Sanitation and Hygiene Practices in Northern Ghana: An Analysis of Household Health Risks

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Abstract

This study assessed household health risks in relation to sanitation and hygiene practices. A convergent parallel mixed method design, involving a survey of 200 household heads and two semi-structured interviews, was employed. The forward linear regression method was used to determine how sanitation and hygiene practices influence household health risks. From the results, age was the most considered criterion for using a homestead toilet facility. Income made the most significant contribution to change in the choice of toilet facility with a Beta Weight of 0.313 at a statistically significant level of p<0.00. Income was again identified to be the most statistically significant determining factor for access to sanitation and hygiene materials with 0.389 at a significant alpha level of p<0.00. The identified factors that define sanitation and hygiene practices cut across gender division of labour, age, occupation, housing type and residential location. Owing to the range of demographic, social and economic factors influencing the adoption of proper sanitation and hygiene practices, it is recommended that sanitation and hygiene improvement interventions should inculcate socio-demographic and economic concepts to reduce household health risks.

KEYWORDS: *Hygiene Behaviour, Household Income, Residential Localities, Sanitation Facilities, Social Factors*

Introduction

Sanitation, defined as "access to and use of facilities and services for the safe disposal of human urine and faeces" (World Health Organization [WHO], 2018: XII), is recognized as a person's right (United Nations [UN], 2010). Although the level of individuals who have access to adequate sanitation has improved since 1990, data from UNICEF and WHO (2021) shows that in 2020, 54% of the global population (4.2 billion people) used safely managed sanitation services. Moreover, WHO (2018) estimates that less than half (45%) or 3.4 billion people use safely managed toilet facilities, through emptying and transporting of excreta for treatment and final disposal or reuse and an additional 2.2 billion people use basic services without proper disposal or treatment methods. Regarding hygiene, in 2017, 60% of the world's people had basic handwashing facilities (soap and water) available at home, 3 billion lacked such facilities at home, 1.6 billion had limited facilities (not having soap or water) and 1.4 billion had no facility at all (UNICEF & WHO, 2019).

Getting access to sanitation and hygiene services that are even the most basic is a daily challenge for billions of people in developing countries, where 70% of the population still lack basic sanitation services and nearly three-quarters do not have hand washing facilities (UNICEF & WHO, 2019). Inadequate access to sanitation and hygiene is a leading explanation for diseases worldwide which is associated with the reasons why sanitation-related diseases account for about 50% of the health burden in developing countries (UNDP, 2018).

Several of the Sustainable Development Goals (SDGs) target progressively reducing inequalities related to sanitation and hygiene (UN, 2015). The aim of SDG 1 is to 'end poverty in all its forms everywhere', which includes a target for universal access to basic services (SDG 1.4). Goal 3 is aimed at ensuring healthy lives and promoting well-being for all and it includes a target for achieving universal health coverage (SDG 3.8). SDG 4 aims to 'ensure inclusive and equitable quality education and promote lifelong learning opportunities for all', including targets for upgrading education facilities to provide safe and inclusive learning environments, including basic drinking water, sanitation and hygiene (SDG 4.a.1). Finally, SDG 6 aims at ensuring the availability and sustainable management of water and sanitation for all, including targets for universal access to sanitation and hygiene (SDG 6.2). This underscores the importance of prioritizing and bettering sanitation and hygiene services, which are understood to pose significant risks to health at the household and community levels (UNICEF & WHO, 2016).

Post-Millennium Development Goals (MDGs) overview suggests that Ghana is still faced with several constraints in the provision of adequate sanitation for its population (Appiah-Effah et al., 2019). Ghana has witnessed rapid urbanization, putting a constriction on infrastructure and the provision of sanitation facilities (Mariwah, 2018). In spite of this, sanitation has not been prioritized among competing demands like investments in health care, education, transportation, electricity and water (Osumanu et al., 2010; Appiah-Effah et al., 2019). Thus, with the current coverage of 21% (i.e., 25% urban and 17% rural) (Ghana Statistical Service [GSS], 2018), it implies that much progress has not been made in achieving the country's sanitation targets in line with the SDGs.

At the household level, sanitation and hygiene related risks to health cannot be overemphasized. Household characteristics have been found to influence the adoption of different sanitation and hygiene practices (Wasonga et al., 2016; Osumanu et al., 2019). According to Pfadenhauer and Rehfuess (2015), the provision of household water alone is not sufficient to achieve intended health outcomes and must be accompanied by changes in household sanitation and hygiene behavior. This makes it critical to understand individual perceptions, motivations and challenges to enhance the development of more appropriate household level interventions (Osumanu et al., 2019). In recent times, considerable attention has been directed towards improving sanitation and hygiene which should further motivate behavior change among households. Unfortunately, little emphasis has been given to behavior change which is developed from perceptions and attitudes acquired over time (Wasonga et al., 2016). Efforts are also made to promote hygiene behavior change, such as encouraging hand washing at key times to reduce health risks, through knowledge and attitude-oriented interventions, but the very little achievement of such efforts has been described as unfortunate (Greene et al., 2012).

Although there are studies on household sanitation and hygiene practices (e.g., Boadi & Kuitunen, 2005; Osumanu et al., 2019; Adzawla et al., 2020), the insufficiency of information for a complete understanding of household sanitation and hygiene practices in Ghana leads to the need for evidence in order to help reduce health risks. This study assesses sanitation and hygiene practices in relation to health risks at the household level in northern Ghana using Tamale Metropolis. The study attempts to provide household- and community-specific characteristics that shape sanitation and hygiene behavior. This will help understand variations at the household and community level in sanitation and hygiene practices, which can lead to more efficient design and accurate targeting of households and communities for risks reduction. The paper is organized into five sections. Following this introduction is a conceptual framework to guide the study. The third section provides a brief description of the study area and a discussion of the methods used in the study. The main findings are presented in section four with a discussion of the results in the next section. Section six concludes the paper with some recommendations.

Conceptual Framework

The study is based on a social production of diseases and political economy of health conceptions, which places major attention on the social determinants of health by revealing the linkages and dependencies between health and social conditions (WHO, 2010; Bohnet-Joschko et al., 2020). Worthman and Kohrt (2005) explained that political factors and the distribution of resources make it easier to determine what resources are available to households and who can have access to those resources. Levin and Browner (2005) posits that social inequalities is a factor that can create variations in the health conditions of particular social groups, which is a clear illustration of the relationships that exist between rates of mortality and levels of wealth. Increasingly, studies have examined how superiority differences, including those that are based on race, gender and social class, impact the health conditions of people (Sargent & Johnson, 1996; Levin & Browner, 2005; Bellmann, 2012). These studies strongly support the ideology of social class or position which is noted to play an important role in sanitation and hygiene disparities among households (Solar & Irwin, 2010).

