation facilities affects both urban and rural areas (WHO/UNICEF,2014).

The research was conducted in some a few selected Peri-urban settlements that are found in the Tamale Metropolis of Ghana so as to study the environmental sanitation conditions of the households of these settlements which would give insight in to the magnitude of sanitation and hygiene problems and optimize actions to be prioritized in the prevention of environmental sanitation and hygiene-related diseases.

In 2015, 6.5 billion people used improved sources of drinking water that required a under 30 minutes per trip to collect water, and are thus classified as having basic drinking water services (WHO/UNICEF,2017). A further 263 million people (4 percent of the population) had access to improved sources that needed more than 30 minutes per trip to collect the water, and are thus classified as having limited drinking water services (WHO/UNICEF,2017). The proportion of people getting access to improved sanitation has increased more rapidly than the proportion of people getting access to improved water. In

2015, 5 billion people used an improved sanitation facility that was not shared with other households, and thus are classified as having at least basic sanitation services. In addition, 600 million people (8 per cent of the population) used improved but shared facilities that are classified as limited sanitation services(WHO/UNICEF,2017)

Africa, account for over 80 per cent of open defecation in the world (Fast facts, 2015). Access to adequate sanitation is often taken for granted but it is interesting to realize that roughly 37 per cent of the world's population still lack access to decent sanitation. Open defecation is one of the main causes of diarrhoea. Diarrhoea disease is the second leading cause of death in children under five years old in Ghana. It causes an annual mortality in 760 000 children (Gebru.T et al.,2014). Each year, children lose 272 million school days due to diarrhoea and about 3,000 children under age 5 die as a result of diarrhoea, mostly before their second birthday. Nationally, on average 22.9% of people in Ghana do not have access to any sanitation facility (open defecation) and only 15% use improved unshared sanitation facilities (UNICEF,2015)

 There is a serious economic impact to this problem that should not be ignored; every US $1 spent on sanitation brings a $5.50 return by keeping people healthy and productive. The global economic gains from investing in sanitation and water are estimated at $260 billion per year, and finally poor sanitation, on the other hand, costs countries between 0.5 and 7.2 per cent of their GDP (WHO/UNICEF, 2014). When households make poor water and sanitation choices, the societies they live in collectively cannot escape the consequences.

1.1   Background information about the research problem

Access to clean drinking water is one of the most important preconditions for sustainable development. The meta-analyses of (Fewtrell et al.,2005) suggest that safe drinking water supplies do reduce the incidence of diarrhoea. In addition, sanitation is the cause of many

other development challenges, as poor sanitation impacts public health, education, and the environment. The biggest difference in accessibility in safe water and basic sanitation use are those between urban and rural populations. Globally, access to improved drinking-water sources is 95 percent in urban areas, compared with 73 percent in rural areas. There is great difference in urban-rural divide in drinking water in sub-Saharan Africa, where 81 percent of people in urban areas are served, compared with 41 percent in rural areas. (UNICEF, 2006)

Water supply and sanitation condition in Ghana is unsatisfactory. Large Parts of the populations, both urban and rural equally do not have access to safe and adequate water supplies and sanitation facilities.

The 3 communities were selected for this study due to the location in one of the big metropolitan cities found in Ghana. Gumbihini, Kukuo and Vitting are peri-urban settlement that are located with the Tamale metropolitan area. With an annual population growth rate of 3.5%, the Tamale metropolis is one of the fastest growing cities in Ghana. The Tamale metropolis area is supplied water through the Ghana Water company limited with is the national Public water supplier whiles waste Collection is outsourced to private companies under

the supervision of the waste management department of the Tamale Metropolitan Assembly under the ministry of Local Government.
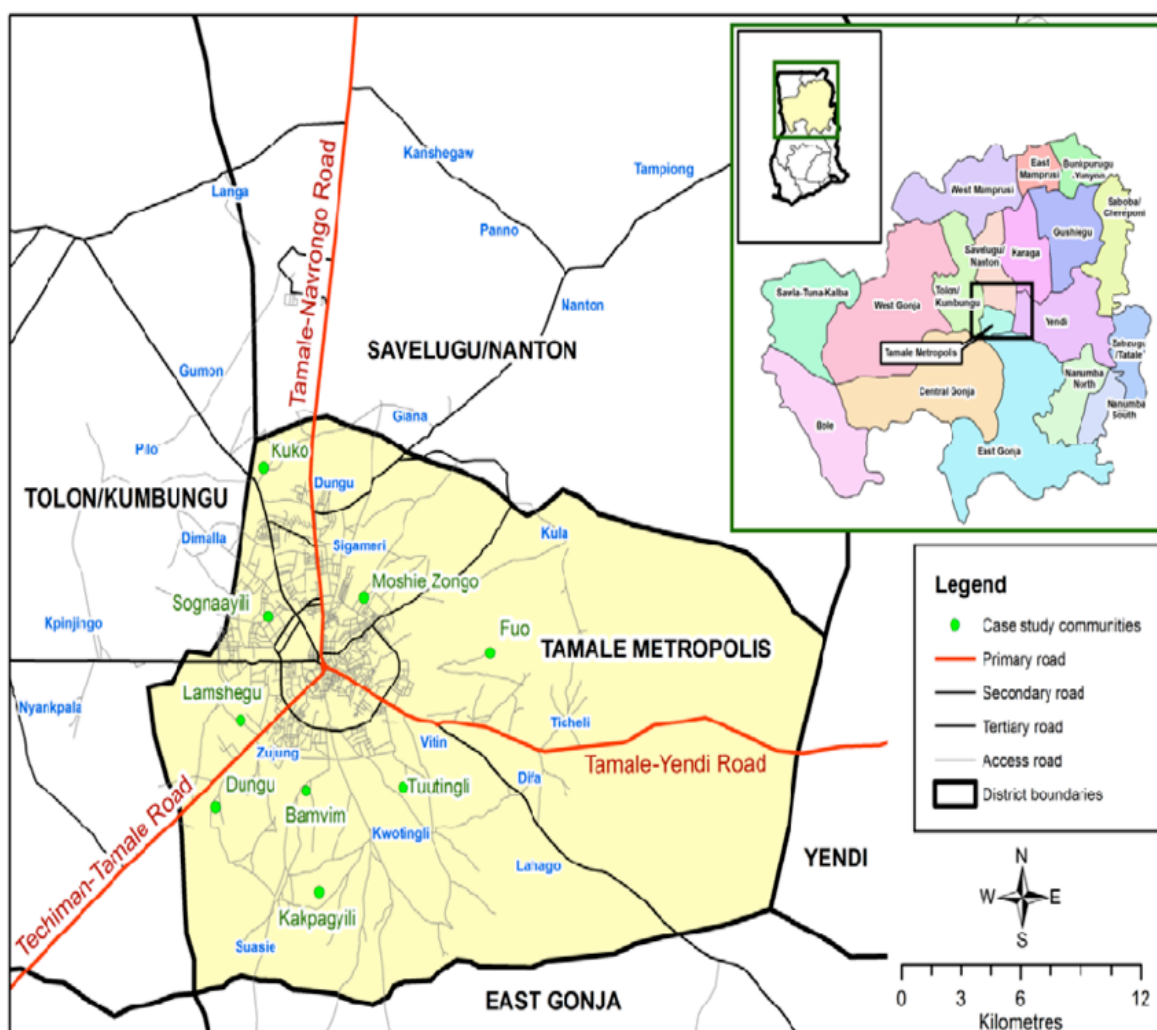

Figure 1 Geographical location of Tamale metropolis

Source: Paul N. Napari et al 2014

1.2   Research purpose

The purpose of this study was to gauge the environmental sanitation conditions with regard to water use, sources of water, waste disposal, domestic hygiene of the households of Gumbihini, Kukuo and Vitting in the Tamale Metropolis of Ghana. This would give an insight to the magnitude of water and sanitation problems in these communities and make it possible to lay ground for adjust programs to be prioritized in the improvement of the environmental sanitation of these communities.

