AVAILABILITY OF HOUSEHOLD LATRINES, DISPOSAL OF CHILD STOOL AND ITS ASSOCIATION WITH DIARRHEA AMONG CHILDREN UNDER THREE YEARS IN TAMALE METROPOLIS

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THESIS SUBMITTED TO THE DEPARTMENT OF PUBLIC HEALTH, SCHOOL OF ALLIED HEALTH SCIENCES, UNIVERSITY FOR DEVELOPMENT STUDIES, IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF PHILOSOPHY DEGREE IN COMMUNITY HEALTH AND DEVELOPMENT

OCTOBER, 2019
DECLARATION

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

Candidate’s Signature: …………………. Date: ………………………

Name: CHENIMBE BANAMBA

Supervisor
I declare that the work hereby presented in this thesis was supervised in accordance with the University for Development Studies laid down guidelines on supervision.

Signature of Supervisor: ………………………. Date: ………………………

Name: Dr. MARTIN NYAABA ADOKIYA
DEDICATIONS

This work is dedicated to my family (“CHANIMBE FAMILY”), to my wife Mavis Brenyah and our little girl Emily and all friends for all the support.
Acknowledgements

I give glory to the Almighty God for the grace granted upon me by making this work come to light. This has been successful due to the hard work of many others.

Many thanks go to all respondents who have volunteered and participated in this study. I could not have done it without you. May God replenish all the energy lost. I am grateful to all assembly members within the Tamale Metropolis for your unfailing support.

I am sincerely thankful to Dr. Martin Nyaaba Adokiya for your unforgettable role you played for the success of this study. No amount of words can I use to express my deepest gratitude to you for your dedication which made this come to reality.

To all staff of the University for Development Studies, School of Allied Health Sciences and the Graduate School, I say “THANK YOU” to all for the tuition and support given me and to all my colleagues for all your support to this work.

God bless us all who in diverse ways contributed for the success of this study.
ABSTRACT

Globally, sanitation remains a challenge in many countries. About 2.3 billion people across the world lack improved basic sanitation. In Ghana, 4.8 million people have no improved sanitation and practice open defecation. Poor sanitation account for over 760,000 diarrhea and over 10,000 child death currently. Based on these, this study looked at the level of availability of household latrines, disposal of child stools among caregivers and its association with diarrhea among children under three years in Tamale Metropolis. Quantitative data was collected from 399 respondents with qualitative data gathered from six (6) Focus Groups Discussions. Findings are presented in the form of tables, charts and numerical summaries. Other findings are in inferential statistics using Fisher’s Exact tests to measure association between the dependent variable (diarrhea) and independent variables (latrine availability, usage and stool disposal practice). The study found that 83% of households within the study area do not have latrines at the household level. This indicates that majority of the households tend to use other avenues including open space for defecation. Diarrhea prevalence among children under 3 years as revealed by the study stands at 36.3%. The study also found that 60% of caregivers within the Tamale Metropolis do not practice improved disposal of child stools. In exploring the level of awareness by caregivers regarding the dangers associated with improper stool disposal practice, results show 97.9% of the caregivers are aware of the dangers. The study also found that households without latrines stand a high risk of children contracting diarrhea with Pearson chi2 value of 15.9 and p-value of < 0.001. In another angle, the finding of the study show that improper disposal of child stool has a very significant correlation with children under 3 years contracting diarrhea with Pearson chi2 value of 36.5 and a p-value of < 0.001. This means that households that do not practice proper disposal of stools will have children more likely to contract diarrhea. The study did also find that the kind (improved and unimproved) of latrine a household uses has an influence on diarrhea. Analysis revealed children in households with unimproved latrines are more likely to contract diarrhea with a Pearson chi2 value of 19.2 and a p-value of < 0.001 for association between having latrine in a household and children contracting diarrhea. On the other hand, the study found no association between kinds of latrine (improved and unimproved) and stool disposal practice when tested against diarrhea with p-values of 0.27 and 0.72. Based on the available data, the study recommends for policy makers and development agents to advocate for latrine construction at the household’s levels. It is also recommended for development partners and agents to advocate for improved latrines. With poor sanitation increasing diarrhea prevalence, high diarrhea related deaths in children under five years among others, efforts must be made at all levels to help improve the sanitation situation. The Metropolis must also ensure a well-structured and the collaborative systems for coordination of sanitation related initiatives. The study also recommends for further study to help deeper understanding on the above situation.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DECLARATION</td>
<td>i</td>
</tr>
<tr>
<td>DEDICATIONS</td>
<td>ii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>iii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>iv</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>v</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>x</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xi</td>
</tr>
<tr>
<td>LIST OF ABBREVIATIONS AND ACRONYMS</td>
<td>xii</td>
</tr>
<tr>
<td>CHAPTER ONE</td>
<td>1</td>
</tr>
<tr>
<td>GENERAL INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.0 Background of the Study</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Problem Statement of the Study</td>
<td>5</td>
</tr>
<tr>
<td>1.3. Research Questions</td>
<td>6</td>
</tr>
<tr>
<td>1.4. Objectives of the Study</td>
<td>7</td>
</tr>
<tr>
<td>1.4.1 General Objectives</td>
<td>7</td>
</tr>
<tr>
<td>1.4.2 Specific Objectives</td>
<td>7</td>
</tr>
<tr>
<td>1.5 Justification of the Research</td>
<td>7</td>
</tr>
<tr>
<td>1.6 Operational Definition of Terms</td>
<td>8</td>
</tr>
<tr>
<td>CHAPTER TWO</td>
<td>14</td>
</tr>
<tr>
<td>LITERATURE REVIEW</td>
<td>14</td>
</tr>
<tr>
<td>2.0 Global Sanitation, Water and Hygiene Challenge</td>
<td>14</td>
</tr>
<tr>
<td>2.1 Global Sanitation Coverage</td>
<td>15</td>
</tr>
<tr>
<td>2.2 Improved Latrine Use</td>
<td>16</td>
</tr>
<tr>
<td>2.3 Sanitation Policy Context</td>
<td>20</td>
</tr>
<tr>
<td>2.4 The Community Led Total Sanitation</td>
<td>23</td>
</tr>
<tr>
<td>2.5 Effects of Poor Sanitation</td>
<td>25</td>
</tr>
<tr>
<td>2.6 Sanitation Related Diarrhea among Children</td>
<td>28</td>
</tr>
<tr>
<td>2.6.1 Effect of Diarrhea on Child Health</td>
<td>29</td>
</tr>
<tr>
<td>2.7 How Sanitation Influences Diarrhea Disease</td>
<td>30</td>
</tr>
<tr>
<td>2.7.1 The Effect of Sanitation Interventions on Diarrhea Disease</td>
<td>32</td>
</tr>
<tr>
<td>2.7.2 Providing Adequate/Improved Sanitation</td>
<td>33</td>
</tr>
</tbody>
</table>
2.7.3 Promoting Hygiene ................................................................. 34
2.7.4 Latrine Availability .............................................................. 37
2.8 Latrine Use, Knowledge, Attitude and Hygiene Practices ........ 38
2.9 Factors Promoting Latrine Use ............................................... 40
2.10 Factors Hindering Latrine Use ............................................... 43
2.11 Theoretical Frame (Social Ecological Model of Health Behavior) ..... 44
2.11.1 Introduction ......................................................................... 44
2.11.2 Individual Level of Ecological Health Behavior Model ......... 45
2.11.3 Relationship Level of Ecological Health Behavior Model ...... 46
2.11.4 Community Level of Ecological Health Behavior Model ....... 47
2.11.5 Societal/ Policy Level of Ecological Health Behavior Model .... 47
2.12 Conceptual framework ............................................................ 47

CHAPTER THREE ............................................................................... 50
METHODOLOGY .................................................................................. 50

3.1 Introduction ............................................................................... 50
3.2 Study Setting ............................................................................. 50
3.3 Study Design ............................................................................. 52
3.4 Study Population and Units ....................................................... 53
3.5 Inclusion Criteria ....................................................................... 53
3.6 Exclusion Criteria ....................................................................... 53
3.7 Sample Size Determination ......................................................... 53
3.8 Sampling Technique .................................................................... 54
3.9 Study Variables and Data Sources ............................................. 55
3.10 Data Collection .......................................................................... 55
3.11 Recruitment of Study Subjects .................................................. 56
3.12 Data Management ..................................................................... 56
3.13 Data Processing ......................................................................... 56
3.14 Data Analysis and Presentation ................................................ 57
3.15 Ethical Consideration ............................................................... 57
3.15.1 Informed Consent and Confidentiality .................................. 57
3.16 Benefits and Risk ...................................................................... 57
3.17 Validity and Reliability of the Study ......................................... 58
3.17.1 Validity..........................................................................................................58
3.17.2 Reliability......................................................................................................58
3.17.3 Transferability ...............................................................................................59
3.18 Study Limitation...............................................................................................59

CHAPTER FOUR......................................................................................................61

PRESENTATION OF FINDINGS...........................................................................61

4.1 Introduction........................................................................................................61
4.2 Socio-Demographic Characteristics of Respondents.........................................61
4.3 Children Population in Households.................................................................63
4.4 Latrine Availability ............................................................................................64
4.5 Demographic Characteristics and latrine availability ........................................72
4.6 Demographic Characteristics and latrine use....................................................74
4.7 Child Stool Disposal Practice...........................................................................76
4.8 Factors influencing child stool disposal practices..............................................77
4.9 Diarrhea Prevalence ........................................................................................78
4.10 Latrine Availability, kind of latrine, stool disposal practice and diarrhea ......80
4.11 Causes of Diarrhea ........................................................................................81
4.12 Awareness of Dangers of Improper Disposal of Child Stools .........................82

CHAPTER FIVE .......................................................................................................83

DISCUSSIONS...........................................................................................................83

5.1 Introduction........................................................................................................83
5.2 Gender .................................................................................................................83
5.3 Respondent Status .............................................................................................84
5.4 Respondent Educational Level.........................................................................85
5.5 Household Head Educational Level.................................................................86
5.6. Income.............................................................................................................87
5.7 Expenditure .......................................................................................................88
5.8 Household size ................................................................................................89
5.9 Latrine Availability ...........................................................................................90
5.9.1 Latrine in Household.....................................................................................90
5.9.2 Type of Latrine in Household .......................................................................91
5.9.3 Place where Household Members Defecate.................................................92
5.9.4 Latrine Shared with other Households ............................................................93
5.10 Reason Why Households Do Not Have Latrines .............................................94
5.11 Intent to have a latrine ......................................................................................94
5.12 Capacity to Construct a Latrine ........................................................................95
5.13 Factors that Influence Latrine Possession in the Study Area ................................95
  5.13.1 Provision of Subsidies in Latrine Construction ..........................................95
  5.13.2 Income ........................................................................................................96
  5.13.3 Lack of Skills in Constructing Latrines .......................................................97
  5.13.4 Education .....................................................................................................99
  5.13.5 Perceived Threat .........................................................................................99
  5.13.6 Close Proximity to Bush, Public Latrine and Households with Latrine ....100
  5.13.7 Socio-cultural Factors ...............................................................................101
5.14 Child Stool Disposal Practices ........................................................................102
5.15 Diarrhea Prevalence .......................................................................................103
5.16 Awareness of Dangers of Improper Disposal of Children Feces ....................104
5.17 Factors Associated with Diarrhea Prevalence ................................................105
  5.17.1 Respondent Educational Level ....................................................................105
  5.17.2 Regular Income ..........................................................................................105
  5.17.3 Latrine Availability and the Kind of latrine in a Household ......................106
  5.17.4 Shared Latrine and Place of Defecation .....................................................107
  5.17.5 Method Used to Dispose Child Stool .........................................................108

CHAPTER SIX ........................................................................................................109
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS ................................109
  6.1 Introduction ......................................................................................................109
  6.2 Economic Affordability by the Study Population ............................................109
  6.3 Latrine Availability and Its Usage .................................................................110
  6.4 Child Stool Disposal Practice among Caregivers ..........................................111
  6.5 Awareness of Dangers of Improper Disposal of Child Stool .........................112
  6.6 Conclusions .....................................................................................................113
  Recommendations ..............................................................................................114
REFERENCES .......................................................................................................117
APPENDICES ......................................................................................................133
Appendix 1: Study Questionnaire for Caregivers ..................................................133
Appendix 2: Interview Guide for Focus Group Discussions .................................141
# LIST OF TABLES

Table 1:1 Improved and Un-improved Sanitation Facilities ........................................10

Table 1.2: Unimproved Sanitation Facilities ...............................................................11

Table 4.1: Socio-demographic Characteristics of Respondent (n=399) ......................63

Table 4.4: Demographic Characteristics and latrine availability (n=399) .................73

Table 4.5: Demographic Characteristics and latrine use (n=399) .............................75

Table 4.6: Child stool disposal practice and influencing factors ...............................78

Table 4.7: Latrine Possession, kind of latrine, stool disposal practice and diarrhea ....81
LIST OF FIGURES

Figure 1.1: Sanitation Ladder ......................................................................................13

Figure 2.1: Global Sanitation Coverage .....................................................................16

Figure 2.2: Possible Contaminant Sources under Poor Hygienic and Sanitary
Conditions ....................................................................................................................31

Figure 2.3: How WASH can affect Childhood Under-nutrition ................................36

Figure 2.4: Theory of Planned Behavior ...................................................................41

Figure 2.5: The Social Ecological Health Behavior Model ......................................45

Figure 2.6: Conceptual Framework for the Study .......................................................49

Figure 3.1: Geographical Location of Tamale .............................................................51

Figure 4.1: Number of children in Households ..........................................................64

Figure 4.2: Latrine Availability ..................................................................................65

Figure 4.5: Child Stool Disposal Practices ................................................................76

Figure 4.6: Prevalence of diarrhea among children less than 3 years of age ..........79

Figure 4.7: Latrine availability and Diarrhea Prevalence .........................................80

Figure 4.8: Causes of Diarrhea ................................................................................82
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AfDB</td>
<td>African Development Bank</td>
</tr>
<tr>
<td>CLTS</td>
<td>Community Led Total Sanitation</td>
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<td>CDC</td>
<td>Center for Disease Control</td>
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<td>DALYs</td>
<td>Disability Adjusted Life Years</td>
</tr>
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<td>EDD</td>
<td>Erythema Elevatum Diutinum</td>
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<td>EU</td>
<td>European Union</td>
</tr>
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<td>FAO</td>
<td>Food and Agriculture Organization</td>
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<td>FHI</td>
<td>Fritz-Haber-Institute</td>
</tr>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>GDHS</td>
<td>Ghana Demographic Health Survey</td>
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<td>Ghana Health Service</td>
</tr>
<tr>
<td>GLSS</td>
<td>Ghana Living Standard Survey</td>
</tr>
<tr>
<td>HWWS</td>
<td>Hand Washing With Soap</td>
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<td>JMP</td>
<td>Joint Monitoring Programme</td>
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<td>JHS</td>
<td>Junior High School</td>
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<td>KG</td>
<td>Kindergarten</td>
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<td>MMDAs</td>
<td>Metropolitan, Municipal and District Assemblies</td>
</tr>
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<td>MDG</td>
<td>Millennium Development Goals</td>
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<td>MICS</td>
<td>Multi Indicator Clusters Survey</td>
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<td>NCWSS</td>
<td>Community Water and Sanitation Strategy</td>
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<td>NGOs</td>
<td>Non-Governmental Organization</td>
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<td>OD</td>
<td>Open Defecation</td>
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<td>ODF</td>
<td>Open Defecation Free</td>
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<td>RCTs</td>
<td>Randomized controlled trial</td>
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<td>SDG</td>
<td>Sustainable Development Goals</td>
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<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
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</tr>
<tr>
<td>SOWC</td>
<td>State of the World's Children</td>
</tr>
<tr>
<td>SHS</td>
<td>Senior High School</td>
</tr>
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<td>TPB</td>
<td>Theory of Plan Behavior</td>
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<td>UN</td>
<td>United Nations</td>
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<tr>
<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
</tr>
<tr>
<td>UDS</td>
<td>University For Development Studies</td>
</tr>
<tr>
<td>VERC</td>
<td>Village Education Resource Center</td>
</tr>
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<td>VIP</td>
<td>Ventilated Improved Pit</td>
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<td>WASH</td>
<td>Water Sanitation and Hygiene</td>
</tr>
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<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>WVIG</td>
<td>World Vision International in Ghana</td>
</tr>
</tbody>
</table>
CHAPTER ONE

GENERAL INTRODUCTION

1.0 Background of the Study

Improved sanitation is declared by the United Nations (UN) as human right that all nations must deliver as part of ensuring good health. This step by the UN is as a result of the importance of improved sanitation in the development of any society across the globe. Without access to it, many communities are left vulnerable to infections including diarrhea and cholera (United Nations Children’s Fund (UNICEF, 2015)). While the consequences of not having access to improved sanitation result in diseases, it also affects the workforce of society and further compound health and development issues. Other effects include; lack of dignity, negative economic and education effects (World Health Organization – WHO, 2012).

Though all groups of persons within society are susceptible to the consequences of improper sanitation, the most affected group to infections are usually children under five years and more especially those under 3 years (World Health Organization, 2012). The poor, marginalized and rural communities are usually the most affected with lack of latrine. About 71 percent of people without access to improved latrines are located in rural places. This account for why 90 percent of all open defecation cases are rurally related (United Nations 2015 Millennium Development Goals - MDG report).

Globally, about 2.3 billion people lack access to basic sanitation services including latrines (WHO, 2015). Out of the population without access to latrine facilities, 892 million have relied on open defecation (UNICEF, 2016). The 2015 WHO report
“Progress on Drinking Water, Sanitation and Hygiene” revealed over 600 million individuals across the globe are reported to be sharing latrines with other households. While this practice of sharing latrines somehow reduces the exposure of fecal matter to human contact, it does not meet the definition of basic sanitation services as stipulated by the WHO. According to WHO and UNICEF (2017), basic sanitation services implies the use of improved sanitation facilities exclusively by a household. In other words, it refers to improved sanitation facilities that is not shared between households. According to WHO, basic or improved sanitation (latrine) facilities is limited to the use of the following facilities:

1. Flush or pour-flush to piped sewer system, septic tank, and pit latrine
2. Ventilated improved pit (VIP) latrine,
3. Pit latrine with slab and
4. Composting toilet.

