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KNOWLEDGE, ATTITUDE AND PRACTICES OF ISLAMIC LEADERS IN RELATION TO SUSTAINABLE DEVELOPMENT GOAL 6 IN TAMALE

FARIDU ABDUL-WADUDU

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BY

FARIDU ABDUL-WADUDU (BSc. Nursing)

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UNIVERSITY FOR DEVELOPMENT STUDIES

DECLARATION

DECLARATION

Student

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

..... 19/05/2022

Faridu Abdul-Wadudu Date

Supervisor

I hereby declare that the preparation and presentation of the thesis was supervised in accordance with the guidelines laid down by the University for Development Studies.

..... 19/05/2022

Glover Evam Kofi (PhD) Date

DEDICATION

This work is dedicated to my family and loved ones.

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ABSTRACT

The campaign for improved sustainable development goal six (6) is increasingly threatened as people's existing knowledge and attitudes seem not to promote clean water and proper sanitation practices. Environmental sanitation has become a problem to the extent that it has engaged the attention of authorities as well as concerned citizens. As a result, over the years Ghana failed to achieve her set sanitation target. One area that has suffered from this problem is the Muslims (Zongo) communities.

The main objective of the study is to assess the knowledge, attitude and practices of Islamic leaders in relation to Sustainable Development Goal 6 (SDG6) in Tamale Metropolis.

The study employed a descriptive cross-sectional study design. The study used primary data collected through questionnaire by the interview method among a total of 384 Islamic leaders randomly selected from the various listed major Mosques in the Tamale Metropolis. In line with the principles of the Health Belief Model as the theoretical framework for this study, the dependent variables: Knowledge, Attitudes and Practices in relation to clean water and sanitation were set against the independent variables: Socio-demographics; Acceptance of the precepts of Islamic religion on sanitation and clean water; Perceived seriousness of SDG 6; Perceived benefits related to SDG6 and Perceived barriers associated with SDG6.

This study has highlighted inadequate knowledge among Islamic leaders on SDG6 in Tamale Metropolis. Few respondents (27.7%) had confidence in the achievement of the SGD-6 by the year 2030. The findings suggest that even though respondents were very aware of the critical role of cleanliness in Islam, they lack the impetus to make a difference as leaders in the SDG6 implementation on the ground. The findings also show a significant association between educational status and knowledge and practices related to SDG6 ($X^2=37.542$, $p=0.001$). Among other critical findings, this thesis is unique in demonstrating that the three respective identities: traditional culture, Islam and modern policy (SDG6) share the mutual trust in clean water and sanitation within society. The confidence that each party brings to the table as a genuine stakeholder could enhance symbiotization and harmonization of links between the respectively different reasoning structures for the achievement of SDG6 - clean water and sanitation within the society.

It is recommended that change agents in SDG6 Health Education should have reference roots in cultural sensitivities and religious ideas that bring meaning and bigger agency in the drive towards achieving this mutually critical goal.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

By the end of 2015, the Sustainable Development Goals (SDGs) took over from the Millennium Development Goals (MDGs) (UN General Assembly, 2015; UN Water, 2018). Goal 6 of SDGs seeks to 'ensure availability and sustainable management of water and sanitation for all'. Despite the fact that some other SDGs also seek to address the challenges of water, sanitation, and hygiene (WaSH), this goal specifically sets out a clear plan of action in framing WaSH development efforts between 2015 to 2030 (UN, 2018). Unlike what pertains in the previous MDG target 7.C: reduce the proportion of people without access to safe drinking water and basic sanitation by half by 2015 (UN, 2015), the agency of SDG 6 is to demand a shift in knowledge needs regarding the challenge. This is especially important given the fact that the human right to cleanliness is intricately related to other human rights (Albuquerque, 2019). He goes on to say that the right to sanitation includes specific conditions for accessibility, price, availability, quality, and acceptance (ibid). "Sanitation is more vital than political independence," Mahatma Gandhi is reputed to have declared (Mulama, 2018).

In September 2015, the member nations of the General Assembly of the United Nations unanimously agreed to agenda 2030 that seeks to transform the world in all important arenas by centering on the actions of people, leaders and all stakeholders in the realm of physical, social and economic development. It was resolved by all member states of the United Nations to take transformative approach towards ending poverty and its related hurdles worldwide; concertizing people to tread on the path

that leads to sustainability in growth and development and ensuring that no one is left behind.

The agenda 2030 has seventeen (17) Sustainable Development Goals (SDGs) to be achieved between the periods of 2015 to 2030. These goals are accompanied with one hundred and sixty-nine (169) global targets for effective and efficient measurement of outcomes of the goals set. The targets are well inclusive and mimic all spheres of development including economic, social, political and environmental spectra of sustainable development. It also seeks for the realization of women empowerment and respect for the fundamental human rights of people across member countries.

Sustainable management of water resources and access to safe water and sanitation have been noted to be critical as link for economic growth and productivity with significant leverage for nearly every one of the other SDGs relying, in one way or the other, on Water, sanitation and hygiene. No doubt, the United Nations General Assembly recognizes that access to safe water and sanitation is a human right.

1.2 Problem Statement

The United Nations (UN) has declared that access to safe drinking water and sanitation is a fundamental human right (UN, 2018). However, over 2 billion individuals globally do not have accessibility of safe drinking water (UNICEF, 2014). Safe drinking water and sanitation facilities are deemed vital for human existence and well-being (WHO, 2011). Millions of people's health, particularly children's, is jeopardized if these fundamental demands are not met (Yaya et al., 2018). However, according to the WHO, about 2.3 billion and 844 million persons worldwide cannot access basic water for drinking and sanitation facilities, respectively, resulting in 842,000 deaths each year (WHO, 2017). Poor hygiene habits and insufficient sanitary

conditions, according to WHO (2010), have a major influence in the rising burden of communicable diseases in developing nations. The estimates (WHO/UNICEF 2010) show that 1.1 billion individuals encounter difficulties in accessing water supplies and 2.6 billion people lack adequate sanitation. The need to employ a suitable conduit to deal with the menace emanating from sanitation and personal hygiene geared towards achieving Sustainable Development Goals (SDG) on sanitation has therefore been seen as critical.

According to the data, 2.2 billion people lacked access to safe drinking water and 4.2 billion lacked access to safe sanitation in 2017. (United Nations, 2018). At home, 3 billion people lack elementary hand washing amenities. It was revealed that 2 out of every 5 healthcare institutions in the world lack soap and water, as well as alcohol-based hand rub (2016 data) (United Nations, 2018). The COVID-19 epidemic has made this objective even more critical (United Nations Economic and Social Council, 2020). However, the pandemic may hinder water utilities capacity to achieve this goal by increasing revenue losses that would otherwise be utilized to invest.

Eighty countries had delivered clean water to more than 99 percent of their populations by 2017. Between 2000 and 2017, the global population without access to safe drinking water fell from about 20% to around 10%. (UN, 2018). To eliminate open defecation, 2.6 billion people will need toilets and sanitation, as well as a shift in human behavior. (WHO, 2017). Nearly one-third of countries, including China, Indonesia, Brazil, Ethiopia, Pakistan, India and Nigeria will need to fast-track progress to stop open defecation by 2030 to reach SDG sanitation targets (UNICEF, 2014). Governments, civil society, and the commercial sector will need to work together to achieve this (Kellogg, 2017).

The problem of open defecation is closely related. Around 892 million individuals still defecate in the open. Between 2000 and 2015, the number dropped from slightly over 1.2 billion to just over 1.1 billion. 90% of individuals who still defecate in the open lived in rural areas, and the majority of them were concentrated in just two regions, with 558 million in Central and Southern Asia and 220 million in Sub-Saharan Africa (WHO, 2016). By 2030, a significant effort will be required to put a stop to this behavior (WHO, 2016).

The acceptance of the Sustainable Development Goals by member countries in the year 2015 became critical due to the set of values it carries globally (Adjei et al., 2017). This is in tandem which the teachings of Islam, a islamic religion that seeks to guide mankind unto the right path. Sustainable Development Goals and Islam revolve around the same fulcrum of ensuring practices in the environment that nurture and not harm the very survival of humans today and the generations to come (Adjei et al., 2017).

1.3 Justification

Providing sanitation facilities and services, as well as waste management, are important to the development tasks of the Metropolitan, Municipal and District Assemblies (MMDAs), as stated by the Legislative Instruments that formed them and the Local Government Act, 1993 (Act 462). Generally, however, anecdotal evidence suggests that these basic services have not been adequately provided by MMDAs. Ghana Demographic and Health Survey (2015) opined that just 1 out of every 10 rural households used upgraded household toilets in 2015, while 3 out of 10 opted for open defecation, and no district in Ghana has attained open defecation-free status. According to the Ghana Statistical Service (2018), while more than half of Ghanaian households have a designated location for handwashing, only roughly one out of

every five families has access to water or other cleansing agents. In Ghana, however, there is no comprehensive urban basic sanitation policy or plan (UNICEF Ghana, 2014).

According to Adom, Takramah, Kwabla, and Kweku (2016), Ghana's five major cities (Kumasi, Accra, Tamale, Tema and Sekondi-Takoradi) accounted for roughly 19% of the country's total population in 2010 and generated an estimated 3,200 tons of solid trash every day. Other urban areas, which account for around 34% of the overall population, also produced 5000 tons each day. The analysis also illustrates that food wrapping and packaging has evolved over the last two decades, from leaves and paper through thin-film plastics and now to denser plastics. Similarly, vending of drinking water has progressed from "bucket-and-cup" through "thin-film plastics," and now to denser plastics such as sachet and bottled "mineral" water.

The Ghana Demographic and Health survey report in 2014 revealed that most houses do not still have household toilets and resort to public toilets and open defecation. The results indicated that above 70 percent of households were without toilet facilities, while another 14 percent used public toilets. The challenge of insufficient drainage facilities for sullage and storm water conveyance causing flooding in most areas every rainy season also compounds the issues in Ghana. Apart from this, over 10,000 Ghanaian children die each year from medical conditions that could be prevented with regular hand washing using soap and water (Adjei et al., 2017). The Ghana Demographic and Health Survey (2014) reports that poor sanitation and personal hygiene contribute to about 70% of diseases within the Northern Region of Ghana. It is obvious therefore that Northern Region faces its own peculiar challenges in this respect. According to the Ghana Demographic and Health survey (2015), poor sanitation and personal hygiene contributes to about 70% of diseases within the

Northern Region of Ghana. About 72% of the people have no toilets and therefore practice open defecation making it the region with the highest prevalence of open defecation in Ghana.

Tamale is the regional capital of the Northern Region of Ghana. There is evidence that the problem of poor sanitation and the supply of clean water has remained one of the major challenges of the municipality. Consequently, the records (Adjei et al., 2017) suggest that in northern Ghana for instance, water and sanitation related diseases remain a major public health concern especially health problems primarily transmitted through the fecal-oral route.

It must be said however that, water and sanitation situation of cities in Ghana remains a topical issue generally because of negative effects of increased population that has overwhelmed the capacity of service provision, the emergence of slums and scarcity of social amenities. The Tamale Metropolis as the destination of many migrants from rural areas all over the north including even international youth from Mali, Burkina-Faso, and the Ivory Coast faces the challenge of ensuring that SDG6 (water and sanitation) is secured (Adjei et al., 2017). The mere influx of youth from neighboring rural areas of the north and from neighboring countries who are predominantly Muslim means that Zongo communities of Tamale face comparatively more challenges that need some critical policy because good health and survival demands that clean water and sanitation become inseparable.

Consequently, the records (Adjei et al., 2017) suggest that in northern Ghana for example, Hylecobactor Pylori remains a major public health concern. The health problem primarily transmitted through the faecal oral route is associated with a broad spectrum of gastric pathologies including; chronic gastritis, Mucosal Associated

Lymphotrophic tumor (MALT), Gastroesophageal Reflux Disease (GERD), Peptic ulcer disease and Gastric cancers. Others include Hepatitis A and E viruses causing fulminant hepatitis (acute liver failure from acute liver necrosis). These are found to be highly prevalent with high mortality rate especially among pregnant women in northern Ghana (Adjei et al., 2009).

The principles of impoverished people's livelihood can be reinforced by ensuring accessibility of clean water and good sanitation services, as well as inspiring individuals to practice greater medical, household, and environmental hygiene (UNICEF, 2015). The knowledge and understanding of people about sanitation, clean water, and health associated issues are regarded key determinants in orienting practice in a specific setting (Akter & Ali, 2011).

Given that the population of the Tamale Metropolis is overwhelmingly Muslim, it is obvious that Islamic ideas could play a critical role in the achievement of SGD6 in minimizing the spread of diseases (Akter & Ali, 2011). If the core quality of good teaching proceeds by developing the main points from past to present, simple to complex, known to unknown, and from most frequently used to least frequently used, then using Islamic precepts of personal hygiene and environmental sanitation for Health Education among Muslims evokes the principle of Teaching that recommends working from the known to the unknown.

The tenets of Islam, strongly support physical cleanliness as next to godliness (Mamat et al., 2009). The Prophet, (PBUH), said 'cleanliness is half of faith'. Of the 5 fundamental tenets of Islam, practicing scrupulous personal hygiene at intervals of 5 throughout the day, is aside from the normal routine of bathing as stated in the Qu'ran. The "sunna" (methods of the Prophet) prescribes washing the hands to the

wrists, the mouth, the nose (nostrils), the ears, and the neck; a purified state called tahara or ablution done as many as 5 times in the day. The spiritual significance of tahara (ablution) aside, the exercise has implications also for the health of the disciple if efforts are made to show the links and if given some more impetus. In this sense, the Prophet's (PBUH) dictum could be considered as a very strong foundation for the Sustainable Development Goal 6: "Ensure access to … sanitation for all". Apart from its spiritual essence, Tahara has meaning for strategic health education to improve physical cleanliness (Bajirova, 2018). The argument is that, the custom of Tahara as a spiritual rite has already laid the foundation that could enhance knowledge on personal/household hygiene, better disposal of waste, eliminating open defecation and enforcing hand washing. From this premise of the known, it may be easier to introduce the health part (washing the hand with soap and clean water before performing ablution).

In September 2019 when I presented my research proposal the first time, COVID-19 was not an issue in Ghana. The novel idea that formed my research focus at the time was an Experimental Study to explore strategies for washing hands with soap before the religious rite of ablution (the fiqh), water and general sanitation including the observance of the code for washing the hands especially after using the toilet (Qadaahul Haajah in Quran verse 5:6). This was in a bid to explore the strategic use of the precepts of Islam as conduit to facilitate diffusion of sanitation related innovations in the Zongo communities of Ghana.

Unfortunately, just before I could start the project, the COVID-19 pandemic swept through the world with its unprecedented havoc. I was frustrated by the fact that the COVID-19 pandemic unilaterally evoked the same critical measures I originally sought to establish using the experimental approach - seeking to use the dictum of

Islamic cleanliness (independent variable) to gauge the effect of the changes on the dependent variable (achievement of SGD6). The COVID-19 pandemic therefore directly preempted my initial research agenda for example in making washing hands with soap the 'new normal' for all (including non-Muslims, my proposed control group), therefore rendering my research objective quite redundant.

Given this background and time limitations, the purpose of this current study therefore shifted focus to a cross-sectional study investigating how Islam meets the secular in the pursuit of the 'new normal' where running water and soap for washing the hand as well as environmental hygiene is critical. Knowledge, Attitudes, and Practices (KAP) related to achieving SDG6 are crucial for the long-term sustainability and effectiveness of water and sanitation programs in communities (USAID, 2011). In order to provide trustworthy and sufficient data for efficient implementation of SDG6 programs and guaranteeing good public health, this study intends to analyze the knowledge, attitudes, and practices related to SDG6 among Muslims leaders in Tamale Metropolis, Ghana.

1.4 Research Questions

A number of questions therefore beg for answers;

1. What is the level of knowledge of Islamic leaders in relation to Sustainable Development Goal 6?
2. What is the attitude of Islamic leaders in relation to Sustainable Development Goal 6?
3. What are the practices of Islamic leaders in relation to Sustainable Development Goal 6?
4. What are the relationships between socio-demographics of Muslims leaders and their Knowledge Attitude and Practice towards SDG6?

1.5 General Objective

The main objective of the study is to assess the knowledge, attitude and practices of Islamic leaders in relation to Sustainable Development Goal 6 in Tamale.

1.5.1 Specific Objectives

1. To assess the Knowledge of Islamic leaders in relation to Sustainable Development Goal 6 in the Tamale Metropolis.
2. To assess the Attitude of Islamic leaders in relation to Sustainable Development Goal 6.
3. To determine the Practices of Islamic leaders in relation to Sustainable Development Goal 6.
4. To identify the relationships between socio-demographics of Islamic leaders and their Knowledge, Attitude and Practice towards SDG6.

1.6 Significance of the Study

This study seeks to find answers to the many questions that beg for answers. It seeks to devise innovative means of reaching the Zongo community through advocacy using islamic religion as a conduit. This project will contribute to the achievement of goal six (6) and goal three (3) of the Sustainable Development Goals and to the realization of government's special focus on addressing sanitation as a problem. The outcome of this study may therefore be useful to policy makers, scholars as well as management of health institutions. In this wise, the study findings may give health practitioners a different perspective of handling clients due to its novelty.

In addition, the study findings would aid in formulating evidence-based decisions by programme implementers with the aim of providing comprehensive services. For the

same reason, it is anticipated that, this study would stimulate other researchers in Ghana into working around this issue.

1.7 Limitations of the Study

Fieldwork for this study was limited to Tamale Metropolis. As a result of this, the conclusions drawn may therefore be useful mainly to this Metropolis in Ghana. The challenge of COVID-19 has also limited movement during the fieldwork generally. More time was therefore spent and more cost to the study than originally budgeted. These challenges have however, not affected the quality of the data and the thesis write-work in any negative way.

1.8 Organization of the study

There are six chapters in this thesis. The first chapter provides a summary of the study's background material, research questions, hypothesis, importance, and organizational structure. The second chapter contains a thorough assessment of relevant literature. The methodology for the study is covered in Chapter 3, which includes the study type, population selection, sampling strategies, respondent recruitment, data collection techniques and processes, data analysis methodologies, and the study region profile. The results and interpretations are presented in Chapter 4, which includes a collection of texts, tables, and figures that illustrate the findings. The fifth chapter contains discussions of similar studies that are compared globally. The essential facts, conclusions, and suggestions are summarized in Chapter 6.

1.9 Theoretical Framework

My theoretical perspective is founded on the Health Belief Model's concepts (Rosenstock, 1974). The Health Belief Model (HBM) tries to explain why people participate in preventative health practices in the absence of overt symptoms of illness. Any activity conducted by an individual for the intention of preventing

sickness, detecting sickness in an asymptomatic stage (Kasl and Cobb, 1966), or enhancing health is classified as preventive health behavior (Rosenstock, 1974). The HBM's basic premises are that in order for an individual to act in prevention of sickness, he must: (1) believe that he is personally prone to the ailment; (2) believe that the incidence of the disease will have at least moderate severity on some aspect of his life; (3) believe that taking health action will be useful in minimizing his vulnerability to the disease or, if the illness occurs, minimizing its brutality; and (4) believe that taking action will not require overcoming psoriasis (Rosentock, 1974).