1.3   Research Questions

The study attempts to answer the following research questions

1. what is the level of access to drinking water and sanitation services in households in the study communities?

2. what is the level of knowledge of household in make water safe for household consumption?

1.4   Significance of the study

As the development of environmental sanitation services continuous to gain more relevance in government policies and programme and more funds are being channelled towards this effort there is the need for more information on the environment sanitation situation to be accessed in the poorer parts of the big cities in Ghana. This study would help to examine the accessibility and utilization of the environmental sanitation services and hygiene facilities in the communities. The study would serve to identify some of the bottlenecks and helps to mark the hygiene risk practices in households. There have been various interventions and policies in Ghana to meet these goals, some of which, according to the 2009 Ghana Water and Sanitation Sector Performance Report, include the development of the National Community Water and Sanitation Programme and the subsequent creation of the Community Water and Sanitation Agency. The establishment of the Water Resources Commission, the creation of a Water Directorate and an

Environmental Health and Sanitation Directorate, as well as the formation of the Coalition of NGOs in Water and Sanitation, have all tremendously promoted and facilitated coordination in the sector (MWRWH, 2007). Despite these interventions water supply and its related sanitation issues in terms of constant water supply, water quality, water treatment and access to proper waste disposal had since persisted especially in the peri-urban communities in the major cities in Ghana.

The results of the data collected from the research will help inform the activities of the environmental sanitation awareness programme of the Metropolitan assembly to best achieve its goal of improved environmental practices through better water and sanitation services utilization.

1.5 Scope of the Study

The scope of this research includes elements such as water supply, water consumption and water accessibility and basic sanitation. The study is limited to the research problems related to environmental sanitation of at the household level and based on data collected from sampled households

2 Literature Review

This chapter will review relevant literature and what their findings will be. The review begins with the literature on water and sanitation situation globally. Finally, literature is reviewed on water and environmental sanitation conditions in Ghana since there is scant literature on Tamale. A conclusion is drawn at the end of the chapter which highlights the reviewed literature.

2.1 Environmental Sanitation

The WHO Expert committee on environmental sanitation defined in 1950 environmental sanitation as "the control of all those factors in man's physical environment, which exercise or may exercise a deleterious effect on his physical development, health and survival" (Dwivedi & Sharma,2007). In particular it refers to the control of community water supplies, excreta and wastewater disposal, refuse disposal, vectors of disease, housing conditions, food supplies and handling, atmospheric conditions, and the safety of the working environment (Franceys et al.,1992).
Environmental sanitation includes disposal and treatment of human excreta, solid waste and wastewater, control of disease vectors, and provision of washing facilities for personal and domestic hygiene. The Water Supply and Sanitation Collaborative Council have defined it as "Interventions to reduce people's exposure to disease by providing a clean environment in which to live, with measures to break the cycle of disease". Environmental sanitation comprises both a change in behaviour and facilities to form a hygienic environment (Mmom et al.,2011).

The WHO in 1993, defined "environmental health comprises of those aspects of human health, including quality of life, that are determined by physical, chemical, biological, social and psychosocial factors in the environment. It also refers to the theory and practice of assessing, correcting, controlling and preventing those factors in the environment that can potentially affect adversely the health of the present and future generations" (Gosselin et al.,2001).

According to the United Nations International Decade for Action -water for life 2005-2015 report, it is estimated that there are 2.5 billion people who still do not use an improved

sanitation facility and a little over 1 billion practicing open defecation. Almost two thirds 64% of the world, relied on improved sanitation facilities. Since 1990, almost 1.9 billion people have gained access to an improved sanitation facility in 2011. The greatest progress has been made in Eastern Asia, where sanitation coverage has increased from 27% in 1990 to 67% in 2011. This amounts to more than 626 million people gaining access to improved sanitation facilities over a 21-year period. However, current trends show sub-Saharan Africa and Southern Asia still struggle with low sanitation coverage. In sub-Saharan Africa, 44% of the population uses either shared or unimproved facilities, and an estimated 26% practices open defecation while in Southern Asia, the proportion of the population using shared or unimproved facilities has declined to 18% but open defecation remains the highest of any region 39%. (Fast Facts JMP,2013)

Open defecation rates declined globally from 24% in 1990 to 15% in 2011. In absolute numbers, this signifies a drop of 244 million people to 1.04 billion in 2011. The decline in the population practicing open defecation has differed from region to region. Eastern Asia, South-eastern Asia and the Latin America and Caribbean regions have seen a steady decline since earliest measurements describing conditions in 1990. In Southern Asia, the population practising open defecation peaked around 1995, after which it declined. Only in sub-Saharan Africa is the number of people defecating in the open still increasing. (JMP,2015) As can be seen in figure 2 below the rate of open defecation has been on the increase in Ghana even with an increase in access to improved services and this is in line with trends across Africa.
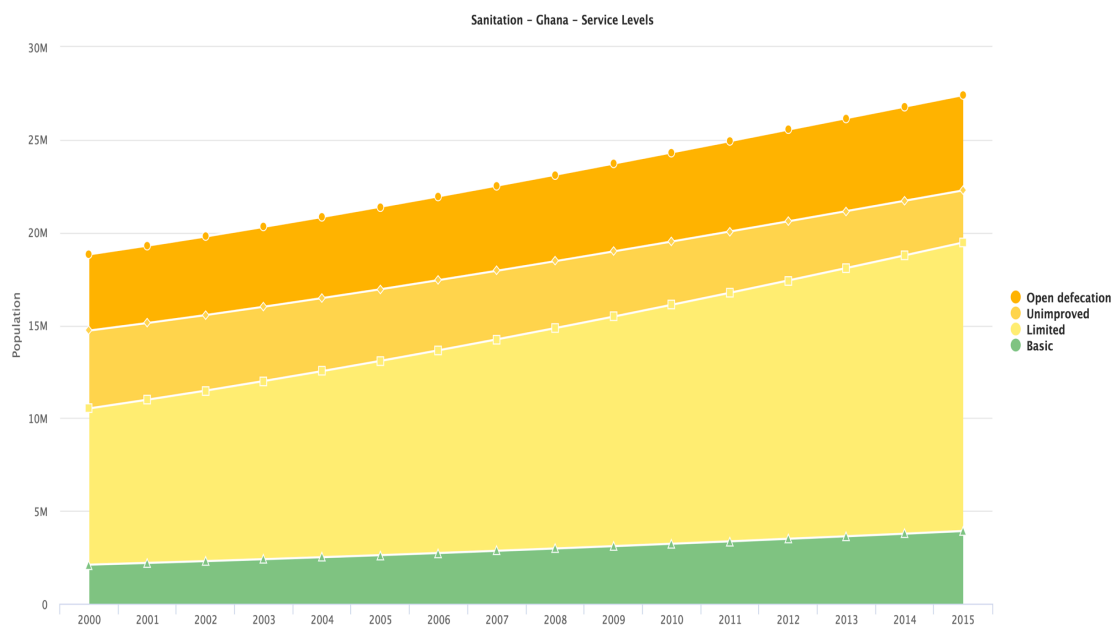
Figure 2 Sanitation Service levels in Ghana
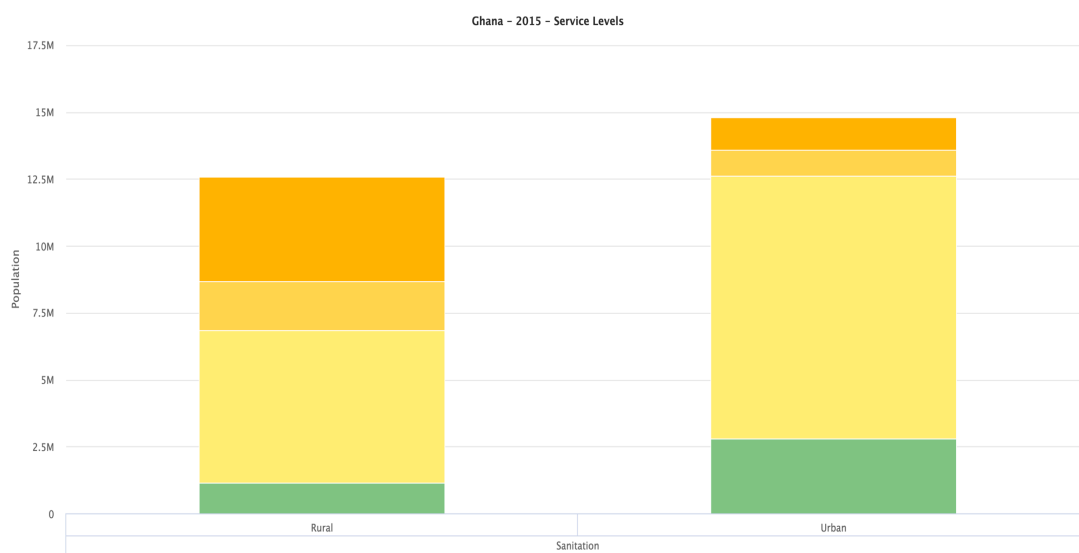
Source: WHO/UNICEF JMP 2015