In households with access to improved sanitation facilities, it has generally been observed that children’s stool is sometimes left exposed and not collected nor safely disposed into latrines. World Health Organization in 2015 defined safe child stool disposal as “rinsing stool into latrine or direct use of latrine by child”. On the other hand, child stool disposal is considered improper or unsafe if “stool is put/rinsed in a drain/ditch, thrown in the garbage, left or buried in the open” (WHO, 2006). This improper disposal of child stool creates susceptibility to contaminations leading to infections like diarrhea even in houses with sanitation facilities and hinder attempts in ensuring an environment free of fecal pathogens and preventing the transmission of fecal-oral diseases such as diarrhea.
Child stools are considered harmless and is therefore not treated with any sense of perceived threat nor susceptibility in many Ghanaian societies. Though most sanitation programs and initiatives centre on improving household sanitation, the issue of child stools management (disposal practices) is mostly overlooked (Brown et al., 2015). Stool of children are the most common and dangerous source of fecal contamination in a household especially due to children’s risky behaviours. By nature, children are found of engaging in unhealthy behaviours which include putting of their items or substances including their fingers into their mouths and food irrespective of contamination or the hygiene condition. These behaviours make them prone to pathogens than adults (WHO, 2015).

Improper/unsafe disposal of stool is among the risky and unhealthy behaviours by mothers and these results in children contracting diarrhea. In Ghana, while over 4.8 million people defecate in the open, improper disposal of stool of under 3 years children also remains a common practice in the rural areas where latrine availability and usage are at its lowest (36 percent) (UNICEF, 2015). Like other countries around the world, diarrhea remains a major issue causing mortality in Ghana. Averagely, about 25 percent of under 5 years mortality is attributed to diarrhea (Ghana Health Service, 2016). According to the Ministry of Health as cited by Issaka Kanton Osumanu in 2007, 84,000 deaths annually in Ghana can be traceable to diarrhea. Of these total deaths, 25 percent is made up of children under 5 years (Ghana News Agency, 2003). Although diarrhea serves as one of the common diseases among children under five years in Ghana, the magnitude varies between urban and rural settings. While prevalence in the urban areas stands at 10.5 percent, the rural figure stands at 14.5 percent (Ghana Demographic and Health Survey, 2014). Improper disposal of human excreta, together with contaminated drinking water and poor
sanitation situation accounts for a greater proportion of all morbidity and mortality in Ghana (Alliance Health, 2014). In most rural settings in Ghana, children defecate in an open and mostly within the compound and the stool are mostly left exposed. In other settings, though provisions are made for children to defecate into a container (chamber pot), the stool are thrown away within the compound (World Vision Ghana, 2015). Susceptibility to contaminations resulting from these practices becomes common through utensils, hands, food and water. The 2015 report by WHO revealed that improper disposal of children’s stool carries a higher health risk.

Studies by Fobil et al. 2010 found that the sanitation and other environmental conditions surrounding a neighbour have significant effect on health and mortality especially towards child. In similar situations, past studies by Sinmegn et al, 2015 and Yassin 2014 have revealed that the population of people at a higher risk of diarrhea contraction as usually children aged 6–23 months, male children and those born with low weight. Also, these studies revealed that mother’s illiteracy, age of a mother (<25 years), poor household economic conditions and rural residence are all found to be associated with childhood diarrhea.

In Tamale Metropolis, 7 out of 10 people defecate in the open. The Metropolis is ranged the second highest in the country with open defecation (Multiple Indicator Cluster Survey, 2015). The 2015 Ghana Health Service annual report state that diarrhea remains second to malaria as causes of mortality as well as morbidity among children in the Metropolis. Though several studies have been conducted in the Tamale Metropolis with focus on sanitation and its impact on health, such studies identified rates of open defecation, causes of open defecation, impact of open defecation on health and among others. In all these studies, little efforts have been
made to know the association of children’s feces disposal and childhood diarrhea. Given this missing link, this study assessed latrines availability and usage in Tamale Metropolis. The study also examined the magnitude of unsafe disposal of children’s feces as well as its association with diarrhea among children under 3 years who are either diagnosed or undergoing diarrhea treatment in Tamale Metropolis. The study also explored caregiver’s knowledge on the dangers of improper disposal of children feces.

1.2 Problem Statement of the Study

Due to poor performance in the sanitation field in Ghana as revealed by studies such as the Joint Monitoring Programme by UNICEF and WHO, efforts by governmental and non-governmental organizations have been geared towards reducing or putting an end to open defecation (improved sanitation) with an ultimate aim of improving health and reducing preventable deaths. The call has led to the adaptation of “Community Led Total Sanitation (CLTS)” as a model or approach for sanitation improvement at the rural areas. The approach has recorded progress over the years as over 4000 communities have been declared open defecation free in Ghana on sanitation league table between 2011 and 2014 (UNICEF 2017). Integration of sanitation consciousness into all constructions and other aspect of human activities, advocacy and among other interventions has contributed to some level of improvement in sanitation and individual health consciousness. However, this gains over the years is on a low rate and for that matter a call for concern at all levels. Evidence to the low progress is the fact that from 2011 to 2017, Ghana has only recorded a 1 percentage point change (increase) for improved sanitation. That is from 14 percent to 15 percent (UNICEF, 2015).
Despite the enormous sanitation challenges and its impact on the health and total wellbeing of all individuals, the management of stool of children at the household level has received less attention. This situation is not only limited to household attitudes towards sanitation but also sanitation programmes by government and non-governmental organizations. Diarrhea, a sanitation related disease upon several efforts still remains the second leading cause of mortality in children within the Tamale Metropolis after malaria (Metropolis Health report, 2016). The Multiple Indicator Cluster Survey – MICS, 2016) reported that the Metropolis is not only ranked second with number of people who practice open defecation, there is a high perception among people in the Metropolis that children stool is not harmful and so, improper disposal of child stools remains a practice commonly in the Metropolis.

It is based on the above that this study sought to assess the availability of household latrines, disposal practices of child stool and its association with diarrhea among children under 3 years within the Tamale Metropolis.

### 1.3. Research Questions

What is the level of household latrine availability, child stool disposal and its association with diarrhea among children under three years in Tamale Metropolis?

1. What percentage of caregivers have access and use household latrines?
2. What is the magnitude of unsafe/improper disposal of children stool among caregivers?
3. What percentage of caregivers are aware of the dangers of unsafe children stool disposal?
4. What is the association between household latrine availability, stool disposal practice and diarrhea?
1.4. Objectives of the Study

1.4.1 General Objectives
The main aim of this research is to assess household latrine availability, the level of disposal of child stool and its association with diarrhea prevalence among children under three years in the Tamale Metropolis. To achieve this aim, the research seeks to address the following specific objectives:

1.4.2 Specific Objectives
1. To assess the availability of household latrines among caregivers with children under three years in the Tamale Metropolis;
2. To determine the state of disposal practice of children’s stool by mother/caregiver in the Tamale Metropolis;
3. To explore the awareness level of caregivers on the dangers of improper disposal of children’s stool by mother/caregivers;
4. To establish the association between household latrines availability, mode of child stool disposal and its association with diarrhea among children under three years in the Tamale Metropolis.

1.5 Justification of the Research
Diarrhea account for over 500 deaths annually in the Tamale Metropolis despite the presence of many Non-Governmental Organizations (NGOs) supporting government efforts in the fight against deaths emanating from preventable diseases such as diarrhea (Metropolis Annual Report, 2014). According to the 2015 annual report of the Metropolis, diarrhea accounted for 7.2 percent of outpatient treatments within the Metropolis. Though several studies have been conducted and focused on the causes of diarrhea and open defecation rate within the Metropolis, the issue of child stool
disposal which is more dangerous and causes diarrhea infection has been silent in such studies.

Based on the above situation, this study sought to investigate latrine availability, level of improper disposal of child stools and its association with childhood diarrhea within the Tamale Metropolis. The study brings to bear the level of availability of household latrines and how caregivers disposes off child stools within the Tamale Metropolis. While the information emanating from this study will generally help policy makers, it specifically will be of importance for considering policy reviews, amendments as well as framework development and sanitation packages to include children’s access to sanitation facilities irrespective of age. Findings of this study will also be of help to both governmental and non-governmental organizations on the kind of behaviour change models and programs as well as programing for child friendly latrine designs for improved sanitation.

1.6 Operational Definition of Terms

**A pit latrine or pit toilet:** This kind or type of toilet/latrine collects human feces into a hole created into the ground. It is usually covered by a concrete slab containing with a drop hole. The drop hole might be connected to a toilet seat or squatting pan for user comfort (WSP and UNICEF, 2015). Pit latrines can either be designed as a dry toilet without water for flushing. Or they have a water seal (syphon) in which case they are called a "pour-flush pit latrine". A pit latrine generally consists of three major parts: a hole in the ground, a concrete slab or floor with a drop hole, and a shelter (Tilly, 2014).

**Sanitation:** Refers to public health conditions related to clean drinking water and adequate treatment and disposal of human excreta and sewage. Preventing human
contact with stool is part of sanitation, as is hand washing with soap. Sanitation in this study is limited to separation of human excretory from human contact (WHO, 2017).

**Environmental sanitation**: Refers to the control of environmental factors that are connected to disease transmission (Tilly, 2014).

**Basic Sanitation**: In 2017, the Joint Monitoring Programme by WHO and UNICEF defined a new term: "basic sanitation service". This is defined as the use of improved sanitation facilities that are not shared with other households. A lower level of service is now called "limited sanitation service" which refers to use of improved sanitation facilities that are shared between two or more households (WHO and UNICEF, 2015).

Caregiver: Refers to any persons who is responsible for the day to day support of a child under 3 years of age.

**Improved sanitation facilities**: Facilities that ensure hygienic separation of human excreta from human contact (UN MDGs Report, 2015, UNICEF/WHO, 2015)

**Unimproved sanitation facilities**: Facilities that do not ensure hygienic separation of human excreta from human contact. Unimproved facilities include pit latrines without a slab or platform, hanging latrines and bucket latrines (JMP, 2016).

JMP definitions of improved and un-improved sanitation facilities are as elaborated in Table 1.1
### Table 1: Improved and Un-improved Sanitation Facilities

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<tr>
<td>1.</td>
<td><strong>Flush toilet</strong></td>
<td>Uses a cistern or holding tank for flushing water, and a water seal (which is a U-shaped pipe below the seat or squatting pan) that prevents the passage of flies and odors. A pour flush toilet uses a water seal, but unlike a flush toilet, a pour flush toilet uses water poured by hand for flushing (no cistern is used). (WHO-UNICEF, 2014c)</td>
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<td>2.</td>
<td><strong>Piped sewer system</strong></td>
<td>Is a system of sewer pipes, also called sewerage, that is designed to collect human excreta (feces and urine) and wastewater and remove them from the household environment. Sewerage systems consist of facilities for collection, pumping, treating and disposing of human excreta and wastewater (WHO-UNICEF, 2014c)</td>
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<td>3.</td>
<td><strong>Septic tank</strong></td>
<td>Is an excreta collection device consisting of a water-tight settling tank, which is normally located underground, away from the house or toilet. The treated effluent of a septic tank usually seeps into the ground through a leaching pit. It can also be discharged into a sewerage system (WHO-UNICEF, 2014c)</td>
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<td>4.</td>
<td><strong>Flush/Po ur flush to pit latrine</strong></td>
<td>Refers to a system that flushes excreta to a hole in the ground or leaching pit (Protected, covered) (WHO-UNICEF, 2014c)</td>
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<td>5.</td>
<td><strong>Ventilated improved pit latrine</strong></td>
<td>Is a dry pit latrine ventilated by a pipe that extends above the latrine roof. The open end of the vent pipe is covered with gauze mesh or fly-proof netting and the inside of the superstructure is kept dark (WHO-UNICEF, 2014c)</td>
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<td>6.</td>
<td><strong>Pit latrine with slab</strong></td>
<td>Is a dry pit latrine whereby the pit is fully covered by a slab or platform that is fitted either with a squatting hole or seat. The platform should be solid and can be made of any type of material (concrete, logs with earth or mud, cement, etc.) as long as it adequately covers the pit without exposing the pit content other than through the squatting hole or seat (WHO-UNICEF, 2014c)</td>
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Composting toilet is a dry toilet into which carbon-rich material (vegetable wastes, straw, grass, sawdust, ash) are added to the excreta and special conditions maintained to produce inoffensive compost. A composting latrine may or may not have a urine separation device (WHO-UNICEF, 2014c)

Special case A response of "flush/pour flush to unknown place/not sure/DK where" is taken to indicate that the household sanitation facility is improved, as respondents might not know if their toilet is connected to a sewer or septic tank (WHO-UNICEF, 2014c)

Source: WHO-UNICEF, 2014c

Table 1.2: Unimproved Sanitation Facilities

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<td>1. Flush/pour flush to Elsewhere</td>
<td>Refers to excreta being deposited in or nearby the household environment (not into a pit, septic tank, or sewer). Excreta may be flushed to the street, yard/plot, open sewer, a ditch, a drainage way or other location (WHO-UNICEF, 2014c)</td>
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<tr>
<td>2. Pit latrine without slab</td>
<td>Uses a hole in the ground for excreta collection and does not have a squatting slab, platform or seat. An open pit is a rudimentary hole (WHO-UNICEF, 2014c)</td>
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<tr>
<td>3. Bucket</td>
<td>Refers to the use of a bucket or other container for the retention of faeces (and sometimes urine and anal cleaning material), which are periodically removed for treatment, disposal, or use as fertilizer (WHO-UNICEF, 2014c)</td>
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<tr>
<td>4. Hanging toilet or hanging latrine</td>
<td>Is a toilet built over the sea, a river, or other body of water, into which excreta drops directly (WHO-UNICEF, 2014c)</td>
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<tr>
<td>5. No facilities or bush or field</td>
<td>Includes defecation in the bush or field or ditch; excreta deposited on the ground and covered with a layer of earth (cat method); excreta wrapped and thrown into garbage; and defecation into surface water (drainage channel, beach, river, stream or sea) (WHO-UNICEF, 2014c)</td>
</tr>
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</table>
Safely managed sanitation: This is basic sanitation service where in addition excreta are safely disposed of in situ or transported and treated offsite (WHO, 2017)

Community-Led Total Sanitation (CLTS): Is an approach to achieve behavior change in mainly rural people by a process of "triggering", leading to spontaneous and long-term abandonment of open defecation practices. CLTS takes an approach to rural sanitation that works without hardware subsidies and that facilitates communities to recognize the problem of open defecation and take collective action to clean up and become "open defecation free" (Fewtrell et al., 2005; Görgülü et al., 2000).

Diarrhea: Is the condition of having at least three loose or liquid bowel movements each day which often lasts for a few days and can result in dehydration due to fluid loss (WHO, 2015)

Latrine availability: Refers to the physical presence of a toilet facility and usage by household members. Figure 1 shows the Sanitation Ladder (UNICEF, 20014)
Figure 1.1: Sanitation Ladder

Open defecation
Open defecation: when human feces are disposed of in fields, forests, bushes, open bodies of water, beaches or other open spaces or disposed of with solid waste

Unimproved facilities
Unimproved sanitation facilities: do not ensure hygienic separation of human excreta from human contact.

Shared
Shared sanitation facilities: facility of an otherwise acceptable type shared between two or more households. Only facilities that are not shared are considered improved.

Improved
Improved sanitation facilities are likely to ensure hygienic separation of human excreta from human contact.

Adapted from UNICEF 2012 and modified
CHAPTER TWO

LITERATURE REVIEW

2.0 Global Sanitation, Water and Hygiene Challenge

Generally according to the United Nations in 2014, “the world has made strides in achieving the MDG target for safe water coverage over the past decade, meeting the target ahead of schedule”. “However, sanitation remains an important challenge for the global development agenda. Sanitation achievement or improvement is still below the target of 77 percent as anticipated by the UN MDG targets” (UN MDGs Report, 2015, UNICEF/WHO, 2014). An estimated 2.4 billion people still do not have access to improved sanitation facilities and of these, around 946 million people still practice open defecation (UNICEF/WHO, 2015). With the inability of many countries and especially Africa countries to meeting sanitation targets, the Sustainable Development Goals (SDGs) were lunched in 2017. The importance of sanitation was then reaffirmed by the United Nations in the Sustainable Development Goals (SDGs) calling for an end to open defecation and universal access to adequate and equitable sanitation by 2030 (UN General Assembly, 2015). It was realised that progress on drinking water, sanitation and hygiene is critical for the achievement of the other SDG targets, including reducing poverty and achieving universal access to basic services (1.1 and 1.2); ending all forms of malnutrition (2.2); ending preventable child deaths, combating neglected tropical diseases and waterborne diseases, and achieving universal health coverage (3.2, 3.3, 3.8 and 3.9); providing safe and inclusive learning environments (4a); ending violence against women and girls and reducing gender inequality (5.2 and 5.4); and reducing deaths caused by disasters (11.5) (JMP, 2016).
2.1 Global Sanitation Coverage

Across the world, there is a huge difference in sanitation coverage which exist between regions and between urban and rural areas. The World Health Organization in 2015 reported that “people without access to improved sanitation facilities are concentrated in Southern Asia and sub-Saharan Africa”. According to Walker et al., 2013, the situation is especially dire in sub-Saharan African countries. In Walker’s report, while in Southern Asia, sanitation coverage has increased from 22 percent in 1990 to 49 percent in 2015, sub-Saharan Africa’s coverage only increased from 24 percent to 31 percent over the same period (UN MDGs Report, 2015, UNICEF/WHO, 2014). Aside the differences by way of continents, there is also a disparity between the urban and rural areas. As reported by the UN MDGs report in 2015, only 51 percent of the rural population has access to improved sanitation facilities worldwide compared with 82 percent of the urban population (UN MDGs Report, 2015, UNICEF/WHO, 2014). Holistically at the global level, open defecation rates have reduced from 24 percent in 1990 to 13 percent in 2015 (WHO-UNICEF, 2015).

Based on this trend, the United Nations efforts towards improving sanitation include ending open defecation (OD) at all level by 2025 (UN, March 2013). The urgency to address this issue stems from the fact that “open defecation constitutes a health and human capital crisis” (Coffey et al., 2014) with far-reaching implications that “keep(s) women under the threat of harassment, violence and rape. It forces girls to abandon education at puberty. It contributes to a cost of $260 billion a year through death, ill health and loss of productivity” (Excerpt from Jan Eliasson, the Deputy General Secretary of the United Nations address at the campaign launch to end open defecation, May 28, 2014). Figure 2 shows the global sanitation coverage.
2.2 Improved Latrine Use
Sanitation has generally been neglected at all levels across the world and in Africa to be specific (WaterAid, 2008). According to the World Health Organization, while over 80 percent of countries globally recognized and ensure right to water, only 50 percent recognition is given to the right to sanitation (WHO, 2012a). Classical to this, the United Nations (UN) did not perceived access to clean and safe sanitation as fundamental human right until in 2010 (WHO, 2012b). Having taken steps to improving sanitation across member countries, the assembly then launched an advocacy initiative dubbed the “Sanitation Drive to 2015” aimed at improving progress towards attainment of universal latrine coverage as targeted in the SDGs (UNICEF, 2011).
Though the initiative and many others produced some results, about 39 percent of people still do not have access to improved sanitation globally. The percentage of people who are not able to enjoy this basic human right declared by the UN is on a high in developing countries where about 1.1 billion people are openly defecating (UNICEF, 2011).