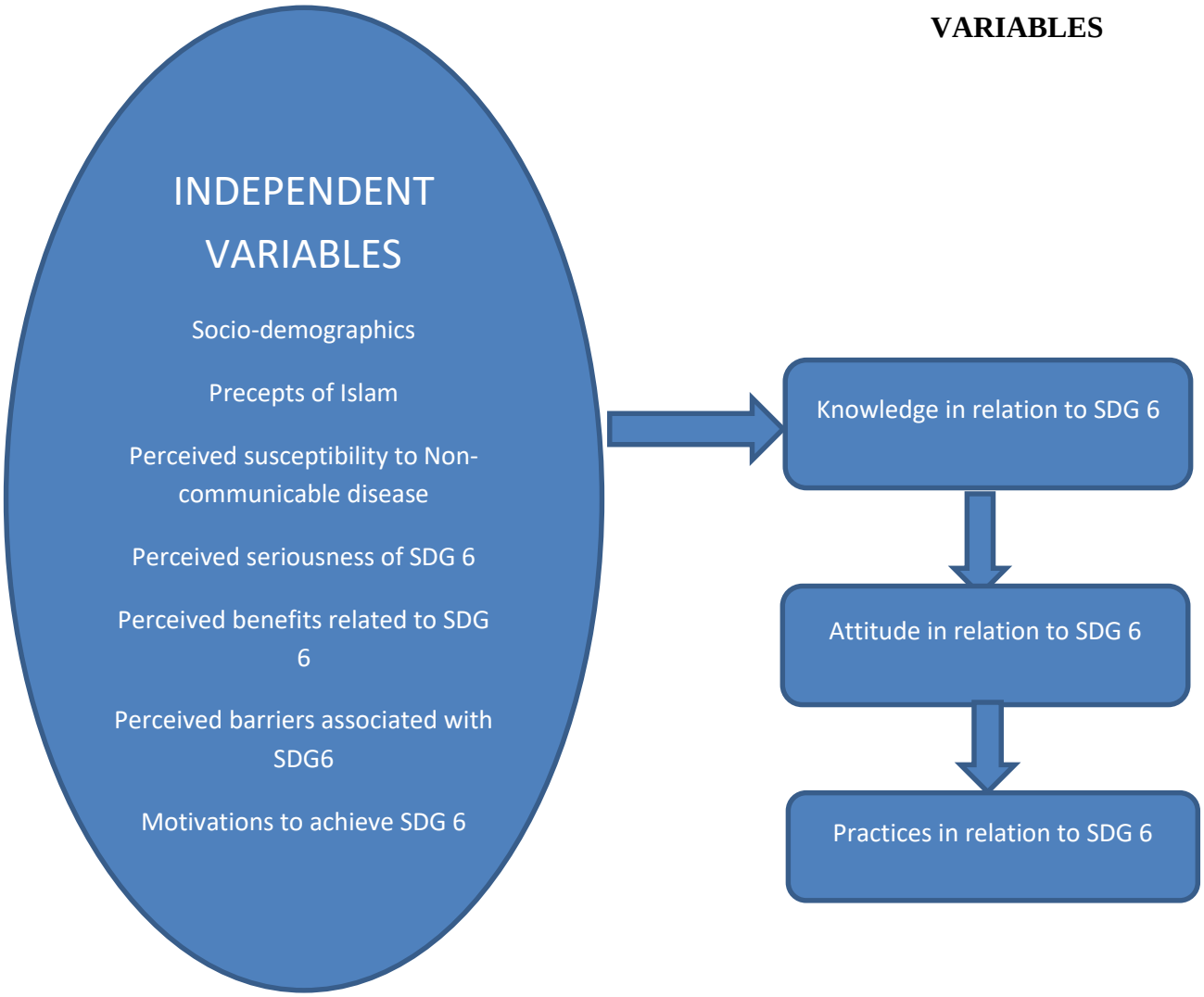

Figure 1.1: Theoretical Framework

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

A literature review is a procedure that entails reading relevant literature to gain a thorough overview of the material that is available and relevant to the subject under investigation. Polit and Beck (2017) stated that literature review focuses on areas relevant to the research topic. Relevant studies and literature related to hypertension was reviewed. Analysis of relevant peer reviewed studies in low and high resource countries were searched and reviewed in the following databases; CINHL, Medline, Pubmed, Biomed, books and gray material on SDG6. The review was grouped under the following headings: History of Islam in Ghana, overview of SDG6 and Knowledge. Attitude and Practice of SDG6.

2.1 A brief history of Islam in Ghana

Arab merchants traveling through the trans-Saharan salt and gold trade routes presented Islam to West Africa as early as the 8th century (Martin, 2003). They were accompanied by Muslim intellectuals, who were influential in building mosques and learning centres along the way. (Martin, 2003). Furthermore, the historically nomadic Hausa and Fulani traveled across West Africa, bringing their Muslim values with them to areas like Ghana (Martin, 2003). Locals' acceptance of Islam, on the other hand, was a late development, occurring somewhere in the 15th century (Martin, 2003). It's wasn’t just an easy process. Certain native scholars are of the view that, Daawa staff from neighboring African countries brought Islam to Ghana (Martin, 2003). They perceive that majority of Daawa staff in Ghana have received Islamic education in mosques, adding that the mosque in Ghana has played a significant role in the lives of Muslims. Islam is one of the most commonly practiced islamic

religions in Ghana. Since the 10th century, it has existed in Ghana. According to the Ghana Statistical Service's Population and Housing Census, the number of Muslims in Ghana is projected to be 18 percent. Out of this about 80% of the Islamic population stated above come from the Northern part of Ghana (GDHS, 2021).

2.1.1 Role of Islam leaders and Practice of Hygiene.

Leadership is the willingness of a person to direct a group of people to carry out a specific task, to room their followers with the intention of succession Management, so that no negligence can be made (Martin, 2006). A real leader is indeed a man of principle who has good coordination, firmness and dynamism in his personalities. In Muslim communities, leaders are highly obeyed. The Holy Book, the Quran, recommends and creates tangible commendations for the qualities that a leader must possess in order to lead effectively (Al-Ghazali, 1939). Generally, there are several leaders in Islam and each has particular role to execute. Some Islamic leaders include, Alim, Allamah, Almani, Caliph, Imam, Grand Imam, Grand mufti and many more (Al-Ghazali, 1939). Islamic leaders irrespective of their peculiar roles have the mandate to perform activities which include, motivating the followers, delegating powers to individuals, training people, consultative decision-making, problem solving and appraisals. In Africa, mallam is a title given to someone who has learnt much and trained to teach the Quran (Al-Kawthari, 2006).

At the community level, an Imam is chosen. Members of the society vote for person who is thought to be intellectual and trustworthy (Al-Kawthari, 2006). The Imam must be acquainted with and have understanding of the Quran, as well as be able to read it accurately and gracefully. An Imam's primary duty is to conduct Islamic worship services. Indeed, the term "imam" in Arabic literally means "to stand in front of," referring to the Imam's position in front of the worshipers during prayer (Al-

Kawthari, 2006). The citizens listen to the Imam recite the verses and words of prayer, either aloud or quietly, depending on the prayer (Al-Kawthari, 2006). In addition to being a prayer leader, the Imam may also be a member of a Muslim community's larger leadership team (Al-Kawthari, 2006). The Imam's advice can be sought in personal or religious matters because he is a respected member of the community (Al-Kawthari, 2006). He can be approached for spiritual guidance, assistance with a family problem, or in other times of need. The Imam may visit the sick, participate in interfaith service programs, and so on (Al-Kawthari, 2006).

Muslims have detailed instructions from the Prophet Muhammad about how to live their lives, including how to pray, fast, and remain ritually pure (Al-Kawthari, 2006). These instructions can be found in Hadith collections (Al-Kawthari, 2006). There are minor and major impurities, according to Islamic law, minor impurities include, among other things, urinating, defecating, and eating. Before prayer, a Muslim is expected to conduct a ceremonial cleaning of their body to remove these small impurities (Al-Kawthari, 2006). Islam has established strong foundations for a stable, clean, and sanitary way of life. To make the point even better, consider some practices through which hygiene is promoted, brushing teeth, washing hands, ears, and feet five times before praying, cutting eyebrows, trimming moustaches, and shaving pubic hair are all crucial steps in maintaining grooming (Al-Kawthari, 2006). Islam strongly advocate the teachings of the Prophet about distancing at least a metre away from a person with a contagious disease (Grabenstein *et al*, 2013). They speak about abstinence from alcohol and doing regular exercises such as horse ride. The prophet promoted the idea of 'Quarantine' when he made this statement in his teaching "that people from an area of plague should not go to another area that was free of plague" (Grabenstein *et al*, 2013). Throughout history, Muslims have practiced preventative

medicine, and they were among the first to believe in vaccination. Vaccines were later associated with colonization, which was unfortunate (Grabenstein *et al*, 2013). The concept of preventing harm, on the other hand, comes from Prophet Muhammad, peace be upon him, who said "you cannot enter or leave a city if it is infected with an infectious disease (Grabenstein *et al*, 2013). If you develop the illness, you should not spread it to anyone" (Grabenstein *et al*, 2013). Theologically, vaccination is based on this principle. Foods, drugs and vaccines are accepted provided the ingredients are proven to be halal (Grabenstein *et al*, 2013).

2.2 Overview of Sustainable Development Goals.

The MDG initiative began in 2000 and lasted until 2015. Its overall goal was to alleviate extreme poverty (United Nations 2017). 189 UN member states signed on to the campaign, which set eight development targets (WHO 2017). The goal of Target 7c was to reduce the number of persons that do not have access to safe drinking water and basic sanitation, including hygiene, by half. The aim was revised several times before being adopted in 2006. Disease prevention requires access to clean water and sanitation. Diarrhoeal illness alone kills 1.5 million people each year, including 360,000 under 5 children, mainly in low-income regions. Unsafe water, sanitation, and hygiene are assumed to be accountable for 58 percent of diarrhoeal diseases (WHO, 2017).

The MDGs were replaced by the SDGs for the period 2015–2030, which included a stand-alone goal—SDG 6—on water and sanitation access. MDG 7c and SDG 6 direct the collection of water and sanitation statistics worldwide, which determines what is known about access to water and sanitation. National policies, donor funding tactics (Cotton and Bartram 2008; Bain et al. 2012), and delivery of

services to a major portion of the world's population are all influenced by the goals.

The WHO and the United Nations Children's Fund (UNICEF) used the Joint Monitoring Programme for Water Supply and Sanitation to track progress toward MDG 7c (JMP). JMP counts 'improved and unimproved' sources of water and 'improved and unimproved' sanitation facilities as indicators of safe drinking water and basic sanitation. Survey data, such as Demographic and Health Surveys (DHS), UNICEF Multiple-Indicator Cluster Surveys (MICS), World Bank Living Standards Measurement Surveys (LSMS), WHO World Health Surveys (WHS), and national censuses and surveys, are used to make estimates (Cotton and Bartram 2008). The achievement of the MDGs has been remarkable. According to JMP statistics, the targets for safe drinking water availability were met in 2010, five years ahead of schedule (United Nations MDG Monitor 2017). It was noted that about 2.6 billion people acquired access to 'improved' drinking water sources between 1990 and 2015, whereas 2.1 billion people obtained access to 'better' sanitation. Since 1990, the number of people who practice open defecation has decreased by about half. However, the findings of our comprehensive literature analysis on MDG 7c suggest that these statistics may be overly optimistic, raising the question of whether MDG 7c progress has been sustainable and equitable (Adjei et al., 2017). In 2015, all United Nations Member States accepted the SDGs as a collective wake-up call action to eradicate poverty, safeguard the environment, and ensure that all people enjoy peace and prosperity by 2030 (WHO, 2017). There are currently 17 goals that have been combined to address the primary developmental concerns facing UN member countries. The SDGs stimulate cooperation between governments, the private sector, research,

academia, and civil society organizations with UN backing (CSOs). This link guarantees that the appropriate actions are made now to improve the lives of future generations in a sustainable manner. People, planet, prosperity, peace, and partnerships are the five underlying principles of Agenda 2030 (UN, 2017).

Table 2.1: The 17 Sustainable Development Goals.

NUMBER	GOAL
1	No poverty
2	Zero hunger
3	Good health and well-being
4	Quality education
5	Gender equality
6	Clean water and sanitation
7	Affordable and clean energy
8	Decent work and economic growth
9	Industry, innovation and economic growth
10	Reduced inequalities
11	Sustainable cities and communities
12	Responsible consumption and production
13	Climate action
14	Life below water
15	Life on land
16	Peace, justice and strong institution
17	Partnerships for goals

(United Nations, 2017).

2.3 Sustainable Development Goal 6.

"Clean water and sanitation for all" is the sixth SDG. The official language is: "Ensure availability and sustainable management of water and sanitation for all." It is one of 17 SDGs created by the United Nations General Assembly in 2015. (United Nations, 2017). The intention comprises eight aims that must be met by 2030 with 11 indicators using to check progress toward achieving the goals (UN, 2018). Safe and affordable drinking water; end open defecation and provide access to sanitation and hygiene; improve water quality, wastewater treatment and safe reuse; increase water-use efficiency and ensure freshwater supplies; implement IWRM; protect and restore water-related ecosystems are among the six "outcome-oriented targets." Expanding water and sanitation assistance to developing countries and supporting local engagement in water and sanitation management are the two "ways of achieving" aims (UN, 2018). In 2017, about 2.2 billion individuals did not have safe drinking water and 4.2 billion were without safe sanitation (Department of Economic and Social Affairs, 2020). At home, 3 billion people lack essential hand washing facilities (Department of Economic and Social Affairs, 2020). In 2016, two out of every five healthcare institutions in the world lacked soap and water, as well as an alcohol-based hand rub (Department of Economic and Social Affairs, 2020). The COVID-19 epidemic has made this objective even more critical (United Nations Economic and Social Council, 2020). However, the pandemic may hinder water utilities' capacity to achieve this goal by increasing revenue losses that would otherwise be utilized to invest (UN, 2018). SDG 6 is intertwined with the rest of the SDGs. Progress on SDG 6 will, for example, enhance health (SDG 3) and school attendance, both of which help to alleviate poverty. "Today, Sustainable Development Goal 6 is significantly off course," UN Secretary-General António Guterres said in April 2020, adding that it "is

hampering progress on the 2030 Agenda, the realization of human rights, and the attainment of peace and security around the world" (UN, 2017).

The United Nations (UN) has declared that access to safe drinking water and sanitation is a fundamental human right (UNESCO, 2019). Over 2 billion people throughout the world do not have access to safe drinking water (UNESCO, 2019). Eighty countries had provided clean water to more than 99 percent of their people by 2017. (UNICEF, 2019). Between 2000 and 2017, the world population without access to safe drinking water fell from about 20% to around 10%. (UNESCO, 2019). To eliminate open defecation, 2.6 billion people will need toilets and sanitation, as well as a shift in human behavior (WHO and UNICEF, 2017). Nearly one-third of countries, including Ethiopia, Brazil, China, Pakistan, Indonesia, India and Nigeria will need to accelerate progress to stop open defecation by 2030 to reach SDG sanitation targets (WHO, 2017). Governments, civil society, and the commercial sector will need to work together to achieve this (Kellogg, 2017).

Individuals are protected from illness by safe drinking water and clean toilets, which also allow society to be more economically productive. Attendance at school and at work is beneficial to both education and employment. As a result, restrooms in schools and businesses are included in the second goal (achieve access to enough and equitable sanitation and hygiene for all). Women and girls, as well as others who are vulnerable, such as the elderly or those with disabilities, require equal sanitation and hygiene solutions. In June 2019, UNICEF and the World Health Organization published a 138-page report titled Progress on household drinking water, sanitation, and hygiene 2000-2017: a specific focus on inequality. (WHO and UNICEF, 2019). According to the report, in 2017, 5.3 billion people, or 71% of the world's population, used a clean, on-premises

drinking-water service that was available when needed and free of pollution (WHO and UNICEF, 2019). By 2017, 6.8 billion people, or 90% of the global population, had used "at least a basic service," which comprised "an improved drinking-water source within a 30-minute round journey to collect water" (WHO and UNICEF, 2019). In 2017, 785 million people lacked "even a basic drinking-water service, including 144 million people who [were] dependent on surface water," according to the UN (WHO and UNICEF, 2019). According to the report, about 2 billion individuals drank "feces-contaminated drinking water" (WHO and UNICEF, 2019). Diseases like as "diarrhoea, cholera, dysentery, typhoid, and polio" are transmitted by unclean water, according to the research, and cause roughly 485,000 diarrhoeal fatalities each year. (World Health Organization and UNICEF, 2019). It warned that by 2025, half of the global population will be living in water-stressed localities (WHO and UNICEF, 2017). In 2017, 22% of health-care institutions in LDCs lacked access to running water, with equal amounts lacking sanitation and waste management services (WHO and UNICEF, 2017). According to a UN evaluation of SDG achievement in 2020, increasing donor pledges to the water sector will remain critical to achieving Goal 6. (UN, 2020). This is why the United Nations has established the SDG 6 Global Acceleration Framework, a unified approach aimed at improving support to countries (WHO, 2018).

SDG 6 indicates that water is not just delivered, but also that it is safe to consume and available at all times. Goal 6's eight aims are inextricably related to one another and to other SDGs. Although the majority of SDGs have good interlinkages with SDG 6, some ambitions within other SDGs may conflict with SDG 6. Increasing access to water and sanitation, for example, reduces poverty

and has good effects on health and school results. Agricultural activities (SDG 2) and energy services (SDG 7) may, on the other hand, have detrimental effects on water quality and ecosystems (Bharat & Dkhar 2018; Bharat et al. 2020). Ghana's economic and social institutions have been strengthened, resulting in faster growth and adoption of the Sustainable Development Agenda. Ghana has made great progress in improving its inhabitants' education and health, including expanding schooling possibilities and lowering baby and child death rates. Performance Monitoring and Accountability (PMA) performed a survey on the status of the Sustainable Development Goals 1 to 6 in 2015.

Table 2.2: SDGs and their indicators for measurement

SDGs	INDICATORS
Goal 1 **No poverty**	Access to basic services varies according to income. Only 26% of the poorest households have power, compared to 99.5 percent of the wealthiest households. Four out of every five people live in a home with electricity. 37.0 percent of the wealthiest families have improved sanitation compared to 13.6 percent of the poorest households.
Goal 3 **Good health and well-being**	The poorest women, aged 15 to 49, have the lowest chances of having their family planning needs satisfied. Women in the poorest families have the most unmet family planning needs (28.2%), while those in the wealthiest households have the lowest (14.2 percent).
Goal 4 **Quality education**	Despite significant increases in primary education, females from the poorest households still lag behind in secondary education.
Goal 5 **Gender equality**	In Ghana, over one-fifth of women aged 20 to 24 were married before the age of 18 and nearly one-eighth (12.0%) had a child by that age. By the age of 18, one out of every four women in the poorest 40% of households is married, compared to one out of every ten in the richest 20%.
Goal 6 **Clean water and sanitation**	About 36.3 percent of households practice open defecation on a regular basis, 7.2 percent have a place to wash hands with soap and water, and 38.3 percent have intermittent access to a better main drinking source.

(PMA, 2015).

2.4.1 Status of SDG-6 in Ghana

Ghana, like other African countries, struggles to provide adequate and improved sanitation to its rural and urban people. Rapid urbanization has accompanied Ghana's economic expansion, putting a strain on infrastructure and sanitary services. No district in Ghana has been proclaimed defecation-free. There is also minimal private sector participation in rural basic sanitation since rural sanitation firms are thought to be unprofitable. Improved sanitation technologies are expensive, and there are few

creative ways to help disadvantaged families build latrines. According to current information, the overall accessibility of basic sanitation in Ghana is estimated to be 21%, with rural and urban coverage rates of 17 and 25 percent, respectively. After the SDGs, there was a 6% rise, leaving the remaining 79 percent defenseless against the unavoidable effects of poor sanitation. In Ghana, only 1 out of every 5 households has improved sanitation. Local leaders and local government agencies have little ability to effectively organize people for collective action. Though Ghana's poverty rate is decreasing, the challenges presented by rapid urbanization are growing. In Kumasi, nearly half of the population uses public toilets, with just one toilet per 1,000 residents, and water supplies are frequently non-existent in low-income urban areas. The population's wellbeing, dignity, and economic development are all suffering as a result of this.