The ideology of social position is a key component of Diderichsen et al.'s (2001) model of the mechanisms of health inequality, which stresses that society, through social position, experiences particular exposures to health risks (Graham & Kelly, 2004; Nishijima et al., 2020). According to this ideology, variations in the rates of morbidity and mortality within specific groups of people are noticeable as a result of the differences in their socio-economic backgrounds. Health risks are stratified based on mechanisms like context, which is broadly regarded to encompass social and political mechanisms that generate, configure and sustains the hierarchies in political institutions, labour markets, educational systems, and societal and cultural values (Solar & Irwin, 2010). Hence, it can be explained that within the contextual dimensions of the model includes those factors that are associated with individuals and their environments which can influence sanitation and hygiene practices (Dreibelbis et al., 2013).

Additionally, the availability of markets, products, hygiene enhancing resources, like hand washing materials, as well as demographic and socio-economic features of households and the community are central in determining sanitation and hygiene practices. The social context in the model, according to Diderichsen et al. (2001), is how society is structured or

how social relations are organised and cause stratification and subsequently ascribe individuals and households to distinct positions in society. The stratification in society is engendered on different susceptibilities to conditions that compromise the health of people. Individuals' exposure to risks can be explained in terms of the availability of material resources and the accompanying health conditions (Diderichsen et al., 2001).

Household factors that have been identified to be key determinants of sanitation and hygiene practices include household size, income, education, age, employment status, gender, housing type and home ownership (Mbata, 2006; Arthur, 2010; Rotowa et al., 2015; Osumanu et al., 2019; Aigbiremolen et al., 2019). These factors have been reported to be positively correlated with good sanitation and hygiene practices. At the community level, access to water supply, availability of toilet facilities (Arthur 2010) and structural factors such as unemployment, uneven resource distribution patterns, social cohesion and confidence in leadership (Owusu 2010; Bisung et al., 2015) are significant determinants of sanitation and hygiene practices.

The conceptual framework used for this study (Figure 1) illustrates how mechanisms across governance (socio-demographic, economic and political factors) interact to create social and economic statuses in which people are categorized according to their levels of education, income, gender, occupation and other factors. Individuals and households have different experiences based on their social statuses which define their vulnerability to risks that compromise their health (Solar & Irwin, 2010; Bohnet-Joschko et al., 2020). The structural mechanisms in Figure 1 produce divisions in the social class of individuals and households based on their socio-economic statuses, power and resource access (Diderichsen et al., 2001). Finally, the social context, structural mechanisms and the accompanying socio-economic statuses of individuals and households are considered as structural determinants that are referred to as the social determinants of health risks (Graham & Kelly, 2004).

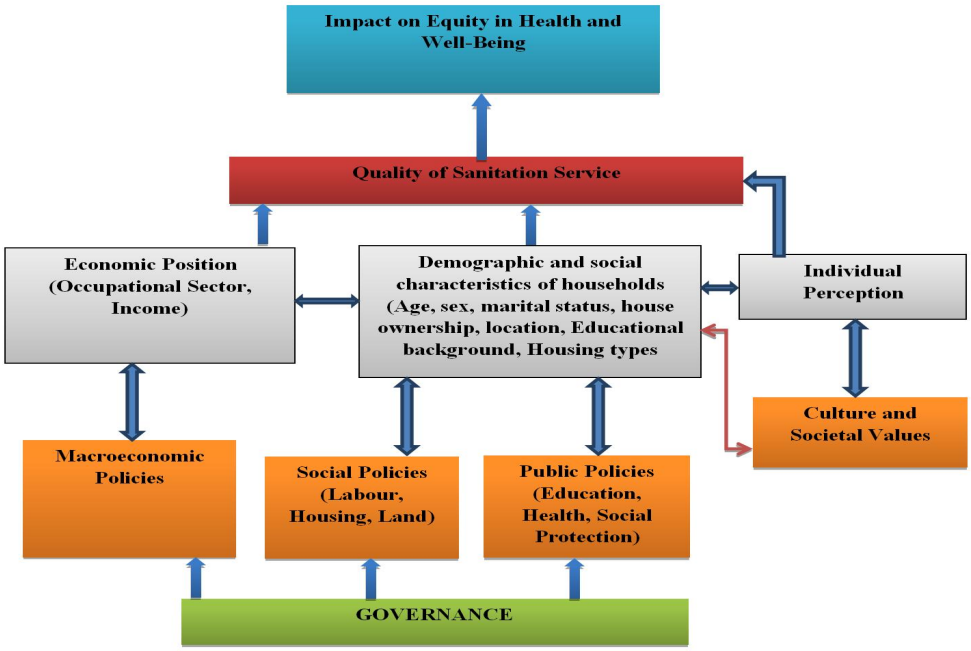

Figure 1: Conceptual framework

Methodology

The study context is Tamale Metropolis (Figure 2), which is located in the central part of the Northern Region of Ghana. According to GSS (2014), the Metropolis is estimated to have a total land size of 646.90180 km^2. Geographically, it lies between longitudes 0º36' and 0º57' West and latitudes 9º16' and 9º34' North. Tamale Metropolis is divided into three sub-metros - South, Central, and North (Tamale Metropolitan Assembly [TMA], 2018).