Irrespective of the efforts from all (governmental and non-governmental) actors towards improving the sanitation profile, the sector is faced with limited funding globally especially in developing countries (WSP, 2012). While the sanitation sector continues to receive less priority in terms of funding, it cost many countries direly each year especially in sub-Saharan. As a country, Ghana losses over 290 million united state dollars annually due to poor sanitation. This amount of loss represents 1.6 percent of gross domestic product each year (World Bank, 2012).

Accelerating the use of improved latrine does not only save cost for a nation, it also brings health, educational and economic gains which further leads to increased productivity (WHO, 2004). As reported by the United Nations University in 2010, improved sanitation has the tendency of improving the health status of workers by adding 3.2 billion working days annual the world over. Improved sanitation also has the potency of multiplying this benefit up to four times (United Nation, 2010).

Findings from a multi country studies by Bartram et al in 2007 show that improved sanitation continue to be the most assured way of improving upon the health of any human population and remains the strongest factor to child survival. The role of sanitation in ensuring health and preventing deaths has been proven to be scientifically more effective to that played by water. Improved sanitation contributes up to 37 percent probability of reducing childhood diarrhea compared to 21 percent
reduction through improved water supply (Bartram et al., 2007). Esrey et al, in 1991 also reported from a study “Effects of improved water supply and sanitation on ascariasis, diarrhea, dracunculiasis” that improved sanitation has the potential of reducing diarrhea prevalence between 35-40 percent. The study again reported that “improved sanitation can further reduce childhood mortality by half”. According to Graham in 2001, “partial improved latrine use” (possibly > 50 percent availability and usage) contributes to an appreciable level of reduction in diarrhea and benefit the larger community due to safer and clean environments. Detailed evidence shows that the longer a household own and use a latrine has an influence or impact on the prevalence/occurrence of diarrhea among children (Anteneh and Kumie, 2010).

Generally, about 75 percent of all sanitation related studies demonstrated positive health benefits, compared with 48 percent of those which considered water supply alone. It has been estimated by research findings that while improved water quality alone can reduce childhood diarrhea incidences by 15-20 improved hygienic practices such as hand-washing with soap reduces it by 35 percent. On the other hand, improved and safe disposal of children and adults’ feces contribute to over 40 percent reduction on childhood diarrhea (WHO, 2008).

According to the WHO in 2012, all the three elements of WASH (Water, Sanitation and Hygiene) together reduced childhood diarrhea incidences by up to 95 percent (WHO, 2012). Ensuring appropriate facilities for defecation at the household level reduces economic burden, saves time, lessen health costs, and increase educational performance and returns on education investment. It must also be noted that improved sanitation access ensures water quality at all levels (UN, 2008).
Based on the available evidence and benefits from improved sanitation, the United Nations in 2017 launched the Sustainable Development Goal 6 which aims at achieving “universal access to improved basic sanitation and hygiene” by the year 2030 (SDG Baseline report, 2017). Though national governments, local and international development partners in pursuance to achieving the goal continue to channel resources towards increasing and improving the quality, availability and usage of household latrine, funding for the sector remain a major gap. According to WHO and UNICEF in 2017, the sanitation sector is not only faced with limited funding but a widening gap by way of access to improved sanitation facilities between the developed nations and the developing once, the urban and rural settings, the poor and the rich. This situation calls for concern and require more commitment and coordinated efforts for impactful gains. For instance, in 2017, SDG goal 6 progress report by the United Nations indicate that only two-third (4.9 billion) of the world population have access to improve sanitation with majority of those without improved access living in Asia and Africa. According to the report, Ghana alone accounts for about 4.5 million people without access basic improved sanitation.

Effective sanitation management recognize the involvement of various and varied range of stakeholders with communities and traditional units if the goal 6 of the SDG is to be achieved. Despite that little progress has been made towards improved sanitation especially in Ghana, over 80 percent of countries have developed clear plans and procedures of engaging communities in sanitation management (UN, 2017). Though various plans have been developed across countries aimed at improved sanitation for improved health and holistic development, implementation gaps have slowed down progress across all levels (WHO, 2012).
2.3 Sanitation Policy Context

In 2016, United Nations having reviewed achievement made towards the Millennium Development Goals (MDGs) by all countries launched the Sustainable Development Goals (SDGs) with effect from 2017 (World Vision Ghana, 2017). In setting targets and thresholds on all issues that affect life, the sanitation sectors were emphasis for countries to pay equal attentions as any other sector of the country. As such, goals 6 of the SDG was set to ensure the availability of improved basic sanitation and water facilities, accessibility to the facilities as well as the management and sustainable of such facilities at all (community, household and institution) levels. The SDGs while aiming at improved health through sanitized environment also seeks to upholding human dignity without compromising on equality, equity and poverty extremes. (UNICEF, 2017).

In 2015, the UN having perceived that most Africa countries were not in good standing to achieve the sanitation MDG targets, took steps aimed at ensuring improved sanitation through systematic planning and commitment to the plans. By so doing, Ministers and Heads of Delegation responsible for sanitation from 32 African countries including Ghana were made to sign to the pledge with firm resolutions to: “establish, review, update and adopt national sanitation and hygiene policies, place sanitation and hygiene at the top of the development agenda in Africa, improve coordination and accountability for sanitation, establish specific public sector budgets for sanitation with a minimum of 0.5 percent of GDP being allocated for sanitation and hygiene, promote use of effective and sustainable hygiene and sanitation approaches among others” (UN, 2016).

The right to sanitation as held by the United Nation stipulates that “all persons should have access to affordable sanitation facilities of acceptable quality for
personal use” (UNICEF, 2017). Ghana as a member country of the United Nation couple with entrenched provisions in the countries’ constitution which gives citizens the right to improved basic sanitation services made and continue to make efforts towards achieving the declaration by the UN. As such, several initiatives including legal and policy framework have been initiated aimed delivering improved sanitation. Key among this is the National Sanitation Policies which was developed in 1999 and reviewed in 2010. The policy contains strategic direction on the implementation of the sanitation policy for the purpose of helping objective targets of the policies. The policy also aims to create and improve on enabling environment for all persons in Ghana to be encouraged to improve their behaviors towards hygiene and sanitation. These sanitation policies envisage access to basic sanitation to all Ghanaians. As part of aligning the National Sanitation policy to the SDG, the reviewed version of the policy has the goal of making sanitation facilities affordable to all Ghanaians by 2030 (Ghana National Sanitation Policy, 2010).

To attain the SDG goal 6 which talks about ensuring the availability and sustainable management of water and sanitation for all at all age, the National sanitation policy focuses on:

a) Providing the roadmap for local government (MMDAs) in the implementation, provision and maintenance of sanitation services and facilities

b) Highlighting the integral roles of capacity development, legislation and regulation, information education and communication, sustainable financing and cost recovery

c) Identifying, specifying and mapping the roles of partner institutions and
d) Identifying the broad array of environmental sanitation challenges that needs to be tackled (solid waste, liquid waste, industrial waste, hazardous waste, storm water drainage, environmental and hygiene education, vectors of diseases and disposal of the dead).

Other specific provisions of the policy aim that by 2030: all persons “will be educated and made aware of the importance and need for improved Environmental Sanitation practices for improved health aimed at change in behavior; all institutions including public place will have access to, and make use of, hygienic, affordable, functional, and sustainable toilet and hand washing facilities; all premises, dwellings and their immediate surroundings will be clean and free from waste and unpleasant odors and will have adequate drainage and that the burden of environmental sanitation and hygiene related diseases will be drastically reduced. The developed policy had the objective of contributing to the dignity, health and wellbeing and general prosperity of all Ghanaians. The policy recognizes that healthy and hygienic behavior and practices begin with the individual. The implementation of the policy is aimed at increasing the demand for sanitation at the household level and encourage communities to take responsibility for improving the sanitary conditions of their environment” (Ghana, National Sanitation Policy, 2010).

Though the policies and other legal frameworks such as the formulation of the National Community Water and Sanitation Strategy (NCWSS), the level of responds to the demand created through the implementation of the policies remain to be established.
2.4 The Community Led Total Sanitation

A Joint Monitoring Report of 2015 by UNICEF and WHO and the World Bank's report of 2015 highlight Ghana as part of the many countries in Africa that could not meet or otherwise stay on track regarding achievement of sanitation targets under the MDGs. Ghana having made commitment towards the achievement of the SDGs and with lessons learnt from the MDG era, the government and all development agents have embarked on an agenda Open Defecation Free initiative using the Community Led Total Sanitation (CLTS).

CLTS introduced by Kaman Kar was pioneered during an evaluation of a water and sanitation programme by WaterAid. Partners in the pioneering process who also contributed to the enhancement of the approach included: Village Education Resource Center (VERC) in Mosmoil village, Rajshahi district and Bangladesh between 1999 and 2000 (Kar and Wilward, 2011). The CLTS approach basically involve triggering of communities to collectively identify and analyse their sanitation situation with focus on open defecation so as to take community owned actions towards solving sanitation issues by ending open defecation. That is to become Open Defecation Free (ODF) (Kar and Chambers, 2008).

Open defecation (OD) is referred to a practice where people defecate in open spaces instead of using designated places such as a latrine or toilet. Though this practice is generally all over irrespective of being it a city or a village, the situation is very worrying in rural areas. According to WHO and UNICEF, for every 10 persons around the world who practice open defecation, 9 live in rural areas (WHO/UNICEF, 2015). In the case of Ghana, the situation of openly defecating is equally worrying. Recent statistics indicates that in the Upper East region, an estimate of 89 percent of the population practice defecating in open with only 3 percent of the population in the region using sanitation facilities that are improved and not shared (UNICEF, 2015).
Open defecation (OD) practice exposes individuals within a community to adverse health effects. Most affected are usually children. Among the effects on children include diarrhea, cholera, under nutrition. Other consequence including absenteeism from school due to illness (Mara et al., 2010). Non-health impacts include loss of dignity, privacy and safety. While women are identified as the most victims of these situations, it economic burden on the family regarding medical bills cannot be ignored (Mara et al., 2010).

In an effort to end open defecation and the adverse effects it brings, there is a realization that early sanitation strategies that were focused on providing latrines to individuals were not effective in mitigating OD because these approaches could not address challenges of sustainability and behaviour of community members (Devine, 2009). In line with this, the CLTS approach to solving rural sanitation issues was born, equipped, address and enhance upon limitations revealed from earlier sanitation strategies.

The CLTS focuses on behavioural change at the community level as a means to help ensure that the sanitation accomplishments made are a reflection of what the people actually wish for themselves and this will help sustain these gains (Kar and Chambers, 2008).

Since the emergence of the CLTS in 2000, more than 60 countries have embraced the approach. Many of these countries have also now included CLTS into their national policies on sanitation as a vehicle to meet the sanitation objectives and goals (Institute of Development Studies, 2016). Using CLTS as a model for achieving improved sanitation at the household levels gained attention in Ghana in 2007 after Plan Ghana, UNICEF and Wateraid piloted it in 237 communities (Plan Ghana, 2006). According
to Kar and Chambers, 2008; Pickering et al., 2015, “thousands of ODF villages have been declared, and – quite remarkably – at least five national governments of eastern, southern, western and central Africa have now adopted CLTS as the approach in their national sanitation strategies” (Kar and Chambers, 2008; Pickering et al., 2015). Kar and Wilward, also reported that “in a relatively short time, hundreds of thousands have gained the benefits of better sanitation by changing their individual and collective hygiene behaviour, including their open defecation practices – changing where they shit – and millions are poised to do the same” (Kar and Wilward, 2011).

However, the CLTS is reported not to be effective sometimes (Guiteras et al., 2015). Like other countries, Ghana also adopted the CLTS as a national sanitation policy. However, there seems to be little progress in liberating communities from defecating openly. Though CLTS is reported of yielding some intermediate results, there is however growing concerns and questions with evidence over the sustainability of the approach (UNICEF, 2015).

2.5 Effects of Poor Sanitation

Number six (6) among the UN most recent Sustainable Development Goals was the vital pledge to ensure universal “access to adequate and equitable sanitation and hygiene for all and to end open defecation, paying special attention to the needs of women and girls, and those in vulnerable situations by 2030” (SDG Baseline report, 2017). As policy makers and world leaders continue to debate the actions required to achieve this ambitious goal, an estimated 15,000 children under five years of age die every day globally from diarrhea diseases caused by lack of hygienic water and sanitary living conditions.
Poor sanitation remains one of the major causes of child mortality. The situation will likely not change or improve if over a billion people still openly defecate. Poor sanitation will also likely increase the gander inequality if care is not taking as the lack of improved sanitation in schools account for factors contributing to young girls dropping out of education early (UNICEF, 2015).

Though several initiatives have been taken at global and national levels to bring about a reduction in the numbers affected with lack of access to proper sanitation, but sadly enough, there is still a high number of people, especially in developing countries that still have limited access to a basic sanitation.

Sanitation is of great importance in maintaining health and increasing life-spans of humans. It is especially very important for the well-being of children. This is because, around the globe, many under five years children die on daily basis from preventable diseases caused by limited access to basic sanitation. For instance, UNICEF in May 2017 reported that diarrhea kills about 525,000 children each year worldwide with several others being malnourished and stunted.

Beyond the upsetting impact on child mortality rates, poor sanitation also affects social and economic development (Cumming and Cairncross, 2016). Children, especially young girls are likely to attend school more frequently when schools provide private, safe and clean sanitation facilities on the school premise. Women and young girls who lack access to sanitation in their homes are often victims of sexual assault as they go in search of private places to fulfill their sanitation needs. The effects of poor sanitation is such wide that aside if influence on education, productivity outcomes are equally affected. For instance, stunting among children which affect both educational and long-term productivity outcomes is linked to poor
sanitation (SOWC, 2013). This implies that providing access to proper sanitation can lead to increased gains in education outcomes and also help increase the safety of women. Availability of improved sanitation facilities pay special attention to the needs of women and girls and those in vulnerable situations as enshrined in Goal 6, target 6.1 of the Sustainable Development Goals (SDGs).

The consequences of improper sanitation are several. It affects right from the household’s level through to the national economy level. As a country, Ghana loses about 1.6 percent of her total GDP to addressing the consequence of poor sanitation (GSS, 2015). The impact of poor sanitation does not only lead to deaths which could have been prevented, it also drains the economy of working force, limit savings and investment, causes poor performance in schools and aggravate poverty situations. The effects of poor sanitation are such huge that it cannot be ignored. The economic, social, cultural, gender, health, tourism, environmental and income effects retard to a greater extent the full realization of human development of the affected persons (Kov et al., 2008).

According to UNICEF-WHO Progress on Sanitation and Drinking water, 2012 update report, “only 19 percent of the urban population and 8 percent of the rural population have access to improved sanitation facilities throughout Ghana”. About 33 percent of the Ghanaian rural population practice open defecation. Also, the poor is more likely to be involved in this practice compared to the rich (WHO and UNICEF, 2012). In curving the situation, an estimated $52 million per year was being spent on sanitation in Ghana as at 2007. Of the amount, $1.8 million came from the Government of Ghana. Foreign donors including the World Bank, UNICEF, the EU, and the Danish International Development Agency contributed a total of $50.2 million. Despite the increasing commitment by successive Ghanaian governments and donors, the goal of
eliminating open defecation still remains an aspiration with thousands of children dying each year due to poor sanitation.

2.6 Sanitation Related Diarrhea among Children

Diarrhea is the most common fecal-oral disease that affect children, especially those below age five. The World Health Organisation defines diarrhea as “the passage of loose or watery stool, usually at least three times in a twenty-four-hour period”. It is reported to be the second leading cause of under-five mortality in the world. Estimates suggest that childhood diarrhea kills 760,000 children annually in the world (Black et al., 2013). Globally, diarrhea diseases are caused by infectious agents such as bacteria (e.g. E. coli, salmonella, shigella, campylobacter), viruses (e.g. rotaviruses, noroviruses and adenoviruses), and protozoa (e.g. cryptosporidium, amoeba and giardia). However, the aetiology of diarrhea diseases varies from region to region. Rotavirus is the main cause of severe and moderate diarrhea (Lozano et al., 2013; Kotloff et al., 2014).

The incidence and prevalence of diarrhea diseases varies greatly with the seasons and a child’s age. The youngest children are most vulnerable with prevalence being highest in the first two years of life though declines as the child grows older (Boschi et al., 2014). Globally, it is suggested that diarrhea diseases contribute to 4 percent of the total disease burden in the world, 3 percent of the overall mortality and 11 percent of all under-five (children below age five) mortality. In September 2008, UNICEF reported that Ghana and other African countries contributed to 35.3 percent of child mortality due to diarrhea globally. In India, it is reported that from 2001-2003, about 1.3 million under-five deaths due to diarrhea occurred (Million Death Study, 2010).
The two greatest factors that contribute to the high prevalence of diarrhea among younger children are improper disposal of child stools by caregivers and high practice of open defecation by children among some households (Caulfield et al, 2004). For instance, in the Indian subcontinent, unsafe disposal of the stools of under-three children is more prevalent in Bangladesh (78 percent), Nepal (69 percent) and Afghanistan (52 percent) (UNICEF, 2014, WHO/UNICEF, 2015). Improper/unsafe disposal of child stools have been identified as one of the risky behaviours of mothers. It is suggested that children whose stools are disposed of unsafely have a higher risk of diarrhea than those who disposed of safely, and the odds of diarrhea range from a minimum of 1.3 to a maximum of 2.2 (Tilahun et al., 2014 and Sinmegn et al., 2014). Available literature from research conducted in Sri Lanka and Iraq reported that, children from households where excreta was disposed of in a latrine were less likely to have diarrhea than children whose families disposed of excreta improperly (Mertens et al., 1992).