Figure 3 Sanitation Service Levels between Rural and Urban Centers
Source: WHO/UNICEF JMP 2015

The level of disparity in sanitation service levels is more pronounced if the population is divided between urban and rural as illustrated by figure 3 above. About 12.5million urban

dwellers have access to improved services compared to just about 7million in the rural communities.

Table 1: Percentage distribution of households by Toilet/Latrine Facilities according to Residence, Ghana 2008

Source: Ghana Statistical Service Demographic and Health Survey (2008)

Type of Toilet Facility	Population		
	Urban	Rural	Total
Improved, not shared facility	**17.8**	**8.2**	**12.4**
Flush/pour flush to piped sewer system	2.6	0.5	1.4
Flush/pour flush to septic tank	9.7	1	4.8
Flush/pour flush to pit latrine	2.1	0.2	1
Ventilated improved pit (VIP) latrine	2.6	2.2	2.4
Pit latrine with slab	0.8	4.2	2.7
Composting toilet	0	0.1	0.1
Non-improved facility	82.1	91.8	87.7
Any facility shared with other households	68.8	42.3	53.9
Flush/pour flush not to sewer/septic tank/pit latrine	0.1	0	0.1
Pit latrine without slab/open pit	4	13.6	9.4
Bucket	1.8	0.2	0.9
No facility/bush/field	7.2	35.4	23.1
Missing	0.2	0.3	0.3
Total	**100**	**100**	**100**

These figures 2 and 3 above and table 1 gives a clearer picture of the vast disparities in terms of the service levels and availability of sanitation services between the urban and rural populations of the country. In table 1 above for instance where 17.8% of the population in urban areas have access to improved not shared toilet facility the figure is just 8.2% in the rural population which is less than half of what pertains in urban areas. The greater the coverage the higher the probability of choosing such improved facilities for a better health development of households. Validating the issues, 16 million Ghanaians use

unsanitary or shared latrines, 4.8 million have no latrines at all and defecate in the open. The poorest quintile is 22 times more likely to practice open defection than the richest (WSP, 2012).

Though urban sanitation access usually far exceeds rural access, it is widely known that the poor, unplanned, densely populated areas such as my study communities of Gumbihini, Kukuo and Vitting are badly underserved. Their household density further, compounds the risk of contamination than sparsely populated rural areas. Limited sanitation options and high demand are made worse by poverty and limited space, creating a major environmental sanitation challenge in these communities

2.2 Elements that influence the availability of latrines

The issues which determine whether basic sanitation facilities are present or absent from the household are complex and varied (Shaw,1999). The most commonly recognized reason for the lack of a household toilet was the high cost and lack of space. The most common reason was related to poverty, socio-cultural issues, and technical difficulties (McConville,2003).

2.3 Problems to progress in basic sanitation

Forty percent of the world's population still do not have access to basic sanitation facilities. The most critical reason for this is that in many circumstances there is far less demand for basic sanitation than there is for water and other services, both among communities and Policy makers. Successful and sustainable sanitation programmes begin with demand creation – at both the political and household level (UNICEF, 2008).

More than 89.8% of people in Ghana have access to improved water source. On the contrary, only 14% of people have access to improved sanitation. Due to drinking contaminated water, diarrheal disease is the fourth most commonly reported illness at health centres throughout the country and accounts for 7% of all out-patient visits to health centres nationwide (GDHS,2014). Although diarrhoea is common among children under five years in Ghana, there is disparity between the prevalence in the urban 10.5% and rural areas 12.8% (GDHS, 2015) In addition to not having sanitation infrastructure, some cultural beliefs and views encourage people in rural areas not to use latrines. People are being educated and encouraged to use latrines via community-led sanitation initiatives.

2.4   Water Sector

Water they say is life and is an essential element in the survival of all living things, an sufficient, safe and available water supply must be accessible to all humankind. WHO defines domestic water as being water used for all usual domestic purposes including consumption, bathing and food preparation. Domestic water supplies are one of the fundamental requirements for human life. Without water, life cannot be sustained beyond a few days and the lack of access to adequate water supplies leads to the spread of disease (Howard, 2003).

2.5   Water Supply System in Ghana

The first public water supply system in Ghana, then Gold Coast, was established in Accra just before World War I. Other systems were built exclusively for other urban areas among them the colonial capital of Cape Coast, Winneba and Kumasi in the1920s. In 1948, the Department of Rural Water Development was established to engage in the development and management of rural water supply through the drilling of bore holes and construction of wells for rural communities, after Ghana's independence in 1957, a Water Supply Division, with headquarters in Kumasi, was set up under the Ministry of Works and Housing with responsibilities for both urban and rural water supplies (GWCL,2018). A WHO study of the water system in the country due to a severe drought in 1959 culminated in the establishment of the Ghana Water and Sewage Corporation (GWSC) by an act of parliament in 1965 (Act 310) as a legal public utility entity (GWCL,2018)

 GWSC was to be responsible for:

- Water supply and sanitation in rural as well as urban areas.
- The conduct of research on water and sewerage as well as the making of engineering surveys and plans.
- The construction and operation of water and sewerage works,
- The setting of standards and prices as well as collection of revenues

The management of water and sanitation is based on a hierarchy of institutions deriving their key roles from the Constitution of Ghana or Acts of Parliament. Their roles can be grouped into three categories: (1) Policy, planning and monitoring. (2) Facilitation and regulation. (3) Service provision.