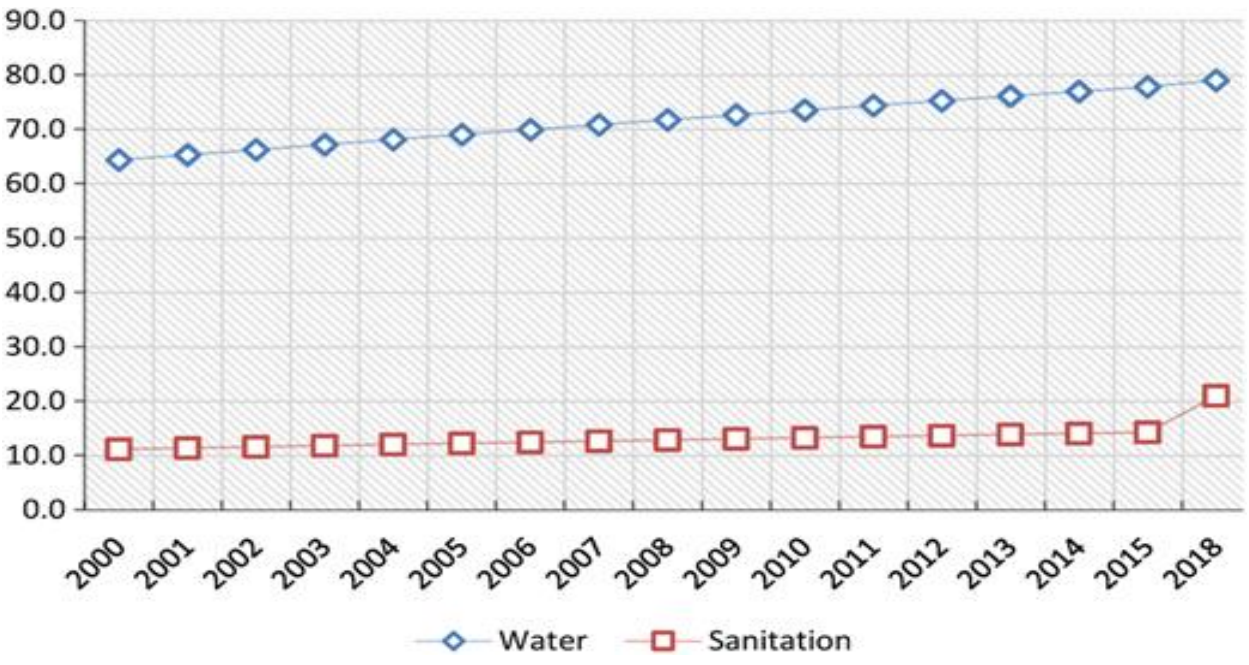

Figure 2.1: Improved water and sanitation coverage trend in Ghana

(*Sources:* WHO/UNICEF (2017) and GSS (2018)

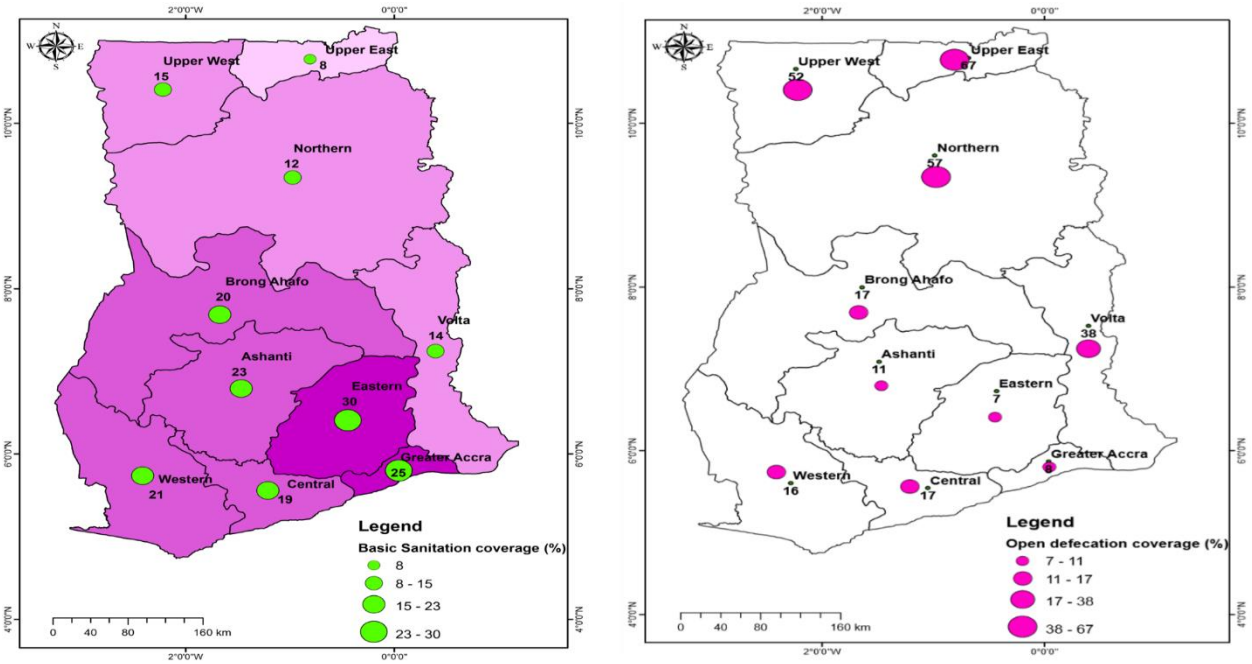

Figure 2.2: Spatial distribution of basic sanitation coverage and open defecation in Ghana

(*Source:* adapted from GSS (2018).

This tells clearly that sanitary and water issues in the northern part of Ghana is very appalling and hence needs immediate attention. For instance, several researches indicated that airborne and waterborne infections are very prevalent. Considering Tamale, as a low-income city in a heavily indebted poor world, the Tamale Metropolitan Area (TMA) is in the early stages of the urban environmental transformation, with most environmental problems occurring close to home. Bad accommodation, insufficient potable water supply, unsanitary conditions, uncollected waste, and indoor air pollution are some of the more critical household environmental concerns.

According to a 2011 report by the Tamale Metropolitan Planning and Coordinating Unit, Tamale has a 40% housing crisis, which has contributed significantly to the city's poor environmental sanitation in the form of slum growth. Around 70 percent of

the metropolis's 45,269 households live in compound houses (one of the most common types of housing) and share facilities like kitchen, toilet and bathhouse.

2.5 Water and Sanitation Situation in Ghana.

Sanitation is defined by the Community Water and Sanitation Agency (CWSA) as the promotion of hygiene and the disposal of feces and solid waste. The provision and usage of latrines is a critical part of the strategy for breaking the cycle of excreta-related disease transmission. Hygiene promotion ensures that suitable hygiene practices are used and applied. Sanitation initiatives aim to improve environmental sanitation and living circumstances in order to boost productivity and health (CWSA, 2004). People must have access to toilet facilities that prevent them (and others) from coming into contact with human excreta and wastewater by providing toilets that are convenient, clean, easily accessible, and inexpensive to all. Meeting these basic needs, and thereby decreasing the illness burden associated with their inadequacy, should be the driving force behind improving the health of disadvantaged groups (UN-Habitat, 2003). The main water and sanitation policy aims of Ghana's government are to accelerate the provision of safe drinking water and appropriate sanitation facilities, as well as to ensure their long-term management (GWCL, 2016). These goals can be met through the creation of District Water and Sanitation Plans (DWSPs), the enhancement of community-owned and controlled water delivery systems, and the strengthening of public-private partnerships. The administration also aims to include hygiene education in water and sanitation services (GWCL, 2016).

Water and sanitation is a human right to physical and reasonable access to sanitation that is safe, secure, clean, socially and culturally acceptable, and ensures dignity in all domains of life (Telmo, 2012). Access to water supply and sanitation has improved in Sub-Saharan Africa, but the region still lags behind all other developing regions:

access to safe drinking water has increased from 49 percent in 1990 to 57 percent in 2011, while access to improved sanitation has only increased from 28 percent to 31 percent in the same time span, despite the Ethiopian government's eagerness to improve the standard of WASH service in order to track progress toward the 2030 Sustainable Development Goals (WHO/UNICEF-JMP, 2017). Ghana's water, sanitation, and hygiene situation is dire, with the majority of the people lacking access to clean and adequate water, sanitation, and hygiene facilities, as in most underdeveloped countries (GWCL, 2010). As a result, communicable diseases account for three-quarters of Ghana's health concerns, which are caused by unsafe or inadequate water supplies and poor waste management, mostly excreta (Abera et al., 2016). Diarrhoeal illnesses caused by poor water and sanitation management are one of the leading causes of morbidity and mortality among infants and children (WHO/UNICEF, 2015). The combination of potable water, sanitation facilities, and sanitary habits has shown a high potential for contributing to a significant reduction in child and mother morbidity and mortality (WHO, 2015).

Water is used for drinking, cooking, storing food, personal hygiene, and other functions (WHO and UNICEF 2006). It is known to provide a 'basic' drinking water facility when a household consumes water from a household piped water supply, a safe community source such as a well, spring, or borehole, or caught rainfall. Ghana's lack of safe drinking water is caused by a number of issues. The majority of people consume surface water, which has dangerous parasites and a high microbiological burden. Some sections of the world's water is discolored and includes harmful substances. During the dry season, many areas have water shortages. Despite efforts to guarantee that children and families everywhere have access to safe drinking water, statistics shows that 76 percent of households are at danger of swallowing faecal

matter-contaminated water. While more than half of Ghanaian families have a designated area for hand washing, only around one out of every five households has access to water or other cleaning products, according to the Ghana Demographic and Health Survey.

Open defecation is still a significant environmental sanitation problem in Ghana's rural areas (GDHS, 2016). Regardless, the social drivers of this phenomenon are often ignored (Adjei & Kyei, 2013). Due to a lack of data, Ghana is listed as a country with 5–25% of the population using open defecation. Specifically, open defecation is practiced by 19 percent of Ghana's population, which increased to 22 percent in the 2017/18 assessment (Adjei & Kyei, 2013). The country's open defecation rate varies, but it is particularly high in Ghana's northern regions and rural areas (Adjei & Kyei, 2013). The implication is that open defecation's negative health effects could affect up to 60% of the population. Bad sanitation costs Ghana about 420 million Ghana cedis per year, according to estimates from 2010 (Martin, 2013). The cost of open defecation alone is 118 million Ghana cedis, which is more than the cost of eliminating open defecation through the provision of latrines (Martin, 2013). Eliminating open defecation is a critical step toward providing basic sanitation to all citizens (GDHS, 2016; Pradhan, Sinha, Satapathy, Swain, & Mishra, 2018).

Ranjula Swain (2017) did a paper titled 'Critical examination of the SDGs,' which identified various criticisms against the SDGs as being ambiguous, difficult to define, execute, and supervise. According to the literature, there is a high possibility of mismatch between socioeconomic development and environmental sustainability goals. Critics are also doubting the generalized SDGs' measurability and tracking, she added. The author indicated that the sources of financial and investment funds for the SDGs would be unpredictable. Her research focused on the inequities in the SDGs

and the economic, social, and environmental elements that are most effective in achieving the goals. According to the findings, developed countries should maintain their environmental and social policies in order to help achieve these goals. Another suggestion is that developing countries should focus on environmental policies in order to achieve their objectives, just as they do with economic and social policies. In his paper Water Infrastructure, the UN MDGs, and Sustainable Development, Paul Jowitt (2008) examined some of the issues surrounding international development, UN MDG delivery, and effective water supply and sanitation. According to his research, infrastructure delivery on the African continent is poor, and investments in these areas are required to improve access to water and sanitation. He claimed that individuals who are impoverished will find it difficult to provide the resources needed to improve their situation. He stated that the widening divide between rich and poor, unfavorable political inertia, and the pernicious consequences of corruption have hampered the delivery of water and sanitation infrastructure. All of the MDGs, according to his research, are dependent on infrastructure and education delivery. There will be no development without the criteria for development, which include a reasonable government framework, a viable civil society, corruption, freedom from persecution, and conflict.

Montgomery and Menachem (2007) investigated water and sanitation in underdeveloped nations by factoring in health. They stated that in order to achieve excellent health, global access to clean water and safe sanitation should be improved, as poor sanitation and water resources are connected to millions of deaths in the developing world. They claimed that collaborating with the government to build water and sanitation infrastructure would result in global coverage that would be sustainable. Three themes emerged from their research: water, sanitation, and

hygiene. Water and sanitation, for starters, boost health and lead to additional benefits. In order to attain sustainability, researchers should also focus on developing interventions that fully address the impact of the environment, culture, and economy during implementation and maintenance.

Mugagga and Nabaasa (2016) analyzed the potentials and restraints on Africa's pursuit of the SDGs in their study that considers the relevance of water resources to the attainment of sustainable development goals. The article claimed that Africa is blessed with abundant water resources, but this is a myth because most of the water is salty and therefore unfit for human consumption. (World Business Council for Sustainable Development (WBCSD), United Nations, 2015) (2016). Their fundamental point is that in order for Africa to fulfill the SDGs, it needs to properly utilize its water resources, which can lead to development by strengthening industries like agriculture, cattle, energy, industry, tourism, and so on. Water, they argue, is a necessary resource for accomplishing the SDGs. However, obstacles such as water deterioration and underutilization have impeded Africa's efforts to meet the SDGs. They also suggest that the continent may fare better if member countries commit to the sector and spend more in it by adopting sustainable policies and collaborating with neighboring communities on water resource management. This study is significant to my work since it underlines the importance of developing water resources in African countries, especially Ghana, in order to attain the SDGs. However, it overlooked African countries' financial difficulties in accessing water resources.

In their paper Meeting and Missing Target: Public Health Dynamics of Sanitation and Water in Ghana, Alagidede & Alagidede (2015) acknowledged sanitation and water as vital markers of a healthy nation. They claimed that better access to safe drinking water had been realized, but sanitation had not. Their research discovered a

connection between water, sanitation, and poverty (Lynch & Mathew, 2010). According to the study, most Ghanaians had increased water access prior to the MDGs, but there was a significant discrepancy in access between rural and urban dwellers, with urban settlers having better access to excellent drinking water than rural residents. According to them, the improvement of water in Ghana is largely due to public awareness of the benefits, health-related ailments, and NGO actions to offer sanitation and water services. They also stated that sanitation has not improved significantly, and that the majority of the population does not have access to toilets and relies on open defecation (19%). Water is costly and must be brought down to the level of the average person in order for them to have access. They suggested that greater education, public-private partnerships, investments, and legislation be implemented to enhance the country's cleanliness. The study's main takeaway is that Ghana's most pressing health issue is one of water and sanitation, which must be addressed. Although their work contributes to the debates on challenges and solutions to the country's water and sanitation concerns, this study fails to explore the role played by international institutions and other agencies in achieving SDG 6 (water and sanitation).

Finally, constraints such as a lack of investment, a lack of political will, and challenges in maintaining services must be addressed in order to improve access to water and sanitation (Bharat & Dkhar 2018). According to the text, there are three major sources of exposure: social, economic, and environmental factors, all of which function as channels for infections (Bharat & Dkhar 2018). As a result, in order to obstruct the pathogen's progress, we must address a community's economic, cultural, and environmental factors (Bharat & Dkhar 2018). According to Montgomery and Menachem (2007), the government should move its focus away from centralized

treatment systems and toward home procedures such as Point of Use (POU) technology, because centralized systems do not serve everyone, especially those in rural areas. The centralized system has numerous drawbacks, including expensive costs, complex maintenance, and improper operation. Traditional sanitation systems, according to the authors, should be replaced with vented, upgraded latrines because they emit disagreeable odors (Montgomery & Menachem, 2007). Financial restrictions and corruption were cited as obstacles to delivering sanitation and water. As solutions to the difficulties, they suggested appropriate legislation, funding initiatives, enhanced technologies, and community-based research (Montgomery & Menachem, 2007). This article is pertinent to this study because it discusses the importance of water and sanitation in developing nations, such as Ghana, for increasing people's health and other advantages.

2.6. Institutional structure for Water and Sanitation.

Ghana has five ministries responsible for the environment and sanitation at the national level. The Ministry of Sanitation, the Ministry of Local Government and Rural Development (MLGRD), and the Ministry of Water Resources, Works, and Housing are the three ministries in responsibility of sanitation. The Ministry of Environment, Science and Technology and the Ministry of Health, which manages health statistics and contributes to policy-making, standard-setting, and hygiene education, are the other two ministries involved in environmental sanitation (MLGRD, 2009).

2.6.1 Ghana Water Company Limited.

The Ghana Water Enterprise Limited (GWCL) is a government-owned company that produces and distributes drinkable water to Ghana's metropolitan population. In peri-urban areas, GWCL distributes water and manages household connections, public stand posts, and boreholes. While water production has increased, Tamale's average per-capita daily water usage has decreased, owing to population expansion outpacing supply and changing climatic conditions, particularly during the dry season. According to Kuma et al. (2010), daily per capita water use in 1996 was 24.2 m3/year (0.066 m3/day or 66 liters/day), whereas it should have been 0.094 m3/day or 94 liters/day in 2009. GWCL opined that the present per capita daily water use varies based on socioeconomic position. For example, low-income residents use 0.025-0.035 m3/day, while middle-income inhabitants use 0.060-0.075 m3/day, and upper-income individuals use over 0.120 m3/day (GWCL, 2010). Water consumption varies depending on the number of persons in each family and the location of each household.

2.6.2 Ministry of Local Government and Rural Development (MLGRD)

MLGRD is one of the sanitation-related agencies. It is in charge of developing and coordinating sanitation policy, issuing sanitation service and management guidelines, and overseeing the National Environmental Sanitation Policy Coordinating Council (MLGRD, 1999). Institutional responsibilities for sanitation are clear in theory, with the Ministry of Local Government and Rural Development (MLGRD) being in charge of drafting environmental sanitation policy.

2.6.3 Environmental Protection Agency (EPA)

Ghana's Environmental Protection Agency is the primary government agency in charge of environmental protection and improvement. National Policy on Environmental Sanitation Ghana's National Environmental Sanitation Policy (ESP) was created in 1999 after extensive consultation with different stakeholders. It covers a wide range of environmental sanitation issues, including solid and liquid waste, industrial and hazardous waste, storm water drainage, environmental and hygiene education, disease vectors, and the burial of the dead (Republic of Ghana, 1999). The MLGRD policy is a short document that lays out core ideologies and aims, assigns duties and responsibilities, and discusses environmental management and protection, as well as legislation and finance. The Environmental Sanitation Policy aims to create and maintain a clean, safe, and pleasant physical environment in all human settlements in order to improve the social, economic, and physical well-being of all people. It includes a variety of complementing activities such as sanitary infrastructure building and maintenance, service provision, public education, community and individual action, regulation, and legislation (MLGRD, 2009). Many of the major issues and constraints in environmental sanitation are addressed in the policy, including the lack of designated duties for government agencies, a lack of capacity and skilled professionals at all stages, and issues related to the transfer of environmental sanitation responsibilities without corresponding budget, staff, or equipment transfers.

The policy also gives the Assemblies the authority to enact bylaws and regulations to aid in their environmental sanitation management. To supplement these efforts, the judiciary is likely to create and empower Community Tribunals to prosecute violators of environmental sanitation laws and regulations (MLGRD, 1999). This presents a

clear opportunity for MMDAs to enact rigorous environmental sanitation bye-laws that hold city residents accountable for environmental sanitation in Kumasi, ensuring excellent sanitation practices.

2.7 Knowledge, Attitudes and Practices towards SDG-6 (Water and Sanitation).

The Knowledge, Attitudes, and Practices (KAP) survey is a method for gathering quantitative and qualitative data that shows misunderstandings or misconceptions that may provide hurdles to the activities being implemented and potential barriers to behavior change (USAID, 2011). The growing burden of communicable diseases in developing countries is mostly due to poor hygiene practices and insufficient sanitary settings (Murray & Lopez, 2019). In schools, providing enough water, sanitation, hygiene, and waste management has a number of positive consequences. Children who have sufficient water, sanitation, and hygiene (WASH) conditions at school are better able to incorporate hygiene education into their daily life and can serve as effective ambassadors and change agents in their families and communities (Adams, Bartram, Chartier & Sims, 2019). Students should be encouraged to practice good hygiene, sanitation, and water management in order to pass on their hygiene knowledge to their families and communities (UNICEF, 2016). Ghana has proposed 2030 Sustainable Development Goals (SDGs) that include universal and equitable access to clean and affordable drinking water, sanitation, and hygiene for all (GHS, 2015).

One of the most important reasons of infectious disease transmission is a lack of knowledge, attitude, and practice (KAP) on Sustainable Development Goal six (6), which notably addresses water and sanitation (Barnard, Routray & Majorin, 2013). Water and sanitation effectiveness is determined not just by the availability of facilities, but also, and most crucially, by human compliance (Barnard, Routray &

Majorin, 2013). People will not be able to alleviate health concerns caused by unsafe water, inadequate sanitation, and hygiene unless they have adequate KAP in respect to SDG6 (Barnard, Routray & Majorin, 2013). People's knowledge and attitudes about water and sanitation can impact the scope of safe SDG6 practices (Ozdemir. Elliott, Brown & Nam, 2011). Water and sanitation projects have been implemented in the Northern area as part of a package of health extension initiatives since 2013, with the goal of protecting public health and lowering water and sanitation-related mortality and morbidity (Arthur & Imoro, 2021). Despite the continuous efforts of water and sanitation initiatives, recurrent water and sanitation-related diseases, such as acute watery diarrhea (AWD), continue to plague the region (Oppong, 2017).

As a result, it makes sense to concentrate on the understanding, attitude, and behavior of opinion leaders, such as Islamic leaders in the Tamale metropolis, with regard to the SDGs. People's insights on certain topics, such as the SDGs, are known as knowledge. Then attitude is how they feel about the SDGs, and practice is how they put those feelings into action (Kaliyaperumal, 2014). Numerous Knowledge, Attitude, and Practice (KAP) research have been undertaken to determine individuals' environmental sustainability awareness levels, such as studies on measuring SDG awareness in prospective elementary teachers (Borges, 2019), and energy consumption (Paço & Lavrador, 2017), environmental awareness among university students (Ahmad and Arifin, 2018), environmental knowledge, attitude, and practices of students and teachers (Esa, 2010), environmental awareness among secondary school students (Noordin et al., 2010), and others. According to Sybille (2011), these kind of studies reveal not only knowledge, attitude, and behaviors, but also individual impressions of the content. This might be viewed as a community's educational

diagnostic (Kaliyaperumal, 2014). As a result, KAP studies provide an excellent technique to assess the level of community awareness (Ahmad et al., 2015).

Abera, Abraham, and Asfawosen (2020) conducted a study on water and sanitation knowledge, attitudes, and practices among residents in Tigray, Northern Ethiopia. The data revealed that 741 (98%) of the respondents are aware of the health effects of incorrectly managed liquid wastes, and the majority of them, 710 (93.9%), wash their hands with clean water. 671 (89.2) of the respondents knew that a latrine is necessary and required in every household. 42.2 percent (95 percent CI: 38.7 percent, 45.7 percent) of the respondents had good knowledge of water and sanitation.