### 2.6.1 Effect of Diarrhea on Child Health

Diarrhea disease affects child’s nutritional status, with an associated health and socio-economic consequences (Bassani et al, 2010). It is reported that 25 percent of stunting in children under the age of two could be due to five or more diarrhea episodes (Checkley et al., 2008) and long-term exposure to fecal pathogens which may be associated with environmental enteric dysfunction (Humphrey, 2009). While most diarrhea diseases associated with poor water, sanitation and hygiene tend to be endemic, some are epidemic in nature – notably, cholera and typhoid fever (Bezatu et al, 2013). Cholera is an acute diarrhea disease that can kill within hours if left untreated, and it is a continual public health problem in many parts of the world.
Researchers have estimated that every year there are roughly 1.4 million to 4.3 million cases, and 28,000 to 142,000 deaths per year worldwide (Blossner et al., 2005). The majority of reported cholera cases and deaths occur in Africa (Gaffga et al., 2007).

2.7 How Sanitation Influences Diarrhea Disease

Human excreta are the source of many infectious disease agents. As a result of open field defecation practices, human excreta contaminate the surface soil/field, food and water sources. The exposed excreta provide breeding places for flies and other insects. The major reason for this is that majority of the population especially in rural areas do not use safe and decent latrine system and rather practice open field defecation (WHO, 2004).

Globally, poor sanitation result into serious health problem particularly to the poor and disadvantaged people. Lack of sanitation facilities compels people to practice open defecation and this increases the risk of transmission of diseases (WHO, 2013). The disease burden associated with poor water, sanitation, and hygiene is estimated to account for 4.0 percent of all deaths and 5.7 percent of total disease burden in disability adjusted life years (DALYs) worldwide (Prüss et al, 2002). Excreta borne diseases such as Typhoid fever, shigellosis and among others remain common in most countries including Ghana. These diseases can easily be controlled if everybody uses and maintain latrine facility.

Diarrhea diseases are characteristically transmitted via the fecal-oral route. Poor sanitation increases an individual’s exposure to fecal pathogens through multiple pathways, as demonstrated in Figure 3.
Figure 2.2: Possible Contaminant Sources under Poor Hygienic and Sanitary Conditions

Source: Adapted from the UN Refugee Agency WASH Manual, 2014.

It is reported that an estimated 842,000 diarrhea deaths were caused by inadequate WASH (502,000 from water, 280,000 from sanitation and 297,000 from hand hygiene) in 2012 and this represents over half of diarrhea diseases, or an estimated 1.5 percent of the total disease burden (Prüss-Üstün et al., 2014). Children, especially those under 3 years are more susceptible to diarrhea from fecal contamination than adults and other groups due to the characteristics they display at childhood stages (Boschi et al, 2008). Under 3 years children in most cases are not able to walk. They are known to putting anything they get hold of into the month. This makes them more
susceptible to diarrhea contraction compared to adults. In other cases, they eat any food irrespective of being contaminated or not and this makes them more vulnerable to poor sanitation consequences. Unlike adults who are susceptible to only secondary barriers as shown in the diagram above, children are exposed to both barriers. Given what we know about disease transmission routes and possible barriers to these, the most recent estimate suggests that improved water, sanitation and hygiene could prevent the deaths of 361,000 children under the age of five, or 5.5 percent of deaths in that age group (Prüss-Üstün et al., 2014). A different estimate, which includes WASH in addition to other interventions such as oral rehydration treatment and exclusive breastfeeding, suggests that 95 percent of diarrhea deaths in children under the age of five could be prevented by 2025, as a result of targeted scale-up of such proven interventions (Bhutta et al., 2013).

2.7.1 The Effect of Sanitation Interventions on Diarrhea Disease

As diarrhea genic pathogens spread by many different interacting pathways and with scientific proves on how improved sanitation can reduce diarrhea prevalence, it is recommended that sanitation interventions be well coordinated in order to be more efficient and effective. Improving access to adequate amounts of water from an adequately distanced source, hygienic sanitation facilities and promotion of handwashing with soap should be the key components of an integrated WASH campaigns (Cairncross et al., 2010). An additional potentially critical intervention would be to improve food hygiene, which may prevent many diarrhea deaths, especially in places where food hygiene is difficult to maintain (Curtis et al., 2011).

A randomized control trial impact evaluation among 121 villages in Mali after the implementation of CLTS program shows that sanitation interventions (CLTS) has
positive impact on reducing diarrhea and its related health concerns. According to the study, there is evidence that the CLTS program has a positive and significant impact on growth outcomes among children less than five years of age. When accounting for baseline height measurements, children under five years old in CLTS villages were taller and 14 percent less likely to be stunted. Improvements in child weight and a reduction in the proportion of children underweight were also observed but were not statistically significant. The program also appeared to reduce the prevalence of severe stunting by 22 percent and the risk of being severely underweight by 35 percent (Maria et al., 2015). Providing access to sufficient quantities of safe water, the provision of facilities for a sanitary disposal of excreta, and introducing sound hygiene behaviors are of capital importance to reduce the burden of disease caused by these risk factors (Jefferson et al., 2007).

### 2.7.2 Providing Adequate/Improved Sanitation

Adequate or improved sanitation facility is one that hygienically separates human excreta from human contact (WHO/UNICEF, 2015). The following sanitation solutions fall within this category: the flush toilet, piped sewer system, septic tank, flush/pour flush to pit latrine, ventilated improved pit latrine, pit latrine with slab and a composting toilet. Though the mentioned above are all considered improved sanitation facility, the level of safety vary from one kind to another. The WHO has recently estimated that effective sewer connections provide an estimated 69 percent reduction in diarrhea disease compared to an estimated 16 percent reduction from improved sanitation without sewer connections – although this is based on limited evidence and should therefore be considered preliminary (WHO, 2014a).

A systematic review by Wolf and colleagues, which included 11 studies of a randomized, quasi-randomized, case-control or observational design found that
improved sanitation can decrease diarrhea disease by 28 percent, and also that there are notable differences in illness reduction according to the type of improved water and sanitation implemented (Wolf et al., 2014). Sewer connections were associated with greater reductions in diarrhea compared to other onsite or non-reticulated sanitation interventions. The underlying evidence for this is limited to a small number of studies and the extent to which any technology is appropriate, and to which the costs are justified, will depend on the setting. These results are broadly in accordance with the results of previous systematic reviews in this area. Three previous systematic reviews of the impact of sanitation on diarrhea estimated a mean decrease of 32, 34 and 36 percent (Fewtrell et al., 2005; Waddington et al., 2009; Cairncross et al., 2010).

It was revealed in 1993, WHO meeting with health specialists gave excreta disposal and personal hygiene practices especially handwashing as the most influential factors in reducing morbidity and mortality due to diarrhea diseases. According to WHO, a 1991 review of 144 studies linking sanitation and water supply with health clearly states that: “the role of water quality in diarrhea disease control is less important than that of sanitation and hygiene”. Furthermore, WHO reports that, a 1986 study emphasized the importance of sanitation specifically as compared to stand alone water supply interventions (WHO, 2008).

### 2.7.3 Promoting Hygiene

According to a number of systematic reviews, handwashing with soap (HWWS) has a significant effect on health and reduced diarrhea. A Cochrane Review carried out by Ejemot and colleagues, which pooled data from five RCTs of community-based interventions in low or middle-income countries found a reduction of 32 percent in diarrhea episodes among children (Ejemot et al., 2008). A number of other systematic
reviews, many of which take into account trials beyond RCTs, have found a higher reduction in diarrhea, of up to 48 percent (Curtis et al., 2003; Fewtrell et al., 2005; Waddington et al., 2009; Cairncross et al., 2010).

Although further evidence is required to assess the sustainability of HWWS behaviour change interventions (Brown et al., 2013), research shows that, if widely practiced, hand washing with soap could reduce diarrhea by almost 50 percent and respiratory infections by nearly 25 percent. Hand washing with soap also reduces the prevalence of skin diseases, eye infections like trachoma and intestinal worms, especially ascariasis and trichuriasis (Agboatalla et al., 2005). A study in India by Cairncross and colleagues shows that persistent change in behaviour may be possible following an effective intervention. In this study several methods were used to study the sustainability of changed hygiene behaviour at various periods up to nine years after the conclusion of a multi-pronged hygiene promotion intervention in Kerala, India. Good handwashing practice was reported by over half of the adults in intervention areas, versus less than 10 percent of adults in a control area (Cairncross et al., 2005).

It has been estimated that environmental factors, including no access to or poor sanitation and hygiene practices, may account for half of all undernutrition (Blossner and de Onis, 2005; Prüss-Üstün and Corvalan, 2006; Victora and Fall, 2008; World Bank, 2008). Further, one study has estimated that approximately 860,000 child deaths attributable to undernutrition could be prevented with improved WASH (Prüss-Üstün et al., 2008).
Poor WASH could potentially affect childhood nutrition via at least three pathways: intestinal worms, EED and repeated bouts of diarrhea (Dangour et al., 2013). As shown figure 2.3, inadequate access to improved water, sanitation and hygiene exposes human to polluted environment leading to contamination of food, fluid and field causing intake of pathogens into human system. These can however be prevented through improved WASH service. With sanitized sanitation, e-coli contamination of water bodies which causes diarrhea would be reduced. Availability and proper usage of improved sanitation facilities would also reduce if not eliminate contact with fecal matter.
2.7.4 Latrine Availability

Despite the enormous facts about the need and importance of improved sanitation services, about 2.3 billion people worldwide still lack access to improved sanitation facilities (WHO, 2014). With the world’s population that have access to sanitation facilities, only 39 percent representing 2.9 billion people use safely managed facilities which is the most recommended by WHO. According to WHO in 2014, the waste of 29 billion people with access to basic sanitation is untreated. These wastes are left to flow into rivers and emptied. It causes contamination and put communities at risk of disease. According to the 2014 report, while 8 percent of the world’s population share latrines with other households, a significant proportion (12 percent) uses unimproved facilities such as a latrine over an open pit or water with an overwhelming 12 percent defecating in an open. According to Water Aid in 2017, majority of the population that lack access to improved sanitation facilities are located in sub-Saharan Africa with women and girls as the most affected of the consequence of poor sanitation aside the disease.

In Ghana, access to sanitation facilities (latrines) remains a major problem despite efforts by both governmental and non-governmental organizations. According to UNICEF in 2015, about 60 percent of the Ghanaian populace use shared toilet facilities, 15 percent use improved ones, six percent uses unimproved, and 19 percent practice open defecation. The situation vary by location as well as regions as 35 percent and 19 percent urban and rural respectively have access to improved sanitation with the Northern region which include Tamale Metropolis having 23 percent of the population with latrines.
2.8 Latrine Use, Knowledge, Attitude and Hygiene Practices
Sanitation embodies: availability, accessibility, quality, knowledge and use. Improving sanitation goes beyond physical-structural presence of infrastructure to include knowledge on usage of the facilities, maintenance of the facilities as well as change in attitudes and behavior towards improved practices (WHO, 2012c). Although income is a major determinant of the kind of latrine people use, knowledge on latrine also plays a critical factor in the kind of latrine people use and the impact it brings to households (Walker et al., 2011). According to Diouf et al 2014, in rural areas where there is limited knowledge on sanitation, most communities use pit latrines though some households are able to afford the cost in constructing a more improved facility. Knowledge on latrines and importance plays a key role in the ownership and use of sanitation to influence diarrhea prevalence (Hunter et al., 2014).

Sanitation and hygiene are critical since it serves as a bedrock for health, survival, and development of any community or country at large (Karley et al., 2009). Though there has been proven evidence on the extent to which improved sanitation practices can lead to improved health, attitudes and practice by individual remain very key for the manifestation of impact. Thus, for sanitation to bring about improved health, people must adapt positive health behaviors and practices (Siziya et al., 2013). Individual hygiene behaviors can be affected by many factors, including beliefs, values, habits, socio-economic and cultural factors, level of knowledge, personal preferences, family characteristics, physical and social characteristics as well as living environments. Therefore, the hygiene habits of each individual differ, meaning that these habits are unique to individuals (Fewtrell et al., 2005; Görgülü et al., 2000). Despite the proven impact of improved sanitation and hygiene practice, some cultures
serve as hindrance. Such cultures hold certain beliefs and norms that does not encourage improved sanitation practice. In India, increased in improved sanitation facilities did not lead to desired results. According to Amy et al in 2015, an evaluation conducted in India after implementing a Community Led Total Sanitation project revealed that there was massive increased access to improved sanitation facilities. However, the result of the evaluation shows that there was no corresponding increase in the reduction of diarrhea cases among children and adults. According to the study, further engagement with project beneficiaries revealed poor knowledge on latrine use, attitudes and culture contributed to continuous prevalence of diarrhea. The report indicated that Indians have a culture which holds that defecating in the bush shows that excreta is put away from human settlement and such practices means good hygiene.

Within the Tamale Metropolis, several communities are faced with lack or inadequate sanitation hygiene facilities leaving people at the risk of water, sanitation, and hygiene related diseases. Literature and existing evidence demonstrate that diarrhea is slightly less common among children whose households use improved latrines compared with those who did not (WSP, 2013). Childhood stunting, which can affect both educational and long-term productivity outcomes, has been linked to poor sanitation and hygiene and in particular open defecation practices (SOWC, 2013).

According to UNICEF, poor sanitation and hygiene practices have many serious repercussions. Children – and particularly girls – are denied their right to education because their schools lack private and decent sanitation facilities. The poor low wage earners are less productive due to illness, health systems are overwhelmed and national economies suffer. Sanitation and hygiene, is a road map for sustainable
development in the sectors of development. Improving sanitation and hygiene not only results in good health but also generates considerable socio-economic benefits in terms of a better living environment and an expression of care for the dignity of citizens, especially women and children (UNICEF, 2013).

2.9 Factors Promoting Latrine Use

Generally, human response to health behaviors is due to the benefits or the perceived threat associated with a particular life style (Janz et al., 1984). According to the health belief model which is one of the most widely used conceptual frameworks for understanding health behavior, a person's willingness to change a health behavior is primarily due to; the Perceived Susceptibility, Perceived Severity and Perceived Benefits. People will not change their health behaviors unless they believe that they are at risk. The probability that a person will change his/her health behaviors to avoid a consequence depends on how serious he or she considers the consequence to be. It is difficult to convince people to change a behavior if there is no any perceived gains in such alternative way of life.

Also, individuals by nature sometimes decide at what time and place they should adopt to a particular health behavior referred to here as latrine use. Using the Theory of Plan Behavior (TPB) as depicted in figure 2.4, behavioral achievement depends on both motivation (intention) and ability (behavioral control).
Figure 2.4: Theory of Planned Behavior
Source: Center for Disease Control (CDC) 2016.

Attitudes - This refers to the degree to which a person has a favorable or unfavorable evaluation of the behavior of interest. It entails a consideration of the outcomes of performing the behavior.

Behavioral intention - This refers to the motivational factors that influence a given behavior where the stronger the intention to perform the behavior, the more likely the behavior will be performed.

Subjective norms - This refers to the belief about whether most people approve or disapprove of the behavior. It relates to a person's beliefs about whether peers and people of importance to the person think he or she should engage in the behavior.

Social norms - This refers to the customary codes of behavior in a group or people or larger cultural context. Social norms are considered normative, or standard, in a
Perceived power - This refers to the perceived presence of factors that may facilitate or impede performance of a behavior. Perceived power contributes to a person's perceived behavioral control over each of those factors.

Perceived behavioral control - This refers to a person's perception of the ease or difficulty of performing the behavior of interest. Perceived behavioral control varies across situations and actions, which results in a person having varying perceptions of behavioral control depending on the situation. This construct of the theory was added later, and created the shift from the Theory of Reasoned Action to the Theory of Planned Behavior.

Diffusion of innovation also plays a key role in promoting the use of latrines. Irrespective of the kind of theory that may likely promote the use of a latrine, Anteneh, and Kumie, in 2010 holds it that ownership of a latrine facility does not guarantee health benefits unless the said facility is utilized effectively. Aside the talked above factors several others such as; behavioral, demographic, geographic, climatic and economic (LabSpace-the Open University, n.d.) equally plays a role in promoting latrine use. Studies conducted in Tanzania and Ethiopia further indicated that socio-demographic and economic factors significantly promoted use of latrine facilities at the household level (Kema, 2012, Awoke and Muche 2013).

According to Anteneh and Kumie (2010), supportive supervisory visits to households by health personnel, presence of school going children, peer pressure, social learning and living in close proximity to a health institution have also been found to promote latrine use. However, controlling for all these factors has shown that stronger social ties have a greater influence on latrine use (Shakya et al. 2012). Despite the fact that sanitation is often perceived to be a household matter, the
influence of wider community factors may not be overruled and an in-depth understanding of all factors promoting latrine use at all levels is valuable (World Bank, 2004).

2.10 Factors Hindering Latrine Use

Improving latrine use is associated with a wide range of benefits to an individual, the household and community at large. However, there exit several challenges at national level including weak national strategies and policies, inadequate financing and poor prioritization of latrines by Governments. At the household level, higher priority has been accorded to improved access to water than improved access to sanitation (latrines). UNDP in 2006 indicated that poverty and gender inequalities could further explain the disparities in latrine use among communities with evidence suggesting that women place a higher value on private latrine facilities than men yet they have the least decision-making power as well as control over household resources.

In other studies, odor and fly problems have also been shown to hinder use of latrines at the household level (Anteneh and Kumie, 2010). Globally, the misunderstanding on the linkage between sanitation and health, institutional and policy shortcomings limited infrastructure and social taboos further pose challenges (UN University, 2010). According to the Community Water and Sanitation Agency (CWSA) in 2015, the main hindrances to the scaling up of latrine facilities and usage can be attributed to low prioritization of sanitation by policy makers, inadequate funding for the sanitation sector. The report also maintained that, adverse hydro-geological conditions, flooding in low lying areas among others also accounts for the reason why people are constrained in using improved sanitation facilities.
2.11 Theoretical Frame (Social Ecological Model of Health Behavior)

2.11.1 Introduction

For improved access to Water, Sanitation and Hygiene to effectively contribute to the reduction of disease and improve the health of a population, it heavily depends on the behavior people attach to their health. With improved sanitation practices heavily dependent on the behavior of individuals, the community and society, the study adopted the social ecological model of health behavior as the theoretical framework of the study to help explain study objectives.

Basing on the perspective of UNICEF, Socio-Ecological model is a theory-based framework for understanding the multiple and interactive effects of personal and environmental factors that determine behaviors, and for identifying behavioral and organizational leverage points and intermediaries for health promotion within organizations (UNICEF, 2015).