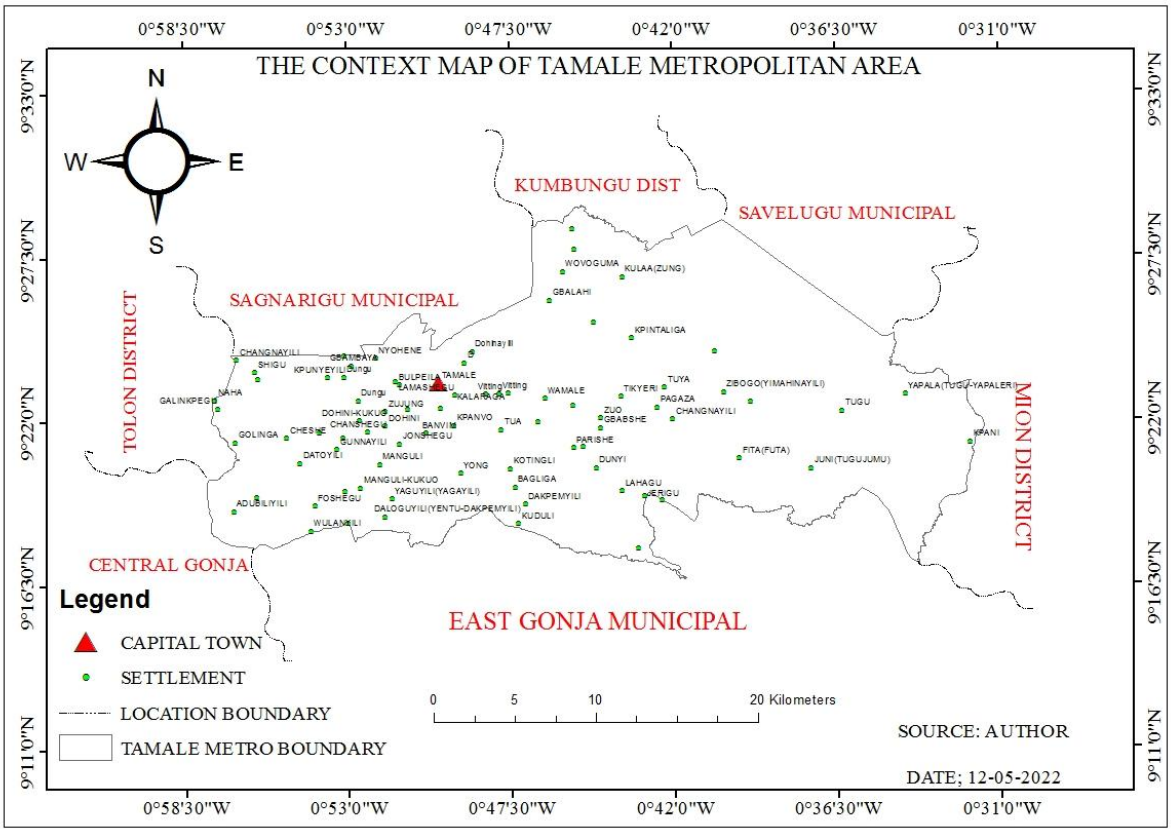

Figure 2: Map indicating the Tamale Metropolis

A convergent parallel mixed method design, which helps researchers to use both quantitative and qualitative techniques concurrently (Creswell, 2014), was employed. This allowed the use of cross-sectional analyses of data from the population at a specific point in time (Alexander et al., 2015). Respondents were drawn from households in the Metropolis and staff of TMA. According to TMA (2018), the total household population of Tamale Metropolis was 219,971. Using the sample size determination formula by Miller and Brewer (2003) to calculate the required sample size for the study, a total of 200 households were used for the study. The procedure is as follows:

$n = \frac{N}{1+N(e)^2}$; where n = sample size, N = sample frame, and e represents the margin of error.

$$n = \frac{N}{1+N(e)^2}, n = \frac{N219971}{1+219971(0.05)^2} = 400$$

From the above calculation, the total sample size is 400 households which was conveniently

divided into two (taking into consideration time and resources available for the data collection) to yield a sample size of 200 households. A multistage cluster sampling technique was employed to select households for the study. Tamale Metropolis was zoned into three clusters namely: high-class locality, middle-class locality, and low-class locality, based on the classification by GSS (2014). Due to the lack of accurate data on the number of households in each locality, the 200 households were equally divided amongst the three clusters which yielded approximately 67 households per a cluster. Further, simple random sampling was used to select three communities from each cluster, averaging 18 communities (see Table 1) and households were selected using systematic sampling techniques, using an interval of 10 (k^{th}) to systematically select houses.

Table 1: Study communities

High-lass Locality	Middle-class Locality	Low-class Locality
Kalpohin	Lamashegu	Moshie Zongo
Gumani	Kukuo	Aboabo
New Vittin	Jisonayili	Zogbeli

The tools used in collecting data were questionnaires, observation checklists, and interview guides. Questionnaires were administered to household heads or their spouses in either English or *'Dagbani'* (the dominant local language in the Metropolis). It covered general sanitation and hygiene practices, including household characteristics, availability and use of toilets, and handwashing practices. Direct observation of sanitation and hygiene practices was carried out alongside the questionnaire administration using observation checklists. A non-participant method of observation was used and, in this case, indicators of sanitation and hygiene practices were observed. Finally, two semi-structured interviews (SSIs) were conducted with the Planning Officer of TMA and the Head of the Waste Management Department (WMD) of TMA using interview guides. The interviewers adopted a general structure for inquiring, but the set of questions were not always the same, offering the liberty to probe and ask additional questions for the understanding of interviewees as at when it was deemed necessary.

The quantitative data was analysed with the Statistical Package for Social Scientist (SPSS Version 20.0) analytical tool. All the relevant information gathered from the household survey were coded after being collated and edited. Also, the values in categorical data sets were sorted according to groups that do not overlap each other. Cross-tabulation analysis was conducted by combining two or more frequency tables to reveal particular trends of results. In addition, correlation analysis was done for nominal and categorical data to identify whether there exists a positive or negative relationship between variables, and also the strength of those relationships. Multiple linear regression was further conducted to predict households' choices of toilet facility based on their characteristics (location, sex, age, marital status, educational background of the household head, household size, housing type, home occupancy status, sector of occupation and income level of households). The same model was used to predict household features that determined access to sanitation and hygiene materials. The regression equation is stated as:

$$Y = \beta_0 + \beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5 + \varepsilon$$

Where; Y=Dependent variable (Predicted choice of toilet facility), β_0=Regression Intercept, X_1=Income level, X_2=Housing type, X_3=Location, X_4=Home Occupier status, X_5=Location,

β_1 to β_5 are their respective regression coefficients in the model. Ɛ also represents residuals.

A forward regression method was used to determine only the statistically significant predictors in the regression model. The independent variables that have the least Pearson's correlation with the choice of toilet facilities were excluded from the equation. This was considered to be hierarchically affecting the statistically significant household features that predict the choice of toilet facilities.

Content analysis, a type of narrative way of analysing data (Vaismoradi et al., 2013), was employed to analyse the qualitative data. The data were systematically coded and categorized to help in exploring textual information and subsequently examined to determine patterns, trends, frequencies, relationships, structure, and discourses of communication (Grbrich, 2007).

Results

This section presents the findings on sanitation and hygiene practices in relation to health risks. The results are presented thematically under: household characteristics, toilet practices, hygiene practices, and gender norms, sanitation and hygiene and health risks.

Socio-demographic characteristics of respondents

Primarily, the study targeted household heads (both men and women) since it concerned behavioural issues, which represents the interactions between both men and women in society. Table 2 presents the socio-demographic characteristics of the respondents covered in the study. In all, 51.5% of the respondents were males and 48.5% were females. The most recurring age group of respondents ranged between 26 and 45 years. Respondents' level of educational attainment included primary, junior high school, senior high school, tertiary and Islamic education, but primary education was dominant (25%) followed by Islamic education (21.5%). Majority (53.5) of the respondents were married compared with single-household heads (24%), and the widowed (13.5%). The average household size was 2.11 persons, but the most dominant (39.0%) household size was between 1-5 persons. Compound houses accounted for 54.5% of the housing types occupied by respondents followed by self-contained houses with 22%. Also, 42% of the households lived in houses they owned, 32% occupied family-owned houses and 18.5 lived in rented houses. More (55%) of the respondents worked in the informal sector than the formal sector (4.5%). Estimates of the monthly incomes of households showed that the most occurring income level ranged between [6]GHS600.00 to GHS1,000.00, representing 30.5%, followed by incomes ranging from GHS100.00 to GHS500.00. As income increased further above GHS1,500.00, its occurrence in the data reduced suggesting that average household income in the Metropolis is relatively low.