Policy, planning, financing and monitoring are the responsibility of the ministries. The Ministry of Water Resources, Works and Housing (MWRWH) is responsible for overall water resource management. The Ministry of Local Government and Rural Development (MLGRD) is the lead agency for the sanitation sector (rural and urban). (MWRWH, 2007) Water use regulation is the responsibility of the Water Resources Commission (WRC). It grants water rights and manages the utilization of water resources, while the Public Utilities Regulatory Commission (PURC) examines and approves tariffs for water and the other utility services.

Metropolitan, Municipal and District Assemblies (MMDAs) plan, operate and maintain water and sanitation facilities in their areas of jurisdiction. Water and sanitation facilities are funded largely from their shares of the District Assemblies Common Fund (MWRWH, 2007) Water and sanitation services are provided by both public and private organizations and individuals. These include: CWSA, which provides safe water and related sanitation services to rural communities and small towns under community ownership and management. CWSA activities are funded by government with donor support. GWCL, which self-finances its recurrent costs, raising funds from consumers to meet overheads and maintenance costs, but receives government funds for expansion programmes. The government recently established the Ghana Urban Water Company Limited (GUWL) as a subsidiary to manage the operations of the GWCL. Water and Sanitation Development Boards (WSDBs), which manage and oversee water supply systems and sanitation services within small towns, with the responsibility for setting tariffs and collecting fees from water consumers and customers within their operational areas. Water and sanitation committees plan, implement and oversee water and sanitation systems constructed for communities in the rural areas. The Water and Sanitation Monitoring Platform (WSMP) is an independent national water and sanitation monitoring platform seeking to increase accessibility to relevant water, sanitation and hygiene sector information and analysis. (MWRWH, 2007)

2.6   The state of water supply in developing countries

In developing regions, while 73% of the urban population uses piped water from a household connection, only 31% of rural inhabitants have access to household piped water supplies. In Sub-Saharan Africa, only 5% of the rural population gets water piped to premises. In contrast, in urban areas of Sub-Saharan Africa, 35% of urban dwellers use water piped to the household (WHO/UNICEF, 2010).

2.7   Accessibility of water

Access to improved water sources is one of the indicators been tracked by the Joint Monitoring Programme (JMP) to determine if the MDG target for water and sanitation is being met. JMP is the official United Nations mechanism in charge of monitoring progress toward the MDG target, which is to: "Halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation." (UN MDG,2000) Access to improved water sources should serve as a backdrop to understand the extent to which households are practicing water treatment and storage at the point of use for water obtained from this resource (Hygiene Improvement Project, 2010).

An improved water source is an infrastructure improvement to a water source, a distribution system, or a delivery point, which by the nature of its design and construction is likely to protect the water source from external contamination, in particular from faecal matter (Hygiene Improvement Project, 2010).
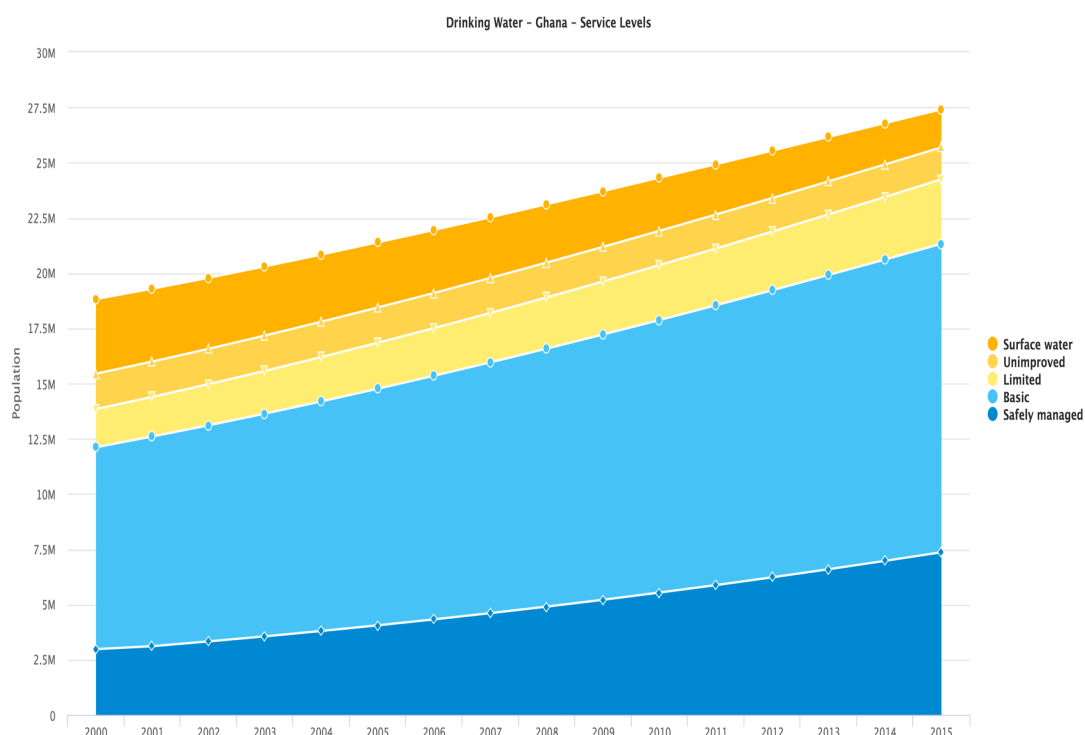

Figure 4 :Population in Ghana with piped and non-piped water (2000-

Source: WHO/UNICEF JMP (2015)

As shown in figure 4 above the level of access to improved water source in Ghana has been on the increase since 2000 from about 12.5million with access to about 22million

with access in 2015, and this naturally will bring about a decline with people accessing unimproved water sources.

2.8 Water collection time and distance to a water source

The time it takes to go and collect water is a good marker of water availability as it takes into account distance, waiting times, the effort needed to obtain water. Studies have shown that people will not really curb their water use if collection times are less than three minutes, or a distance of about 100 metres in easy terrain with no waiting times. Longer collection times will result in a restricted use of water (Rottier et al., 2003). The amount of time spent collecting water will impact the amount of water that a household makes available to its members. The longer the time devoted in fetching water, the less chance a family has to collect enough water to satisfy household water needs. UNICEF and WHO suggest that when the time invested in going to the source, collecting water, and returning to the household is between three and 30 minutes, the amount of water collected may vary between 15 and 25 litres per person per day. This range is considered suitable for a person to meet basic needs.
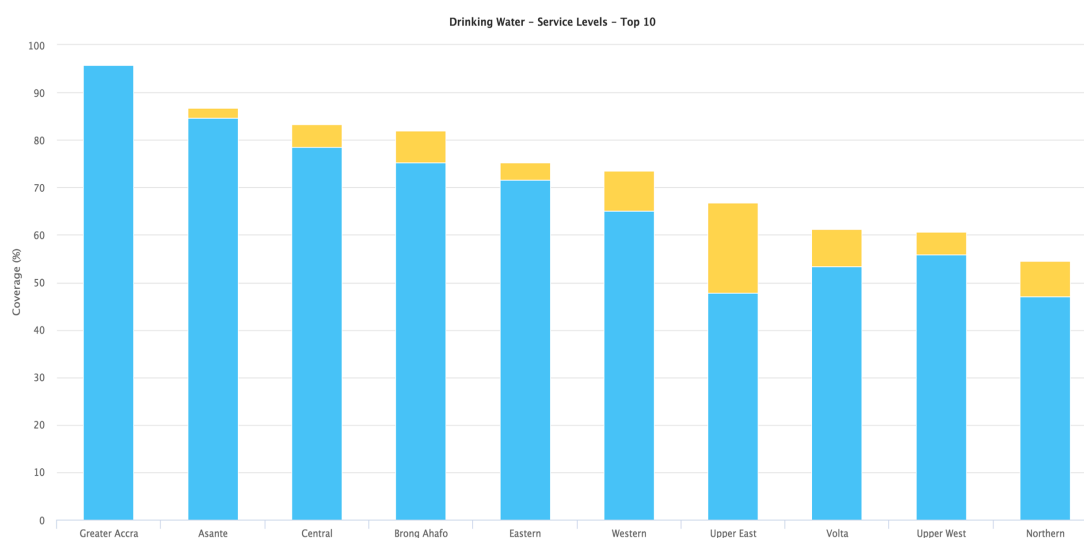