The choice of the socio-ecological health model is due to the complex interrelation between the individual, relationship, community and societal factors. The efficacy of practicing an improved sanitation behavior is influenced by the individual, the relationship the individual has, the community and the society at large. As seen in the chart below, the model presents a comprehensive explanation on how these components interplay to influence diarrhea prevalence among a group of people and children for the purpose of this study.
From Figure 2.5, there is a logical linkage between the sub-sections which implies that any initiative aimed at behavior change must factor in the various component for effective and meaningful impact. This means that designs for behavior change or improved sanitation practices must factor in all the above components when coming out with sanitation improvement strategies.

### 2.11.2 Individual Level of Ecological Health Behavior Model

At the individual level, focus is on sanitation practices and behavior of individuals that pre-exposes children to fecal contamination leading to diarrhea and possible deaths. The behavior of individuals towards a health practice has a greater influence
on how fecal matter is being exposed. According to Wanzahun Godana in 2017, the presence or absence of a sanitation facilities does not exactly predict the acts of individuals but may influence the behavior to some extent.

The socio-ecological model looks at the age category of individuals and corresponding behavior or practices that makes the individual susceptible to diarrhea and it associated effects. Preventive measure by the model at this stage focus on promoting appropriate hygiene and sanitation practices. Examples may include promotion of recommended handwashing practices, use of improved sanitation facilities and ensuring maintenance of the facilities (CDC, 2015).

### 2.11.3 Relationship Level of Ecological Health Behavior Model

This level of the model looks at the cause and solutions at the interpersonal levels. It looks at causes at the individual level, family level, and friends and among others that may lead to child diarrhea. For example, having a latrine and using it does not guarantee that members of the household especially children will not fall sick of diarrhea disease. This is because other people within the area do not use latrines and perhaps openly defecating. Their actions can still lead to other households having and using latrines being susceptible to diarrhea incidence.

By way of prevention, the model looks at behavior change for all and promote interventions that seek to educate communities, families and individuals for a positive change in behavior. At this stage all possible barriers including cultural must be inclusive or targeted in intervention packages since there is some level of interaction which is capable of influencing health. This will discourage some harmful practices that exposes human to fecal contact (CDC, 2015).
2.11.4 Community Level of Ecological Health Behavior Model
The model at this level consider the contexts in which social relationships occur, such as schools, neighborhoods and workplaces. Here, focus is on environment that surround a child or individual. For example, if a child or any individual have access to improved sanitation at the household level and does not have any form of improved sources at either the school or working environment, the likelihood of diarrhea prevailing still remains. Interventions at this level may be implemented at the community, family and individual level as well as at the institutional levels (schools and health care levels) (CDC, 2015).

2.11.5 Societal/ Policy Level of Ecological Health Behavior Model
This level of the model looks at policy, cultural norms, economic, institutional and all other factors that define way of life. It looks at economic and social policies as well as culture that maintain promote inequality between people leading to some not being able to afford some basic needs such as a latrine. It focuses on policy level issues that may be barriers to improved sanitation and hygiene practices. Interventions at this stage may focus on policy influence at all level. Advocacy for changes in policy, traditions and norms to regulate open defecation and instill proper sanitation practices is highly recommended at this level to help reduce diarrhea prevalence and its corresponding effects on child health (CDC, 2015).

2.12 Conceptual framework
This section discusses the framework that is used to explain the interrelationship between availability of household latrine, disposal practices applied on child stools and its impact on diarrhea among children (under three years). A conceptual framework, as defined by Miles and Huberman (1994), is a visual or written product that explains, either graphically or in narrative form, the main things to be studied—
the key factors, concepts, or variables—and the presumed relationships among them. The framework demonstrates the relationship between the independent variable (latrine availability, usage and feces disposal practice) and the dependent variable (diarrhea). In this study, the Health Belief is used.

The Health Belief Model is a psychological model, which seeks to explain and predict health behaviors by focusing on the attitudes and beliefs of individuals. (FHI, 1996). The health belief model is mostly being used to explore and predict both long- and short-term health behaviors such as the possession and use of improved sanitation facilities.

The model operates on an assumption that perceived threat influences human behavior towards health. According to the model, a person will take a health-related action (i.e. own an improved latrine and use it including properly disposing of child stools) if that person: feels that a negative health condition (i.e, diarrhea) can be avoided, has a positive expectation that when a particular action or recommended action is taken, he/she will avoid a negative health condition. For example, when an individual is convinced that by using improved latrines diarrhea is likely to be prevented, he/she is most likely to put in more efforts into owning one considering the perceived threat he/she have on diarrhea disease. The conceptual framework that was adapted and modified for the study is provided as figure 2.6.
Figure 2.6: Conceptual Framework for the Study
CHAPTER THREE
METHODOLOGY

3.1 Introduction
This study is centred on household latrine availability, disposal practice of child stools and its association with diarrhea among children under three years in the Tamale Metropolis. Chapter three covers research, sample size, sampling procedure and the research instruments used in gathering data from respondents as well as data analysis. It also contains the basic demographics and ethical principle that were considered in the study.

3.2 Study Setting
The study was conducted in the Tamale Metropolis in the northern region of Ghana. The Metropolis is one of the six metropolitan assemblies in the country and the only Metropolis in the northern part of Ghana out of the 28 Districts/Municipalities in the Northern Region. It is located within the Guinea Savannah belt and ranked as the fourth largest city in Ghana. The Metropolis has three (3) sub-Metropolis made up of Tamale central, North and South. It shares boundaries with Savelugu, Nanton, Tolon, and Kumbungu Districts to the west, Central Gonja District to the South-West, East Gonja to the South and the Yendi Municipal with a total land size of approximately 922km sq. The Metropolis has a total population of 485,213 with 45,269 households with a projected growth rate of 3.5 percent according to the 2010 population and housing census.
Tamale Metropolis is the administrative capital for the Northern Region of Ghana. The predominant ethnic group is Mole-Dagbon with Dagbane as the main language. However, urban Tamale has a high number of settlers from other regions. The indigenes are predominantly Muslims (84 percent), Christians (13.6 percent), traditional worshipers constitute 1.4 percent and other forms less than 1 percent.
(Population and Housing Census, 2010). Agriculture, hunting and forestry are the main economic activities within the Metropolis. Of the economically active group, 83 percent are found in the private sector with the remaining population in the public sector. Polygyny is a common practice of the people with functional extended family systems. The health needs of the people are provided by Tamale Teaching Hospital, two other Hospitals, Christian health facilities and private hospitals and clinics.

3.3 Study Design
The study design was a descriptive cross sectional which captured information at specific time points. Quantitative and qualitative research designs were used for the study. Quantitative data was used to assess the availability and utilization of household latrines among caregivers. It also helped in assessing how children under three year’s stools were disposed at the household level. Awareness level on the dangers involved in improper disposal of children’s stool by caregivers was studied. Qualitative on the other hand was used for in-depth exploration of the cause of diarrhea among children under three years of age.

The data gathered was from respondents with varied characteristics and demographics. The general aim was to quantify and also understand the situation under study. This method adapted addressed questions about the ‘what’, ‘how’ or ‘why’ (qualitative method) and ‘how many’ or ‘how much’ (quantitative method) (Bricki, 2007). The method helped in quantifying the level of latrine availability in households as well as described practices among caregivers in the disposal of child stool. It also helped in establishing the reasons behind childhood diarrhea in homes within the Tamale Metropolis.
3.4 Study Population and Units
The target population of the study were caregivers in households with children under three years of age for the quantitative study while key informants (e.g. opinion leaders) were selected for the qualitative study.

3.5 Inclusion Criteria
A respondent must be a caregiver of 18 years of age and above with a child three years of age or below in the household. The respondent should have stayed in the area for not less than 6 months before the interview date. The caregiver in the household must be responsible for the primary and day-to-day care of the child. In a household with more than one caregiver qualified for the interview, only one caregiver was randomly selected for participation.

3.6 Exclusion Criteria
Caregivers less than 18 years were excluded irrespective of the length of stay in the household. Caregiver with a child three years or less who have stayed in the area for less than 6 months as at the date of the interview were as well excluded.

3.7 Sample Size Determination
The sample size was determined by using Fisher’s et al (1998) formula.

\[ n = \frac{Z^2 \times P \times (1 - P)}{e^2} \]

Where,

\[ n = \text{the desired sample size (if the target population is greater than 10,000)} \]

\[ Z = \text{the value for corresponding confidence level (that is 1.96 for a 95 percent confidence interval)} \]
P = the estimated value for the proportion of the target population that have the condition of interest (P = the most conservative estimate, there being no documented prevalence of diarrhea, 50 percent was used)

e = the level of statistical significance set which is 5 percent with a 95 percent confidence interval.

\[ n = \frac{1.96^2 \times 0.5 \times (1 - 0.5)}{0.05^2} \]
\[ = \frac{(1.96 \times 1.96) \times (0.5) \times (0.5)}{0.05^2} \]
\[ = \frac{3.8416 \times 0.25}{0.0025} \]
\[ = 0.9604 = 384.16 = 385 \]

The sample size is 385 study participants. Since there was no grantees that all the 385 desired respondents will participate, 3.5 percent non-responds (15.4) was added to the sample size to have a total sample size of 399.

3.8 Sampling Technique
Households were sampled for the quantitative data via random sampling technique. In doing so, all areas within the Metropolis were clustered into 24 zones. The total sample size (399) was divided over the 24 zones given an average of 17 households. At each zone, the total number of households were divided over zonal sample size of 17 and the figure obtained served as the interval for selecting households for the interview after a random starting point. This was to ensure that the data obtained is evenly distributed. Having run quantitative analysis on the data gathered, grandparents, assembly members, water and sanitation team members were purposively selected for the qualitative aspect of the study. This group of people constituted key informants for focus group discussions.
3.9 Study Variables and Data Sources
Latrine availability, usage and stools disposal practice were the independent variables of the study while diarrhea constituted dependent variable. Data was gathered from both primary and secondary sources. The primary source of data was obtained from questionnaire administration and interviews that was conducted with key informants.

3.10 Data Collection
The data for the research work were obtained from primary and secondary sources. The primary data was obtained from caregivers of children who are 3 years or below. Primary data collection for this study was conducted in the month of June, 2018 using questionnaires and observation as the main data gathering instrument. A questionnaire is defined as a research instrument (or other types of prompts) for the purpose of gathering information from respondents. As an instrument in data collection, questionnaire enables a researcher to understand the social world from the perspective of subjects (Kvale and Brinkman, 2009).

The questionnaires were developed based on the objectives of the study and in line with the conceptual framework. Closed and open-ended questions were used. The questionnaires were administered using the face-to-face approach.

Prior to the main data collection, a pre-test study was organized at Sagnarigu community in the Sagnarigu Municipality. The aim of this pre-test study was to test the tool and instruments involved. The sampling method, questionnaire, method of administration, respondent approaches among others were as well tested. This was to authenticate the accuracy, effectiveness and viability of the survey instruments.

Envisaging some challenges such as misinterpretation of question in self-completing questionnaires, limited or lack of knowledge in the subject area, difficulty in two weeks events recall and among others, a training was organized for enumerators
(persons who supported in the data collection). As part of the training, enumerators were taking through sessions where variables, components of the study, key terminologies and among others were clearly contextualized, explained and agreed upon.

3.11 Recruitment of Study Subjects
The date, time, and place for each interview were scheduled by the researcher in accordance with what was most conducive and comfortable for the subjects. Depending on the level of understanding to the questions and interruptions, interviews lasted for about 40 to 50 minutes.

Interviews were conducted in the native language – Dagbane. The choice of the native language was based on the high illiteracy level in the study communities. The study team ensured that only people from the target population took part in the study.

3.12 Data Management
While being in the field, the data was obtained through questionnaire administration. Data from each day’s trip to the field were synchronized into a central server where it was stored.

3.13 Data Processing
Downloaded data from the server was coded and analysed using STATA (version 14). As part of data processing, raw data from the field were cleared to ensure completeness of responses. Where applicable, multiple responses and questions relating to a particular variable were regrouped for analysis. Data were analysed to determine the level of latrines availability, child stool disposal practices among caregivers and the association of these variables on diarrhea among children under three years of age.
3.14 Data Analysis and Presentation
Data analysis were conducted and presented in both descriptive and inferential analysis. Frequency distribution (figures and graphs), percentages and bar charts were used in presenting descriptive analysis while regression analysis using p-values and chi-square were used for inferential analysis of the study.

3.15 Ethical Consideration
All ethical dimensions in this study were of utmost interest. Permission was obtained from the Tamale Metropolis Assemble before the study was conducted.

3.15.1 Informed Consent and Confidentiality
Informed consent as averred by Silverman (2011) is a ‘process of negotiation’ between the researcher and the study subjects, and not a ‘one-off action’. Prior to the start of questionnaire administration with each respondent, adequate explanation on the purpose of the study and permission was asked from every respondent with assurance to maintain confidentiality on the information provided. In every questionnaire administered, respondents were told of their right to withdraw from the study or decline to answer any question they considered inappropriate. Confidentiality was also guaranteed by making sure that study subjects were not represented by their names. Full disclosure about the study was made to participants and their respective concerns were also addressed accordingly.

3.16 Benefits and Risk
This study had no direct or immediate benefits for participants. It was however, envisaged that by finding factors associated with diarrhea among children under three years, this research’s outcome could help to define the most important questions that would inform sanitation policies in the Metropolis. Participation in the study involved little or no risk to subjects.
3.17 Validity and Reliability of the Study

3.17.1 Validity

Validity as used in this study also stands for research ‘trustworthiness’ or ‘credibility’.

Maxwell (2005) defined validity as the ‘correctness or credibility of a description, conclusion, explanation, interpretation, or other form of account’. A common ‘validity threat’ that is often discussed in quantitative inquiry and which was considered relevant in this study is the researcher’s ‘bias’, preferably called ‘subjectivity’ (ibid). It involves the possibility of obtaining data that fits or corroborates the researcher’s prior notions, values, beliefs, or even theories. This is conceivable in view of the fact that ‘value free’ inquiry is hard if not impossible to achieve. Rather, what is important is for the researcher to recognise and take into account how his/her own values and preconceptions might have influenced the study’s findings; and the range of measures/steps that were taken to tone down their impact (Patton, 2002). Validity and credibility in this study was ensured through data triangulation (using multiple or variety of data sources); interviews in this study were therefore not limited to a particular gender or age group’s account or experience, but to other sources.

3.17.2 Reliability

Consistency in research, alternatively called reliability, is employed to determine the reasonable degree to which a study’s finding can be reproduced by a different researcher (or even the same researcher) in similar or the same social environment (Rosenstock et al., 1974). The whole idea of ‘replication’ in quantitative inquiry is problematic particularly because of its implicit suggestion about the existence of ‘objective truth’ against which the ‘reliability’ or ‘consistency’ of one research finding would be measured. Different layers of complexity associated with human
social behaviour and the fluidity of our social world further make claims or efforts for reliability more complicated (Traore et al., 1994).

3.17.3 Transferability
When studies are transferable, they are reasonably useful to colleague researchers with similar research problem and under similar social environment (Pruss et al., 2000). The notion of transferability delineates the extent to which the finding of a quantitative study in context ‘D’ can be generalized to ‘E’, where ‘E’ is a population in a similar or with comparable characteristics. Thus, any new gain in perspective or knowledge is transferable to similar populations irrespective of demographic features (Dahlgren, Emmelin, and Winkvist, 2007). Given the fact that comprehensive health care may vary from settings to settings even though it could be a worldwide problem, the extent to which the present findings would be transferable is difficult to ascertain. Nevertheless, the use of several respondents within the local settings and the explicit description of the methods that were employed are expected to aid concerns for transferability especially in similar populations (Laxminarayan et al., 2006).

3.18 Study Limitation
This study has some form of limitations. Thus, caution should be taken in using the findings contained in this study. These include:

1. Accuracy of two weeks recall on diarrhea among children under three years of age. Respondents were asked on issues relating to children contracting diarrhea over the past two weeks prior to the date of data collection. Though respondents were able to provide some information accuracy of two weeks recall.
2. Limited access to observing and confirming indoor sanitation facilities. As part of data collection, it was mandatory for enumerators to observe and confirm reported latrines in households as well as the kind of latrines. However, this could not be strictly adhered to in some cases where respondents indicated the presence of latrines in living rooms where enumerators were not given access to. This made it difficult to confirm the availability of the sanitation facilities and their kinds in such households.
CHAPTER FOUR

PRESENTATION OF FINDINGS

4.1 Introduction
This chapter presents the findings obtained from the data gathered from caregivers interviewed.

As part of studying the availability of household latrines, disposal of children's feces and its association with diarrhea among children under three years in Tamale Metropolis, a survey was conducted to obtain primary information regarding the subject. The study targeted households with caregivers who had a child/children 3 years of age and below.

4.2 Socio-Demographic Characteristics of Respondents
In understanding how household characteristics interplay with latrine availability, child stool disposal practice and diarrhea among children under three (3) years of age, socio-demographic information of study participants were gathered. Below contains the result obtained from the socio-demographic characteristics.

In total, 399 caregivers were interviewed. Out of this figure, 389 representing 97.5 percent were females. Among the females, 39 (9.2 percent) were household heads. With the males, 6 were household heads and serve as caregivers.

Among the sample surveyed, a total of 107 caregivers representing 26.8 percent have had various level of education ranging from primary, Junior High, Senior High to Tertiary with 3.3 percent, 4.5 percent, 5.30 percent and 12.50 respectively. Out of the entire (399) population interviewed, 95.20 percent were married.

By way of income, majority (53.38 percent) earned lowest income of 300 Ghana cedis and below. Also, 22.80 percent and 14.8 percent earned an average of 700 and 1000
Ghana cedis respectively. A relatively fewer (36 people) representing 9 percent of the caregivers however did reported of earning 1,500 Ghana cedis and above.

Findings obtained show that 16.80 percent of the households surveyed were small in size with ≤ 5 persons. On the other hand, 57.10 percent households were medium in size with population between 6 and 10 persons while 26.10 percent had persons above 10.

