Original Research Article

Knowledge, Attitude and Practices among population in Relation to Sustainable Development Goal 6 in Tamale

Abstract

Background: 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. This study's main aim was to assess Muslim leaders' knowledge, attitude and practices in relation to Sustainable Development Goal 6 (SDG-6) in the Tamale Metropolis.

Methods: The study employed a descriptive cross-sectional study design. The study used primary data collected through questionnaire by the interview method among 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 Religion on sanitation and clean water; Perceived seriousness of SDG 6; Perceived benefits related to SDG6 and Perceived barriers associated with SDG6.

Results: The findings suggest that even though respondents were very aware of the critical role of cleanliness in Islam, they lacked the impetus to make a difference as leaders in the SDG6 implementation. The findings also show a significant association between educational status and knowledge and practices related to SDG6 (X^2=37.542, p=0.001).

Conclusions: 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.

Keywords: Socio-demographics; Sustainable Development Goals; Symbiotization; Sanitation; Muslim leaders

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), SDGs This Goal specifically sets out a clear plan of action in framing WaSH development efforts from 2015 to 2030 (UN, 2018). Unlike what pertains in the previous MDG target 7.C: ‘halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation’ (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 countries 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. This current study assessed the knowledge, attitude and practices of Muslim leaders in relation to Sustainable Development Goal 6 (SDG6) in Tamale Metropolis

Methods

Study Area

Tamale Metropolis 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 situated in the Region's center region, bordering the Sagnarigu District to the west and north, Mion District to the east, East Gonja to the south, and Central Gonja to the south-west. The Metropolis is 646.90180 square kilometers in size (GSS- 2010). The Metropolis is located between $9^{o}16$ and $9^{o}34$ north latitude and $0^{o}36$ and $0^{o}57$ west longitude. In the metropolis, there are 115 communities. According to the 2010 Population and Housing Census, Tamale Metropolis has a population of 233,252,

accounting for 9.4% of the region's population. Males make up 49.7% of the population, while females make up 50.3 percent. (Ghana Statistical Service: District Analytical Report, 2014).

Study Approach

The researchers used a mixed approach to data collection to acquire a wider picture of SDG-6 and its health consequences in the study region. A mixed method approach incorporates or mixes components of qualitative and quantitative research. The quantitative technique assessed SDG goal 6 (water and sanitation) knowledge, attitude, and behavior in the Tamale Metropolis, as well as the link between water and sanitation practices. A qualitative technique was used to investigate the socio-cultural variables that impact SDG-6 behaviors in the Tamale Metropolis. 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). 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 1)** presents the mixed method approach.