Kendie (2010) investigates the link between socio-cultural factors and changes in rural population water consumption and sanitation behavior in Ghana's Upper West and Upper East regions. Waste management in these areas was found to be primitive. Garbage disposal methods included household dumping, community dumps, and farm disposal. The association between settlements and rubbish disposal was also investigated in the study. When compared to nucleated settlement areas, it was discovered that dispersed settlements had more garbage disposed on compound farms. Animal excreta was also dumped on neighbouring farms for use as manure. The management of waste water was determined to be awful. Waste water was permitted to trickle into pits, where it became stagnant, allowing disease vectors to breed (Kendie, 2010). These management tactics raised concerns because the practice of dumping garbage on surrounding farms is likely to result in a rise in health-related diseases due to the farms' proximity to farmers' houses (Kendie, 2010).

Marina, Naresh, and Sunil (2018) conducted a cross-sectional study in Nepal to evaluate Muslim knowledge, attitudes, and practices. The study used a mixed method

approach to gather data from 300 people, including Muslims and their leaders. The study's findings revealed that participants had favorable views on SDG6. Furthermore, the majority of respondents (56.2%) had a high level of awareness concerning water supply and sanitation, while others (30.5%) had a moderate level of knowledge, and 13.3% had no understanding of health-related issues. Furthermore, it was discovered that the majority of inhabitants (43.8%) believe private taps are suitable for drinking and domestic use, while 40.4 percent believe communal taps are safe. Furthermore, 10.5 percent of people believe hand pumps are safe, and 5.3 percent believe unprotected wells are safe for any use. The majority of respondents (79.6%) were aware of the fact that "sanitation is a group of methods for collecting human excreta, urine, and community waste in a hygienic manner," while 20.4 percent gave incorrect answers.

According to data from a survey done in Ghana by Post and Obirih-Opareh (2013) to measure people's sanitation knowledge, the majority of study participants stated that it was the state's obligation to take care of the sanitation problem. According to the study's findings, sanitation issues are still considered the province of the colonial government, and thus sanitary officers should be employed to protect the environment. Similarly, Ghana's previous system was unable to cope with the growing volume of solid garbage generated. As a result, the public disposed of garbage in an indiscriminate manner, particularly in watercourses and drainage channels, and frequently by burning, contributing to the bad sanitation situation management (Fink, 2010; Curringham and Saigo, 2010). Huge refuge heaps at overflowing garbage containers may be found all around the city, especially near markets and squatter colonies (King et al. 2011; Chukwu, 2010).

Arthur and Imoro (2021) conducted a study on water and sanitation knowledge and practices among traders in Tamale, Ghana's northern region. Tamale Central Market is the subject of this case study. It was shown that 57.9% of traders kept their drinking water in a narrow, closed container, which was similar to what was found in rural areas. Every day, 62.8 percent of the participants cleaned the water storage container, and 34% cleaned it before obtaining water. Chlorination of water was considered as more common (38.3%) among participants to keep water safe. 19.1 percent of individuals who do not use any of the water treatment methods said the water they use is already clean and safe, while 5.3 percent said treated water tastes bad. It was also discovered that 94.4 percent of participants used soap and water to wash their hands. However, 98.9% of traders prefer to wash their hands before eating.

Furthermore, Kramrani, Zainiyah, Hamzah, and Ahmed (2017) found that a total of 680 (90 percent) households used protected water sources (pump/spring) for domestic uses, with only 139 (18.3%) treating water at the HH level by boiling or using Wuha-Agar/ chlorine. The majority of the homes, 659 (87 percent), spent less than or equal to 30 minutes fetching water, while the average daily water use was less than 20 liters per person in the majority of the respondents, 668. (88.4 percent). In addition, it was discovered that 700 families (92.6%) had improper garbage disposal practices. Only 267 (35.3 percent) of the houses had a latrine, and only 40 (14.98 percent) of those with a latrine had a handwashing facility. Among the houses with latrines, 224 (84 percent) used them. Almost all of the homes who do not have a latrine defecate in the open field (98 percent). In 49.2 percent of the respondents (95 percent confidence interval: 45.6 percent, 52.7 percent), good water and sanitation practices were observed.

In terms of urbanization, infrastructure, and population growth, Tamale is one of Ghana's fastest-growing cities (Human Development Report, 2010). This is accompanied by significant waste management, water scarcity, and urban planning issues. Solid and liquid waste management is a serious environmental issue in the Metropolis. According to a UN Human Resettlement Program evaluation from 2009, the city creates about 150 tons of solid trash per day and can only clear 7.5 tons per day. They also stated that 80 percent of the population uses community toilets or defecates in the open (United Nations Human Resettlement Program, 2009). They also mentioned the necessity for sanitation facilities and equipment, as well as the implementation of current sanitation plans and regulations.

Markets are necessary in any city since commercial activities are the lifeblood of any country's economy. Lack of control over the expansion of markets and trading, on the other hand, bodes doom for cities due to inherent risks such as disease outbreaks, flooding, and a loss of aesthetic value (Fakere & Fadamiro, 2012). The problem of environmental cleanliness in Tamale's major market is getting worse by the day. Inefficient waste management techniques, such as bad waste processing and disposal procedures, poor drainage systems, and insufficient sanitary equipment, as well as a lack of willingness to enforce laws, are examples. According to Kankam-Yeboah et al. (2010), the majority of market places in Ghana have poor sanitation. The continuance of these issues is mostly due to market traders. According to Worlanyo (2013), a research at Accra's Dome Market found that most market users, such as dealers, are unconcerned with sanitation due to a lack of knowledge on good hygiene and sanitation. Their attitude toward sanitation was assigned to them in the study. Traders' personal hygiene is critical to public health. According to Ofori et al. (2011),

the country's market centers' environmental and sanitary conditions endanger public health, both residents and market contributors.

The assessment of general literature on SDG6 in Ghana, specifically in northern Ghana and Tamale, reveals, among other things, the research community's growing concerns about fast urbanization. The city's massive population expansion, primarily due to immigration from all across the region and even the West African sub-region, has put unprecedented strain on the city's scarce social amenities. Poor control in the growth of markets and trading, according to Fakere & Fadamiro (2012), bodes doom for cities due to inherent hazards such as disease outbreaks, floods, and loss of aesthetic value. Given this context, this study aims to investigate the significance of SDG6 in the lives of people in the Tamale Municipality, as well as the knowledge, attitudes, behaviors, and coping strategies of a city that appears to be overwhelmed by SDG6 issues.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

The technique or plan for carrying out the precise steps of the study is referred to as research methodology (Burns and Grove, 2009). This section discusses the research design as well as the technique employed to conduct the study. This section will cover the study's study area, study type, study population, sampling methodology and size, study variables, data collection methods and instruments, data processing and analysis, and quality control measures.

3.1 Study Area.

Legislative Instrument (L.I) 1801 of 2004 established the Tamale Metropolis. It is the sole Metropolis in Ghana's northern region and one of the country's six Metropolitan Assemblies. It is also the northern region's capital. The Tamale Metropolis is one of the 26 districts that make up Ghana's Northern Region. It is located in the centre of the region and shares borders with Mion District to the east, the Sagnarigu District to the west and north, Central Gonja to the south-west, East Gonja to the south, and. The Metropolis is 646.90180 square kilometers in size (GSS- 2010). The Metropolis is located between 9º16 and 9º34 north latitude and 0º36 and 0º57 west longitude. In the metropolis, there are 115 communities. Tamale Metropolis has a population of 233,252, representing for 9.4 percent of the region's population, according to the 2010 Population and Housing Census. Males account for 49.7% of the population, while females account for 50.3 percent. The proportion of metropolitan residents who live in urban regions (80.8%) is higher than that of those who live in rural areas (19.1 percent). The sex ratio in Tamale Metropolis is 0.99:1. (male: female). The metropolis' population is young (almost 36.4 percent of the population is under 15

years old), resulting in a broad base demographic pyramid that tapers off to a tiny number of elderly people (60 years and above) accounting for 5.1 percent. The district's total age dependency ratio is 69.4, with rural localities having a greater age dependency ratio (86.5) than urban areas (65.7) (Ghana Statistical Service: District Analytical Report, 2014).

3.1.1 Social and Cultural Structure

The Northern Area of the country has always had substantial ground cover due to lower population levels, and the Tamale Metropolis is no exception. This region began to undergo fast population expansion after many people of many ethnic origins moved there to reside, transforming it into a cosmopolitan region. The majority are Dagombas, although other ethnic groups such as Gonjas, Mamprusis, Akan, Dagaabas, and tribes from the Upper East Region also live in the Metropolis. Other nationals from Africa and other parts of the world can also be found in the Metropolis. Annual celebrations, naming ceremonies, and marriage ceremonies are all examples of the region's significant cultural traditions. Damba, Bugum (fire festival), and the two Muslim Eid festivals (Eid Fitr and Eid Adha) are only a few of the annual celebrations in the Metropolis. Muslims account up 90.5 percent of the population of Tamale Metropolis, followed by Christians (8.8%) and other religious affiliations (0.7 percent). Catholics account for 3.0% of all Christians, followed by Pentecostals and Charismatics (2.4%) and Protestants (2.4%). (2.4 percent). The proportion of traditionalists in the metropolis is high (0.3 percent) (TaMA, 2010).

3.1.2 Geographical Features

The Metropolis is around 180 meters above sea level, with a few tiny slopes. This topographical characteristic of the terrain is useful for road construction, electricity

expansion, and other regional development projects. The Metropolis records only one solitary precipitation per year.

In the Metropolis, there are very few water bodies. This is the cause of the low groundwater level. The only natural water sources are a few intermittent streams that produce water during the rainy season and dry up during the dry season. Tamale headwaters can be found on higher ground in both of these streams. Several artificial dams and dug-outs were also built, either by individual society members or by Metropolis Non-Governmental Organizations. Dams like the Builpela and Lamashegu are examples of this. Both cattle and domestic water are stored in these dug-outs. Despite its poor drainage, the Metropolis has the potential for agricultural development if it could be dammed for irrigation purposes (TaMA, 2010). The Nyohini and Agric Forest Reserves are located in the Metropolis's central region. Although these forest reserves have been invaded and used for economic purposes, certain elements of the populace use them as an open defecation area, increasing fundamental sanitation risks in the city (TaMA, 2010).

3.1.3. Economic Activities

Nearly 63.3 percent of the population aged 15 and up is economically active in the metropolis, while 36.7 percent is not. 92.6 percent of those who are socially active are employed, while 7.4 percent are unemployed. 8.1 percent, 5.1 percent, 2.4 percent, 2 percent, 1.4 percent employed in specialists, factory and equipment operations, supervisors, technicians, and clerical staff, respectively. Students account for the majority of them (56.0%), while 20.9 percent perform household activities for people who are not socially active and 12.4 percent are either too young or too old to work. For the first time, nearly half of the unemployed (52.9%) are looking for work in the city (Ghana Statistical Service, 2014).

3.1.4. Literacy and Education

Seventy percent of people aged 11 and up are literate, whereas thirty percent are illiterate. The proportion of literate males (69.2%) is larger than that of females (51.1 percent). Five out of ten people can communicate in both English and Ghanaian (54.8 percent). There are 52.9 percent men and 45.1 percent women among the 84,897 people aged 3 and older who are actually attending school in the metropolis. Males account for 58.6% of those who have previously attended school, while females account for 41.4 percent. This indicates that males have a higher proportion of those who have attended school in the past and those who are currently enrolled. Nursery has 15.1 percent of those really attending school, 18.2 percent in JSS/JHS, 12.5 percent in SSS/SHS, and elementary school has the greatest percentage (40.0 percent). In the metropolis, only 5.7 percent of the population aged three and up attends tertiary institutions (Ghana Statistical Service, 2014).

3.2 Study Approach.

To get a larger picture of SDG-6 and its health implications in the study region, the researcher employed a mixed approach for data collecting. A mixed method approach contains or combines elements from both qualitative and quantitative study. The quantitative method investigated SDG objective 6 (water and sanitation) knowledge, attitude, and behavior, as well as the relationship between water and sanitation practices in the Tamale Metropolis. Within the Tamale Metropolis, a qualitative method was employed to study the socio-cultural determinants that influence SDG-6 practices. This aided in the creation of unambiguous descriptions and inferences. Furthermore, quantitative data revealed the size of the problems, and qualitative data described and explained the problems. Qualitative research has the capacity to

generate rich, descriptive data that aids in the comprehension of meanings and interpretations.

The mixed methodologies research methodology is a new research trend (Sousa, Driessnack, & Mendes, 2017). The strategy is commonly utilized due to the limitations of using qualitative or quantitative methodologies alone (Doyle, Brady, & Byrne, 2009). According to Doyle et al. (2009), both qualitative and quantitative approaches have advantages and downsides. Studies focusing purely on quantitative methodologies, for example, have strengths in transferability and consistency, whereas qualitative approaches can give a thorough insight of respondents' lived experiences. In contrast, quantitative research can provide an abstract understanding, while qualitative research results may not be generalizable to different situations (Doyle et al., 2009). As a result, combining the two methodologies in one study is expected to produce a better grasp of the complicated challenges than using either strategy alone (Meissner, Creswell, Klassen, Plano, & Smith, 2011). Given this background, Figure 3.1 presents the

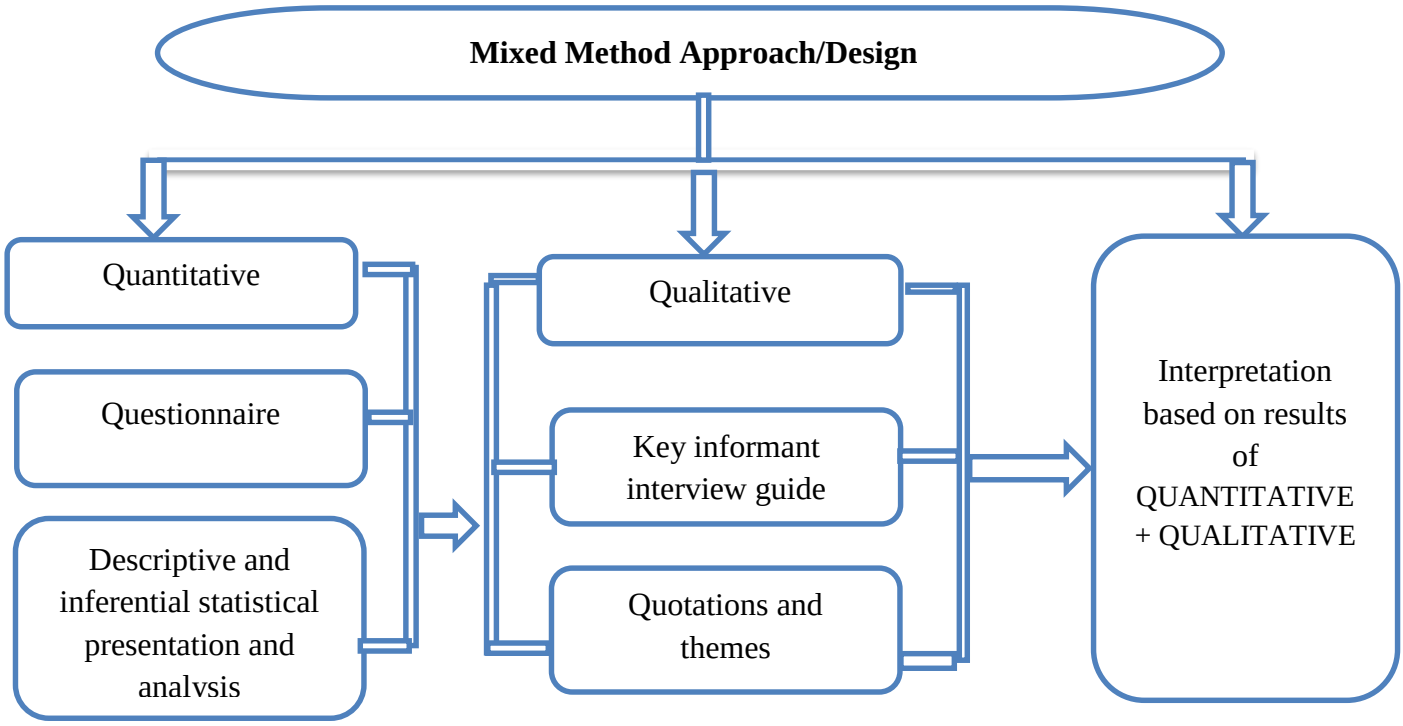

Figure 3. 1: Topology of the study approach/design

3.3 Study Design.

The descriptive cross-sectional study design was used in this investigation. According to Leedy and Ormrod (2010), a descriptive survey is a design that uses questions to gather information about the traits, opinions, attitudes, practices, and experiences of individuals or groups.

Cross-sectional studies entail gathering data from a representative sample drawn from a population at a specific point in time (Orlsen & Marie, 2014). The study's design is appropriate since it seeks the ideas and viewpoints of Islamic leaders in the Tamale Metropolis. It's also in line with the study because relevant data was gathered during a defined time period. Because of the researcher's restricted time, this research design was chosen over a longitudinal study design. It was designed as a descriptive cross-sectional survey to provide information on the current situation in order to aid the

development of interventionist policies. The research could also serve as a baseline for future trend investigations.

3.4 Study Population

According to Burns and Grove (2005), target population is a group of individuals who meet sampling criteria to which the study findings will be generalized. The target population of study for this research work was Islamic leaders within the Tamale metropolis. Leaders from various Islamic sects were selected including, Al-Sunna, Tijaniyya and Ahmadiyya Muslims.

3.5 Sampling Procedure.

Multi-stage sampling techniques was used to select participating mosques and respondents. The metropolitan was grouped into five clusters of communities, that is North, South, East, West and Central. In each cluster of community represents a specific mosque affiliated to a specific Islamic sect. Other four other mosques were randomly selected to add to already selected mosque that is affiliated to a specific sect. Randomize selection of four additional mosques in each cluster was achieved by writing all the names of mosques within a cluster on a piece of paper, folded and placed in one box. The box was shaken for proper mix up of the papers. Select without replace method was used to pick four mosques. This method was applied for all the five clusters. Respondents were also recruited using simple random technique. For a sample size of 384 each cluster was assigned with 77 respondents and within each cluster five mosques were interviewed. This means that each mosque was entitled to approximately 16 respondents. Therefore, 16 “YES” and 16 “NO” were written on pieces of paper, folded and mixed in one box. This box was placed at the entrance of the mosques where the leaders pass into the auditorium. If a leader picks “YES” that person was included in the study and “NO” for exclusion.

3.6 Sample Size Determination

The sample size for a point estimate sample was obtained using the Cochran (1977) formula. The study's sample size was determined by the population, confidence interval, confidence level, and estimated frequency. The researcher assumed prevalence Knowledge level of 50%. The formula is stated and applied below.

$$N = \frac{Z^2 \times pq}{d^2}$$

Where:

N = required sample size

Confident level at 95%

Z = Standard error associated with the level of confidence (1.96)

d = margin of error at 5%

p = estimated proportion of knowledge on SDG-6 in the population = 50% = 0.5

q=1-p

$$N = \frac{Z^2 \text{ x } p \text{ (1-p)}}{d^2}$$

$$N = \frac{(1.96)^2 \text{ x } 0.5 \text{ x (1-0.5)}}{(0.05)^2}$$

N = 384.16

Therefore 384 participants were included in the study. However, ten (10) Muslims leaders were selected purposefully from the total participants for the key informant interview.

3.7 Inclusion and Exclusion Criteria

3.7.1 Inclusion Criteria

Islamic leaders both males and females who have lived in the Tamale metropolis for 12 months or more were given equal chance to be included. Leaders within the sampled mosques were included in the study as key informants.

3.7.2 Exclusion Criteria

Muslims and Islamic leaders who had been in Tamale for less than a year before to the survey, as well as Islamic leaders from outside Tamale, were excluded from the research.

3.8 Data Collection Tool

The study relied on primary data sources. The study collected both quantitative and qualitative data types using first-hand knowledge from the field as the major data collecting source. Quantitative data included types of toilet facilities, main source of drinking water, water treatment methods, major disease types within households, indiscriminate waste disposal, and other Water and Sanitation practices and background information of respondents, while qualitative data included diverse perspectives and opinions of respondents on the socio-cultural factors that influence SDG-6 practices within the Tamale Metropolis (age, sex, level of education, employment status, islamic religion and marital status).

The questionnaire consisted of four parts and numbered alphabetically (A, B, C and D). The first part collected data on study population's socio-demographics. The second contained questions measuring knowledge level on SDG 6. The third part looked at Attitude of respondents towards SDG 6 and data on Practices of SDG 6 among Muslims leaders was the fourth part. Eighteen items were used to measure

knowledge level, Participants who marked between 12 - 18 were measured as having adequate knowledge; those with 6 - 11 had moderate knowledge and below 5 marks had limited or poor knowledge.

The researcher followed the interview guide to acquire data from the study participants during the key informant interview. The volunteers were all of a similar character and agreed to take part in the study. The discussions were tape recorded to guarantee that all of the participants' points of view were documented. Detailed field notes were recorded during each discussion, in addition to the audio recordings, to better capture responses and nonverbal actions during the discussion processes. During the qualitative data analysis, the regular use of thorough field notes greatly aided in maintaining consistency in respondents' ideas and opinions.