Figure 5:Managed and Unimproved Water Coverage in Ghana (2015)

Source: WHO/UNICEF JMP (2015)

Figure 5 above gives a regional break down of water consumption from improved and unimproved sources and it clearly show that less than half of the entire population in the northern region of Ghana were the study was done has access to improved water source.

2.9 Impacts of Water and Sanitation

The impact of deficient water and sanitation services falls primarily on the poor. Underserved by public services, people in rural and peri-urban areas of developing countries make their own insufficient arrangements or pay disproportionately higher prices to water vendors for often insufficient and sometimes unsafe water supplies. Their poverty is intensified and their productivity decreased, while their sickness puts severe strains on health services and hospitals (Department for International Development, 1998). Urban sanitation access usually far exceeds rural access, it is widely known that the poor, unplanned, densely populated areas are badly underserved. This density, therefore increase their risk of contamination than thinly populated rural areas.

Water and sanitation improvements, in association with hygiene behaviour change, can have significant effects on population and health by reducing a variety of disease conditions such as diarrhoea, intestinal helminths, guinea worm, and skin diseases. These improvements in health can, in turn, lead to reduced morbidity and mortality and improved nutritional status (Billig et al.,1999).

3 Methodology

3.1 Study Area

The Tamale Metropolis is one of the 26 districts in the Northern Region. It is located in the central part of the Region and shares boundaries with the Sagnarigu District to the west and north, Mion District to the east, East Gonja to the south and Central Gonja to the south-west. The Metropolis has a total estimated land size of 646.90180 sqkm (GSS,2010). Geographically, the Metropolis lies between latitude 9º16 and 9º 34 North and longitudes 0º 36 and 0º 57 West. It has a Population of 233,252 and a total of 219,971 households, living in 19,387 houses. (GSS,2014)

The study was done in 3 communities out of the 115 communities that are found in the Tamale Metropolitan Assembly, these communities are Gumbihini, Kukuo and Vitting. These 3 communities are densely populated and relative poor.

3.2 Research design

A descriptive, quantitative research designed which utilized a across-sectional method (Kate,2006) was used to conduct the study on the status of environmental sanitation conditions of the households in the selected communities. The respondents were asked to describe the environmental sanitation conditions with regard to water use, water accessibility, excreta disposal, and accessibility of Toilet facilities in the selected study communities.

3.3 Population

The target population refers to the entire set of individuals who meet the sampling criteria (Burns & Grove 2005). The target population in this study were all the residents living in a numbered house in the studied communities in Tamale. An accessible population is the portion of the target population to which the researcher has reasonable access (Burns & Grove 2005). In this study, the accessible population included a sample of random households in Gumbihini, Kukuo and Vitting.

3.4 Sampling methods

The study used two types of sampling techniques purposive sampling in the selection of the communities to conduct the study in and simple random sampling in the selection of households in the selected communities.

Sampling inclusion criteria for this cross-sectional research was a household lived in a house with a designated house number within any of the communities. Sampling exclusion criteria for the study were: (i) being organisations (such as offices, hotel, stalls etc), (ii) Houses without a designated house number. Verbal informed consent was obtained from the respondent from the randomly selected household before been interviewed.

The eligibility criteria for being a respondent of the interview was (i) household head (ii) the female household head was given priority, because they are both conversant about domestic water and household sanitation. In a household with a literate head of household a questionnaire was giving out to be filled by the head of household rather than an interview, this was done because most literate household head were less candid with the sanitation situation in the household when interviewed in other not "lose face" in front of strangers since societal expectation of sanitary conditions of households with an educated head of household is much higher than an illiterate household.

The entire data collecting process began on the 22nd May 2017 and ended on 30th June 2017. During the data collection activities undertaken included the main household data collection visits, follow-up on unavailable respondents. It also included data checking in the field and refilling of questionnaires at households after finding of incomplete responses in the filled questionnaires given out to literate household heads to fill.

3.5 Data analysis

All responses to the questionnaires and face-to face interviews were coded and transcribed using Microsoft Excel. Afterwards the data was cleaned. Statistical analysis was performed using Microsoft Excel

4 Results

4.1 Research results

From a total of 379 households sampled in the three selected communities, 361 households participated, giving a response rate of 95.2%. Of the 361 households that participated in the study, all the three communities were included and the distribution of the households by communities is represent by table 2 below. Respondents in Gumbihini were 132 which was the largest of the three communities followed by Vitting with 117 respondents and finally Kukuo with 112 respondents.

Table 2: Respondents Distribution within the Study communities

Communities	Total Number of Respondent's	Percentages
Gumbihini	132	36.6
Kukuo	112	31
Vitting	117	32.4
Totals	**361**	**100**

I collected some Basic demographic information about the household in the selected communities table 3 below gives a basic demographic date of respondents in the study.

Table 3: Basic demographic data of sampled households

Characteristics	Number	Percentage
Gender of head of the household		
Male	293	81.2
Female	68	18.8
Total	**361**	**100**
Gender of respondents		
Male	78	21.5
Female	283	78.5
Total	**361**	**100**
Total number of persons in households		
1-3	3	0.8
3-5	50	13.8
5-7	75	20.8
>7	233	64.6
Total	**361**	**100**
Education level of the head of household		
Literate (formal schooling)	101	27.9
Illiterate	260	72.1
Total	**361**	**100**

The results show that only (68) 18.2% of households were headed by women and 78.5% (283) of the respondents were females, but the majority (293) 81.2% were headed by males as shown in Table 3 above. According to the results (260)72.1% of the head of households could not read and write (illiterate), 101 (27.9%) of the respondents received formal education. The mean family size of the households was 6.3. The majority of households (233) 64.6% had household members greater than 7, followed by 5 to 7 household sizes (75) 20.8%. Households with 1 to 3 members were the least (3) 0.8%.