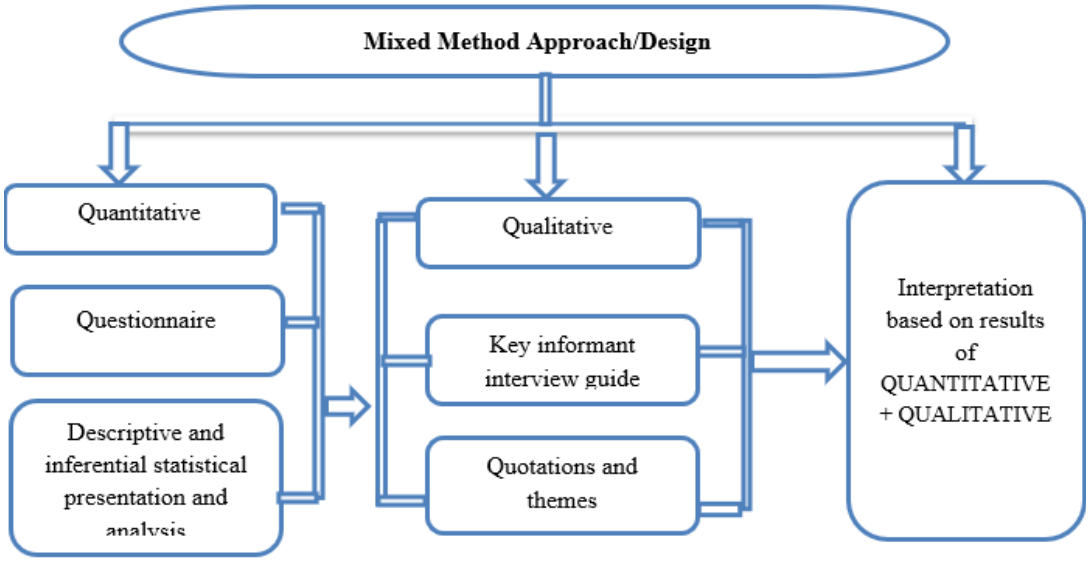

Figure 1: Topology of the study approach/design

Study Design

The descriptive cross-sectional study design was used to obtain the quantitative data using questionnaires. A descriptive survey, according to Leedy and Ormrod (2010), is a design that uses questions to obtain information about the characteristics, opinions, attitudes, practices, and experiences of individuals or groups. The questionnaires were self-administered by the researchers and paraphrased into local language for individuals who could not answer in English due to literacy issues. A panel of experts determined the questionnaire's content and face validity before and after pre-testing. This research design was chosen over a longitudinal study design due to the researcher's limited time. It was intended as a descriptive cross-sectional survey to provide current situation information to aid in the creation of interventionist policies. The study could also serve as a starting point for future trend investigations.

Study Population

The target population of study for this research work was Muslim leaders within the Tamale metropolis. Leaders from various Islamic sects were selected including, Al-Sunna, Tijaniyya and Ahmadiyya Muslims.

Sample Size and Sampling

390 respondents were approached with the questionnaires; however, 384 respondents completed and returned the questionnaires, yielding a 98.5% response rate. 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.

Data Collection and Analysis 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, 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 researchers 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.

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 researchers 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.

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.

Ethical Considerations

Permission was sought from the Head of the Department of Public Health, UDS. 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. All participants in

the 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. 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. Participants' confidentiality and identity were maintained throughout the study, including in all correspondence between the researchers.

Results

Socio-demographic Characteristic of the Study Population

The characteristics of the population are shown in (**Table 1)**. Out of the 390 respondents (Muslim 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 as shown in **figure 2**. 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 1**).

Table 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

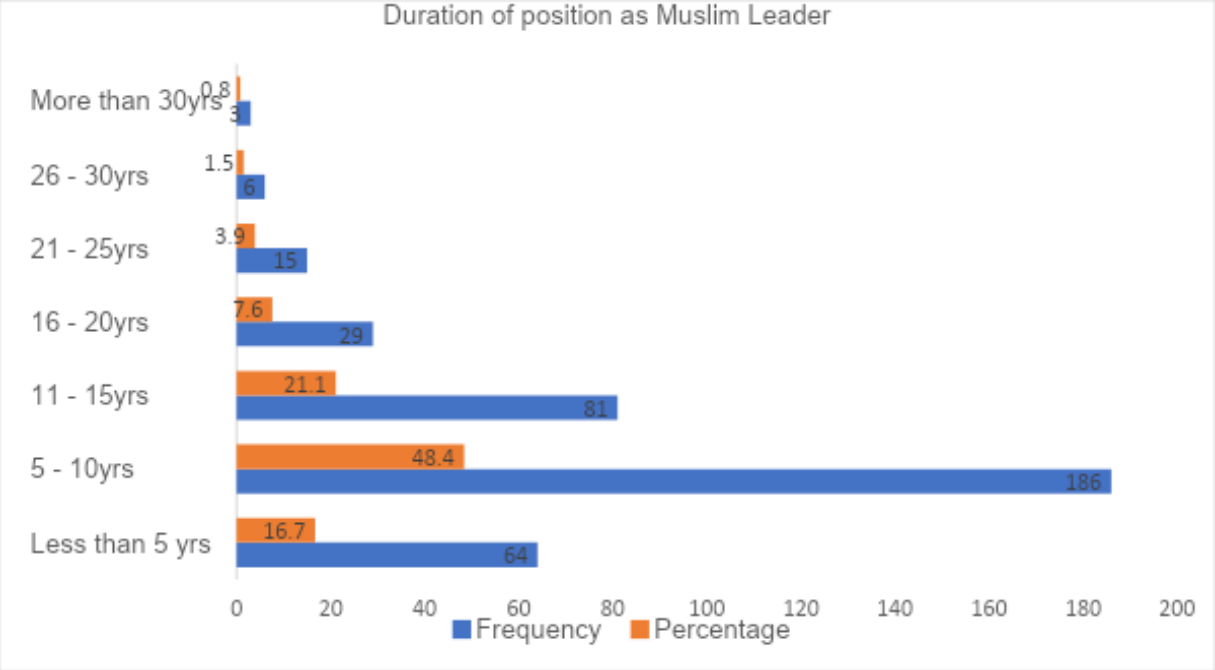

Figure 2. A bar chart showing the duration of the respondents as Muslim leaders.