Table 2: Socio-demographic characteristics of respondents

Variable	%	Variable	%
Age		*Level of Formal Education*	

[6] US$1.00 was equivalent to GHS5.85 at the time of data collection.

15-25	11.0	None	9.0
26-35	29.5	Primary	25.0
36-45	31.5	Junior High School	16.5
46-55	12.0	Senior High School	12.5
56-65	12.5	Tertiary	15.5
66+	3.5	Islamic	21.5
Gender		*Sector of Occupation*	
Male	51.5	Formal	45.0
Female	48.5	Informal	55.0
Marital Status		*Household Income (GHS)*	
Single	24.0	100-500	23.0
Married	53.5	600-1,000	30.5
Divorced	9.0	1,100-1,500	28.5
Widowed	13.5	1,600-2,000	16.0
Total	100.0	Above 2,000	2.0
Household Size			
1-5	39.0	*Housing Type*	
6-10	29.0	Self-contained	22.0
11-15	18.5	Storey	6.0
16-20	9.0	Compound	54.5
21-25	4.5	Others	17.5
Home Occupancy			
Own house	42.0		
Rented house	18.5		
Family house	32.0		
*Others	7.5		

*Include people staying in houses owned by other people (non-family members) but do not pay rent.

Household toilet practices

Pit latrines (29%) which are shared with other households and water closets (26.5%) were the only recorded types of toilet facilities owned by households in the Metropolis. Generally, public KVIPs were the most used type of toilet facility by households accounting for 33.5% of the households and 11% practiced open defecation.

Based on WHO's (2018) description of a good standard toilet facility, the state of toilet facilities was categorized into very bad, bad, somewhat good, and good. The results (Table 3) show that majority of the toilet facilities in good condition were water closets whilst majority of the facilities in very bad condition were home pit latrines. Result of Pearson's

correlation coefficient test shows that there is a statistically significant positive linear relationship between the type of homestead toilet facility (M=4.48, SD=0.502) and its condition (M=3.45, SD=0.773). The relationship was moderate in strength, and it was statistically significant (r=0.413, p=0.00).

Table 3: State of household toilets

Type of facility	**Condition of facility**				
	Good	*Somewhat good*	*Bad*	*Very bad*	*Total*
Home pit latrine	20	33	3	2	58
Water closet	44	7	1	1	53
Total	**64**	**40**	**4**	**3**	**111**

In all the 111 household toilet facilities observed, maintenance responsibility among members (M=2.55, SD=1.01) affected the quality of the facility (M=3.45, SD=0.773). A Pearson's r data analysis revealed a moderate positive correlation (r=0.363) which is statistically significant at p=0.00. Most (71.9%) of the toilet facilities in good condition were maintained by women (Table 4). It was also revealed that toilet facilities in very bad conditions dominated when maintenance responsibility was assigned to only men and only children, but when maintenance responsibility was assigned to everyone the conditions of household toilets were found to reduce in standards although better than when maintained by only men.

Table 4: Toilet maintenance responsibility and conditions of homestead toilets

Maintenance responsibility	**Condition of facility**			
	Good	*Somewhat good*	*Bad*	*Very bad*
Men	6.3	2.5	25.0	66.7
Women	71.9	87.5	0	0
Children	10.9	7.5	0	0
All	10.9	2.5	75.0	33.6
Total	**100.0**	**100.0**	**100.0**	**100.0**

Various criteria were used in assessing household toilet usage practices including age, income level, household membership, gender and other criteria outside those specified. According to the findings (Figure 3), the dominant criterion was age of the user. One must also be a member of a particular household before getting access to a home toilet.

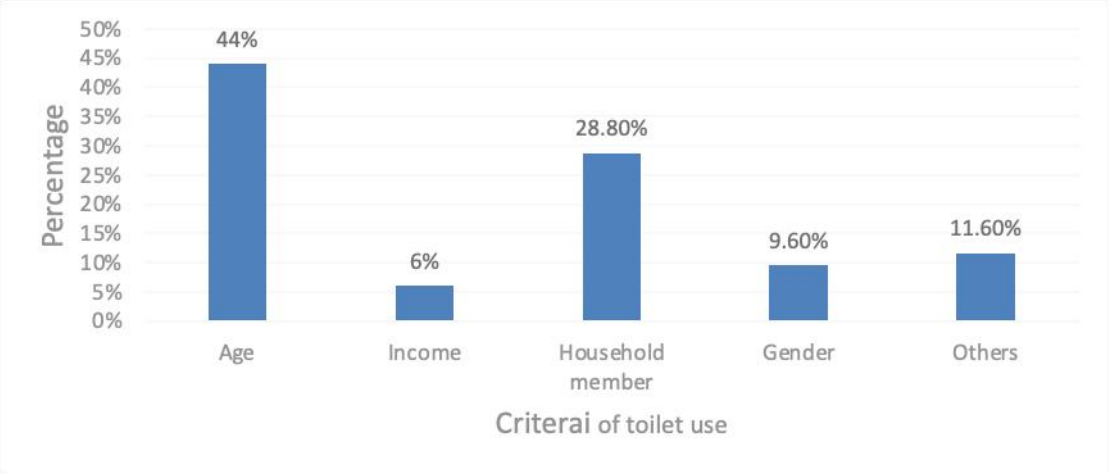

Figure 3: Criteria used in selecting the user of a homestead toilet facility

A multiple linear regression model was used to reveal the influence of each household feature on the choice of toilet facility. The analysis was performed to ensure that there was no violation of the assumption of linearity and none of these predictors were multicollinear. Table 5 shows that the value of tolerance for each independent variable (location, sex, age, educational level, marital status, household size, housing type, home occupier status, occupation and income level) was greater than 0.10. Similarly, the value of the VIF independent variable was less than 0.10. The results indicate that, there is no multicollinearity on all independent variables.

Table 5: Test for multicollinearity

Variable	Tolerance	VIF
Location	0.726	1.377
Sex	0.758	1.319
Age	0.692	1.445
Education level	0.866	1.155
Marital Status	0.628	1.591
HH size	0.707	1.414
Housing type	0.626	1.598
Home occupier status	0.767	1.304
Occupation	0.635	1.576
Income level	0.523	1.911

NB: Dependent Variable: Toilet use

From Table 6, the model explained almost 50% (Adjusted R^2=.484) of the variance in the dependent variable (choice of toilet facility) which was statistically significant (p=0.028) at an alpha level of 0.05. This means that there is a 95% confidence that household features statistically affect the choice of toilet facilities.