Of the population interviewed, 54.4 percent spent their income on food while 33.8 percent spent on education. The remaining proportion (11.8 percent) of the respondents spent their income on other components such as house repairs, social events, rent and until
Table 4.1: Socio-demographic Characteristics of Respondent (n=399)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Caregiver</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female Household Head</td>
<td>39</td>
<td>9.8</td>
</tr>
<tr>
<td>Male Household Head</td>
<td>360</td>
<td>90.2</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never Been</td>
<td>297</td>
<td>74.4</td>
</tr>
<tr>
<td>Primary</td>
<td>13</td>
<td>3.3</td>
</tr>
<tr>
<td>Junior High School (JHS)</td>
<td>18</td>
<td>4.5</td>
</tr>
<tr>
<td>Senior High School (SHS)</td>
<td>21</td>
<td>5.3</td>
</tr>
<tr>
<td>Tertiary</td>
<td>50</td>
<td>12.5</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>19</td>
<td>4.76</td>
</tr>
<tr>
<td>Married</td>
<td>380</td>
<td>95.24</td>
</tr>
<tr>
<td><strong>Income levels</strong> (Monthly)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowest (300)</td>
<td>213</td>
<td>53.38</td>
</tr>
<tr>
<td>Lower (700)</td>
<td>91</td>
<td>22.80</td>
</tr>
<tr>
<td>Middle (1000)</td>
<td>59</td>
<td>14.79</td>
</tr>
<tr>
<td>Upper Middle (1500)</td>
<td>25</td>
<td>6.27</td>
</tr>
<tr>
<td>Highest (&gt;1500)</td>
<td>11</td>
<td>2.75</td>
</tr>
<tr>
<td><strong>HOUSEHOLD SIZE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small (5 People)</td>
<td>67</td>
<td>16.79</td>
</tr>
<tr>
<td>Medium (10 People)</td>
<td>228</td>
<td>57.14</td>
</tr>
<tr>
<td>Large (&gt;10 People)</td>
<td>104</td>
<td>26.07</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2018

4.3 Children Population in Households

As part of household membership, 35.5 percent of the respondent had ≤ 3 children in their households. A total of 169 representing 42.3 percent had children population between 4 and 6 children with the remaining 22.2 percent having ≥ children as represented below in figure 4.1.
The chart below is a graphical presentation of the results on children population.

**Figure 4.1: Number of children in Households**

**4.4 Latrine Availability**
The findings show that only 67 representing 16.8 percent of the households have latrines. The remaining 83.2 percent of the households within the Tamale Metropolis do not have latrines.

Figure 4.2 below is a graphical representation of the latrine availability within the Tamale Metropolis
Explaining reasons for lack of household latrines, 79.2 percent of 332 people without latrines reported of not being able to afford for a latrine while the remaining 20.8 percent revealed other reasons such as having no space to put up a latrine, prefer open defecation, and now putting up latrine and among other reasons. By way of having the capacity (skill) to construct a latrine, 80 percent of the households revealed they do not have the capacity with only 3.3 percent reporting of having the capacity to put up a latrine.
To unearth the reasons behind the quantitative data presented in figures 4.3, Focus Group Discussion (FGD) were held to provide qualitative data. During the discussion sessions, it was revealed that the presence of public latrines influenced some households not to prioritize owning sanitation facilities in the homes. Participants in the FGD also revealed that, persons that do not live in the center of cities have the option to use bush and open spaces around dwelling and as such need not to spend their limited resources on sanitation facility provisioning.

Regarding the inability of households to afford the cost of providing a sanitation facility, information gathered shows that role play (assigned responsibilities) with household influence latrine ownership. According to the FGD participants, men are assigned the basic responsibility of providing family needs such as latrine facilities and as such women sees it an extra cost on their part to provide even if they have the financial ability. Amina, a focus group discussion participant had this to say “asking...
we the women the reasons why we do not have household latrines is difficult to answer. It is our husbands who are the heads of the household and decide what to do for the family. If they have not built a latrine, we cannot know why nor question them. If you ask and they become angry, you lose most of your privileges.

Based on the inability of the men and sometimes the women to provide coupled with other competing demand, caregivers confirm their inability to afford for the cost a household latrine.

Dependency on external support was also revealed to have influence of household readiness to own a latrine. From the discussions, some households are expecting external support from NGOs and other agencies to enable them construct latrines. As part of the discussion, a community volunteer for Water, Sanitation and Hygiene had this to share ‘’during household inspection, when you get to a households that do not have latrines and question them why they are not making efforts to own a latrine, some household question us back that why are we the volunteers not making efforts to get NGOs to come and support. Some also tell us that why didn’t we the volunteers add them to the list of those NGOs supported in constructing’’. Comments such as the above suggest that external support (NGOs interventions) is directly related to household latrine availability.

In other instances, participants revealed that the limited availability of skilled persons in the construction of latrines within their settings is causing monopoly and hence the high cost.

Grouping the qualitative information into thematic teams, the table below contains some quotes from participants.
<table>
<thead>
<tr>
<th>Thematic Team</th>
<th>Focus Group Number</th>
<th>Respondent Number</th>
<th>Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not need a latrine</td>
<td>1</td>
<td>Respondent number 3</td>
<td>“for some of us, we stay in areas where there are public latrines that we can use at all times. In some of them we do not pay and building one on your own to me is waste of resources”.</td>
</tr>
<tr>
<td>Prefer OD</td>
<td>2</td>
<td>Respondent number 4.</td>
<td>In using a latrine, you end up inhaling the bad smell into your system. But with open space, you face the direction of the wind the smell goes the other way”.</td>
</tr>
<tr>
<td>No Space</td>
<td>3</td>
<td>Respondent number 2</td>
<td>“The compound is used up and the rooms are too small to have water closet even if you can afford. The water situation in these areas is such that you cannot even get water to flash WC even if you have”.</td>
</tr>
<tr>
<td>Cannot afford financial Cost</td>
<td>4</td>
<td>Respondent number 1.</td>
<td>“I use the little money I have to do important things which the money is usually not even sufficient”.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Respondent Number</td>
<td>“the reason why most of we women are not into gainful employment and cannot afford is, we have to make time to take care of children. For example, in the morning I have to bath my children, prepare breakfast for the house, most time take the children to school, pick them up from school and start preparing supper for the house. What time again do I have to work? Who will want to employ someone in my situation in a job that needs about 8 hours per day? Even if any organization or company is willing to employ me, can I produce the expected results? “</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>“though all households need to have toilet, I think it is those in the cities where there is no bush to use for defecation that need it more. For us going into the bush to defecate even help boost our crop yield”. “by cluture our children are to give way for adults in everything. In order not to be disobedient, we advise the children to use the bush for defecation” Said by another participant. On closeness to a public latrine, Wasila had this to say “for some of us, we stay in areas where there are public latrines that we can use at all times. In some of them we do not pay and building one on your own to me is waste of resources”.”</td>
</tr>
</tbody>
</table>
• Households With Latrine but Practice OD

![Diagram showing household with latrines and percentages of defecation](#)

About 60% of Households With Latrines Still had one or more persons defecating in an open

**Figure 4.4: Household with latrines that practice OD.** Source: Field Survey, 2018.

From the data gathered, it was realized that there exist a significant (60%) of households with latrines who still practice open defecation. Detailed analysis with incorporation of demographic characteristics showed that these practices were common in households with large population. Also, the practice is common in households where caregiver have never had any form of education. However, a few practices were recorded in homes of caregivers with some level of education.

Focus group discussion to find reasons behind defecating in an open despite the presence of a latrine at home revealed varying circumstances. Key and most frequent among all the focus groups included: traditional, cultural, behavioral, health wise and among others. By way of analysis, the data is presented in the below table with some selected voice quotes from participants under each thematic team.
<table>
<thead>
<tr>
<th>Thematic Team</th>
<th>Focus Group Number</th>
<th>Respondent Number</th>
<th>Quote from Respondent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superstition</td>
<td>1</td>
<td>2</td>
<td>“Traditionally, certain incantation by the men ceases to function if they come in contact with the urine of highly pregnant woman. That is the reason why women are made to bath in their rooms when they are getting due to deliver”</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4</td>
<td>“When you are in covenant with your husband or wife not to do a certain art under any circumstance and you violate that, your feces are not supposed to mix-up. If the fecal matter mix-up, both of you will give birth to physically challenged children even if you marry a different partner”</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6</td>
<td>A typical dagomba man like my husband who really saw his grandparents and they have entrusted the family into him cannot use a latrine. If not a lot of calamities will befall the entire family”</td>
</tr>
<tr>
<td>Behaviors/Culture</td>
<td>1</td>
<td>3</td>
<td>“Culturally, children are expected to make way for the elderly in the use of any facility in the household. Due to these, we most time ask the children not to go and occupy the latrine/bath when the elderly is in need of it. As such, it is convenient to allow them use the open since you do not know when the next elderly will use the facility”.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>10</td>
<td>“Ever since we were borne, we have always known the bush as a place for defecating. There has not been a problem with that. We do not defecate just by the house but move a bit away from the house”.</td>
</tr>
<tr>
<td>Health</td>
<td>1</td>
<td>3</td>
<td>“If we decide to use the latrine in houses, the smell alone will make all of us sick in 1day”</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>8</td>
<td>“We are told as women we can contract certain disease from sharing a latrine with other. In other to avoid these we the women in these household rather prefer the bush where you are free from those challenges”</td>
</tr>
</tbody>
</table>
In knowing the technical abilities of families to construct a latrine, it was revealed that almost all the household surveyed had not technical abilities to construct a latrine. In a focus group discussion, participants spoke of the numerous attempts made to construct and failed due to the technicalities that make if different from the normal construction features. Speaking with all the FGs, it was revealed that majority of households that currently do not have latrines attempted constructing it on their own but had it collapse. Madam Damarta from FG 3 had these to say “The current collapsed structured is the third we have constructed in our household. In each of the attempts, it will work perfectly during the dry season. However, as soon as the rains set in, it will curve in and finally collapse. The skill needed to build a latrine to me is quite different from ordinary building skills.”

“In our case, we even brought a brother who is an apprentice in building construction. He has constructed a number of things for us. However, with the latrine,
anytime he constructs, water still finds it way into the pit. When we asked around, we were told constructing a latrine is a bit technical especially the substructure” …said madam Safura

4.5 Demographic Characteristics and latrine availability

In finding out about the availability of latrines, it was revealed that out of the 16.79 percent of households that had latrines, only 3 percent were headed by females. Also, majority (62.69 %) of the households that had latrines were households that have caregivers with some level of education ranging from primary to the tertiary. With households where caregivers have never been to school, only 12 percent had latrines. Though only a few households had latrines, it can be seen from the data that latrine availability increases as caregiver education goes higher as captured in table 4.2 below. By way of marital status, 99 percent of caregiver living in households with latrines were married.

With respect to income, data gathered shows that most of the households without latrines were within the lowest and lower income category. Interestingly, the data also revealed that, out of 36 caregivers who fell within the upper and higher income category, only 10 had latrines within their households.

Regarding household size, the data shows that households with population ≤ 5 owned 14.93 percent of total households with latrines. On the other hand, households with larger population – owned 84.07 percent of the households with latrines.
Table 4.4: Demographic Characteristics and latrine availability (n=399)

<table>
<thead>
<tr>
<th>Item</th>
<th>Latrine Freq(%)</th>
<th>No latrine Freq(%)</th>
<th>P-value Fisher Exact / Chi square</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Caregiver</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female Household Head</td>
<td>4(10.26)</td>
<td>35 (89.74)</td>
<td></td>
</tr>
<tr>
<td>Male Household Head</td>
<td>63(17.05)</td>
<td>297(82.05)</td>
<td>0.023 / 11.272</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never Been</td>
<td>20(8.40)</td>
<td>218(91.60)</td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>2(15.38)</td>
<td>11(84.62)</td>
<td></td>
</tr>
<tr>
<td>Junior High School (JHS)</td>
<td>7(38.89)</td>
<td>11(61.11)</td>
<td>&lt;0.000 / 84.7094</td>
</tr>
<tr>
<td>Senior High School (SHS)</td>
<td>8(38.00)</td>
<td>13(61.90)</td>
<td></td>
</tr>
<tr>
<td>Tertiary</td>
<td>30(60.00)</td>
<td>20(40.00)</td>
<td>&lt; 0.000 / 84.7094</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>2(10.53)</td>
<td>17(89.47)</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>65(17.37)</td>
<td>314(82.63)</td>
<td>0.708 / 1.9684</td>
</tr>
<tr>
<td><strong>Income levels</strong> (Monthly)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowest (300)</td>
<td>16(7.48)</td>
<td>198(92.52)</td>
<td></td>
</tr>
<tr>
<td>Lower (700)</td>
<td>20(21.98)</td>
<td>71(78.02)</td>
<td></td>
</tr>
<tr>
<td>Middle (1000)</td>
<td>21(35.59)</td>
<td>38(64.41)</td>
<td></td>
</tr>
<tr>
<td>Upper Middle (1500)</td>
<td>5(20.46)</td>
<td>20(79.54)</td>
<td></td>
</tr>
<tr>
<td>Highest (&gt;1500)</td>
<td>5(45.45)</td>
<td>6(54.55)</td>
<td>&lt;0.001 / -</td>
</tr>
<tr>
<td><strong>Household size</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small (5 People)</td>
<td>10(14.93)</td>
<td>57(85.07)</td>
<td></td>
</tr>
<tr>
<td>Medium (10 People)</td>
<td>44(19.30)</td>
<td>184(80.70)</td>
<td></td>
</tr>
<tr>
<td>Large (&gt;10 People)</td>
<td>13(12.50)</td>
<td>91(87.50)</td>
<td>0.278 / -</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2018
4.6 Demographic Characteristics and latrine use

As part of the study, data was collected on latrine use in the Tamale Metropolis. Though only a few households within the study area have latrines, the majority of the population use latrines. Of the 399 respondents, 80.5 percent households used latrine. However, the majority (61.7 %) of households depend on public latrines. On another hand, eight households without latrines share with neighbors. Further analysis shows that all the households that depend on public latrines and sharing with other households practice open defecation. Also, 19.6 percent of household do not use latrines at all. Of this category who do not use latrines, 69 percent were from households whose caregivers have never been to school while the remaining had some form of education between primary to tertiary.

The study did gather data on latrine usage and income. The data shows that of the 19.5 percent of households who reported of not using latrine, 87 percent were those within the lowest and lower income category as compared to the 4.6 percent with high income. From the data as contained in table 4.3 below, it can be seen that most (84.62 percent) of households that do not use latrines are households with population size of 10 people and above.
Table 4.5: Demographic Characteristics and latrine use (n=399)

<table>
<thead>
<tr>
<th>Item</th>
<th>Use latrine</th>
<th>Do not use latrine</th>
<th>P-value</th>
<th>Fisher exact</th>
<th>Chi square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freg(%)</td>
<td>Freg(%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Caregiver</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female Household Head</td>
<td>36(92.31)</td>
<td>3(7.69)</td>
<td>-</td>
<td>0.060</td>
<td>8.2604</td>
</tr>
<tr>
<td>Male Household Head</td>
<td>285(79.17)</td>
<td>75(20.83)</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never Been</td>
<td>182(76.79)</td>
<td>55(23.21)</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>11(84.62)</td>
<td>2 (15.38)</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junior High School</td>
<td>43(89.58)</td>
<td>5(10.42)</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior High School</td>
<td>16(76.19)</td>
<td>5 (23.81)</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary</td>
<td>43(86.00)</td>
<td>7(14.00)</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>18(94.74)</td>
<td>1 (5.26)</td>
<td>-</td>
<td>0.480</td>
<td>6.9428</td>
</tr>
<tr>
<td>Married</td>
<td>303(79.74)</td>
<td>77(20.26)</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Income levels</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Monthly)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowest (300)</td>
<td>170(79.81)</td>
<td>43(20.19)</td>
<td>-</td>
<td>0.055</td>
<td>9.1215</td>
</tr>
<tr>
<td>Lower (700)</td>
<td>66(72.53)</td>
<td>25(27.47)</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle (1000)</td>
<td>53(89.83)</td>
<td>6(10.17)</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Middle (1500)</td>
<td>23(92)</td>
<td>2(8)</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest (&gt;1500)</td>
<td>9(81.82)</td>
<td>2(18.18)</td>
<td>-</td>
<td>0.055</td>
<td>9.1215</td>
</tr>
<tr>
<td><strong>Household size</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small (5 People)</td>
<td>56(83.58)</td>
<td>11(16.42)</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium (10 People)</td>
<td>197(86.40)</td>
<td>31(13.06)</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large (&gt;10 People)</td>
<td>68(65.38)</td>
<td>36(34.62)</td>
<td>&lt;0.001</td>
<td></td>
<td>20.5649</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2018
4.7 Child Stool Disposal Practice
The study associated children under 3 years of age stool disposal practice. As seen in figure 4.5 below, a significant proportion (60 percent) of the caregivers do not properly dispose child stools. Specific methods practiced by this proportion considered as unimproved included; dig and burying, throwing into compounds, rinsing into drain or ditch, throwing into dustbins and bushes.

Figure 4.5: Child Stool Disposal Practices
4.8 Factors influencing child stool disposal practices.
The study also looked at factors that influence how stools of children were disposed as seen in table 4.4 below. The study revealed that education is one of the major factors influencing stool disposal practice among caregivers in the Metropolis. Out of the total of caregivers who are educated, more than half (53.16 %) practiced improved methods of disposing children stools compared to 30.58 percent of caregivers who are not educated. The information shows that household’s size also serves as an influencing factor in disposal practice of child stools. The findings show that the larger the household size, the less likely caregivers will practice proper stool disposal and the vice versa. From the table 4.4 below, it can be observed that, 52.94 percent of household with population 7 and below are practicing unimproved disposal practice, about 71.4 percent of households with population above seven (7) do not properly dispose child stools.

Latrine availability has also been identified from the study to be a factor influencing child stools disposal practice. From table 4.4, it shows that high (76 %) proportion of the households with latrines practice proper disposal of child stools, compared to 67.8 percent of households without latrines.

Also, knowledge or awareness about the dangers of improper stool disposal also plays a major factor on how caregivers dispose stools. The findings indicate that 42.7 percent of caregivers with knowledge on stool disposal impact practice use recommended methods. On the other hand, only 5.8 percent of caregivers with knowledge on impact of proper and improper stool disposal practice recommended methods of disposing child stools.
Table 4.6: Child stool disposal practice and influencing factors.