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. Figure 5 presents the level of awareness SDG 6 among Muslim leaders both female and males.

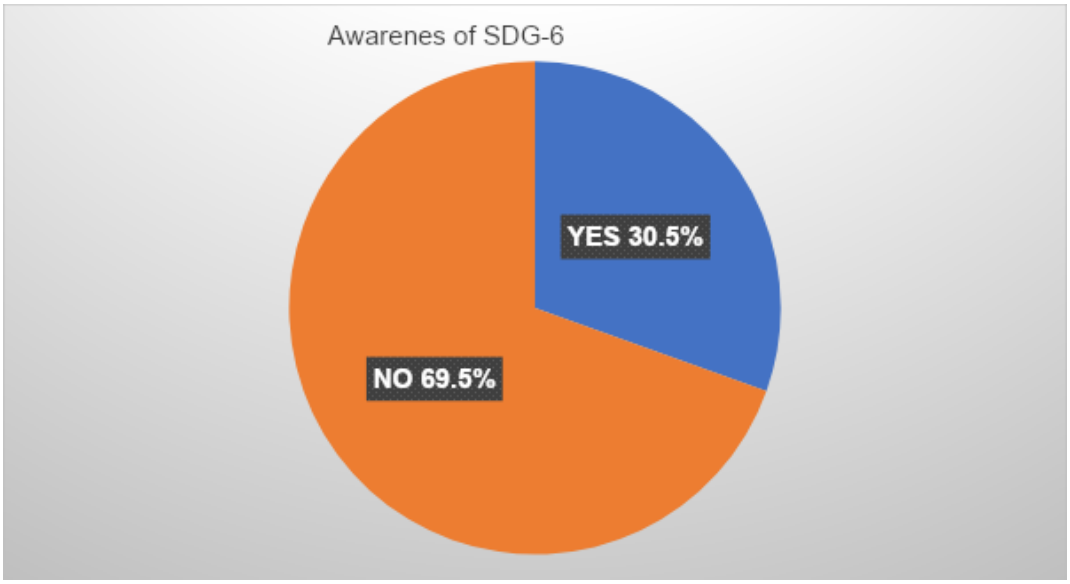

Figure 3. Awareness of respondents on SDG-6.

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 not. 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 2).

Figure 4 reveals that the highest source of information on SDG-6 is from the mass Media, followed by school and the least is from conferences.