4.2 Household drinking water

As shown in figure 6 below the majority of households had obtained drinking water from privately piped water in their compounds (172) 47.7% followed by households that bought water from privately piped taps in neighbour's compound (97) 26.8%. Other households obtained drinking water from public tap/standpipe (34) 9.4% and this group are the minority in this situation. The final group sourced their water from surface water that is a dam (58) 16.1%. Summing up those households that access their water from piped tap the total number is (303) 83.9%.
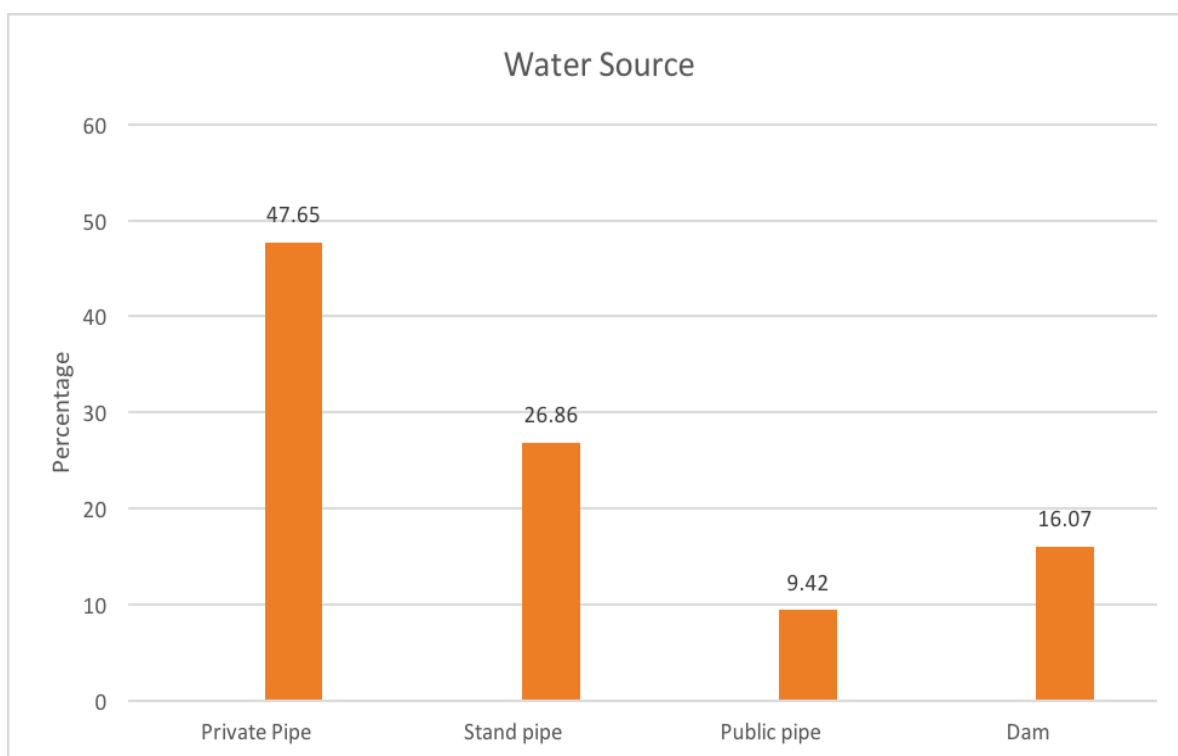

Figure 6: Type of Water source in Gumbihini, Kukuo and Vitting

As shown in figure 6 above, the results of the study indicated that 47.7% of the households had access to their own privately piped water in their house or in their compound.

Households were asked about the time it took to fetch water and distance of the water source from the dwelling. As shown in table 4 below regarding time taken to collect drinking water (round trip), (172) 47.7%% households had access to water in their compound (97) 26.9% households took less than 30 minutes to collect drinking water and the rest of (92) 25.5% households took more than 30 minutes to fetch drinking water.

Table 4: Time and Distance to Collect Water

CATEGORY	Number of Households	Percentage
Time to collect drinking water (round trip)		
Water on premises	172	47.65
Less than 30 minutes	97	26.87
More than 30 minutes	92	25.48
Total	**361**	**100**
Distance of water source from premises		
Water on premises	172	47.65
≤ 200 meters	113	31.3
> 200 meters	76	21.05
Total	**361**	**100**

With regards to distance of water source from Household, table 4 above shows that (172) 47.7% of households had access to water on their premises, (113) 31.3% of households had access to water within 200meter distance from their houses and the rest of (76)21.0% of households had to walk over 200meter to reach the nearest source of water.

As shown in table 5 below in the majority of households (287) 79.5% an adult woman frequently collected drinking water from water sources. Adults woman plus female child collectively carried 85.3% of the water from water sources in the household and children were responsible for 9.75% of all water carried.

Table 5: Person responsible for Water Fetching in the Household

Individual who collects drinking water for households	Number	Percentage
Adult Female	287	79.5
Adult male	36	10.0
Female Child (under age 15)	21	5.8
Male Child (under age 15)	14	3.9
other	3	0.8
Total	**361**	**100**

An vast majority of the households (303), 83.9% in the three study communities did not treat their drinking water at home. Only (58),16.1% of the households applied some form of household water treatment. Of those who treated their water, the principal treatment method used was adding bleach/chlorine 43, followed by those who used the method of letting water container to settle down. In 7 households they boiled water as a home water treatment. The results revealed that water treatment is only practiced in a smaller number of households and these households tend to be those that source the water from dams or unimproved water source.

4.3   Household Sanitation facilities

Suitable basic sanitation services is a crucial component in ensuring good health. Accordingly, during the study information on the condition and type of toilet used by the household was collected.

Table 6: Type of Toilet facility used in households of study communities

Type of toilet	Frequency	Percentages'
Improved		
Flush/pour-flush toilet	22	6.1
Kumasi Ventilated improved pit latrine(KVIP)	179	49.6
Traditional pit latrine	56	15.5
Unimproved		
Communal latrine	6	1.7
Public toilet	95	26.3
Bush	3	0.8
Total	**361**	**100**
Sharing of private toilet with other households		
Yes	186	72.4
No	71	27.6
Total	**257**	**100.0**

As clearly illustrated in table 6 above, the bulk of household represent by (257) 71.1% of households used improved private toilets (flush/pour-flush toilet, Kumasi ventilated improved pit (KVIP) latrine and traditional pit latrine). Almost half of households in the study (179) 49.6% had Kumasi Ventilated improved pit as their basic toilet facility. The other type of improved toilets used was and flush/pour-flush toilet (22) 6.1%.

 Also shown in table 6 above, (104) 28.8% households had used unimproved toilet facilities. Out of which the overwhelming majority (95) 91.4% had used public toilet and (3) 2.9% had not used any kind of toilet all.

As can be seen in table 6 above from the households that had their own private toilet facility, 72.4% were shared.

4.4   Conclusion

In conclusion, the results of the study which has shown the extent of the domestic environmental sanitation conditions in Gumbihini, Kukuo and Vitting in the Tamale

metropolis. The resulted of the study essentially indicated that there was a fairly good domestic sanitation conditions in the respondent's households. It also emerged that the studied residents of the town were deprived from full range of access to basic sanitation services, facilities and interventions by the local government. The majority of households had access to an improved source of water within practical time and distance. But households that had privately piped water connection were not sufficient considering these communities are in a major metropolis. A sizable percentage of households had improved toilets facility; however, the majority of the facilities were KVIP which has its own shortcomings.

5   Discussion

The results of this study has brought about a few surprises with regards to perception and what is reality in these communities. The 3 study communities of Gumbihini,Kukuo and Vitting in total had a coverage of 83.9% when it comes to access to piped water and this high coverage can be attributed to their reasonable access to municipal piped water connections . Thus household with improved water source according to the WHO/UNICEF JMP are higher than the regional average of 47.1(JMP,2015).