<table>
<thead>
<tr>
<th>Variable (Factors influencing Improved Stool Disposal practice)</th>
<th>Yes</th>
<th>No</th>
<th>Chi2</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondent Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>84 (53.50%)</td>
<td>73 (46.50%)</td>
<td>36.441</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No</td>
<td>74 (30.58%)</td>
<td>168 (69.42%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household Size</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 and below</td>
<td>112 (47.06%)</td>
<td>126 (52.94%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>above 7</td>
<td>46 (28.57%)</td>
<td>113 (71.43%)</td>
<td>36.995</td>
<td>0.033</td>
</tr>
<tr>
<td>Latrine Availability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>51 (76.12%)</td>
<td>16 (23.88%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>107 (32.22%)</td>
<td>225 (67.78%)</td>
<td>44.901</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Awareness on stool disposal impact</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>156 (42.74%)</td>
<td>209 (57.26%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>2 (5.89%)</td>
<td>32 (94.11%)</td>
<td>17.665</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2018

4.9 Diarrhea Prevalence
Information was gathered on diarrhea prevalence among children under three (3) years of age in the Tamale Metropolis. About, 36.34 percent had children who had diarrhea two weeks prior to the date of the interview.
Detailed analysis of the data on diarrhea prevalence shows that out of 145 diarrhea cases recorded during the survey, 45.5 percent were males (boys). It was also revealed that diarrhea prevalence among children under three (3) years living in households without latrines were far greater compared to prevalence among children living in households with latrines as shown in figure 4.5 below.

From Figure 4.7, it can be seen that out of the total of 67 households having latrines, 10 representing 14.9 percent had children who had diarrhea two weeks prior to the interview date. On the other hand, out of 332 households without latrine, 135 (57.8 percent) had diarrhea two weeks prior to the interview date.
4.10 Latrine Availability, kind of latrine, stool disposal practice and diarrhea

In exploring the association between having a latrine, the kind of latrine, child stool disposal practice and diarrhea, various computations were done. The data analysed indicate that the association between having a latrine and children contracting diarrhea was statistically significant (P<0.001). This suggests that households that have latrines in their homes are less likely to have children with diarrhea as compared to households without latrines. This explains why diarrhea prevalence were more (135) in households that do not have latrines compared to only 10 in households that have latrines.

In testing the association between the kind (improved or unimproved) of latrine a household use and the chance of children contracting diarrhea, the findings revealed a significant association (P<0.001). This shows that in trying to reduce diarrhea prevalence in a household through the use of sanitation facilities (latrines), it is not just any kind of latrine but an improved kind capable of preventing human contact with fecal matter.
Similarly, the data show an association between properly disposing child stool and children contracting diarrhea. Analysis as contained in table 4.5 below indicate a significant association (P<0.001). This means that the more a household practice proper disposal of child stools, the less likely children in such households will contract diarrhea and the reverse is true.

Table 4.7 Latrine Possession, kind of latrine, stool disposal practice and diarrhea

<table>
<thead>
<tr>
<th>Variable</th>
<th>Diarrhea in children</th>
<th>P-Value</th>
<th>Chi2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Household Latrine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>10</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>135</td>
<td>197</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Improved Latrine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7</td>
<td>54</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No</td>
<td>138</td>
<td>200</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Proper stool disposal</td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Yes</td>
<td>29</td>
<td>129</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>116</td>
<td>125</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>


4.11 Causes of Diarrhea

On the cause of diarrhea, majority of the caregivers interviewed indicated poor access to improved water sources, poor sanitation and hygiene practices are the root causes diarrhea. Out of all caregivers sampled, 62 percent indicated poor sanitation as the cause of diarrhea. Other responses include; contaminated water (7.5 %) and biscuit (0.3 %) with 5 percent responding as ‘‘don’t know’’ as shown in Figure 4.8.
4.12 Awareness of Dangers of Improper Disposal of Child Stools

As seen Table 4.5, only 4 caregivers interviewed are not aware of the dangers of improper disposal of child stools. About 99 percent of the total sample confirmed to be aware of the dangers associated with improper disposal of child stool within households. Among those who are aware of the dangers associated with improper stool disposal practices, 9.19 percent were female household head. Also, 88.65 percent of male headed households confirmed being aware of associated dangers of improper practice of child stool disposal.
CHAPTER FIVE
DISCUSSIONS

5.1 Introduction
This section of the study presents discussion of the findings. It relates key findings of the study to the literature contained in chapter two of this study.

5.2 Gender
From the study conducted, it was found out that majority (97.49 percent) of caregivers within the Tamale Metropolis is made up of women. The findings are in line with popular expectation in the African culture where caregiving is seen as the basic responsibility of a female. A study by Racheal Wanjiku Waithaka in Kenya in 2011 revealed that more women is involved in child caregiving as compared to men. Another study conducted by United Nations Commission on the status of women submitted by Gary Barker in 2009 indicated that while women in Latin America spend almost 2.7 hours per day in taking care of children, men spend only 0.5 hours per day in taking care of children. In Ghana, the findings of these study support that of Family Caregiving Alliance in 2015. In their study, it was found that an estimated 66 percent of caregivers in Ghana are made up of females. According to the report, average Ghanaian woman spend close to 20 hours per week in taking care of children (Family Caregiver Alliance (2001). Although a few men were found to be caregivers, the proportion of male involvement does not debunk the literature stated above.

The findings in these study shows that women continue to discharge the role of caregiving. It also implies that despite the advocacy for gender balance, women within the study area still have the traditional responsibility of taking care of children. With all indications and basing it on the culture of the study area, this is not expected to change completely within a short period. These gender ascribed roles also inhabit
possibilities of leaving un-sanitized situations unattended to over time especially in the absence of women in a household.

The economic implications of the situation are huge and may widen the inequality gap over time. In the situation of the women in Tamale Metropolis, it limits their opportunities in taking up certain roles and jobs and thereby increasing their economic vulnerabilities factors.

Limiting the economic opportunities of women as a result of caregiving role does not only prevent women from participation, it also widens the inequality gap over time. The Ghana Gender Profile Assessment study conducted by the African Development Bank (AfDB) in 2014 reinforced that gender inequality continues to undermine local and national efforts for improving living conditions, reducing poverty and enhancing national development in Ghana.

5.3 Respondent Status
It was found that majority (91.23 percent) of the households were headed by males. The results of the study are consistent with the study conducted by World Bank in 2016 in Ghana. In the reported, it was estimated that female headed households in Ghana stands at 31.4 percent with men recording more. Contrary to this finding, a study by Racheal Wanjiku in 2011 reported of more households headed by females as compared to males in rural Kenya. The 2014-2015 Rwandan national demographic health survey also reported that more women head households as compared to men. Though the findings from Rwanda and Kenya and other parts of the world is contrary to these studies, many other factors could account for the variations. Key among the contributing factors could be the conflict histories surrounding such countries.
Data findings from as presented in chapter four implies that within the Tamale Metropolis, men traditionally would have the oversight responsibility of controlling resources and making decisions as to how the resources of the household would be utilized. This is likely to worsen the economic vulnerability of women as in many cases, men are likely to take decisions that will not lead to the benefit of all persons in the household especially women.

The results also imply that in homes where women serve as single parents, other men as tradition demand control the resources of the family thereby making the women and the children vulnerable to some basic needs such as sanitation facilities at homes. Similarly, the United Nations Development Programmes in 2006 reported that male headed households had higher latrines as compared to female headed households and this could be attributed to the fact that men control resources and can afford to build latrines.

5.4 Respondent Educational Level
The majority (73.18 percent) of the respondents never attended school with only a few who reported to have had education ranging from the basic to tertiary. Of those who have had varied level of education, men dominated with 60%. Comparing highest level of education between the men and women, males also dominated with 78 percent as against females with 22 percent. The findings of the survey is in line with the findings of Ghana Demographic and Health Survey conducted in 2014 where it was reported that more women than men have never attended school.

The results imply that, inequality by way of education between men and women still remains high. With men among the respondents having the highest level of education also confirm the suggestion that resources controlled by men are mostly being used to their advantaged. The less educated people among caregivers as reported from the
study create a possibility for more women in the Tamale Metropolis to likely be found in the informal sector which is characterized by low and irregular income. With those who responded as never been to school, children in such households are more likely to be at risk of contracting preventable disease such as diarrhea. This is because caregivers in such category has limited opportunities of reading to gain knowledge on improved health practices and behaviors.

5.5 Household Head Educational Level
Detailed analysis of the data indicates that most (58.61 percent) of household heads have never been to school. The revelation from these studies aligns with the 2010 population and housing census where it was also reported that majority of household heads within the Tamale Metropolis are illiterate.

With more households not attaining any form of education and considering that by tradition these categories of people control resources, members of these household are at the risk of many health and economic dangers. Economically, these household heads would likely be employed in the informal sector due to limited skill to enable them work in the formal sector. With the informal sector known to be characterized by low and irregular income and poor work conditions, households in the Tamale Metropolis are likely to be poor and may lead to other risk associated with poverty. A study conducted in Nigeria by Kolawole Ogundari (2018) reported that, the probability of a household’s per capita income increases along the level of education a household head attains. Aside the scientific findings on the impact of household head education on the health and general development of household members, popular knowledge in society holds that when a household head is educated, decision concerning the household is influenced by concepts, theories, models and among others obtained from schooling Avachat et al (1992).
On health grounds, decision taken in these households may lack personal or household level initiatives to take preventive health approaches. In many cases and as revealed by literature, households whose head have not been educated has a higher risk of recording many health conditions compared to those whose head has attained some level of education. According to Sichande et al, in 2014, a survey on insecticide treated mosquitos net usage revealed that, more children 5-19 years from households where the head had education were more significant than those who’s from households where heads had never been to school. Another study conducted by Evelyn Gathuru et al in Uganda in 2014 reported that, women are more likely to seek for improved health behavior when the household head is educated than when the head is not educated.

5.6. Income
The monthly average income of a caregiver plays a critical role in the day to day decision making which include to own a household latrine facility. From the study, it was found that about half (50.13 percent) of the respondents reported of not having regular income. Also, about 76.18 percent of the population interviewed have average income of less than or equal to 700 Ghana cedis per month. Though the irregular nature of household income could be attributed to the limited economic activities in some part of Ghana including Tamale, the level of skill possessed as result of the education attained cannot be ruled out as a contributing factor.

With low and irregular income, opportunity for children to be educated, fed with the body required dietary diversity and among other are limited. According to Ellie Kincaid in 2014 as reported by “The New York Time”, the income of any individual is directly related to health. The United State National Center for Health Statistics reported in 2014 that the diseases incident reduces as income of households increases
The study findings conform with the conclusions drawn by Fikret Bienkisi in 2015 and Kolawole Ogundari in 2018 who both reported that an increase in the level of education is positively related to the income. That is, the more educated an individual becomes, the more likely his/her income increases. These mean that most household providers will not be able to meet basic necessities such as improved sanitation facilities. In line with this, Kema, (2012), Awoke and Muche (2013) in their study both reported that a household’s monthly income is a major determinant on decisions of health in a household.

The findings also imply that children from these households characterized by low income are at the risk of low education. Such children are also at risk to diseases such as diarrhea as construction of sanitation facilities will likely receive less prioritization. According to the World Bank in 2012, the chance of a child to complete or attain higher levels of education is heavily dependent on the income level of the family. The world development report by World Bank in 2017 states that while children from middle- and high-income families respectively were able to complete secondary school, about 14 percent of children from low income families were not able to complete secondary school.

5.7 Expenditure

As part of socio-demographic information gathered during the study, it was revealed that more than half (67 percent) of households spend significant portions of their income on food with less than one percent of the respondent reporting to be spending much of their income on health needs. These implies that households are more likely to give less priorities to health preventive measures such as the construction and maintenance of household latrines. The expenditure pattern of the study area is consistent with JMP 2015 report where it was indicated that households with low
income were basically spending almost all their monthly income on food as against health.

The implications from the findings is that a significant proportion of households and their members are left vulnerable to preventable diseases. Considering the average incomes and how irregular it comes; caregivers are less likely to be able to save towards investments. These trend over time has the potency of rendering caregivers into more worsen situations of poverty and its related consequences. According to Shahraki (2016), while the rich and persons with regular income spend most of their income on investment, skill development and inventions, the poor as in the cases of most caregiver within the Tamale Metropolis spend a large proportion of their income on food stuffs.

5.8 Household size

From the data gathered, 83.21 percent of the respondents have household population above 7 people. This is above the national average of 7 people per household. Generally, the size of a household influences variables like literacy, poverty, health among others. The household sizes as revealed by this study implies there would likely be pressure on household income considering that majority (76.18 percent) of respondents had 700 Ghana cedis or less as monthly average income. According to Chinhui et al as presented by Anna Sutherland in 2016, raising family size by an additional child reduces average schooling of children by -0.13 years.

While literature and revelations from this study suggest the likelihood of households not meeting certain basic needs of families, it also has the possibility of deny others the access even in situations where the facilities are present due to family sizes. In the case of a basic necessity like a latrine, large family sizes many lead to the practice of open defecation as members many have to wait for others to before accessing the
facility. The household sizes may also lead to poor management and hygiene which can as well discourage latrine usage.

5.9 Latrine Availability

5.9.1 Latrine in Household

Generally, the study found that most (83.21 percent) of households within the Tamale Metropolis do not have latrines in their homes. The findings are in line with the Multi Indicator Clusters Survey (MICS) in 2015 where it was revealed that most households in the Tamale Metropolis do not have latrines in their households. The findings also confirm the 2016 UNICEF report on open defecation in Ghana where it was reported that 7 out of every 10 people within the Tamale Metropolis practice open defecation.

The results from the study implies that most of the households within the study area are likely to resort to other options such as open defecation, use of public latrines, sharing of household latrines digging and burying and among other practices. According to the WHO (2014a), though some practices like sharing and the use of public latrines limit exposure and contact with human feces, the options are not hygienic and regarded as unimproved sanitation practices by the World Health Organization due to the high risk to diarrhea prevalence such practices possess as seen in chapter four of this study. In homes where these practices are observed, vulnerable groups such as children especially those under 3 years are more likely to frequently fall sick of diarrhea due to the associated behaviour of children within such stages. Considering the income levels of the study population, the absence of latrine in most homes also mean that poverty situations in these households are likely to worsen as savings are mostly likely to be used in offsetting medical bills.
5.9.2 Type of Latrine in Household
It was found that the few (16.79 percent) households who reported owning a latrine in their homes had varying kinds. Type of latrines reported included Flush/pour flush to piped sewer system, Flush/pour flush to pit latrine, Flush/pour flush to septic tank, Pit latrine with slab and Pit latrine without slab or open pit. The latrines observed however differ from the 2010 population and housing census findings where it was reported that Pit latrine with slab and Pit latrine without slab or open pit were the common latrines within the Tamale Metropolis. Flush or pour flush to septic tank were the commonly observed (47 out of the 67 households that had latrines)

Though mentioned above types except Pit latrine without slab or open pit is regarded by WHO as unimproved, the quality of service varies from one kind to another. The tendency of dry technological latrines such as the pit latrines either with or without slap exposing users to fecal contact is high as compared to wet technologies like the pure flash. The type of latrine available in the Tamale Metropolis is attributed to availability of other services such as water. In sections where most of the flush or pour flush to septic tank latrines were recorded, it was observed that water was readily available though not on every day basis as compared to areas where pit latrine without slab or open pit found. The generally scares nature of water and high cost of available sources obviously cannot be ruled out as factors influencing the choice and to some extend the availability of latrines within homes in the Tamale Metropolis. In household where they are able to access water either in compound or outside compound, the high cost of water tariffs does not allow the use of flash pure latrines.
5.9.3 Place where Household Members Defecate

There exists a popular notion that the non-availability of a latrine in a household does not mean the household defecate in an open. To this end, the study sought to know where households defecate as literature prior to the study suggest few households have latrines within the study area. Findings from the study did confirm the literature as results indicates that majority (73.94 percent) of adults defecate in the open. The responds to where children defecate was not different from adult members of households. In the case of children, 62.66 percent of children defecate in an open.

The findings confirm the JMP report in 2015 where it is been reported that the majority (70 percent) of people within the Tamale Metropolis defecate in the open. (JMP, 2015). The results also confirm the findings of World Bank in 2015 where its reported that about 19 percent of people in Ghana practice open defecation with the three northern regions contributing a significant proportion to the percentage.

Children defecating in the open poses more danger to diarrhea than even adults due to the fact that children especially those under three years defecate around the compound and therefore leave households with high risk of fecal (e-coli) contamination.

Openly defecating while dangerous to all groups and ages within society, children are the most vulnerable to such an unhealthy behaviour. Generally, children are not able to differentiate sanitised or hygienic food from non-hygienic and as such are most likely to eat food without washing their hands appropriately and this may lead to diarrhea. Diarrhea has a short- and long-term effect on children, their families and the nation. It is a major cause of malnutrition, dehydration and even death in children under five years. In addition, diarrhea affects the physical and cognitive functioning of children under five years later in their development. According to Centre for Disease
Control (CDC) 2016 report, diarrhea remains one of the leading causes of death in children under five and accounts for 4 percent of child deaths within the country.

5.9.4 Latrine Shared with other Households
Finding from the study shows that 11.94 percent of households with latrines in the Tamale Metropolis share with one or more households. A study by UNICEF in 2015 reported that 59 percent of the Ghanaian population rely on shared toilets including public toilets. The JMP also reported that about 23 percent of people in the northern region who have access to a latrine are sharing with other households or using public latrines. Though shared latrine may be relatively preferred to open defecation, both are not considered as improved sanitation by the World Health organization due to the risk involved. Shared latrine does not only lead to high risk of fecal contact due to poor management; it also brings issues of poor maintenance and economic pressure on the possessing household. Shared sanitation may some time lead to a reduction in human dignity and most time usually lead to open defecation. Sharing of a latrine is associated with joining queues in cases where the latrines at a moment is being used by one household member. These may lead to members turning to other means which include openly defecating. Security and other risk such as harassment becomes an issue for households sharing a sanitation facility especially for females. A similar study in 2017 by Meenakshi Dalal in India revealed that women are sexually harassed when using a shared or public latrine and the culture does not allow them to report such incidence. According to the report, this made women to often prefer defecating in an open to using available facilities.
5.10 Reason Why Households Do Not Have Latrines
To understand the factors behind certain behaviors and practice towards sanitation within the Tamale Metropolis, the study sought to know the reason why a larger proportion of households do not own a latrine. Findings indicate that almost all (94.88 percent) reported of not being able to afford the cost in constructing a latrine. This confirm the JMP findings in 2015 where it was reported that most (60 to 75 percent) of households in the three northern regions of Ghana do not own latrines because of the poverty situation of households. The findings also confirm the 2015 World Bank report on sanitation where it indicated that the poverty situation of developing countries account for the low coverage of latrines in households.

The results show that awareness creation through education and sensitization alone is not enough for households to adopt to proper sanitation practices. The limited economic power means that children in such homes will continue to suffer sanitation and hygiene related illnesses. The situation means that poor households will continue to use alternative avenues which include open defecation and sharing of latrines to meet their sanitation needs. It also means the desire to end diarrhea related deaths within the Tamale Metropolis will be difficult to achieve if poverty situations continue as recorded during this study. The situation calls for interventions at all level to integrate economic empowerment interventions to sanitation programs.