Table 6: Multiple linear regression model summary for choice of toilet facility

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.561[a]	0.315	0.311	0.813
2	0.669[b]	0.447	0.441	0.733
3	0.685[c]	0.469	0.461	0.720
4	0.696[d]	0.484	0.474	0.711
5	0.705[e]	0.497	0.484	0.704

Predictors: (Constant), Income level, Housing type, Location, Home occupier status, Occupation.

From Table 7, income level of households made the strongest significant contribution to the choice of toilet facilities with a *Beta weight* of 0.313 at a statistically significant level of p<0.001. The type of housing also contributed to -0.275 (p<0.001). This is followed by the residential cluster of households, contributing up to 0.167 (p=0.004) to the choice of toilet facilities. The home occupier status of households determined 0.130 (p=0.024). Lastly, the sector of occupation of household heads made the least significant contribution to the model with a standardized beta coefficient of -1.33 at a statistically significant level of p=0.028.

Table 7: Regression coefficients of household features showing their predictive ability of choice of toilet facility.

Variable	Unstandardized B	Standard Error	Standardized Beta	T	Sign
(Constant)	4.065	0.335		12.129	0.000
Income level	0.237	0.047	0.313	5.061	0.000
Housing type	-.268	0.058	-.275	-4.589	0.000
Location	.200	0.070	0.165	2.850	0.005
Home-occupier status	-.118	0.052	-.123	-2.269	0.024
Sector of occupation	-.262	0.118	-.133	-2.218	0.028

The ANOVA tests on the statistical significance of the independent variables as predictors of the choice of toilet facilities (Table 8) revealed that the F statistics (38.345) and its p-value (0.00026) suggest that one or all independent variables had explanatory power beyond what would be expected by chance. Also, the overall F test found in the ANOVA table suggests that the regression equation fits the data well. It was revealed that, for every unit increase in the level of household income, the model predicted an increment in the choice for an improved toilet facility by 0.237 holding all other variables constant.

Table 8: ANOVA Table showing the statistical Significance of the model

Model	Sum of Squares	DF	Mean of Squares	F	Sign
Regression	95.026	5	19.005	38.345	0.000[f]
Residual	96.154	194	0.496		
Total	**191.180**	**199**			

Dependent Variable: Toilet facility
Predictors: (Constant), Income level, Housing type, Location, Home occupier status, Occupation.

A Pearson correlation test to assess educational level and the choice of toilet facility yielded averages of 3.59 (SD=1.63) and 3.71 (SD=0.98) respectively. The relationship was positive, weak and statistically significant (r=0.189, p=0.007). Many (24.5%) of the water closets recorded were identified to be used by households headed by tertiary graduates (Table 9). Open defecation, on the other hand, dominated among households that had heads who attained only primary education. Moreover, the highest percentage of households that had no toilet facility at home, and practiced open defecation, had heads with no formal education, primary education and Islamic education. These variations confirmed the positive Pearson's correlation result for the choice of toilet facility and level of education.

Table 9: Educational background and choice of toilet facility

Level of formal education	Type of toilet facility (%)			
	Home pit latrine	*Home water closet*	*Public KVIP*	*Open defecation*
None	8.6	1.9	9.1	27.3
Primary	20.7	17.0	32.8	31.8
Islamic	27.6	15.0	19.4	27.3
Junior High School	22.5	20.8	13.4	0.0
Senior High School	10.3	20.8	10.4	4.6
Tertiary	10.3	24.5	14.9	9.0
Total	**100.0 (N=58)**	**100.0 (N=53)**	**100.0 (N=67)**	**100.0 (N=22)**

Hygiene practices

The survey considered handwashing practices at some key times including before eating, after eating, after using the toilet and after doing any work. The results showed that more than 90% of the respondents only washed their hands before and after eating. In addition, 69.9% of the respondents washed their hands after using the toilet whilst 51.5% of them did so anytime they finished engaging in any work. According to WHO (2018), for effective hand washing, it must be done with water and soap, preferably, under running water. In this study, it was revealed that 40.8% of the respondents used water (not running water) with soap in washing their hands followed by the use of only water (31%). Others preferred washing their hands with water and sand (15%) or water and ash (13.2%).

Generally, household heads were responsible for the provision of materials for household hygiene, which accounted for 73% of all the responses. However, in some households, these were provided by spouses (17%) or children (10%). It was observed that household heads did not encounter difficulties providing hygiene materials. The regression model in Table 10 revealed household income, age of household head, and housing type to be the most statistically significant independent variables that affected access to hygiene materials.

Table 10: Regression coefficients showing the predictive abilities of household features on access to hygiene materials

Variable	Unstandardized B	Standard Error	Standardized Beta	T	Sign
(Constant)	1.576	0.139		11.304	0.000
Income level	0.150	0.026	0.389	5.698	0.000
Age	-.030	0.013	-0.148	-2.304	0.022

The multiple linear regression model in Table 11 explained slightly over 20% of the variance in access to hygiene materials. This mean that almost 80% of access to hygiene materials was caused by factors other than household features (income level, age and housing type).

Table 11: Model summary depicting the Adjusted R^2

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.418[a]	0.175	0.171	0.45457
2	0.449[b]	0.201	0.193	0.44836
3	0.471[c]	0.221	0.209	0.44380

a. Predictors: (Constant), Income level

b. Predictors: (Constant), Income level, Age

c. Predictors: (Constant), Income level, Age, Housing type

Income level made the strongest contribution to access to hygiene materials. Over 90% of the households with the highest income level (above GHS2,000.00) recorded no challenges in accessing hygiene materials. On the other hand, the lowest income level recorded a high (70%) level of difficulties in accessing such materials. This explained a positive relationship between income level and access to hygiene materials. The model further predicted that, for every unit increase in income level of a household, there is 0.15 unit increase in access to hygiene materials. The age of the household head was the second most significant predictor of access to hygiene materials. The model revealed a negative relationship between the age of household heads and access to hygiene materials. The analysis explained that, as the age of the household head increases, the ability to provide hygiene materials reduces. There was more difficulty recorded in the ages ranging between 56-65 years, accounting for 56%. This is similar among the oldest household heads where more than 60% of them recorded difficulties in accessing hygiene materials. The linear regression model further predicted that, if the age of the household head increases by one unit, there would be a reduction in access to hygiene materials by almost 0.15. The last most significant predictor of hygiene materials accessibility appeared to be the housing type of households. Households living in multi-storey houses recorded the highest access to hygiene materials by 93% followed by self-contains (86%). Households in compound houses, on the other hand, recorded more (51.4%) difficulties in accessing hygiene materials.