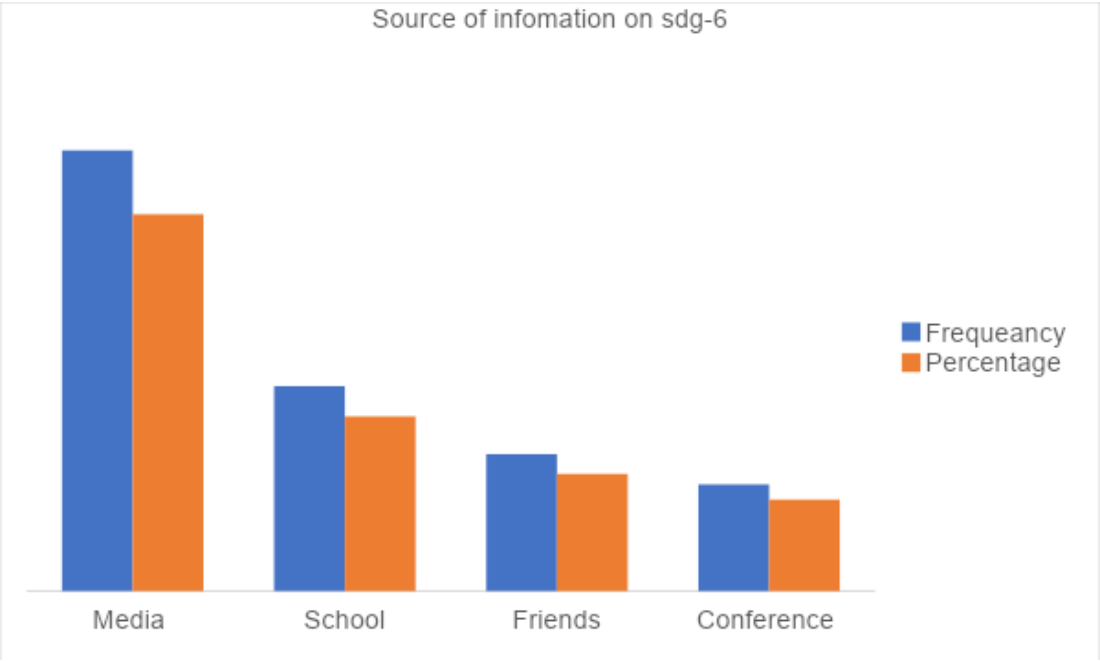

Figure 4. Chart showing the source of information on SDG-6.

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 3 presents the summary of the findings:

Table 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

As shown in Table 2, a sizeable proportion of respondents (46.6%) scored high level of knowledge generally on SDG 6. However, it is important noting that slightly more than half (53.3%) of all respondents had low level of knowledge about SDG 6

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

To examine the association between respondents' socio-demographics and their awareness about SDG-6, the Chi Square test was used and the results are summarized in Table 3. 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 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.

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)**.

Table 4 Association of socio-demographic variables with water treatment practices.

	Current methods being used to make water safe					
Variable	Filtering	Boiling	Nothing	X^2	df	P-value
Age group (years)						
20-29 years	13(7.0%)	7(30.4%)	3(6.1%)			
30-39 years	23(12.3%)	25(47.2%)	5(10.2%)			
40-59 years	54(28.9%)	40(43.3%)	15(30.6%)	1	199.927	<0.001
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						
Male	145(77.5%)	107(77.5%)	53(77.5%)	2	9.228	0.056
Female	42(22.5%)	27(22.5%)	10(22.5%)			
Total	187(48.7%)	134(34.8%)	63(16.4%)			
Education						
No education	2(1.1%)	2(1.5%)	0(0.0%)			
Primary	33(18.1%)	24(18.0%)	33(47.8%)			
Junior High	52(28.6%)	50(37.6%)	14(20.3%)	4	56.231	<0.001
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						
Trader	79(45.9%)	71(41.0%)	10(45.9%)			
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%)	1	52.820	<0.001
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						
Dagomba	125(68.7%)	121(45.9%)	13(45.9%)			
Gonja	25(13.7%)	15(13.4%)	8(13.4%)			
Hausa	16(8.7%)	18(23.3%)	2(23.3%)	6	4.30	0.829
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						
Single	17(9.3%)	12(68.7%)	7(68.7%)			
Married	143(78.6%)	134(13.7%)	23(13.7%)	6	1.685	0.946
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

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 compared 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 5).

Table 5

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

					95% C.I. for AOR	
					Lower	Upper
		Wald	P-value	AOR		
	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.

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 6)

Table 6

Attitude of Muslim 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 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, Muslim 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, Muslim 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 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 SDG-6, 40.4% of the Muslim 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 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 Muslim 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.

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 7.1 and 7.2 give a summary of the findings.

Table 7.1

Practices of respondents on Sustainable Development Goal Six (6)

	Frequency (%)

Variable	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 7.2 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 7.1 and 7.2 show 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 (Muslim 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%).