The results of the study showed that 47.7% of the households had access to their own privately piped water sources and this can be compared to global of average of 73% for the urban population that used piped water from household connection in developing countries. While in urban areas of Sub-Saharan Africa 35% of urban households use water piped to the household (WHO/UNICEF, 2010). The 47.7% of coverage for the study communities is higher than the average for sub-Saharan Africa.

This study also showed that, a vast proportion (269) 74.6% of households had access to water within a time of 30 minutes or less. Literature reviewed has indicated that people will not constraint their water use if collection times is less than three minutes, or within about 100 metres in easy terrain with no waiting times. The Longer it takes to collect water the more likely water use will be restricted by households (Rottier et al., 2003). Ensuring easy access to water source can greatly lessen the time women spend fetching water,

allowing them more time to care for young children and also engage in income generating activities (Environmental Health Project 2004).

The study therefore shows that 79% of the households in the study communities had access to water within a distance of up to 200 meters or less. This can be compared with the findings of study done in Kisumu city (Kenya) in which 77.1% of the household's access to water within a distance of up to 200 metres or less (Wagah et al.,2010).

In many societies, household water is managed solely by women. Females (adult and child) are commonly the ones who fetch water for the home, transport it, store it and then use it for various household purposes (UNICEF, 2008).and this was no different from the result of this study were 85.3% of all water fetched was done by a female (adult and child).

A Female child (under age 15) was one and half times more likely than a male child of the same age to collect water. This finding indicates that the task of water collection is considered a task for members of the household of the female gender. There are several possible explanations for this finding. Traditional cultural and religious practices may determine who is tasked with fetching water for the household. With regards to the unequal distribution of the task of collecting water, this 85.3% is higher compared to the data for all developing countries, which shows an average of 64% (WE Consult & UNICEF Mozambique,2009). Access to an improved source of drinking water within practical time and distance from the household could reduce the burden of hardship on the female members of the household

With regards to Basic sanitation Studies has shown that accessibility to improved sanitation at the 75% is associated with improved health and less than 75 percent still exposes those with improved sanitation in their homes at risk because of the poor environmental conditions round them(Bateman et al.,1995).In the study communities 71.1% of respondents has access to improved sanitation which still falls short of the 75% thread hold .this shows that with a little more effort the 75% target is attainable.

In the study communities 28.8% of respondents used unimproved toilet facility and of this figure 91.4% used public toilets which is not ideal since According to research, most communal or public toilets are consistently poorly maintained and are a health hazard (DFID,1998). Sharing of private toilet facility with other household was common 72.4% of private toilets where shared with other household which degrades the hygienic conditions

of these places. The fact that the toilet facility is been shared will means it will be less hygienic than facilities used by a single household (WHO/UNICEF,2006a).

6 Conclusion and Critical Analysis

This study was to examine the environmental sanitation conditions with regard to water use, basic sanitation facilities use and availability in 3 selected communities in the Tamale Metropolis of Ghana. This study was done at the household level in Gumbihini, Kukuo and Vitting all peri-urban communities in the Tamale Metropolis. The study was able to show environmental sanitation conditions in the selected communities at the household level mainly in relation to water supply and basic sanitation. Largely, the finding of the study showed that there is a relatively good domestic environmental sanitation conditions, it has become clear that some households in the study communities were denied access to full spectrum of basic and essential environmental sanitation services, facilities. The results of the study highlighted the following.

From the results of this study, it is evident that the majority of households had access to an improved source of drinking water within reasonable time and distance to fetch drinking water. However, a significant number of household still rely on unimproved water source for their drinking water. There are gender inequities in the distribution of the task of collection of water as females carried out that task in vast majority of households. A vast majority of households practice any form of water treatment at home due to majority collecting their water from a tap connected to the Ghana water company water system.

Majority of households in the study used improved private toilets. Close to half of the improved toilets were Kumasi ventilated improved Pit type of toilet. While households in the study area had a good understanding about the benefits of having toilet facilities, A significant number of households still used unimproved toilet facilities. This situation makes the accessibility of improved basic sanitation facility insufficient. the insufficient service levels the study communities could be seen as opportunity for further focused improvements towards access to improved water and environmental sanitation services

6.1   Critical analysis

The results of this study can be a significant contributor to policy planning and strategy with regards to issues of environmental sanitation and water use in these communities which are often marginalized in the overall planning and execution of major environmental sanitation projects been run at the metropolitan level

This study also gave me an insight into the "true" situation of the Sanitation and water use conditions in these communities. I missed an opportunity to collect more demographic data such as income levels, type of employment, residency situation of household whether they owned their house or were renting it since all this demographic information play a big part in determining the choice of toilet or water source accessed by the household or the type of services that are available to these households. Also, I should have included more than 3 communities since there are about 8 to 10 of such communities scared around the Tamale metropolis so as to get a fuller picture of the situation in the metropolis since I can't use just 3 communities to generalize the conditions in the region.

Reference list

Bachhuber, D, Conrad, J & Shadix, T. (2008). Developing water: The socio-political constraints to providing clean drinking water in rural India. India: Whitman Direct Action (WDA).

Bateman, OM, Jahan, RA, Brahman, S, Zeitlyn, S & Laston, SL. (1995). Prevention of diarrhoea through improving hygiene behaviours: The Sanitation and Family Education (SAFE) Pilot Project Experience. Washington, DC: United States Agency for International Development (USAID) Environmental Health Project (EHP).

Billig, P, Bendahmane, D & Swindale, A. (1999). Water and sanitation indicators measurement guide. Washington D.C.: United States Agency for International Development (USAID) Food and Nutrition Technical Assistance Project

Burns, N & Grove, SK. (2005). The practice of nursing research: conduct, critique and utilization.5th edition St Loui: Elsevier/sauders

Child Health and Early Development (2015) In: Ghana Demographic and Health Survey

Department for International Development. (1998). Guidance manual on water supply and sanitation programmes. London: Water, Engineering and Development Centre (WEDC).

Dwivedi, P & Sharma, AN. (2007). A study on environmental sanitation, sanitary habits and personal hygiene among the Baigas of Samnapur Block of Dindori District, Madhya Pradesh. J. Hum. Ecol. 22(1):7-10.

Environmental Health Project. (2004). Assessing hygiene improvement: Guidelines for household and community levels. Washington, DC: United States Agency for International Development (USAID) Environmental Health Project (EHP).

Fast Facts : Sanitation. (2011). Retrieved from http://sanitatondrive201.org/wp-content/uploads/2013/03/DSG_Sanitation_Fast_Facts_final.pdf

Fast facts (2013): World Health Organization Joint Monitoring Program www.who.int/water_sanitation_health/en/index.html

Fewtrell, L., Fuge, R., & Kay, D. (2005). An estimation of the global burden of disease due to skin lesions caused by arsenic in drinking water. Journal of Water and Health, 3(2), 101–107.

Franceys, R, Pickford, J & Reed, R. (1992). A guide to the development of on-site sanitation. Geneva: World Health Organization (WHO).

Gebru T, Taha M, Kassahun W (2014) Risk factors of diarrhoeal disease in under-five children among health extension model and non-model families in Sheko district rural community, Southwest Ethiopia: Comparative cross-sectional study. BMC Public Health 14: 395-402.

Ghana Statistical Service (GSS), Ghana Health Service (GHS), and ICF Macro. (2009). Ghana Demographic and Health Survey 2008. Accra, Ghana: GSS, GHS, and ICF Macro

Ghana Statistical Service. (2014): District Analytical report Tamale Metropolis.