Gender norms, sanitation and hygiene, and health risks

Respondents were asked what sanitation and hygiene are meant to achieve and whether or not they constitute health risks. The results reveal that 73% of the respondents considered proper sanitation and hygiene as very important, 16.5% deemed them as important and 8% saw them as somewhat important. Only 2.5% of the respondents saw no need to maintain proper sanitation and hygiene. Surprisingly, a large number (53.5%) of the respondents did not consider any socio-cultural barriers to sanitation and hygiene as health risks. Respondents who agreed to socio-cultural barriers to the practice of sanitation and hygiene as health risks appeared to deem such barriers as innate features that are acquired through socialization and cultural perceptions on household environmental management. Some of the responses that reflected socio-cultural threats to sanitation and practices are quoted below:

> *Men do not feel comfortable engaging in certain aspects of sanitation, especially sweeping, when their wives are around. Around here, people gossip a lot when a man does certain activities society thinks are meant for women to do (Head, WMD, TMA).*
>
> *Some men do a bit of cleaning, but they don't want people to know they do that. I remember when my wife was pregnant, I always woke up around 3:00 am to sweep the compound because I didn't want my co-tenants to say my wife has overpowered me. The point is, I can do anything to keep clean but only in secret. I don't have any problem (Planning Officer, TMA).*

The above responses suggest that roles assignment in household sanitation and hygiene activities are heavily gendered. The capacity of role definition was noted to exist equally between men and women within households with 97.8% whilst the remaining 2.2% represented other members who have the responsibility to define roles. In some of the responses, it was revealed that most of the sanitation- and hygiene-related activities were skewed towards women. For instance, it was noted that almost 73% of the cleaning and maintenance responsibilities were recorded solely under women (Figure 4).

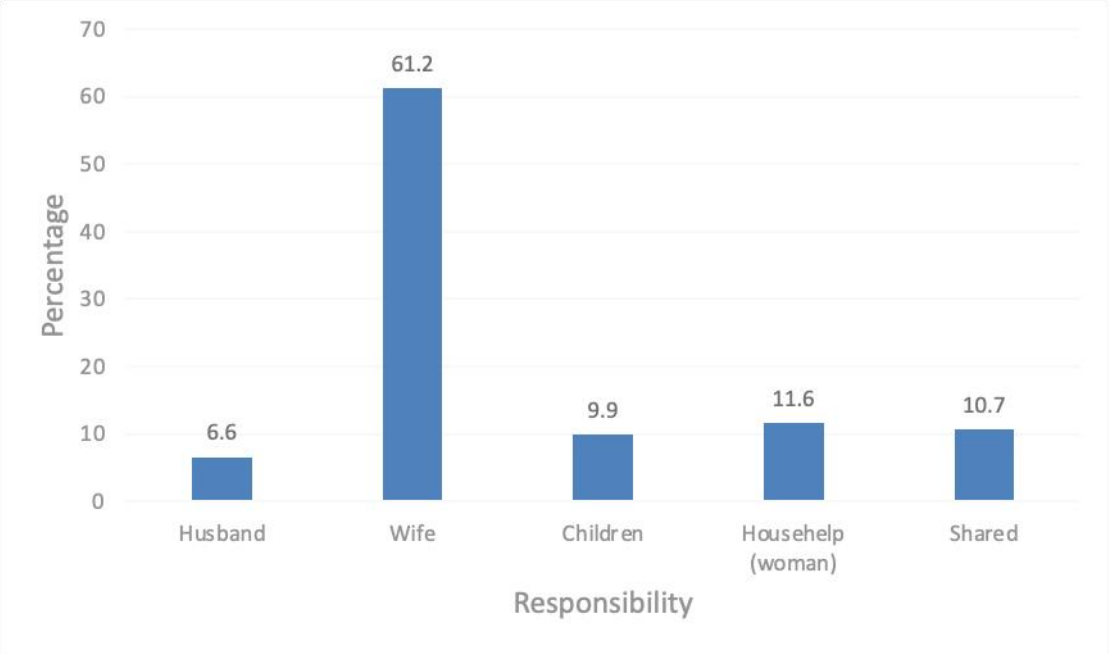

Figure 4: Cleaning and maintenance responsibility among household members

It was further realized that gender-related issues have become deep-rooted in the Metropolis to the extent that people (in other words victims) have wilfully accepted their fate as household sanitation and hygiene maintainers. Some responses from SSIs are presented below:

> *The women do not complain. So, I think they are okay doing cleaning all by themselves. Sometimes even if men want to do cleaning, it is their wives who will complain that they should not do it because they (wives) are there (Planning Officer, TMA).*
>
> *It is the man of the house, who is supposed to instruct the women to do any form of cleaning, not the other way round. What will then be their use in the house if the men will clean for them and feed them at the same time? (Head, WMD, TMA).*

The responses above indicate that gender division of household sanitation and hygiene responsibilities hinder men's interests to engage in certain practices. This makes gender to be the most influencing factor that affects individuals' engagement in sanitation and hygiene practices in Tamale Metropolis.

Discussion

Household characteristics have been identified to be significant predictors of sanitation and hygiene practices (Aigbiremolen et al., 2019; Osumanu et al., 2019) and important ingredients for the achievement of SDG 1 (no poverty), SDG 3 (good health and well-being) and SDG 6 (clean water and sanitation). Household characteristics assessed in this study include age, gender, level of education, marital status, sector of occupation, income, household size, housing type, home occupancy, and localities of households. Household income was found to be positively related to access to home toilets. As the income level of households increased, the choice for water closets increased confirming a positive

relationship. Also, open defecation reduced significantly as income level increased. This scenario means that the higher the income of a household, the lesser the likelihood of those households practicing open defecation (Osumanu et al., 2019) and, by extension, the lower the health risks. Similar to the findings of Routray et al. (2015), age was also found to be key in influencing the usage of homestead toilet facilities. The findings also agree with Wasonga et al. (2016) that children are prohibited from using home toilet facilities, hence, they resort to defecating in open fields. In terms of gender, men particularly did not show much interest in using home toilet facilities. For example, Routray et al. (2015) found that men who defecated in the open stated that latrines were meant for females since they do not suit their daily routines. Moreover, women stay at home most of the time and thus have more need for home toilets.

Housing type also appeared as an explanatory variable to the changes in the dependent variable (choice of toilet facility). Majority of households in self-contained houses and storey buildings owned a toilet facility at home. Water closets, in particular, dominated among these housing types compared to compound houses and other forms of housing structures. Also, there was no open defecation recorded among self-contained and storey building dwellers but was highest among compound house dwellers. The results suggest that households in self-contained houses use safely-managed sanitation facilities compared to those in compound houses which is the most common housing type in the Metropolis (Osumanu et al., 2019). The localities of households made a significant contribution to the regression model on the choice of toilet facilities. More than two-thirds of the homestead toilet facilities were found in high-class residential areas with the majority being water closets. Again, open defecation (and health risks) increased significantly from high class localities to low class areas. The home occupancy status of households also contributed to the regression model being the next most significant contributing explanatory variable in the choice of toilet facility after the locality of households which was also statistically significant (Osumanu, 2007). In this case, households living in their own houses had toilet facilities they used at home and more than half were found to be water closets. However, the majority of households who lived in rented houses did not have access to home toilet facilities but rather dominated in the use of Public KVIPs (Osumanu et al., 2019).