3.9 Data Analysis and Presentation of Results

The information gathered from the surveys was double-checked for accuracy before being entered into the computer using Microsoft Excel. Statistical Package for Social Sciences (SPSS) version 24.0 was used to clean and organize the data. With 95 percent confidence intervals, descriptive statistics such as means, cross-tabulations, and frequencies were employed to describe demographic features of research participants (CI). Tables, charts, and graphs were used to present the findings. The researcher employed recognized statistical methods to test for association between dependent and independent variables after reviewing both parametric and non-parametric models for statistical analysis and inferences. To test for independence between categorical independent and dependent variables, acceptable statistical tests such as the Chi-square test, which are established non parametric models, were applied. Finally, in the multivariable logistic regression analysis, a P-value of 0.05

was employed to identify variables substantially linked with SDG 6 knowledge and practice.

In order to understand the content of the qualitative data, the researcher read the key informant transcripts numerous times. During the reading process, ideas and patterns related to the study objectives were recorded. The qualitative data was subjected to thematic analysis.

3.10 Validity of the Study and Pre- Testing.

Validity is the process of assessing survey questions for their dependability. This involved subjecting the survey for review by group familiar with the topic for evaluation to prevent errors and also pre-testing of the questionnaire on subset of the respondents about 10% of the total population to weed out any irrelevant questions. The study was pretested using a sample size of 10 Muslims leaders including 10 males and 10 females with the same characteristics and similarities as compared to the selected study population. Pre-testing revealed the weakness of the data collection tools. Corrections were made to address the weaknesses that was observed.

3.11 Ethical Consideration

It is impossible to undertake research without first obtaining permission from the appropriate authorities. The Head of the Department of Public Health gave his approval first, and then the project supervisor assessed it. The Committee on Human Research, Publication, and Ethics (CHRPE), Kwame Nkrumah University of Science and Technology, School of Medical Sciences (KNUST-SMS), and the Municipal Director of Health Services in Tamale, Ghana, gave their approval for the study to begin.

Informed consent: Consent with knowledge. Facilitating the process of informed consent, as well as ensuring participant confidentiality and anonymity, are additional ethical considerations. Participants must have appropriate knowledge on the nature of the research, as well as be fully informed about its aim and methods, to give informed consent (Byrne, 2011). Participants must be fully capable of comprehending this information, and with this knowledge, they must freely consent or decline to participate in the study (Walker, 2017). The procedure is based on the principle of respect for autonomy, and it includes informing participants about the research's risks and advantages (Holloway & Wheeler, 2002).

All participants in the current study were given thorough information on the trial's nature and goal, as well as the advantages and hazards. This happened both in person and in writing. Prior to data collection, research participants were also asked to declare their informed consent on a consent form, as per ethical guidelines. On the day of the initial interview, both the researcher and the participant signed this consent form. Furthermore, throughout the research procedure, the option to withdraw from the study at any point was repeated. At the start and end of each interview, participants were asked for their informed consent.

Confidentiality and anonymity. Another ethical consideration is the researcher's need to provide confidentiality and anonymity promises (McHaffie, 2010). Participants' confidentiality and identity were maintained throughout the study, including in all correspondence between the researcher and her supervisors. For example, to preserve privacy, all interviews were held in a private room at the participant's home. To protect the participants' identities, all contact information was kept in a locked cabinet in the researcher's office. The researcher's personal hard drive contained transcribed data and data files related to the study, which were password

protected and thus only accessible by the researcher. These ethical issues follow the recommendations of the Human Research Ethics Committee (HREC).

3.12 Dissemination/Utilization Plan

The ultimate purpose of this research is to utilize the findings to influence policy. It requires sharing the findings from the assessment so that other programmes, both within Ghana and regionally, can benefit. Also, it will be useful to determine what could be done differently through developing and testing alternative conduits to achieving sanitation SDG. The principal investigator will present the report of the study to;

1. The Department of Public Health, University for Development Studies.
2. The Regional and Municipal health directorates, Tamale.
3. The Muslims leaders in the Tamale Metropolis.
4. Publish in a medical and health peer-reviewed journals.

3.13 Limitation of the Study

Conducting research on Knowledge, Attitude and Practice of SDG 6 among Muslims leaders; males and females comes with some challenges that may limit the generalization of findings. This study was conducted with limited sample group. It would be beneficial to plan a study with a larger sample population in order for a larger population to gain knowledge about Sustainable Development Goals 6. The exclusion of most communities in the Tamale Metropolis from the sampling frame and also exclusion of Muslims members means that the study findings cannot be generalized to Muslims in the Tamale metropolis. However, future studies on SDG 6 should undoubtedly focus on this population.

CHAPTER FOUR

RESULTS

4.0 Introduction

The study's findings are presented in this chapter. A semi-structured questionnaire was used to interview a total of 384 people. There are four sub-sections in this chapter. These are organized under 'socio-demographic characteristics, Knowledge of respondents on Sustainable Development Goal Six (6), Attitude of respondents on Sustainable Development Goal Six (6) and Practices of respondents on Sustainable Development Goal Six (6) among the respondents of Tamale Metropolis.

4.1 Socio-demographic Characteristic of the Study Population

The characteristics of the population are shown in Table 4.1. Out of the 390 respondents (Islamic leaders) sampled for the study, 384 responded, representing a response rate of 98.5%. A total of 384 respondents were included in the analysis and there were more men 305(79.4%) than women 79(20.6%). The mean age of the respondents was 48.85 (± 10.27) years and the largest proportion (38.5%) aged 50-59 years with the majority 64.3% being males. Although most of the participants were old enough to marry, 9.4% had never been married before. Of those who had married before, 78.1% were currently together, 1.0% have been separated and 11.5% were widowed. The majority 215(56.0%) of the sample had high school education (i.e. Junior high school and Senior high school) whiles 1.0% has no formal education. The highest proportion (41.7%) were traders whereas 8.1% were unemployed. Females were more likely to be unemployed while males were more likely to be employed either by the government or private. Respondents had a largely uniform cultural structure, more than two-thirds of respondents (67.4%) were from the Northern tribes

collectively known as the Dagombas followed by Gonjas (12.5%) and 3.6% belonged to other ethnic groups such as Guan, Frafra, Ashanti, Bono, Fante etc. In the study sample, 324(84.4%) were urban residents whiles 20(5.2%) were from the rural areas in the Tamale Metropolis.

Regarding the type of Sect in Islam respondents belonged, 36.5% belonged to Sunnah, followed by Tijaniya (19.5%), however 22(5.7%) did not belong to any Sect. Highest proportion of the participants 173(45.1%) serve in the position of Imam followed by Muaazin (20.6%) whiles 79(20.6%) served as women leader. A sizeable proportion (48.4%) of respondents had served in the position as Muslim leader between 6 – 10 years, however only 3(0.8%) had served in the position for 30 years and above. More than two-thirds (77.3%) of the participants have a family size of 5 – 10 whereas 7.3% have a family size of more than 10 as shown in Table 4.1.

Table 4.1. Demographic characteristics of the Respondents

Demographic characteristics	**Frequency N=384**	**Percent (%)**
Sex		
Male	305	79.4
Female	79	20.6
Total	**384**	**100.0**
Age (years)		
20 – 29	23	6.0
30 – 39	53	13.8
40 – 49	109	28.4
50 – 59	148	38.5
60+	51	13.3
Total	**384**	**100.0**
Occupation		
Trader	160	41.7
Arabic Teacher	89	23.2
Public Servant	62	16.1
Farmer	33	8.6
Unemployment	31	8.1
Students	9	2.3
Total	**384**	**100.0**

Marital status		
Single	36	9.4
Married	300	78.1
Divorced	4	1.0
Widowed	44	11.5
Total	**384**	**100.0**
Educational Status		
No formal education	4	1.0
Primary	90	23.4
Junior High School	116	30.2
Senior High School	99	25.8
Tertiary	75	19.5
Total	**384**	**100.0**
Ethnicity		
Dagomba	259	67.4
Gonja	48	12.5
Hausa	36	9.4
Mamprusi	27	7.0
Other	14	3.6
Total	**384**	**100.0**
Sect in Islam		
Sunnah	140	36.5
Shiiya	81	21.1
Tijaniya	75	19.5
Ahmadiyah	66	17.2
No Sect	22	5.7
Total	**384**	**100.0**
Your position in the Sect		
Imam	173	45.1
Sheikh	53	13.8
Muaazin	79	20.6
Women leader	79	20.6
Total	**384**	**100.0**
Residence		
Urban	324	84.4
Peri-Urban	40	10.4
Rural	20	5.2
Total	**384**	**100.0**
Family size		
Less than 5	59	15.4
5 – 10	297	77.3
More than 10	28	7.3
Total	**384**	**100.0**

Source; Field Survey, 2021

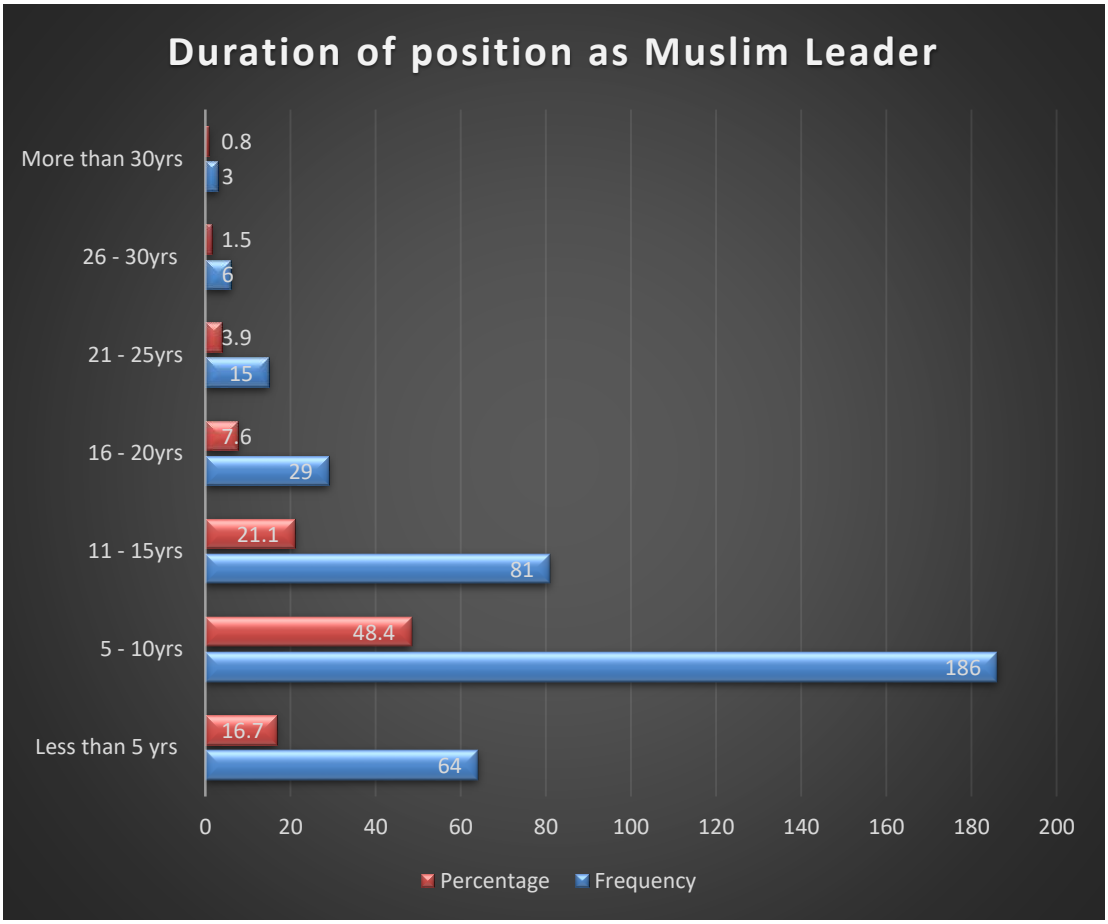

Figure 4.1. A bar chart showing the duration of the respondents as Islamic leaders.

4.2 Awareness of respondents related to Sustainable Development Goal Six (6)

Awareness of SDG6 was obtained by asking respondents to mention whether they had ever heard of SDG 6. Table 4.2 presents the level of awareness SDG 6 among Islamic leaders both female and males.

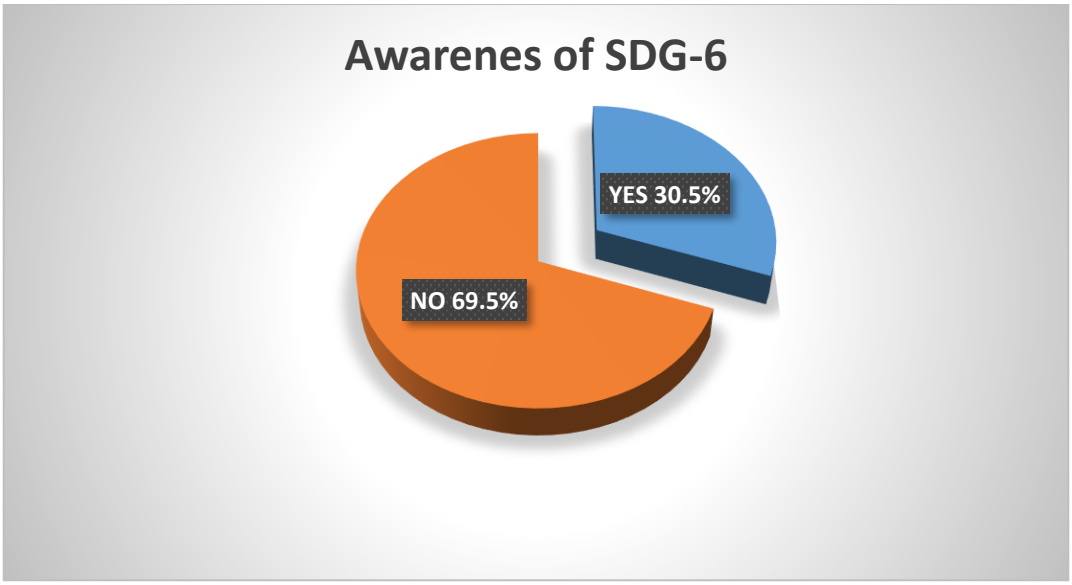

Figure 4.2. Awareness of respondents on SDG-6.

Of the 384 respondents interviewed, 117(30.5 %) have ever heard of SDG-6, with 49.6% of these identifying social media as their source of information on SDG-6. Nevertheless, majority of the respondents (69.5%) had never heard of SDG 6. Approximately 11% of the respondents knew the targets of SDG 6 whereas majority of them 247(64.3%) did not know the targets. Nearly one third of the participants indicated that SDG6 does not focus only on sanitation again majority of them 224(58.3%) did not know whether it focus on only sanitation or no. 135(35.2%) of the participant indicated that SDG-6 talks about access to portable drinking water whereas 30(7.8%) indicated no to this question. Only 124(32.3%) indicated correctly the time limit associated with SDG-6. Majority of respondents (65.1%) did not know the time limit of achieving it (Table 4.2).

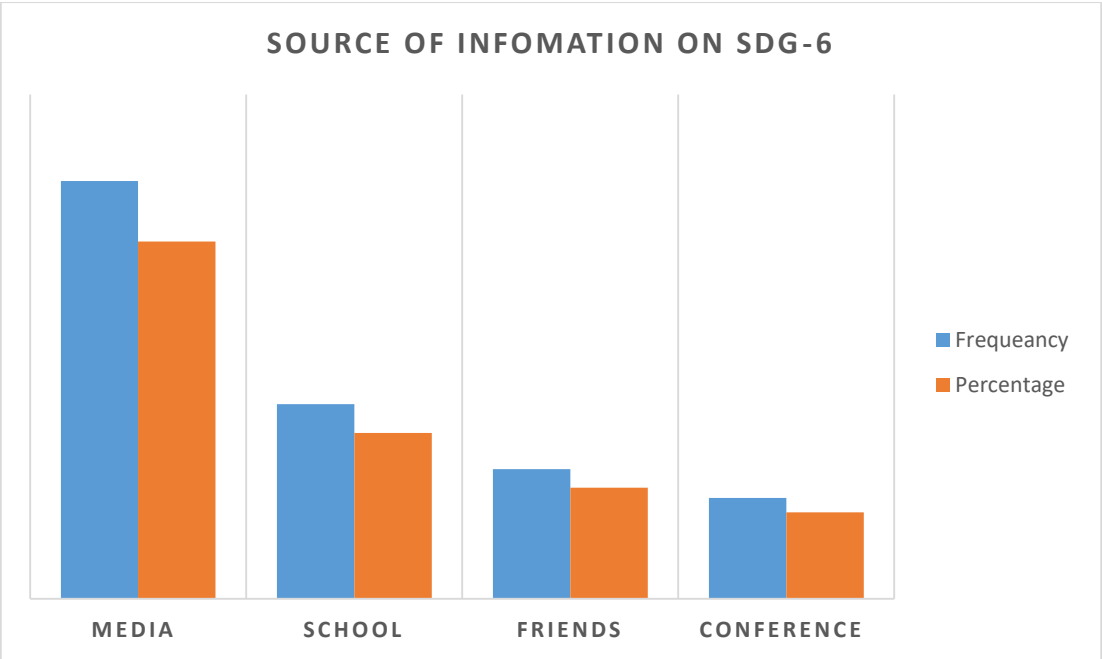

Figure 4.3. Chart showing the source of information on SDG-6.

4.3 Knowledge level of respondents on SDG-6

Data on knowledge about SDG 6 was collected by asking respondents a number of questions built on some indicators of knowledge. These include ability to mention the targets of SDG6: whether SDG6 includes only sanitation, open defecation, safe waste disposal, and whether it includes welfare of females and the vulnerable in society. For the calculation of the overall knowledge level of the participants on SDG 6, a domain composed of sixteen (16) questions on SDG-6 in a Yes /No were used. Any participant that chooses correct answer to any of the variable was scored 1, while incorrect answer was scored 0. The maximum score achievable for high was between 9 to 16 points. The level of knowledge was calculated by dividing the responses into two groups based on a score of more than 8 (9– 16 points) considered high and less than 9 (0 – 8 points) considered low. Table 4.2 presents the summary of the findings:

Table 4.2: Knowledge about SDG-6 among Muslims leaders.

Variables	Frequency(n=384)	Percentage (%)
Do you know the targets of SDG 6?		
Yes	42	10.9
No	95	24.7
Don't know	247	64.3
SDG 6 focuses only on sanitation?		
Yes	60	15.6
No	100	26.0
Don't know	224	58.3
It does not talk about access to portable drinking water?		
Yes	30	7.8
No	135	35.2
Don't know	219	57.0
SDG 6 seeks to end open defecation?		
Yes	98	25.5
No	55	14.3
Don't know	231	60.2
It seeks to address indiscriminate disposal of waste?		
Yes	81	21.1
No	55	14.3
Don't know	248	64.6
It pays special attention to the needs of women and the vulnerable?		
Yes	33	8.6
No	69	18.0
Don't know	282	73.4
The aim of SDG 6 is to improve health care facilities?		
Yes	21	5.5
No	93	24.2
Don't know	270	70.3
SDG 6 must be achieved by the year 2040?		
Yes	10	2.6
No	124	32.3
Don't know	250	65.1

Variables	Frequency(n=384)	Percentage (%)
SDG 6 did not talk about hygiene and		

cleanliness?		
Yes	2	0.5
No	156	40.6
Don't know	226	58.9
SDG 6 encourages open defecation?		
Yes	7	1.8
No	149	38.8
Don't know	228	58.9
Drinking unsafe water can cause illness?		
Yes	335	92.4
No	11	2.9
Don't know	18	4.7
Unsafe water can be treated to be safe for drinking?		
Yes	302	78.6
No	54	14.1
Don't know	28	6.3
Access to safe drinking water is a source of good health?		
Yes	203	52.9
No	136	35.4
Don't know	45	11.7
Personal hygiene protects one against certain diseases?		
Yes	330	85.9
No	42	10.9
Don't know	12	3.1
Open defecation and indiscriminate disposal of waste can cause diseases in Muslim communities?		
Yes	233	58.1
No	118	30.7
Don't know	41	10.7

Source; Field Survey, 2021

As shown in Table 4.2, a sizeable proportion of respondents (46.6%) scored high level of knowledge generally on SDG6. However, it is important noting that slightly more than half (53.3%) of all respondents had low level of knowledge about SDG 6 (Figure 4.4).