Girei, AA & Giroh, DY. (2011). Analysis of the relevance of baseline survey in the selection of beneficiaries: The case of community and social development agency Adamawa State, Nigeria. World Rural Observations.

Gosselin, P, Furgal, C & Ruiz, A. (2001). Environmental health indicators for the U.S. – Mexico border region: Concept document. El Paso: Pan American Health Organization (PAHO).

History of Ghana water Company Limited Retrieved on 11th April 2018:
http://www.gwcl.com.gh/gwcl_history.pdf
Howard, G. (2003). Domestic water quantity, service, level and health. Geneva: World Health Organization (WHO).

Hygiene Improvement Project. (2010). Access and behavioural outcome indicators for water, sanitation and hygiene. Washington, DC: United States Agency for International Development (USAID) Hygiene Improvement Project

Hygiene Improvement Project. (2010). Access and behavioural outcome indicators for water, sanitation and hygiene. Washington, DC: United States Agency for International Development (USAID) Hygiene Improvement Project

Kate Ann Levin (2006) Study design III: Cross-sectional studies Evidence-Based Dentistry.Nature volume7, pages24–25 2006

McConville, J. (2003). How to promote the use of latrines in developing countries. MS. (Field Engineering in the Developing World) thesis. Department of Civil and Environmental Engineering, Michigan Technological University

Ministry of Water Resources, Works & Housing, National Water Policy, 2007

Mmom, PC & Mmom, CF. (2011). Environmental sanitation and public health challenges in a rapidly growing city of the Third World: The case of domestic waste and diarrhoea incidence in Greater Port Harcourt Metropolis, Nigeria. Asian Journal of Medical Sciences 3(3):115-120

Moe, CL & Rheingans, RD. (2006). Global challenges in water, sanitation and health. Journal of Water and Health 04(Suppl):41-57.

Progress on Drinking Water, Sanitation and Hygiene:(2017) Update and SDG Baselines. Geneva: World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), 2017

Prüss-Üstün, A, Bos, R, Gore, F & Bartram, J. (2008). Safer water, better health: costs, benefits and sustainability of interventions to protect and promote health. Geneva: World Health Organization (WHO).

Rottier, E & Ince, M. (2003). Controlling and preventing disease: The role of water and environmental sanitation interventions. Leicestershire: Water, Engineering and Development Centre (WEDC), Loughborough University

S.A. Esrey, "Water, waste, and well-being: a multi-country study".American Journal of Epidemiology 143, pp 608–623, (1996)

Shaw, R (ed). (1999). Running water. London: Water, Engineering and Development Centre (WEDC)/IT Publications.

United Nations Children's Fund. (2006). Progress for children: A report card on water and sanitation. New York: UNICEF

United Nations Children's Fund. 2008. UNICEF handbook on water quality. New York, NY: United Nations Children's Fund (UNICEF)

United Nations Childrens Fund Ghana News Letter (2015)

United Nations Department of Economic and Social Affairs. [2018] Progress towards the Millennium Development Goals, 1990-2005. From: http://unstats.un.org/unsd/mi/goals_2005/goal_7.pdf (accessed 27th April 2018).

United Nations Population Fund, State of World Population (2007)-Unleashing the Potential of Urban Growth. New York, USA: UNFPA,2007

Wagah, GG, Onyango, GM & Kibwage, JK. (2010). Accessibility of water services in Kisumu municipality, Kenya. Journal of Geography and Regional Planning 3(4):114-125

WE Consult Lda & UNICEF Mozambique. (2009). Survey on water, sanitation and hygiene: Findings of a household survey conducted in 18 districts of Mozambique. Maputo: WE Consult Lda and UNICEF Mozambique.

WHO / UNICEF (2014). Progress on Drinking Water and Sanitation, JMP's (WHO/UNICEF)2014_Update.http://www.wssinfo.org/fileadmin/user_upload/resources/JMP_report_22014_webEng.pdf

World Health Organization & United Nations Children's Fund. (2004). Harmonization of major survey instruments. Geneva: World Health Organization (WHO) and United Nations Children's Fund (UNICEF).

World Health Organization & United Nations Children's Fund. (2006b). Meeting the MDG drinking water and sanitation target: the urban and rural challenge of the decade. Geneva: World Health Organization (WHO) and United Nations Children's Fund (UNICEF) Joint Monitoring Programme for Water Supply and Sanitation (JMP).

World Health Organization & United Nations Children's Fund.(2006a). Core questions on drinking-water and sanitation for household surveys. Geneva: World Health Organization (WHO) and United Nations Children's Fund (UNICEF) Joint Monitoring Programme for Water Supply and Sanitation (JMP).

World Health Organization & United Nations Children's Fund.(2010). Progress on sanitation and drinking-water: 2010 Update. Geneva: WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation

7 Appendix

QUESTIONEER FOR HOUSEHOLD SURVEY

1. Household size
   1-3
   3-5
   5-7
   7-more

2. What is the main source of drinking-water for members of your household?
   Piped water into dwelling >>Q7
   Piped water to yard/plot >>Q7
   Public tap/standpipe >>Q4
   Tubewell/borehole >>Q4
   Protected dug well >>Q4
   Unprotected dug well >>Q4
   Rainwater collection >>Q5
   Satchet water >>Q7
   Cart with small tank/drum >>Q4
   Tanker-truck >>Q4
    Surface water (river, dam, lake, pond, stream, canal, irrigation channels) >>Q4
   Other (specify) >>Q4

3. What is the main source of water used by your household for other purposes, such as cooking and hand washing?

   Piped water into dwelling >>Q7
   Piped water to yard/plot >>Q7
   Public tap/standpipe >>Q4
   Tubewell/borehole >>Q4
   Protected dug well >>Q4
   Unprotected dug well >>Q4
   Rainwater collection >>Q4
   Satchet water >>Q7

Cart with small tank/drum >>Q4
Tanker-truck >>Q4
 Surface water (river, dam, lake, pond, stream, canal, irrigation channels) >>Q4
Other (specify) >>Q4

4. Who usually goes to this source to fetch the water for your household?
   Adult woman >>Q6
   Adult man >>Q6
   Female child (under 15 years) >>Q6
   Male child (under 15 years) >>Q6
   Don't Know >>Q6

5. How long does it take to go there, get water, and come back?

   No. of minutes >>Q7
   Water on premises >>Q8
   Don't Know >>Q7

6. What is the Distance from your household to source of water

   Less than 200meters >>Q7
   More than 200Meters >>Q7

7. Do you treat your water in any way to make it safer to drink?
   Yes >>Q8
   No >>Q9
   Don't Know >>Q9

8. What do you usually do to the water to make it safer to drink?
   Boil >>Q9
   Add bleach/chlorine >>Q9
   Strain it through a cloth >>Q9
   Use a water filter (ceramic, sand, composite, etc.) >>Q9
   Solar disinfection >>Q9
   Let it stand and settle >>Q9
   Other (specify) >>Q9
   DK >>Q9

9. What kind of toilet facility do members of your household usually use?
   Flush/Pour Flush>>Q10
   Kumasi Ventilated improved pit latrine (KVIP) >>Q10

Traditional pit latrine >>Q10
Communal latrine >>Q10
Public Toilet >>Q10
No facilities or bush or field
Other (specify) >>Q10

10. Do you share this facility with other households?
Yes
No