The data showed that the majority of those who work in the formal sector had toilet facilities at home. It was revealed that more than half of households where heads worked in the informal sector did not have toilet facilities at home. Two-thirds of those without toilet facilities, however, resorted to public KVIPs. Interestingly, all the open defecation recorded was among households where heads worked in the informal sector. Earlier research (e.g., Boadi & Kuitunen, 2005; Mbata, 2006; Arthur, 2010; Wasonga et al., 2016; Osumanu et al., 2019; Adzawla et al., 2020) suggests that education represents a key factor to emphasize in the course of fighting poor sanitation and hygiene and reducing health risks. It was confirmed that those with higher educational backgrounds appreciated the consequences of poor sanitation and hygiene and, therefore, used better facilities compared to those who had relatively low or no formal education. This scenario suggests that there is a sanitation and hygiene gap between literates and illiterates.

According to UNICEF and WHO (2017), a higher level of toilet facility is the one that is safely managed and not shared with any other household whilst a lower level service is the one that is shared between two or more households. Also, for a toilet facility to be considered

safe and hygienic, the key principles are that the design, construction and use are well arranged that users are separated from faeces (WHO, 2018). Users must be able to avoid both active contacts with soiled surfaces and passive contacts through flies or other vectors. The correlation result in this study implies that as the type of toilet facility improves there would be increase in its cleanliness and maintenance, signalling a positive reduction in health risks.

The availability of sanitation and hygiene facilities is an important requirement for reducing health risks (WHO, 2018). The presence of water, detergents and toiletries in households makes them as sanitation and hygiene conscious households. It was observed in this study that the provision of household sanitation and hygiene materials could be the responsibility of any member of the household, but majority of the responsibilities recorded were borne by household heads. It was shown that lower-income earning households recorded more difficulties in accessing sanitation and hygiene materials compared to higher-income earning households. The relationship between income level and access to sanitation and hygiene materials suggest that health risks are widely predominant among low-income households in the Metropolis. The results further suggest that younger household heads could provide sanitation and hygiene materials for their households compared to when the age is above 55 years. Additionally, housing type influenced access to sanitation and hygiene materials with households occupying storey buildings and self-contained houses having higher access than other households. Though it is imperative to maintain regular handwashing, especially after every activity that requires using the hand, respondents in this study emphasized handwashing at specific times rather than regularly. Meanwhile, regular handwashing reduces the incidence of diarrhoea and other related diseases (Luby et al., 2005).

The gender division of labour was identified to be another social factor that affected sanitation and hygiene practices and health risks among households in Tamale Metropolis. Responsibility for maintaining sanitation facilities within households should be assigned to any member of the household in question or be a responsibility of all (WHO, 2018). This should also involve a clear assignment of responsibilities and roles. But in Tamale Metropolis, the responsibility to clean and maintain household toilet facilities is majorly skewed towards women. Osumanu (2007) made a related revelation that, while men are engaged in decision making regarding the type of toilet facility to construct, its maintenance remains the responsibility of women since cleaning the house, including toilets, is not considered the work of men. The gender differences could be related to the different socialization patterns between boys and girls (Diamontopoulos et al., 2003). These issues may tend to threaten efforts to reducing health risks the responsibility of all household members.

Conclusion

Poor sanitation and hygiene are key health risks that developing countries battle with. In Ghana, a large proportion of the country's health burden is attributed to poor sanitation- and hygiene-related diseases. This study assessed the household factors that influence sanitation and hygiene practices and health risks in Tamale Metropolis. Household characteristics that were found to be statistically significant in influencing household choices of sanitation and hygiene practices are age, gender, level of education, income, housing type, home occupancy, and localities of households.

These factors are critical to reducing health risks. Similarly, only three of the determinants (income, age and housing type) statistically influenced households' access to sanitation and hygiene materials with household income being the most essential factor. Generally, sanitation and hygiene practices and health risks reduction among households, as revealed in the study, are challenged by specific social factors that anchor on the social position of the household. Social class ranks people on the social ladder of society. Thus, the concept of social position, not limited to the economic ladder but in terms of age, knowledge and exposure, and access to housing and environmental services appeared to largely influence households' capacity to engage in proper sanitation and hygiene practices and reduce health risks. Hence, it suggests that sanitation and hygiene improvement approach that do not encompass the social setting of households are likely not to materialize in health risks reduction considering how the concept of social class imbues the sanitation and hygiene perspectives of households in Tamale Metropolis.

To ensure proper sanitation and hygiene, which will subsequently reduce health risks, TMA must not only emphasize owning toilet facilities at home but also a more advanced toilet type as evidenced by the positive correlation between toilet types and their conditions. It is further recommended that a community-led approach must be employed to design effective sensitization programmes that seek to inculcate in households the importance of participating in the sanitation and hygiene framework. Educative programmes organised by community leaders using various communication channels should spell out the need for equal involvement in ensuring quality sanitation and hygiene services at both the household and community level.

References

Adzawla, W., Alhassan, H., & Imoru, A. J. (2020). Explaining the socioeconomic drivers of the choice of toilet facility among Ghanaian households. *Journal of Environmental and Public Health.* https://doi.10.1155/2020/4036045

Aigbiremolen, A. O., Aigbiremolen-Alphonsus, A. E., Nwadike, I., Afogbon, E., Airefetalor, I. A., & Oaikhena, O. I. (2019). Housing features and household access to sanitation facilities in a rural Nigerian community. *Asian Pacific Journal of Health Science*, 5(1), 171-174.

Alexander, L., Lopes, B., Ricchetti-Masterson, K., & Yeatts, K. (2015). Cross-sectional studies. *Eric Note*, 2(6), 1-5.

Appiah-Effah, E., Duku, G. A., Azangbego, N. Y., Aggrey, R. K. A., Gyapong-Korsah, B., & Nyarko, K. B. (2019). Ghana's post-MDGs sanitation situation: An overview. *Journal of Water, Sanitation and Hygiene for Development*, 9(3), 397-415.

Arthur, S. M. (2010). *The relationship between sanitation, hygiene, and household sociocultural-demographic factors: A case study of Bogoso and surrounding communities, in the Wassa West District, Ghana*. MSc Thesis. Kumasi, Ghana: Kwame Nkrumah University of Science and Technology (KNUST).

Bellmann, M. (2012). The interdisciplinary approach of public health. *Journal of Public Health*, 20(347). https://doi.org/10.1007/s10389-012-0518-7

Bisung, E., Elliott, S. J., Abudho, B., Schuster-Wallace, C. J., & Karanja, D. M. (2015). Dreaming of toilets: using photovoice to explore knowledge, attitudes, and practices around water-health linkages in rural Kenya. *Health and Place*, 31, 208-215.