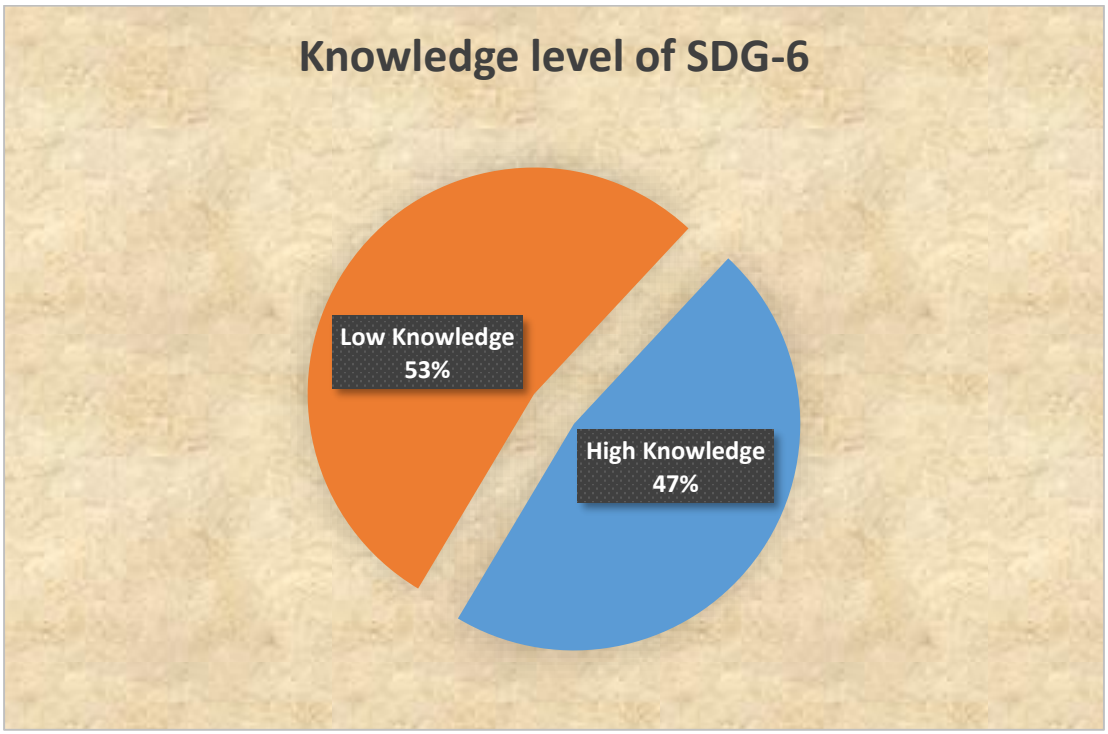

Figure 4.4 A chart showing the Knowledge Level of Respondents.

4.4 Association between demographic characteristics of respondents and Awareness on SDG-6.

To examine the association between respondents' socio-demographics and their awareness about SDG6, the Chi Square test was used and the results are summarized in Table 4.4. Chi-square analysis identified significant association between SDG-6 awareness and the following socio-economic characteristics; age group, X^2 (1, 384) = 102.031, P < 0.001, Educational Status, X^2 (4, 384) = 148.355, P < 0.001,

Occupational status, X^2 (5, 384) = 122.087, P < 0.001. However, the findings show no significant association between awareness of SDG 6, marital status, sex of respondents, residence, Ethnicity and position in the Sect or Mosque **(Table 4.3**).

Table 4.3: Chi-square analysis of socio-economic factors associated with SGD-6 awareness

		Awareness of SDG-6				
		No	Yes	X^2	df	P-values
Age grouped	20-29 years	14	9	**102.031**	**1**	**<0.001**
	30-39 years	34	19			
	40-59 years	88	21			
	50-59 years	92	56			
	60+	47	4			
Sex	Male	209	96	0.875	1	0.349
	Female	58	21			
Marital status	Single	25	11	6.988	3	0.072
	Married	218	82			
	Widowed	30	2			
	Divorced	2	14			
Educational status	No education	4	0	**148.355**	**4**	**<0.001**
	Primary	84	6			
	Junior High	105	11			
	Senior High	69	30			
	Tertiary	13	62			
Occupational status	Trader	139	21	**122.087**	**5**	**<0.001**
	Arabic Teacher	78	11			
	Public Servant	10	52			
	Farmer	22	11			
	Unemployed	21	10			
	Student	5	4			
Residence	Urban	229	95	9.746	2	0.518
	Per--Urban	30	10			
	Rural	16	4			
Ethnicity	Dagomba	196	63	9.742	4	0.145
	Gonja	30	18			
	Hausa	19	17			
	Mamprusi	19	8			
	Other	11	3			
Position in Sect	Imam	113	60	6.092	3	0.117
	Sheikh	39	14			
	Muaazin	63	16			
	Women Leader	60	19			
	Total	**275**	**109**			

Source: field survey, 2021.

The finding that quite a sizeable proportion of respondents had knowledge about SDG6 and its relevance may presuppose that such high knowledge could also be translated into attitudes and practices on the ground. However, findings suggest some yawning gap between awareness/knowledge and practices on the ground. The reasons behind this anomaly were sought from key-informants generally. One Imam explained the predicament as follows:

> *It is not the case that we don't care about sanitation, clean water and neat environment but rather there are some basic reasons why we do what we do. For most community members, the issue is availability and accessibility of water and not necessarily the quality of water (clean water). In the dry season especially, even the city of Tamale may suffer water shortage. People depend in some areas on any ground water available, especially water from dams. In much of the year, the emphasis is on availability and accessibility first and therefore even though we like the best, we can only use what we have at a time. Islam as our way of life talks about all that and even running water for ablution … all of us, no matter what, obey this as given.* (Imam 1)

This Imam has made a clear distinction between awareness about SDG6 and 'practice on the ground.' Awareness is quite absolute with the mass media campaign reaching very far. Islam as a islamic religion has long underscored the relevance of SDG6 and made it a dictum to be enforced in every Muslim household. Almost all respondents said they have ever heard of the tenets on personal neatness, clean, running water and general sanitation as spelt out in SDG6. Like noted by the Informant, the challenge is how to translate this awareness into practice. He noted the difficulty of availability and accessibility of water especially during the long dry season when water for the treatment plant from the very source threatens to dry up. During those periods, there is always a level of water rationing with especially the poorest-of-the-poor in the Zongo not being served for months. He argues therefore that, much as the common person on the streets of Tamale is much aware of the need for potable water for the family, the

demand far exceeds supply and for survival, people revert to shallow ground water which is usually largely contaminated. On the issue of environmental neatness his opinion is as follows:

> *You see, Islam has prescribed the way of life and the rules of life long before we were born. Cleaning the body and also a clean environment has been given long ago as a spiritual duty and a clean person and a clean environment is key in Islam. Humans as we are, sometimes our cultural habits and needs may influence the meanings we bring to this directive. Take for example, much as the relevance of environmental neatness is important in Islam, sometimes the meaning of the text is influenced by cultural definitions. The farmer who uses household residues as fertilizer may say open-defecation and dumbing of degradable waste around the home is good because that revives the land for the farming period more than purchasing artificial fertilizer. For this interest, would you say the farmer should burn or pay Zoom Lion[1] for services when the farmer needs that instead of paying for artificial fertilizer in his own backyard, he may not accept that order.*

The informant presents a situation that sets cultural definitions of waste aside the general definitions offered by proponents of SDG6. For the farmer, the residue of farm produce, husks, cobs, and all 'waste' from processing food items is treasure and not waste. The droppings of animals including fowls, household ruminants including even cattle ranch within the house are critical for reuse in various ways including composing, fuel, and even as plaster for building houses. For many families, there is hardly anything like waste where one person's generated waste is another person's raw material in business. Many people for example go around collecting specific types of waste that is also sold out as raw materials in another industry. Aluminum bowls and roofing sheets collected as waste are sold out to make new aluminum pots. Sawdust collected as waste in one industry serves as fuel in the household for cooking. One informant noted that the dunghill itself is also critical traditionally as a place for certain customary rites. People also wait for the decay of the dunghill so as to carry the residues to their farms. In this cultural milieu where scarcity enforces

[1] Zoom Lion is a national house-to-house rubbish collector

innovations for reuse, the concept of waste is difficult to define in a context where the fact that something is put aside does not mean waste. It could be re-harvested for use with time. Informants agree that the definition of waste is quite blurred in a number of circumstances.

4.4.1 Association of socio-demographic variables with water treatment practices

To examine the association between respondents' socio-demographics and water treatment practice, Chi square test was used. Age, Educational level and Occupation status were significantly associated with methods that were being used to make water safe ($p<0.001$). No other variables were significantly associated with methods used to make water safe (Table 4.4).

Table 4.4 Association of socio-demographic variables with water treatment practices.

Variable	Current methods being used to make water safe					
	Filtering	Boiling	Nothing	df	X^2	P-value
Age group (years)				**1**	**199.927**	
20-29 years	13(7.0%)	7(30.4%)	3(6.1%)	**<0.001**		
30-39 years	23(12.3%)	25(47.2%)	5(10.2%)			
40-59 years	54(28.9%)	40(43.3%)	15(30.6%)			
50-59 years	74(39.5%)	56(37.8%)	18(36.7%)			
60+	23(12.3%)	20(43.3%)	8(16.3%)			
Total	**187(48.7%)**	**148(38.5%)**	**49(12.7)**			
Gender				2	9.228	
Male	145(77.5%)	107(77.5%)	53(77.5%)	0.056		
Female	42(22.5%)	27(22.5%)	10(22.5%)			
Total	**187(48.7%)**	**134(34.8%)**	**63(16.4%)**			
Education				**4**	**56.231**	
No education	2(1.1%)	2(1.5%)	0(0.0%)	**<0.001**		
Primary	33(18.1%)	24(18.0%)	33(47.8%)			
Junior High	52(28.6%)	50(37.6%)	14(20.3%)			
Senior High	40(22.0%)	42(31.6%)	17(24.6%)			
Tertiary	55(30.2%)	15(11.3%)	5(7.2%)			
Total	**182(47.4%)**	**133(34.6)**	**69(18.0)**			
Occupation				**1**	**52.820**	
Trader	79(45.9%)	71(41.0%)	10(45.9%)	**<0.001**		
Arabic Teacher	23(13.4%)	51(29.5%)	15(13.4%)			
Public Servant	40(23.3%)	16(9.2%)	6(23.3%)			
Farmer	13(7.5%)	18(10.4%)	2(7.5%)			
Unemployed	11(6.4.2%)	14(8.1%)	6(6.4.2%)			
Student	6(3.5%)	3(1.7%)	0(0.0%)			
Total	**172(44.8%)**	**173(45.1%)**	**39(10.2%)**			
Ethnicity				6	4.30	
Dagomba	125(68.7%)	121(45.9%)	13(45.9%)	0.829		
Gonja	25(13.7%)	15(13.4%)	8(13.4%)			
Hausa	16(8.7%)	18(23.3%)	2(23.3%)			
Mamprusi	11(6.0%)	10(7.5%)	6(7.5%)			
Other	5(2.7%)	3(6.4.2%)	6(6.4.2%)			

Total	**182(47.4%)**	**167(43.4%)**	**35(9.1%)**	
Marital Status				6 1.685
Single	17(9.3%)	12(68.7%)	7(68.7%)	0.946
Married	143(78.6%)	134(13.7%)	23(13.7%)	
Widowed	2(1.1%)	1(8.7%)	1(8.7%)	
Divorced	20(11.0%)	3(6.0%)	21(6.0%)	
Total	**182(47.4%)**	**150(47.4%)**	**52(13.5%)**	

Source: field survey, 2021

4.4.2 Multivariate analysis for socio-demographics factors as predictors of SDG-6 practice

Multivariate analysis was done using the binary logistic regression model, variables that were statistically significant at bivariate analysis stage were included in the model. The analysis revealed that respondents' knowledge level on SDG-6 predicted water and sanitation practice, those with high knowledge level were likely 31.5 times to engage in SGD-6 practice as compare to those with low knowledge level on SDG, (AOR = 31.5, 95%, C.I. = 11.5 – 40.5). Also, respondents' attitude level towards SDG-6 predicted water and sanitation practice, those with good attitude level towards SDG-6 were likely 2.7 times to engage in proper sanitation and clean water practice as compare to those with poor attitude level towards SDG-6, (AOR = 2.7, 95%, C.I. = 1.1 – 3.4). However, the remaining socioeconomic factors (age, educational level, and Sex) that were included in the model did not significantly predict SDG-6 practice (Table 4.5).

Table 4.5: Binary logistics regression analysis for socio-demographics factors as predictors SDG-6 practice.

		Wald	P-value	AOR	95% C.I. for AOR	
					Lower	Upper
20-29 years		Ref				
30-39 years		.245	.842	1.345	.676	3.514
40-49 years		.311	.231	1.420	.563	4.51
20-24 years		.128	.720	1.134	.571	2.251
60 + years		Ref				
Single		Ref				
Married		.871	.111	1.237	.345	2.41
Widow		Ref				
Widow		.207	.649	.864	.461	1.621
Divorced		.767	.381	4.036	.178	91.630
No education		Ref				
SHS		.133	.716	.802	.245	2.628
JSS		.010	.921	.942	.288	3.077
Primary		.105	.746	1.255	.318	4.952
Tertiary		.000	.983	.986	.282	3.447
Sex	Female	Ref				
	Male	.973	.324	.728	.388	1.368
Poor (Knowledge level on SDG-6)		Ref				
Good		91.153	**.000**	**31.51**	**11.482**	**40.517**
Poor (Attitude level towards SDG-6)		Ref				
Good		4.761	**.029**	**2.691**	**1.068**	**3.427**

Source: field survey, 2021.

In regards to the opinions of informants on the determinants of SDG-6 practices, it was indicated by one key informant that:

> *Generally, adults abide closely to especially the Islamic code of cleanliness in ensuring sanitation. People are aware about the need to treat water by either filtering or boiling to make it safe before drinking. Open-defecation is usually a challenge around the fringes of the city but around the immediate environment in the home, it is usually only children who may be seen doing this…* **(Key Informant, 11)**

The notion that children are the ones who practice 'open defecation' and that open-defecation is limited to around the immediate household environment for only children is a common expression by many informants. It is obvious that in discussing this specific issue, informants seem to confuse the Islamic norm against indecent exposure of the body to the public and the meaning of open-defecation. General observation suggests that in every home in Tamale, there is always an enclosure provided especially as urinal and also for bathing. This, among other considerations, is mainly to avoid indecent exposure of nakedness as Islam proscribed. Indeed, this forms a stern religious order and is strictly guarded. Unfortunately, the observation by the informant suggests that even though majority of households in Tamale certainly have enclosure for urinal and bathing, most households do not have latrines (for defecation) built as part of the infrastructure at home. Until recently, majority of households relied largely on public toilets or open-defecation. Generally, however, open-defecation in the bush is usually preferred. One informant suggests the preference may be related to the norm of age-group solidarity where (female or males) respectively create space from control at home to go to toilet as a group in the

bush. The informant noted for example that, away from the watchful eyes of male control, the female may use the opportunity to discuss pertinent issues and refreshing gossip. Visiting the 'bush' with a friend (same sex) or a group of age mates (same sex) is a very critical juncture creating the needed space for a level of freedom. The sub-culture of age-group meetings and shared activities has been and still remains a strong component of age-group solidarity. Going into the bush for open-defecation together must therefore be seen within the cultural context of age-group comradeship. In this regard, enforcing modern individual household toilets bring with it a level of trepidation, resistance, atomization and enforcing individualism which may contribute adversely towards breaking the traditional meaning of age-group solidarity.

A critical look at the findings may suggest that the operational definition of open-defecation may be confused with the religious emphasis on avoiding nudity in public. Even though the two concepts of nudity (indecent exposure) and open-defecation are entwined, the emphasis of the SDG6 definition of open-defecation is obviously not on "moral pollution" of nudity (whether children or adults) but rather on health implications of the environmental 'pollution' associated with open-defecation. The excuse that "… *but around the immediate environment in the home* (in the city), *it is usually only children who may be seen doing this…"* seems to misconstrue the SDG6 operational definition. Even though children, being children, may not be culpable for religious sanctions for public nudity (nudity associated with open-defecation seen as "moral pollution"), the SDG6 concept is about health implications and therefore children doing open-defecation are no different in relation to health implication of environmental 'pollution' associated with open defecation.

4.5. Attitude of respondents to SDG6

In order to explore the attitude of respondents towards SDG6, a Likert scale was used indicating a number of items that seek to describe specific attitudes towards SDG6. Scores on each item range from Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree (Table 4.5)

Table 4.6: Attitude of Islamic leaders towards SDG-6 (Likert scale)

Items	Frequency (%)				
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
I think it is important to read more about SDG 6.	38(9.9)	99(25.8)	157(40.9)	81(21.1)	9(2.3)
I have strong confidence in the targets of SDG 6.	28(7.3)	77(20.1)	189(49.2)	76(19.8)	14(3.6)
I believe proper waste management should be preached in mosques periodically.	132(34.2)	167(43.5)	28(7.3)	48(12.5)	9(2.3)
I do not see the need to keep Muslim communities clean.	6(1.5)	20(5.2)	45(11.7)	156(40.6)	157(40.9)
Mosque hygiene and home hygiene are equally important to me.	36(9.4)	174(45.3)	40(10.4)	126(32.8)	8(2.0)
To me, Muslims can play a significant role in achieving SDG 6.	39(10.2)	116(30.2)	173(45.1)	48(12.5)	8(2.0)
To me, only the efforts of government can help achieve SDG 6.	6(1.6)	31(8.1)	201(52.3)	120(31.3)	26(6.8)
I think Islamic islamic religion can be a best conduit to preach and educate Muslims about sanitation and hygiene.	147(38.3)	147(38.3)	29(7.6)	61(15.9)	0(0.0)
I do not think Muslims should prioritise washing of ablution cans and mats regularly.	3(0.8)	34(8.9)	36(9.4	207(53.9)	104(27.1)
To me, Islamic leaders have a duty to ensure good sanitation practices and cleanliness in their localities.	121(31.5)	159(41.4)	52(13.5)	48(12.5)	4(1.0)
To me, Islamic leaders have a role to play at addressing open defecation.	79(20.6)	153(39.8)	51(13.3)	96(25.0)	5(1.3)
I believe open defecation is not against Islam.	2(0.5)	15(3.9)	55(14.3)	146(38.0)	166(43.2)
To me, ensuring personal hygiene is also a form of worship in Islam.	187(48.7)	127(33.1)	41(10.7)	29(7.6)	0(0.0)
The safety of drinking water is a concern to me.	96(25.0)	146(38.0)	82(21.4)	57(14.8)	3(0.8)

Table 4.6 shows the attitude of respondents on SDG6. Majority of the respondents (77.1%) showed positive attitude towards SDG6. Approximately almost half (49%) of the respondents were however uncertain about the achievement of SDG6 targets by the end of 2030. In all, 27.4% had confidence in the achievement of the targets. Even though majority (77.9%) of respondents believed that proper waste management should be preached in mosques periodically, it is interesting that 22.1% of respondents thought it is not necessary. It is very encouraging that the overwhelming majority of respondents (81.5%) strongly agree that there is "… *the need to keep Muslim communities clean."* Certainly, the fact that some disagree may imply some reservations about the pragmatic meaning of keeping "… *Muslim communities clean".*

Another interesting finding relates to whether Mosque hygiene and home hygiene are both important. The findings show that 45 percent of respondents agreed that Mosque hygiene and home hygiene are equally important while slightly more than a third (33%) of respondents disagreed. It is equally interesting that regarding working towards the achievement of SDG6, 40.4% of the Islamic leaders thought that Muslims can play a significant role in achieving the SDG 6 whiles a sizeable proportion of respondents (45.1%) stood neutral.

Another interesting finding is that majority of the respondents (76.6%) thought that Islamic islamic religion can be a conduit to preach and educate Muslims about sanitation and hygiene while about 24% either disagreed or stood neutral (7.6%). The challenge here suggests that for some of these leaders, the precepts of Islam are different from the 'concept of neatness' as defined in the secular notion of the word even though the precepts have implications for practices at home, they are not necessarily the same.

The same trend of analysis could be brought to bear on the answer to the question whether Islamic leaders have a duty to ensure good sanitation practices and cleanliness in their localities. The findings show that even though majority (72.9%) strongly agreed to this, some few leaders (13.5%) disagreed to this statement. It is also important that majority of the leaders interviewed (81.3%) believed that open-defecation is against Islamic principles while only 17(4.4%) believed that it has nothing to do with religious precepts.

In the opinion of one of the foremost leaders at the Municipal Mosque, Muslims must work together to ensure cleanliness both at home and in the community they live. His opinion was as follows:

> *I personally think sanitation is an important aspect of our being and our islamic religion upholds that seriously. I am aware that the sanitation situation in especially the Zongo communities all over the country including Tamale is not impressive. I think we lack common basic sanitary facilities including good drainage and household toilets exactly because we did not make them part of the initial planning of households. I must say, we the leadership, is also not very concerned about raising the issue about hygiene in the Mosque. Indeed, in reality, the pressure of general survival issues overshadows other equally important issues. But I must say the media provide some education at community level. I think we as Islamic leaders should bring back handling hygiene within the concepts of Islam because that could make a huge difference if handled well.* ***(*Key informant 5, Imam, 2021).**

The Informant acknowledges the importance of sanitation not only for the individual and community as a whole but also as a religious obligation from the perspective of Islam. If this opinion is read with the findings in Table 4.5, it is obvious generally that the Islamic leadership in Tamale are aware of the critical role of 'sanitation' not only as a religious duty but also a necessity for well-being of the society. However, as noted by the Informant, most Islamic leaders have failed to mount the necessary pressure through teaching that could inform behaviour and practice. It is interesting however, that the latent function of interviews with leadership on the subject seems to

evoke some general consciousness in revisiting that aspect of 'spirituality'. The Informant observes; "… *I think we as Islamic leaders should bring back handling hygiene within the concepts of Islam …"* This positive reaction has been shown generally during interviews of most of the Leaders. It shows reflexivity, a critical reappraisal of the fundamental obligations attached to religiosity in Islam.