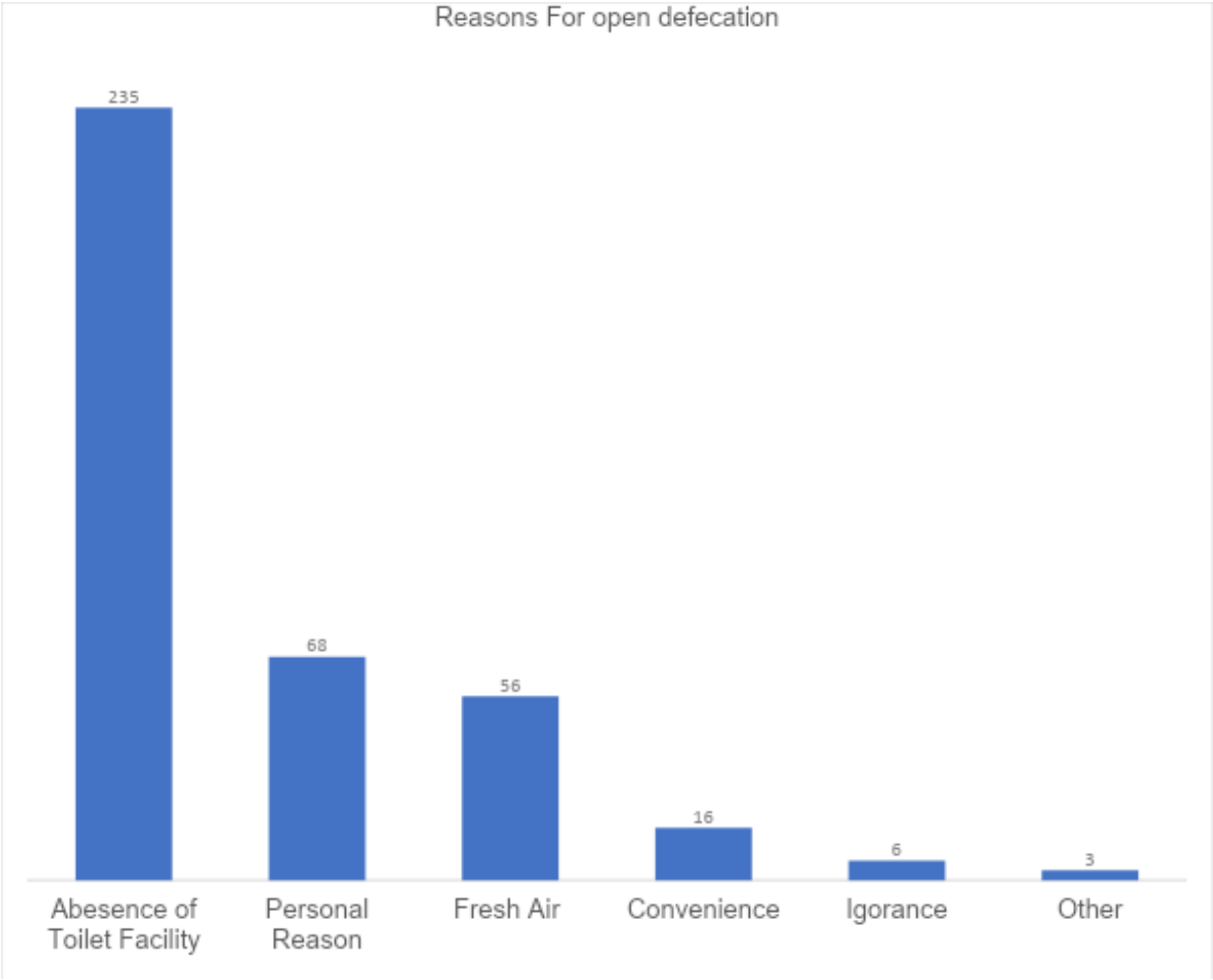

Figure 5. A chart showing the various reasons for open defecation.

Conclusion

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 Muslim leadership (Raudsepp, 2011; Diamontopoulos, et al., 2013).

This study found that the overall awareness of SDG6 among Muslim 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 Muslim 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 Muslim leaders (92.4%) affirmed that drinking unsafe water can cause illness. Approximately 79% of the Muslim 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).

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 SDG-6 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 SDG-6 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 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.

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 religion can play a significant role in contributing towards SDG6 achievement. The 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 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).

Abbreviations

SDG-6: Sustainable Development Goal 6; MDGs: Millennium Development Goals; WaSH: water, sanitation, and hygiene; AOR: Adjusted Odd Ratio; CI: Confidence Interval,

Declarations

Ethics approval and consent to participate

A detailed plan of the study and objectives were submitted to the Head of the Department of Public Health who gave his approval first, and then the project supervisor assessed it. Ethical clearance was sought from 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. The study was carried out in accordance with relevant guidelines and regulations. Informed consent was sought from participants involved in the study. Participants were made aware that information obtained from them would only be used for policy and decision-making by stakeholders. Participants were also made aware that there were no known risks associated with their participation in the study, that participation was voluntary, and that they were free to withdraw from the study at any point. No identifying information such as participants' names captured from the questionnaires was reported as part of the results.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request

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