Boadi, K. O., & Kuitunen M (2005) Environmental and health impacts of household solid waste handling and disposal practices in third world cities: The case of the Accra Metropolitan Area, Ghana. *Journal of Environment and Health*, 68(4), 32-36.

Bohnet-Joschko, S., Nelson, E. C., Zippel, C., Morgan, T., & Ovretveit, J. (2020). How social business innovates health care: two cases of social value creation leading to high-quality services. *Journal of Public Health (Berl.),* 28, 419-428.

Creswell, J. W. (2014). *A concise introduction to mixed methods research*. London:.SAGE Publications.

Diamantopoulos, A., Schlegelmilch, B. B., Sinkovics, R. R., & Bohlen, G. M. (2003). Can socio-demographics still play a role in profiling green consumers? A review of the evidence and an empirical investigation. *Journal of Business Research*, 56(6). 465-480.

Diderichsen, F., Evans, T., & Whitehead, M. (2001). The social basis of disparities in health. In T. Evans, M. Whitehead, F. Diderichsen, A. Bhuiya, & M. Wirth (Eds.), *Challenging inequities in health: from ethics to action* (pp. 8-17). New York: Oxford University Press.

Dreibelbis, R., Winch, P. J., Leontsini, E., Hulland, K. R., Ram, P. K., Unicomb, L., & Luby, S. P. (2013). The integrated behavioural model for water, sanitation, and hygiene: A systematic review of behavioural models and a framework for designing and evaluating behaviour change interventions in infrastructure-restricted settings. *BMC Public Health*, 13(1). https://doi.10.1186/1471-2458-13-1015

Grbich, C. (2007). *An introduction: Qualitative data analysis*. London: SAGE Publications.

Greene, K., Magsamen-Conrad, K., & Venetis, M. K. (2012). Assessing health diagnosis disclosure decisions in relationships: Testing the disclosure decision-making model. *Health Communication*, 27, 356-368.

Ghana Statistical Service (2014). *Ghana population and housing census - 2010: District analytical report, Tamale*. Accra: GSS.

Ghana Statistical Service (2018). *Ghana multiple indicator cluster survey (MICS) - 2017/2018: survey findings report*. Accra: GSS.

Graham, H., & Kelly, M. P. (2004). *Health inequalities: concepts, frameworks and policy*. London: NHS Health Development Agency.

Levin, B. W., Browner, C. H. (2005). The social production of health: critical contributions from evolutionary, biological, and cultural anthropology. *Social Science and Medicine*, 61(4), 745-50.

Luby, S. P., Agboatwalla, M., Feikin, D. R., Painter, J., Billhimer, W., Altaf, A., & Hoekstra, R. M. (2005). Effect of handwashing on child health: a randomised controlled trial. *Lancet*, 366(9481), 225-233.

Mariwah, S. (2018). Sanitation: The neglected Siamese twin of water in achieving the millennium development goals (MDGs) in Ghana. *GeoJournal*, 83(2), 223-236.

Mbata, J. N. (2006). Estimating household willingness to pay for water services in a rural economy: The case of Kanye in southern Botswana. *Development South Africa*, 23(01), 29-43.

Nishijima, M., Sarti, F. M., & Schor, A. (2020). Results of primary health care intervention for prevention of hospitalizations and mortality due to hypertension in Brazil, 2000–2015. *Journal of Public Health (Berl.)*, 28, 469-478.

Osumanu, I. K. (2007). Environmental concerns of poor households in low-income cities: The case of the Tamale Metropolis, Ghana. *GeoJournal*, 68, 343-355.

Osumanu, I. K., Kosoe, E. A., & Ategeeng, F. (2019). Determinants of open defecation in the Wa Municipality of Ghana: Empirical findings highlighting sociocultural and economic

dynamics among households. *Journal of Environmental Public Health*, Article ID 3075840.

Osumanu, I. K., Abdul-Rahim, L., Songsore, J., & Braimah, F. R. (2010). *Urban water and sanitation in Ghana: How local action is making a difference*. London: International Institute for Environment and Development.

Owusu, G. (2010). Social effects of poor sanitation and waste management on poor urban communities: A neighborhood-specific study of Sabon Zongo, Accra. *Journal of Urbanism: International Research, Placemaking and Urban Sustainability*, 3(2): 145-160.

Pfadenhauer, L. M., & Rehfuess, E. (2015). Towards effective and socio-culturally appropriate sanitation and hygiene interventions in the Philippines: A mixed-method approach. *International Journal of Environmental Research and Public Health*, 12(2): 1902-1927.

Rotowa, O. O., Olujimi, J. A. B., Omole, F. K., & Olajuyigbe, A. E. (2015). Socioeconomic factors affecting household's sanitation preferences in Akure, Nigeria. *European International Journal of Science and Technology*, 4, 183-194.

Routray, P., Schmidt, W. P., Boisson, S., Clasen, T., & Jenkins, M. W. (2015). Socio-cultural and behavioural factors constraining latrine adoption in rural coastal Odisha: An exploratory qualitative study. *BMC Public Health*, 15(880). https://doi.10.1186/s12889-015-2206-3

Sargent, C. F., & Johnson, T. M. (1996). *Handbook of medical anthropology: Contemporary theory and method, 2nd ed*. Westport, Connecticut, USA: Greenwood Press.

Solar, O., & Irwin, A. (2010). *A conceptual framework for action on the social determinants of health. Social determinants of health discussion Paper 2: Debates, policy & practice, case studies*. Geneva: WHO.

Tamale Metropolitan Assembly (2018). *Medium term development plan 2018-2022*. Tamale, Ghana: TMA.

UNICEF & WHO (2016). *Joint monitoring program (JMP) for water supply and sanitation*. New York: UNICEF.

UNICEF & WHO (2021). *Progress on household drinking water, sanitation and hygiene, 2000-2020, five years into the SDGs*. New York: UNICEF, Division of Communication.

UN (2010). *Resolution 64/292: The human right to water and sanitation*. Washington, D.C.: UN.

UN (2015). *Transforming our world: the 2030 agenda for sustainable development*. Washington, D.C.: UN.

UNDP (2018). *Human development indices and indicators: 2018 statistical update*. New York: UNDP.

Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing and Health Science*, 15, 398-405.

Wasonga, J., Okowa, M., & Kioli, F. (2016). Sociocultural determinants to the adoption of safe water, sanitation, and hygiene practices in Nyakach, Kisumu County, Kenya: A descriptive qualitative study. *Journal of Anthropology*, (23-24), 1-5.

WHO (2010). A conceptual framework for action on the social determinants of health. *Social determinants of health discussion paper 2: Debates, policy & practice, case studies*. Geneva: WHO.

WHO (2018). *Guidelines on sanitation and health*. Geneva: WHO.

Worthman, C. M., & Kohrt, B. (2005). Receding horizons of health: Biocultural approaches to public health paradoxes. *Social Science and Medicine*, 61(4), 861-78.