In a key informant interview, the Assemblyman of one electoral area for example explains the frustration in trying to enforce the by-law for every house to have its own private toilet within its premises. He explains:

> *We have tried very hard to enforce the by-law for household toilets but then in doing that some households will tell you they have no money to build a toilet facility. Even for individuals to pay just 20pesewas to access the public toilet has been a huge challenge. In this sense, open-defecation cannot be controlled in the community at all. (*Assemblyman, KI, 4).

The Assemblyman's observation brings to the fore the reason why efforts to enforce the by-law pushing all house owners to ensure toilet facilities within their premises has been difficult to realize. The main problem is not so much the space to mount the toilet but rather affordability of the cost involved in building the toilet. Even where public toilets are available for a small fee, people still find it difficult to afford. Availability therefore does not always translate into acceptability.

In a further discussion, the Assemblyman confides his personal disgust at landlords complaining about their inability to afford building a one-room toilet facility. For the informant, this should be weighed against the reality that these landlords could afford to build a number of complete residential rooms for renting-out to the public yet claim they could not afford a small room for toilet facility. Likewise, he argues further that if households could afford to purchase food and eat, no matter the cost, then the logic of paying a token to toilet should never be seen as unaffordable. He therefore

maintains that it may not so much be the issue of affordability than cultural underpinnings.

He observes for example that what seems to deter toilets from being built in-doors may be due to the fear that if poorly maintained, it could be source of unavoidable stench to the whole environment – a situation that is akin to the religious sense of 'spiritual pollution'. In line with this thinking, he argues that the avoidance attitude should be juxtaposed against the cultural reluctance to change gender division of labour which maintains that cleaning of the home is left completely to the female. Obviously, maintaining an in-house toilet threatens to add extra burden and drudgery in domestic division of labour for the female already over-burdened with key elements in her culturally defined boundaries under the triple-role. Building a well-maintained household toilet that 'must not become a source of disgusting odor' at any point in time and the bid to keep the home 'ritually clean', may, among other considerations, presuppose redefinition of gender lines and perhaps roping in the services of the male into household chores. This is culturally unprecedented and re-bounces under-siege of stereotypes. However, it is obvious that without this fundamental change in gender considerations, no one is under the delusion that the diffusion of in-house toilets as an innovation will not create extra and unprecedented female drudgery. Clearly, the strong undercurrent that seems to thwart the social current of the diffusion of this innovation may be far from just the cost of building a toilet per se. It may equally be due to diffidence to move strong cultural keystones in which both females and males are strongly entrenched. Parties may be intrinsically and mutually opposed to the idea because of cultural underpinnings of inherent implicit factional interests (males keeping the status quo and females avoiding increased drudgery). To the informant, this unspoken cultural sensitivity may

therefore underscore the definition of the situation creating deep meaning for traditional lines. Innovations like home-toilets may therefore evoke shifting expectations and norms shared with implications for changing meaning at the very roots of society about appropriate male and female attitudes, practices, characteristics, and roles. Certainly, when a new idea impinges upon the social structure, it affects patterns of social interrelationships in several ways.

The underlying concern is that both parties are very sensitive to the fact that any slack and inconsistency in critical attention to the toilet would result in a situation akin to the religious sense of in-house 'spiritual pollution.' In this sense, both females and males may be sensitive in avoiding any new additions to female household burdens in a setting where culturally, gender-stereotypes create havoc for the male who cleans in his household.

The Chogu community however holds out as a consistent example of a suburb that has shown a collective resolve towards enhancing the achievement of SDG6. One Imam noted that:

> *... Chogu in general has been commended by the Tamale Metro Assembly for their efforts at keeping a strong communal spirit and using that for communal labour to enhance sanitation. People readily come together periodically to clean the community together. However, Chogu as a community is so large that the few public toilets are not able to serve all. This then makes room for open-defecation at the outskirts. The various public toilets available also have problems related to management as political party foot soldiers hijack the toilets and do not clean them as required, so people prefer open defection than using the public toilets.* ***(Imam, KI, 7)***

The story of Chogu presents a good example of the communal spirit in some communities that keeps the environment clean. Two major issues emerge from this interview. In the first place the study sought to find out whether there are any cultural underpinnings evoked and used as a rallying point in the successful popular Chogu

communal labour for cleaning outside the home. Secondly, the study sought to find out the challenges and how these are resolved.

The findings as to whether there is any cultural precedence as a rallying point in the successful popular Chogu communal-labour campaign for cleaning outside the home was answered by one elderly informant as follows.

> *In our cultural expectation, house chores within the confines of the home is the responsibility of the female. Males are responsible for the structures, maintenance of buildings and for clearing the immediate environment outside the house. Males clear the surroundings of bush and ensure paths linking to other houses, farm, and the water place are cleared to avoid snakes. In this sense, calling the male to clean outside the house certainly meets customary expectations. This is usually a male-youth led community-wide campaign using peer pressure to enforce custom. Clearly such campaigns are rooted in the cultural responsibility assigned for males. Any male who refuses to do this could be sanctioned. This cultural role is already there and could be called into force.*

The popular Chogu communal labour for cleaning outside the home may be said to be overwhelmingly successful. According to the informant, the success may be attributed partly to the leadership using customary precepts of division of labour to enforce the by-law. In this sense, as explained by the informant, the essence of communal labour and campaign ardently led by especially male youth to clean the environment (outside the house) is a cultural prerogative that also meets demands of religious tenets congruent with modern local government laws.

The story of Chogu however also shows the frustration associated with limited toilet facilities in the city. The informant presented a new dimension of challenges to the whole sanitation problem. Among other things, he exposes the destructive concept of political rivalry and interference in the management of public toilets. The situation is reportedly a common challenge for public toilets all over Tamale. Any change of the

national government in Ghana usually has grave implications where some foot soldiers of a reigning political party usually *"... hijack the toilets" or* forcefully take over the management of these public toilets for their personal gain. Unfortunately, because these individuals lack management skills, the sanitation of these toilets are generally poorly kept and therefore entrenching open-defecation as the norm.

4.6: Practices of respondents on Sustainable Development Goal Six (6).

In order to ascertain the practices of respondents in respect to SDG6, the questionnaire contained a number of questions on direct practices related to sanitation and clean water. Table 4.6 gives a summary of the findings.

Table; 4.7. Practices of respondents on Sustainable Development Goal Six (6)

Variable	Frequency (%) Yes	No	Don't Know
Have you ever treated drinking water?	341(88.8)	41(10.7)	2(0.5)
Do you treat drinking water by boiling?	199(51.8)	182(47.4)	3(0.8)
Treating drinking water by filtering?	263(68.5)	116(30.2)	5(1.3)
In the past two months, have you given a sermon on cleanliness or hygiene in the mosque?	63(16.4)	272(70.8)	49(12.8)
Water containers are available at the mosques?	349(90.9)	30(7.8)	5(1.3)
Availability of separate container for drinking water?	67(17.4)	295(76.8)	22(5.7)
Narrow-necked water container for ablution?	323(84.1)	61(15.9)	0(0.0)
Use of ladle to draw water from container?	232(60.4)	150(39.1)	2(0.5)
Do you have a functional toilet facility at your mosque?	34(8.9)	347(90.4)	3(0.8)
Do you have a functional urinal facility at your mosque?	342(89.1)	42(10.9)	0(0.0)
Do you have a functional toilet facility at your house?	315(82.0)	69(18.0)	0(0.0)
Do you have a functional urinal facility at your house?	384(100.0)	0(0.0)	0(0.0)
Do people around you practice open defecation?	236(61.5)	133(34.6)	15(3.9)
Do you wash hands with soap under running water before eating?	255(66.4)	129(33.6)	0(0.0)
Do you wash hands with soap under running water before ablution?	83(21.6)	301(78.4)	0(0.0)
Do you think sermons on cleanliness and hygiene are important?	337(87.8)	47(12.2)	0(0.0)
Do you practice daily washing of kettle?	62(16.1)	319(83.1)	3(0.8)
Frequent change of water in kettle?	291(75.8)	88(22.9)	5(1.3)

Table 4.8 Disposal of solid waste among respondents.

How do you dispose solid /liquid waste in your house	Frequency (n=384)	Percentage (%)
Waste water into open drain?		
Yes	246	64.1
No	134	34.9
Don't Know	4	1.0
Waste water via drainage tube?		
Yes	49	12.8
No	305	79.4
Don't know	30	7.8
Solid waste into the garden?		
Yes	20	5.2
No	341	88.8
Don't know	23	6.0
Solid waste by burning?		
Yes	143	37.2
No	224	58.3
Don't know	17	4.4
Solid waste into waste container?		
Yes	370	96.4
No	14	3.6
Don't know	0	0.0
Removal of choked gutters around the mosque?		
Yes	144	37.5
No	211	54.9
Don't know	23	6.0
How often is this done n=144		
Frequently	8	5.6
Periodically	96	66.7
Annually	28	19.4
Biannually	3	2.0
When necessary	9	6.3

Source; Field Survey, 2021

Table 4.7 shows that majority of respondents 341(88.8%) treat water before drinking, whiles 41(10.7%) do not treat water before drinking. When asked the method of treatment used, majority indicated by boiling (51.8%) and by filtering (68.5%). Respondents (Islamic leaders) were asked whether they had given sermon on cleanliness or hygiene for the past two months. Findings show that, the highest proportion of Imams (70.8%) had not given any sermon on the subject whiles only 16.4% had given a sermon on cleanliness at the Mosque. Respondents (70.8%) also

indicated that they had water containers available at the mosques. In all, 17.4% indicated that they had separate containers for drinking water whereas majority of the leaders (76.8%) had no separate container for drinking water. Regarding social amenities in the various mosques of the respondents, almost all respondents (90.4%) indicated lack of a functional toilet facility at their mosque whiles 8.9% had functional toilet facilities in their Mosques. However, majority of the respondents (89.1%) indicate availability of functional urinal facility at their mosques whiles the remaining 10.9% had no urinal facility in their mosques.

Approximately two-thirds (61.5%) of the respondents affirmed that most people around them practice open defecation. Absence of toilet facility was the most reported (61.2%) reason for open defecation among the respondents, followed by personal reasons (17.7%), fresh air (14.6%) and ignorance (1.5%). Nearly Two-thirds (66.4%) of the participants wash their hands with soap under running water before eating whereas the remaining 33.6% do not practice effective hand hygiene before eating. Majority (87.8%) of the respondent thought that sermons on cleanliness and hygiene are important. Regarding disposal of solid waste among respondents' households, 64.1% affirmed that they dispose waste into open drain and by burring (37.2%). Removal of choked gutters was reported by 37.5% of the participant of which most indicated that they do it periodically (66.7%).

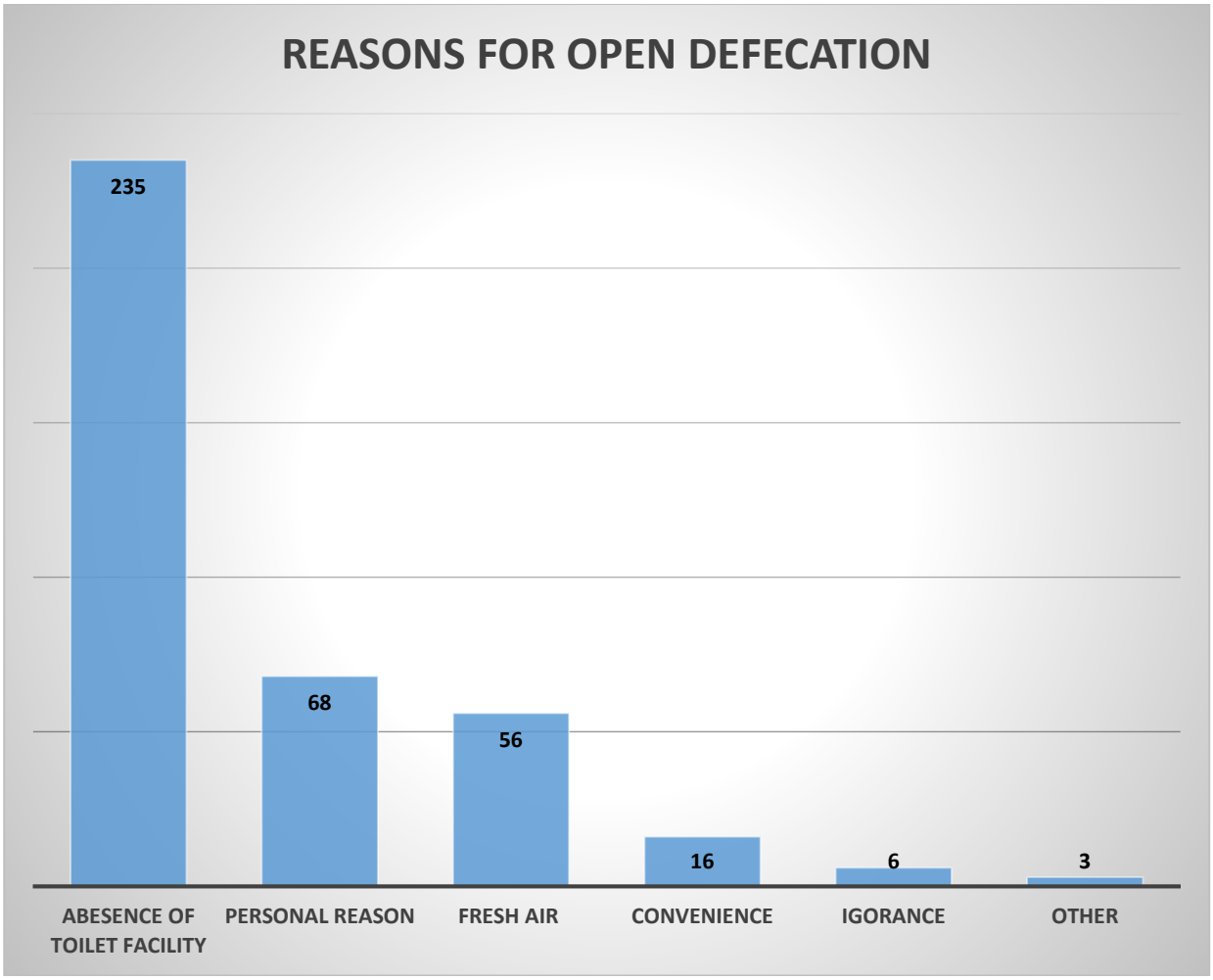

Figure 4.5. A chart showing the various reasons for open defecation.

One critical finding relates to the fact that all key informants agreed that because the far majority of people in Tamale are Moslem, Islamic islamic religion can have a significant influence on sanitation and hygiene practices. One Imam suggests as follows:

> *I personally think that Islamic leaders could actually lead the way in this campaign for sanitation especially. Indeed, the community is predominantly Muslim and people listen to their Imams a lot. Somehow, I think it is easier for the Muslim to understand the need for sanitation and use of clean water. We should learn to put emphasis on this because it is after all Qur'anic (***Imam (KI, 6)**

Another Islamic leader observes as follows:

> *Since a Muslim must use clean water to perform ablution and water for drinking and other purposes must also be clean, the religious practice encourages cleanliness more than anything else* **(Imam KI, 4)**

In another interview with one of the women's leaders of Mosque 8 on sanitation practice, she observed that;

> *Even though our culture says nothing about it, I oppose open defecation. I've had to penalize a number of persons who have been brought before me as a result of open defecation incidents, in which community members report people who use other people's unfinished constructions as toilets. Individuals found in this conduct should be forced to clean the unfinished building and pay a fine, according to my rules..... that is how leaders in Zongo communities deal with open defecation instances* **Women's Leader (K.I, 8).**

On the issue of accessible potable water, the Women's leader observes that it has been a difficult challenge in the suburb.

> *For all intents, the dam is our only source of water. We are well aware that dam water is not ideal, but what options do we have? Those who can afford it occasionally travel to Sawaba to obtain piped water, but the distance is great, and we must walk for hours simply to ensure that our houses have adequate water* (Women leader, KI, 9).

In all, the overwhelming majority of respondents, both male and female Islamic leaders are agreed that Islamic leadership would need to play a critical role in leading in the SDG6 campaign especially because, among other things, it resonates with Islamic precepts. Indeed, as concluded by the Women leader, SDG6 targets must manifest in a manner that is culturally and religiously acceptable within the community if it should be deployed beneficially. However as noted, there are both cultural and infrastructure deficits that make the realization of the SDG6 difficult.

In line with the Theoretical Perspective of this study which is based on the principles of the Health Belief Model (Rosenstock, 1974), the findings in this study demonstrate socio-cultural determinants and meaning for achieving SDG6 as preventive measures prescribed for the well-being of society.

The findings demonstrate that in line with the basic premises of the HBM, Islamic leadership in Tamale Metropolis generally (1) perceive that they are susceptible to health challenges associated with poor sanitation and the use of unclean water; (2) that the occurrence of such sanitation related health problems within the family and in the community negatively affect not only physical well-being but also an affront to the dictum and tenets of the Islamic Faith; (3) In this sense, respondents agree that taking health action would be beneficial physically by reducing susceptibility to sanitation-related illnesses and also beneficial to the spiritual meaning of cleanliness postulated in Islam. (4) In line with the expectation that fulfilling SDG6 is critical to meeting both the physical health and spiritual well-being of the Muslim, it is acceptable to almost all respondents that taking individual and collective action in achieving SDG6 would not require overcoming psychological barriers such as embarrassment and cultural taboos (Rosentock, 1974). In this sense, the perceived susceptibility to SDG6-related health problems; the perceived seriousness of tackling SDG 6 has meaning for both Islam and secular health concepts; the perceived benefits related to keeping in line with practices akin to both SDG 6 (health) and Islamic tenets as a spiritual concept have been found in this study to create strong motivation for working collectively towards achieving SDG 6.

CHAPTER FIVE

DISCUSSION

5.0 Introduction

The main objective of the study is to assess the knowledge, attitude and practices of Islamic leaders in relation to Sustainable Development Goal 6 in Tamale. In this chapter, the findings of the study are discussed in accordance with the stated objectives and research questions.

5.1 Socio-demographics of Respondents.

Three hundred and eighty–four participants were involved in this study. It is to be expected for the sample to be skewed towards the male in line with the patriarchal nature of Islamic leadership. In Nigeria for example where a similar study was done, Armah et al., (2018) report slightly more than half of the leaders (52.5%) was male. The situation is a little different from the current study where the far majority (79.4%) of respondents were male. This trend is to be expected and attributable to male dominance generally in Islamic leadership (Raudsepp, 2011; Diamontopoulos, et al., 2013).

5.2 Awareness and Knowledge of respondents on Sustainable Development Goal Six (6).

This study found that the overall awareness of SDG6 among Islamic leaders in Tamale aged 20 – 60 years and above was 30.5%. Correlates of awareness about SDG6 were advancement in age, being formerly married, higher wealth status, living in urban and peri-urban area. In comparison to the national awareness rate of 23.1 percent, the findings reveal a higher degree of awareness (Sanuade et al., 2018). This

degree of awareness is comparable with earlier studies on water and environmental sanitation awareness (Raudsepp, 2011). Duan and Fortner (2015) found that respondents had a higher level of environmental awareness and awareness of local environmental issues than global environmental issues. In comparison to rural areas, urban areas have much greater levels of SDG-6 awareness (84.4 percent versus 5.2 percent , respectively). This finding is in line with Ghanaian national awareness estimates based on a 2015 national survey, which revealed that rural areas have a lower degree of awareness than metropolitan areas (23.5 percent versus 26.8 percent , respectively) (Shah, 2016; WHO, 2017).

The findings further suggest that although respondents were aware about SDG-6, majority of them (64.3%) could not mention its targets (indicator for knowledge in this study). A similar finding was made by Shah, (2016) in Sweden where majority of Islamic leaders could not mention the targets of SDG-6. Findings further show that high Knowledge of SDG6 were mainly among those with formal education from senior high to tertiary. This finding is similar to results obtained in a study done in southern Thailand, in which they concluded that there was a low level of awareness in the notion of SDGs within the population (Singto, Fleskens & Vos, 2018).

This study further found that more than one–third (35.2%) of the population believed that SDG-6 talks about access to portable drinking water, approximately one-fourth (25.5%) of respondents thought that SDG-6 seeks to end open defecation and 21.1% of them mentioned that it addresses indiscriminate disposal of waste. This finding is in congruence with a study done in Ghana in the Greater Accra region by Worlanyo (2013). Leaders showed a high degree of understanding when questioned about sanitation in regard to garbage (plastic bags, waste paper, food leftovers, and a piece of metal or wood). This outcome is also consistent with earlier research on

respondents' environmental sanitation knowledge and habits (Raudsepp, 2011). Duan and Fortner (2015) found that respondents have a higher level of environmental awareness and knowledge of local environmental issues than global environmental issues. The findings are also consistent with Aljaradin et al., (2011), who found that people's comprehension of the reasons and consequences of inadequate sanitation was lower than their knowledge of waste source reduction, particularly solid waste. According to the literature, Medina (2012) believes that this pertinent understanding will result in a significant reduction in connected environmental concerns that emerging countries like Ghana face.

The related finding that respondents find it quite difficult to quit open-defecation and to ensure waste reduction because it is much associated with changing people's attitude built over years has also been confirmed by the literature (Mosse, 2011).

The general literature (Sherman, Gawronski & Trope, 2014) has shown that greater knowledge influences attitudes and leads to an increase in public support for program efforts. In contrast to the assumptions of this "knowledge theory", the findings imply that knowledge is not the only precondition for the diffusion of innovations. Instead, Sherman et al. (2014) propose that a dual-process mode can reveal the causal mechanism that links the input (e.g., stimuli and their environment) to the output (e.g., learning) (policy support). In a nutshell, the interaction between systematic and heuristic processing occurs when they occur together. Our third finding is that knowledge has a moderating effect on the value–attitude relationship.

On the issue of clean water, the findings show that majority of Islamic leaders (92.4%) affirmed that drinking unsafe water can cause illness. Approximately 79% of the Islamic leaders also reported that unsafe water can be treated to be safe for

drinking. This has been observed by several other studies as well (Sanuade et al., 2018; Kayima et al., 2013).

The finding that personal hygiene protects one against certain diseases was indicated by majority of the leaders (85.9%). This is coherent with a study conducted in Accra, Ghana in the Ga East Municipality by Worlanyo (2013) on market women.

Another important finding of this study is the fact that the highest proportion of the leaders interviewed affirmed that open defecation and indiscriminate disposal of waste can cause diseases in Muslim communities. The finding however explains that despite the knowledge, there is some reluctance in building household toilets. This shows that having a good knowledge may not translate into good practices and may not be a good predictor for sustainable environment practices. Contrary to this finding however, Besar et al., (2013) and Ahmad et al., (2012) found that high level of knowledge about SDG6 among Malaysian Muslims leaders have been the main push factor in sustained efforts towards meeting the goal. Similar results were observed in the study conducted by Medina (2012).

5.3 Attitude of respondents on Sustainable Development Goal Six (6)

Positive attitude on Sustainable Development Goal-6 was observed in only 48.5% (CI: 95%) of respondents. Contrary to this however, a study in urban areas in Northwest Ethiopia showed that majority of respondents (73.6%) had positive attitude towards SDG6 including being against open-defecation (88.8%), and that 95% of the respondents perceive proper sanitation affects health (Joshi, et al., 2013). The difference between the current study and others cited may be attributed to variations in quality and coverage of community health care services in the communities.

An equally important finding in this study is that only 27.4% of respondents had confidence that SDG6 could be achieved by the end of 2030. It is interesting that majority (77.9%) of respondents also believed proper waste management should be preached in mosques periodically in order to curb the menace of poor sanitation in Islamic communities. These findings are in congruence with the study done in Malaysia (Ahmad, 2015) and Nigeria (Robinson, 2013) respectively.

In terms of people's attitudes toward the environment, Bell and Rusell (2012) defined environmental attitude as people's positive or negative feelings toward certain aspects of the physical environment, or toward a physical environment-related issue. The set of ideas, effects, and behavioral intentions that a person holds regarding ecologically linked activities or issues can be considered as their attitude toward sustainable development principles.

This study further found that majority of informants (76.6%) believed Islamic islamic religion can be the best conduit to educate Muslims about sanitation and hygiene as well as having a duty to ensure good sanitation practices and cleanliness in their localities. The finding also shows that people see poor sanitation as a religious threat and a threat to well-being. The finding is consistent with the literature (Lorenzoni et.al.,2017). Redding et al., (2010) observes that concern for sanitation was high when they were perceived as local threats just like poor sanitation in Muslims communities (Zongo). Many believed that ensuring personal hygiene is also a form of worship in Islam.

5.4 Practices of respondents on Sustainable Development Goal Six (6)

According to the findings of this investigation, just a few towns had access to safe drinking water. Only four villages had houses with more than ten household toilets, according to the findings. This finding is comparable to that of Adubofour et al. (2013), who found that Muslim slum areas in Ghana's Kumasi city lacked access to household toilets.

The study also looked at how people in the study area defecate. According to the findings, 61.5 percent of respondents defecate near their homes, with the primary cause given as a lack of toilet facilities in the neighborhood. This finding is comparable to that of Bartram and Cairncross (2010), who discovered that children defecate in front of their homes. In a similar vein, Cairncross et al. (2010) found that youngsters were encouraged to defecate in the bush since it helped replenish the soil's fertility, resulting in higher yields during the agricultural season.

Another interesting fact is that 61.4 percent of respondents said they disposed of their waste in an open space/drain, while 37.2 percent said they burned their solid waste. This outcome from the study is consistent with Kendie's (2010) findings in Northern Ghana, where waste was dumped in the open.

According to the findings, there was a statistical association between study participants' educational status and their ability to judge the sanitary situation at the study location as provided. This finding contradicts that of Kobel and Del Mistro (2015), who found that education was more closely linked to people's sanitation knowledge. As a result, respondents assessed their understanding of the research site's present sanitation status as poor. Poor land use planning and control in unplanned slum settlements, which often have the worst sanitation problems, and inadequate

drainage systems, which are often choked with uncollected solid waste, exacerbate the situation. As a result, adequate drainage and solid waste treatment are required in addition to excreta management services (Bryant, 2018).

The study results also indicated that islamic religion can play a significant role in contributing towards SDG6 achievement. Findings of this study show that respondents support the idea that Islamic precepts about sanitation and personal hygiene should be used to educate people. They argue that the fear of possible punishment from Allah is a strong incentive for the collective effort towards meeting SDG6. This conclusion supports Hope and Jones' findings (2014). The Qur'anic instructions warned Muslims that they would be held accountable not just because it was a "sign" from Allah, but also because it was fundamentally divine order. It goes back to the idea that our Lord keeps a close eye on us [...] you have a responsibility, and you will be educated about it (Hope & Jones, 2014).

The influence of islamic religion cannot be overlooked in the lives of individuals and households, as the majority of people believe in the words of their religious leaders and holy scriptures, and this can combine with already existing strategies to improve good sanitation and hygiene practice in the study area. These findings coincide with studies including that of Khuan, Shaban, and Van De Mortal (2018).

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

6.0. Introduction

The primary findings and conclusions of the study are summarized in this chapter. It also gives suggestions for future studies and practices. The study examined Islamic leaders' knowledge, attitudes, and practices on water and sanitation in the Tamale Metropolitan Area of Ghana.

6.1 Summary

This study has highlighted inadequate knowledge among Islamic leaders on SDG6 in Tamale Metropolis. Approximately, 31% of the respondents had ever heard about SDG-6, with media (49.6%) being their major source of information. Few respondents (27.7%) had confidence in the achievement of the SGD-6 by the year 2030. Nevertheless 65.1% did not know the time limit for this sustainable development goals. Majority (58.1%) agreed that open defecation and indiscriminate disposal of waste can cause diseases in Muslim communities.

The findings show a significant association between educational status and knowledge and practices related to SDG6. Even though the majority of respondents draw water from improved sources within the study area, there is a high level of water treatment, and the majority of respondents use cloth filters, which is due to the work of various NGOs in the study area who provide education and filtering materials to households.

In relation to the objective 3: To determine the Practices of Islamic leaders in relation to SDG6, the findings suggest that even though respondents were very aware of the critical role of cleanliness in Islam, they lack the impetus to make a difference as leaders in the SDG6 implementation on the ground.

Among other critical findings, this study demonstrates the implications of how cultural tenets, religious (Islam) and modern concepts (SDG6) about sanitation and clean water consumption in Dagbon fit together and could therefore be used as capable instrumentality for retooling social development project activities towards SDG6.

6.2 Conclusion

As predominantly Muslim, Tamale (Dagbon) is enjoined to reach their cultural goals in conformity with the Islamic concept that 'cleanliness is next to Godliness'. Given this social-fact as the point of departure, the cultural and religious perspective is already positively placed to meet the demands of SDG6. There is therefore virtually no organized resistance from culture or from Islamic religion to negatively affect achieving SDG6. The only challenge, as shown in the thesis, has been the lack of readily available and accessible resources, including adequate training of Islamic leadership for effective collaboration in achieving SDG6.

Among other things therefore, this study demonstrates the essence of three different identities (custom – Dagbon; the Religious - Islam and the modern - SDG6) staging the symbiotization and harmonization of the link between these different reasoning structures about clean water and sanitation within the society. It is a symbolic dramatization of the mixing of three social contexts, juxtaposing supposedly different institutional borders and thinking patterns for synergistic social development. The tenets of culture, Islam and modern thinking (SDG6) are clearly centrifugally poised in concert on the issue of sanitation and clean running water for use at the household and societal level.

The leadership of the SDG6 programme are aware that to ensure the enhancement of the dignity of people, the approach to health education should evoke the principle of Teaching that recommends working from the known to the unknown. The core quality of good teaching proceeds by developing the main points from past to present, simple to complex, known to the unknown, and from most frequently used to least frequently used. Invariably, learning moves faster when it builds on what the community already knows. In this spirit therefore, if Islam as a Islamic religion enshrines both the spiritual and physical health of followers, then that synergistic meaning between islamic religion, culture and well-being could be effectively manipulated in advocacy to move SDG forward under the slogan *'cleanliness is half of faith'* as a rallying point for health education. Health Education programmes that have reference roots in the sensitivities, culture and Islam as a islamic religion in northern Ghana could have bigger agency in the drive towards achieving SDG6.

6.3 Recommendations

Based on the findings of the study, the following recommendations are made:

6.3.1 The Metropolitan Health Directorate should take responsibility for mounting a more nuanced SDG6 health campaign, based on the sensitivities of specific communities and the cultural/religious inclinations of the target communities.

6.3.2 Special consideration should be given by city administration to integrate practical engagement and vigorous training for community moral leaders instead of the current over reliance on repeated concentration and huge budgets on workshops given to health workers per se on SDG6. Indeed, health workers have already been trained in the profession. Perhaps simple orientations are important. The bulk of training should rather focus on the people, the community, lay leadership.

6.3.3 Emphasis should also be put on the community through improved water supply, developing sewerage and drainage system, more in-house toilet facilities and urban beautification. Indeed, the Parks and Gardens Department as a public agency should be awaken to the task of beautification of the city.

6.3.4 Extension workers should be empowered to undertake continuous home-visit to improve the sanitation of the compound and home. Moral leadership could be empowered to act as agents of social change and the diffusion of SDG6 indicators at the community level.

6.3.5 The Tamale Metropolitan Assembly should organize regular consultative meetings with Moral leadership of Tamale in the course of programme that respects the sensitivities of the community towards meeting SDG6. All religious leaders (Muslim, Christians, traditionalists) should be practically engaged in creating the necessary aura around SDG6 that could make it a moral duty.

6.3.6 The Assembly should assign adequate budgets to enlarge community education, water services and other social amenities such as toilet facilities. Through the participation of many stakeholders (government, NGOs, and communities) in decision-making, good governance should be practiced to encourage water supply, sanitation, and hygiene. Opinion leaders should take part in actions promoting the achievement of the Sustainable Development Goals.

6.3.7 Operational research, partnerships, and possibilities to solve complicated development problems should all be part of a regular joint effort. Research should take the lead in generating essential local indicators that better reflect local conditions while also supporting the global SDG indicators.

6.3.8 The Trash Management Department of the Tamale metropolitan has greatly increased solid waste collection and successfully implemented a wide range of

hygiene education initiatives. However, because most Tamale flush toilets are connected to septic tanks, faecal sludge composting must be prioritized. WMD and groups like IWMI and SANDEC recently launched a trial project that can serve as a model.

6.3.9 To fulfill the needs of the growing population, Ghana Water Company Limited/AVRL must continue to expand its water supply. With expanding urbanization in and around the Tamale metropolitan region, and the resulting growing challenges to water quality, a shift in thinking is required to improve water efficiency through better wastewater management. Reusing water is a cost-effective way to supplement the city's water supply.

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APPENDIX A

UNIVERSITY FOR DEVELOPMENT STUDIES
SCHOOL ALLIED HEALTH SCIENCES
DEPARTMENT OF PUBLIC HEALTH

Informed Consent Form

Introduction

Hello. My name is Faridu Abdul-Wadudu Masters student at the University for Development Studies (UDS) and I am here to conduct a study on **knowledge, attitude and practices of Islamic leaders in relation to Sustainable Development Goal 6 in Tamale.** The study is in partial fulfilment of my academic requirements. By participating in the study, you will provide vital information that might be helpful to the Metropolis. Policy makers can use the study as source of information for decision making.

It is for this purpose that I am kindly requesting for your participation by answering a few questions related to the study which may take about **30 minutes** of your time. In case you choose to participate, your name or identity will not be revealed to anyone. In addition, your participation in this study will not attract any financial rewards but will be on **voluntary** basis, you can choose not to answer any of the question(s). Just like those who may choose not to participate in answering any of these questions, their decision will be respected. Be assured that the information you give will only be used for purposes of this academic study.

Signature :

I have read/been read to the above consent statement and understood that my decision to participate or not to participate in the study is voluntary and that I will not get financial benefits by participating in this study.

Please, fill the following sub-section **(If YES, proceed to Q1, if No, terminate session by thanking the person):**

YES, I have agreed to participate:

Signature/Right thumb Print _____ ***DATE:*** _____

NO, I have refused to participate

Signature/Right thumb Print _____ ***DATE:*** _____

Person Administering Consent:

I, _____, confirm that the above consent was read and signed in my presence: _____

_____ _____

Questionnaire

BACKGROUND INFORMATON	
Name of Interviewer	
Date of Interview	
Respondent ID	

Q#	Question	Responds	code
	Section A: Socio-demographics		
1	What is your age (in years)?	…….	
2	What is your sex?	1. Male 2. Female	
3	What is the highest level of education of respondents	1. No education 2. Primary 3. Junior High School 4. Senior High School 5. Tertiary 6. Informal education	
4	What is your marital status?	1. Single 2. Married 3. cohabitation 4. Divorced/separated 5. Widowed	
5	What is your Ethnicity?	1. Dagomba 2. Mamprusi 3. Gonja 4. Others specify ……	
6	What Sect in Islam do you belong?	1. Sunnah 2. Ahmadiyah 3. Tijaniya 4. Shiiya 5. No sect 5. Others specify…….	
7	What is your position in the Sect/Mosque?	1. Imam 2. Sheikh 3. Muaazin 4. Women leader 5. Others specify…….	
8	For how long have you held that position?	……	
9	What is your occupation?	1. Farmer 2. Trader 3. Unemployed 4. Public servant	

		5. Others specify …….	
10	What is your area of residence?	1. Rural 2. Urban 3. Peri urban	
11	What is your family size?	…….	

Section B: Knowledge of respondents on Sustainable Development Goal Six (6)

12. Do you know about Sustainable Development Goal 6?
1. Yes 2. No

13. If yes, where did you get to know?

1. School 2. Media 3. Friends 4. Others specify ……

Key to the response: Yes, No, Don't know. (*Please tick √)*

No.	Statement	Yes	No	Don't know
	Knowledge About SDG 6			
14	Do you know the targets of SDG 6?			
15	SDG 6 focuses only on sanitation?			
16	It does not talk about access to portable drinking water?			
17	SDG 6 seeks to end open defecation?			
18	It seeks to address indiscriminate disposal of waste?			
19	It pays special attention to the needs of women and the vulnerable?			
20	The aim of SDG 6 is to improve health care facilities?			
21	SDG 6 must be achieved by the year 2040?			
22	SDG 6 did not talk about hygiene and cleanliness?			
23	SDG 6 encourages open defecation?			
	Knowledge about Sanitation and Water			
24	Drinking unsafe water can cause illness?			

25	Unsafe water can be treated to be safe for drinking?			
26	Access to safe drinking water is a source of good health?			
27	Personal hygiene protects one against certain diseases?			
28	Open defecation can cause diseases in Muslim communities?			
29	Can indiscriminate disposal of waste cause diseases among Muslims?			

Section C: Attitude of respondents on Sustainable Development Goal Six (6)

Key to the response: SA- strongly Agree=1, A- Agree=2, N- Neutral=3, D- Disagree=4, SD- Strongly Disagree=5. (*Please tick √)*

S/N	**Items**	**Response**				
		SA	A	N	D	SD
30	I think it is important to read more about SDG 6.					
31	I have strong confidence in the targets of SDG 6.					
32	I believe proper waste management should be preached in mosques periodically.					
33	I do not see the need to keep Muslim communities clean.					
34	Mosque hygiene and home hygiene are equally important to me.					
35	To me, Muslims can play a significant role in achieving SDG 6.					
36	To me, only the efforts of government can help achieve SDG 6.					
37	I think Islamic islamic religion can be a best conduit to preach and educate Muslims about sanitation and hygiene.					

38	I do not think Muslims should prioritise washing of ablution cans and mats regularly.					
39	To me, Islamic leaders have a duty to ensure good sanitation practices and cleanliness in their localities.					
40	To me, Islamic leaders have a role to play at addressing open defecation.					
41	I believe open defecation is not against Islam.					
42	To me, ensuring personal hygiene is also a form of worship in Islam.					
43	The safety of drinking water is a concern to me.					

Section D: practices of respondents on Sustainable Development Goal Six (6)

Key to the response: Yes, No, Don't know. (*Please tick √)*

No.	Statement	Yes	No	Don't know
44	Have you ever treated drinking water?			
45	Do you treat drinking water by boiling?			
46	Treating drinking water by filtering?			
47	In the past two months, have you given a sermon on cleanliness or hygiene in the mosque?			
48	Water containers are available at the mosques?			
49	Availability of separate container for drinking water?			
50	Narrow-necked water container for ablution?			
51	Use of ladle to draw water from container?			
52	Do you have a functional toilet facility at your mosque?			
53	Do you have a functional urinal facility at your mosque? If yes, where does it empty……			

54	Do you have a functional toilet facility at your house?			
55	Do you have a functional urinal facility at your house?			
56	Do people around you practice open defecation?			
57	Why do you think they prefer open defecation?			
58	Do you wash hands with soap under running water before eating?			
59	Do you wash hands with soap under running water before ablution?			
60	Do you think sermons on cleanliness and hygiene are important?			
61	Do you practice daily washing of kettle?			
62	Frequent change of water in kettle?			
	How do you dispose solid waste in your house			
63	Waste water into open drain?			
64	Waste water via drainage tube?			
65	Solid waste into the garden?			
66	Solid waste by burning?			
67	Solid waste into waste container?			
68	Daily washing of kettle?			
69	Removal of choked gutters around the mosque?			
70	How often is this done….			

KEY INFORMANT INTERVIEW GUIDE ON KNOWLEDGE, ATTITUDE AND PRACTICES OF ISLAMIC LEADERS IN RELATION TO SUSTAINABLE DEVLOPMENT GOAL 6 IN TAMALE.

Introduction: This study is being conducted by Faridu Abdul-Wadudu concerning **knowledge, attitude and practices of Islamic leaders in relation to Sustainable Development Goal 6 in Tamale.** The interview will take about 30-40 minutes. Your identity will never be revealed. In addition, you are not obliged to answer any question you do not feel comfortable about, and you may stop the interview at any time. This study is purely for academic purpose and does not intend to criticize you. Please feel free to answer the questions at your own pace.

Do you agree to participate in this interview? Yes [ ] No [ ]

If you have any concerns, please let us know before we start (*address any issue that may come up*).

Please may we start now?

1. In your view, when we talk about sanitation what does it entail?
2. What is your general view about sanitation in Tamale?
3. What is your understanding of the relationship between Islamic teachings and sanitation practices generally?
4. Do you think discussing sanitation issues appear as prominent in the sermons at the Mosque?
5. In your view, is it possible to use Islam as a conduit to achieve positive sanitation related targets? Explain
6. How critical is water in Islam? Explain
7. What is the spiritual significance of ‘clean water’ in Islam?
8. In your opinion, how can Islam be used to achieve SDG 6 in Tamale?
9. Have Islamic leaders taken measures to improve sanitation and hygiene among Muslims? Explain
10. In your opinion, how do we associate Islam with SDG 6? Explain
11. What is your general view about sanitation in Tamale?

12. Why do you think that even though hygiene and cleanliness is important in Islam, yet, the Zongos become quite dirty with waste water and rubbish around?
13. How do we use Islam to solve the problem of hygiene?
14. What do you recommend to ensuring that Muslims adhere to the teaching of prophet Mohammed (PBUH) that cleanliness is half of faith?