5.11 Intent to have a latrine
It was found from the study that almost all (83.21 percent) households that do not have latrines as at the time of the study reported of willing to own a latrine in their respective households. The response shows that the option of openly defecating is entirely not a desire. It also calls for more innovations and discoveries that will seek to make sanitation more affordable for urban settlers such as the Tamale Metropolis.
5.12 Capacity to Construct a Latrine
While seeking to know the willingness of household to own a latrine, the study as well sought to know if households had the capacity or skill needed in the construction of a latrine. Findings indicate that almost all the households interviewed do not have the skill or the capacity needed in constructing a latrine. These finding is in line with the report of UNICEF in 2015 during the lunch of the “Latrine Technology Manual”. In this report, UNICEF indicated that the skill needed in putting a latrine goes beyond the act of joining mortar and block.

It therefore means that latrine construction capacity building must be prioritized when developing or designing sanitation models and programs. This would help increase the number of skilled persons across communities and contribute to making sanitation service affordable to most households within the Tamale Metropolis and beyond.

5.13 Factors that Influence Latrine Possession in the Study Area
5.13.1 Provision of Subsidies in Latrine Construction
The role of development agents such as NGOs in promoting latrine possessions was noted to have contributed to some households owning latrines within the study area. In understanding why some households within the same community had latrines while other did not, the survey sought to ask respondents if they received any form of support from external agents during latrine construction. The survey found that many of the households that had latrines were supported by NGOs. A few households however reported of receiving no external support in the construction of their household latrines. The discovery agrees with the findings of Kema, (2012), Awoke and Muche (2013) who reported that external assistance has been found as a major influencing factor promoting latrine availability and usage in most rural and pre-urban communities. While the provision of subsidy by NGOs makes communities
dependent and raises questions about sustainability, it however help increase availability and usage and influence usage over time.

During Focus group discussions as part of the study, it was found that most households do not want to prioritize the construction of latrines because they are hoping NGOs will come to their communities with sanitation interventions that will include subsidy.

The reliance on external support imply that households either do not see preventive health measures as their basic responsibilities or are completely not able to afford and as such dependency on external support. In situations such as these, children and especially those under the age of 3 are the most affected by way of consequence.

5.13.2 Income
From the study, it was observed that income has an influence on household latrine possession. Comparing income level against latrine availability, the data shows that latrine ownership among people with low income were very low (7.48 percent) compared to (45.45 percent) of those that had high income. The kind of latrine and quality were also observed to be influenced by income. Among the households that possessed sanitation facilities, unimproved kinds like pit latrines without slaps were found in the households of people with low income. On the other hand, more improved kinds like flush/pour flush to piped sewer, flush/pour flush to pit latrines, flush/pour flush to septic tank and among others were found in the homes of people within the high-income category.

The revelation from the study agrees with the finding of UNDP in 2006 where it was identified that poverty plays a key factor in latrine ownership. In their findings, households with high and regular income had more and improved latrines compared
to households with no or low income. The study also confirms the findings of Kema, (2012), Awoke and Muche (2013) where it was revealed that a household’s average monthly income positively influences latrine ownership.

Though poverty plays a greater factor in the ability of a household to construct a latrine, it however cannot be the sole reason why people do not have latrines. According to UNICEF 2015 and WHO 2015, though 6.4 million people are poor, 4.8 million Ghanaians do not have access to basic sanitation services such as a latrine. This means 1.6 people who are poor are able to gain access to basic sanitation services and therefore suggest poverty is not the only reason for lack of household latrines. Also, focus group discussions session of this study revealed that poverty is not entirely the reason for most households not owning latrines. Other factors such as attitudes, culture, and closeness to public latrines and among others are equally responsible for the limited availability of latrines within households.

Though other factors influence latrines ownership, it must however be noted that the economic conditions of a household have great influence on the daily decisions made regarding health (Walker et al, 2011). Sanitation related interventions should therefore consider economic empowerment programing as part of the sanitation program as this will positively impact towards the achievement of the objectives of such programs and projects.

**5.13.3 Lack of Skills in Constructing Latrines**

Generally, only few people across the construction industry have the skill to construct standardized latrines (UNCEF Sanitation Training Manual, 2009). Possession of required skills or knowledge in constructing a latrine plays a key factor in latrine construction and maintenance. In line with a report by Pinfold in 1990, possessing
knowledge or skills on how to go about an action has a success possibility rate of 8 to 23 percent of increasing positive change.

During the study, it was revealed that majority (90 percent) of households did not have the prerequisite skills needed to construct a latrine. Households with latrine reported to have constructed their latrines using hired labour or external support.

The lack of latrine skills increases the economic cost of owning a latrine. This could discourage households in constructing or possessing a latrine. Construction cost becomes high in cases where households have to hire skills/labour. Considering the already poor economic conditions of households within the study area, this will certainly limit the capability of most households in owning a sanitation facility such as a latrine. While these situation does not contribute to increasing latrine availability, it also contributes to open defecation.

The lack or limit skills does not only discourage construction, it also hinders maintenance, repair, replacement and thereby creating sustainability issues. The use of hired or external support in constructions as reported by households who had latrines in the study area does not promote community participation as well as capacity development which is needed for sustainability.

As observed from the data gathered through focus group discussions, the use of latrine within the study area is not a common practice. This therefore implies that communities and households’ capacities must be built to be able to construct their own latrines.
5.13.4 Education
Education has also been proven to play a key role in the ownership and use of latrines within the Tamale Metropolis. From the study conducted, latrine availability among people with formal education was seen to be high as compared to those with low income levels. The variation could be attributed to influence education imposes during decision making. From the quantitative data gathered, further analysis shows that people with formal education are more associated in possessing a latrine compared with people who had no form of education.

5.13.5 Perceived Threat
It was made clear that most households that had latrines had to construct them because they belief that having a latrine reduced the prevalence of diarrhea and other fecal-oral associated diseases. On the other hand, households that had no latrines belief that irrespective of having a latrine on not, it’s natural for household members to fall ill of diseases such a diarrhea. The findings confirm the psychological model (health belief model) which tries to explain and predict health behaviors by focusing on the attitudes and beliefs of individuals.

The model holds that a person will take a health-related action (owning a latrine) if that person: feels that a negative health condition (for example diarrhea) can be avoided, has a positive expectation that by taking a recommended action, a negative health condition can be avoided. In a focus group discussion, a 57% educated woman had this to share with all group participant “sometimes, those who own latrines in their households is not a condition of their income level. They look at it that, if I do not put up a latrine for my household and one-member fall sick of diarrhea resulting from the immediate sanitation situation, I may spend more money even that I would have used for a latrine. Ask yourself if 3 people fall sick. How much will you be
paying for treatment? These are the things others consider and try to put up a latrine”.

This implies that, when planning to increase latrine coverage or the rate at which people or households construct latrines, there is the need for upscale of community level education and sensitization on the importance of owning a latrine. From the above, it is clear that the health benefits and risk an individual or a household perceive has a great influence on the priority given to latrine ownership as well as usage. These also influence the health practices in the household.

5.13.6 Close Proximity to Bush, Public Latrine and Households with Latrine
During the survey, it was revealed that most households that had latrines were located in classical residential areas where there are no bushes around nor public latrine. On the other hand, most household that had no latrine were either located close to public latrines or has some level of bush around the household. It was also found that where households defecate influence latrine possession. Further analysis of data gathered show that people/households that uses public latrine or share a latrine with neighbours are 0.50 and 0.83 risk of not constructing their own latrine as compared to those who defecate in an open with 1.26 times more risk of not constructing their own.

The finding that some people share latrines goes to confirm the findings of World Health Organization in 2015 where it was reported that about 600 million people are sharing latrines with other households. Though sharing of household latrines and the use of public latrines may relatively be better than openly defecating, the two are not considered as improved practices that can limit or prevent human contact with excretory. The practice does not meet the definition of basic sanitation services. Basic sanitation services refer to the use of improved sanitation facilities that are not shared
with other households (JMP, 2017). Finding from the study shows that for households to change their attitude from using public latrines, putting up of public latrines across communities must be discouraged. Shared latrines often characterised by poor maintenance, unhygienic conditions among others. These situations over time causes health problems to households and children are the most affected. Sharing a household latrine or public latrine does not only reduce human dignity, it also exposes beneficiaries to more serious health issues due to poor maintenance of public latrines as well as the insecurity it poses to vulnerable groups.

5.13.7 Socio-cultural Factors

While it was generally observed and verified that only few households had latrines available at their homes, it was also noticed that even in households that had latrines, some members still stick to the use of bush for defecation. Focus Group Discussion to find out why some households that owned latrines still reported of defecating in an open revealed cultural as a factor. It was also revealed that by culture, children are made to make way for the elderly in households even in the usage of sanitation facilities. Do so is considered as a sign of respect.

The implication of these practice over time can be related to why certain individual are addicted to the use of bush for defecation. It also means that children will likely make using the bush as an alternative for defecation and over time it forms part of them.

Bad smell was also reported to be a contribution factor to why some households have latrines and still prefer to practice open defecation. The revelation from the study is consistent with the finding of UNICEF in 2014 who reported from a survey that cultural factors and associated beliefs, taboos and traditions were the main hindrances to latrine use in most rural communities. This strong cultural self-consciousness
indicates that sanitation programing within the Tamale Metropolis must consciously take into consideration cultural practices. Designs for implementation of programs to increase that rate of latrine usage must factor in components that seek to address socio-cultural bottlenecks.

5.14 Child Stool Disposal Practices
This study sought to know the disposal practice of child stool among caregivers within households. It also sought to explore if children 3 years and below are practicing the usage of latrines. As such, the study asked questions regarding how caregivers dispose the stools of children. Questions were also asked as to which category of people within households that do not use available latrines and why such groups do not use.

It was found that majority (60 percent) of caregivers did not practice proper disposal of the stool of their children. The study revealed that areas such as; bush/forest/field, household garden/courtyard, open space outside household garden and among others were the common places caregivers dispose the stool of their children.

Generally, while the results show that less than 40 percent of the caregivers practice improved disposal, it was also observed that such improper practices go on even in households that had latrines. The finding of this study is in line with the World Vision Ghana report in 2017 where it is been reported that in households where there are latrines, some people within the households do not use these facilities. The report also stated that in households with sanitation facilities (latrines), caregivers do not rinse the feces of children into the latrines but rather throw the stools around compounds. These again implies that sanitation designs do not ensure inclusiveness and leads to children not being able to use latrines even if they have the sense to do so.
5.15 Diarrhea Prevalence
To be able to illustrate how poor sanitation or improper disposal of stool is associated with susceptibility to diseases such as diarrhea, prevalence within homes or households with children 3 years were recorded. It revealed from the survey that a sizable (36.34 percent) number of respondents had one or more of their children suffering from diarrhea two weeks prior to the survey date.

It was also found that in households where stool of children was not properly disposed, majority of the children had suffered from diarrhea prior to data collection. On the other hand, though there were children who had diarrhea, only a few suffered were from households that properly disposed children stool compared to where it was not properly disposed. The findings regarding disposal practice and diarrhea prevalence confirms with the World Health Organization report in 2015. In their report the stool of children is the most common and dangerous source of fecal contamination at the household level. The findings again agree with that of Alliance Health in 2014 when it was reported that unsanitary disposal of human excreta is a leading cause of morbidity and mortality among children. It also confirms that of the Ghana Health Service in 2016 where it was recorded that diarrhea remains the second leading disease affecting children and contributing to over 25 percent of mortality in children under five years of age.

Contrary to the finding of Sinmegn et al, 2015 and Yassin in 2014 who reported that male children are more associated with childhood diarrhea, this study found out that diarrhea among female children were more as compared to the male counterparts. The study however agrees with some portions of the report which reported that children aged 6-23 months are more associated childhood diarrhea. From the study, majority of
the children that had diarrhea were between ages 6 and 23 months of age. This again confirms reason given by respondents that children under 3 are more susceptible.

5.16 Awareness of Dangers of Improper Disposal of Children Feces

As part of the study, efforts were made to find out if respondents are aware of the dangers associated with improper disposal of child stools. The study also explored the view of respondents on whether or not the stool of child is harmful as well as the category of people more susceptible to the dangers.

It has been revealed from the study that almost all (99 percent) of households are aware that improper disposal of children stool is harmful. Also, a greater proportion (92 percent) of the respondents know that the child stools are harmful and children under 5 years are vulnerable to the improper disposal practice. Children under 3 years were reported to be most vulnerable due to the behavior associated with children within such age groups. Reasons such as children eating without consciously washing their hands, eating food that are either contaminated or not, putting any thing they found into their mouth, children having weaker immune systems and among others reasons were given as making under 3 years children more vulnerable. This information gathered confirms the findings of World Health Organization in 2015. In the report WHO stated that children by the way of life are found of putting anything including their contaminated fingers into their mouths. These behaviours make children more prone to pathogens than compared to adults”.

The above findings indicate that knowledge (awareness) on the dangers associated with improper disposal of children stool is not a major factor to the causes of fecal-oral disease but rather attitudes, behaviours and practices as revealed by literature and the findings of this study.
5.17 Factors Associated with Diarrhea Prevalence

5.17.1 Respondent Educational Level

The study found that the level of education a caregiver attains influence the prevalence of diarrhea in a household. Further analysis of the data gathered revealed that in households where caregivers (respondents) ever attended school, diarrhea prevalence was lower as compared to respondents who had no formal education. The prevalence level did also vary from one level of formal education to another. In households where respondents had attained tertiary education, diarrhea prevalence were observed to be low compared to SHS, JHS and Primary. On the other hand, in households where respondents had attained an informal education, the prevalence of diarrhea were also lower compare to households that reported not to have ever attended school. The revelations from the study confirms the findings of Sinmegn et al, 2015 and Yassin, 2014 who reported that mother’s illiteracy was found to be associated with childhood diarrhea such that the more educated a caregivers attained, the less diarrhea prevalence in such homes.

The findings indicate that, the more educated a caregiver is, the less likely the household will suffer from diarrhea. This means that sanitation programs will likely impact behaviours and attitudes when tackled at the educational levels. It also means that sanitation programs that seek to include some levels of community education and sensitizations will likely reduce diarrhea prevalence more than those that will not include community education.

5.17.2 Regular Income

According to David (2001), the amount of income a household receives and the interval between incomes determine the kind of decisions that will be made regarding preventive and curative health. In line with this, further analysis of this study
conducted revealed that, in households where respondents have regular and higher income, diarrhea prevalence were seen to be low as compared to households with irregular and low income.

The findings confirm the report by UNICEF and World Vision in 2015 where these organizations reported that households that are engaged in economically viable ventures are more likely to own and manage improved sanitation facilities compared to poor households and individuals. This could also account for the reason why poor and developing countries have the higher proportion of people who do not have latrines and practice open defecation as reported by World Health Organization in 2016. It could also contribute to why diarrhea prevalence is high among rural areas than in the urban areas as contained in the findings of Ghana Demographic and Health Survey, 2014.

5.17.3 Latrine Availability and the Kind of latrine in a Household

Confirming the accession that access to a facility influence behaviour and attitude, the study found that in households where there were latrines, diarrhea prevalence were low compared to households that had no latrines. It was also found that, the kind of latrine used in a household also served as a key factor in the prevalence of diarrhea in a household. In households where respondents reported of using improved latrine facilities such as flush/pour flush to pit latrine, flush/pour flush to septic tank and among other improved systems, the association with diarrhea among children were seen to be low. On the other way around, in households where unimproved kinds like pit latrine without slab or open pit as defined by WHO were in use, the prevalence of diarrhea were seen to be on a high.

The results from the study means that to be able to reduce the prevalence of diarrhea among children, sanitation programs and projects must trigger households to be able
to put up basic sanitation facilities like a latrine. It should however be noted that, the skills needed to construct a latrine, the availability of water, cost and availability of construction material and among other complementary factors determine the kind of latrines households construct. For example, in a household or an area where there is water scarcity, households do not have the luxury of using flash latrine. In worse situations where people do not even have enough water for consumption (drinking and cooking), it become less a priority to think of putting up a latrine which demand the usage of much water.

5.17.4 Shared Latrine and Place of Defecation

From the study, it was found that households that had latrines and were sharing with other households had a higher risk of children getting diarrhea as against other households that had latrines but were not sharing with other households. The study also seeks to know how many people a household latrine was serving to determine adequacy of facilities in homes. It was revealed that, in homes where either multiple households or more than 10 persons were using a latrine, the risk of children contracting diarrhea was high and proportionate to number of people using a latrine. The revelations from the study confirms why the World Health Organization does not regard latrine sharing as having access to a basic sanitation facility as sharing exposes fecal matter and increase risk of human contact with excreta.

In another revelation, the study found that, where household members defecate also matters when talking about factors associated with diarrhea prevalence to children in a household. From the data, in households where adult members openly defecate, children are associated with diarrhea as compared to sharing and the use of public latrines. Though both sharing and use of public latrine is not considered by WHO as
having access, sharing a latrine with other households is relatively better. However, irrespective of the varied level of risk, both are not safe and must not be encouraged.

5.17.5 Method Used to Dispose Child Stool

Generally, sanitation packages and latrine designs have very limited considerations for children and their vulnerabilities. This has created situations that demand collection of child stools for disposal. However, the practices adopted by caregivers in disposing the stool of children plays a very important role in the prevalence and incidences of diarrhea.

From the study, it became evident that in households where improper measures of child stool disposal have been adopted, the prevalence of diarrhea were reported to be high compared to households where caregivers practiced proper disposal. Worse among the practices as observed from the study include; thrown into garage or compound, put/rinsed into drain or ditch, left in the open, put/rinsed into bush. Other practices such as burying, put/rinsing into latrine and throwing into garbage container were revealed to have less risk though equally inappropriate practices. Interaction with caregivers across various age groups indicate households involved in bad or unhealthy child stool disposal practices are not aware of such practices being risky even though they are aware of the dangers of improper stool disposal.

From these findings above, it is therefore critical for sanitation and hygiene related programmes to include proper disposal practices in community education and sensitization programmes. This will help reduce diarrhea risk to children as it has been proven by several studies that the availability of sanitation facilities alone does not prevent diarrhea prevalence but proper usage and maintenance of the facilities (Black et al, 2010).
CHAPTER SIX
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction
The chapter also contain summary of availability and usage of latrine in households, awareness of the dangers of improper disposal of child feces and the economic status of the people under study.

6.2 Economic Affordability by the Study Population
The analysis based on the objectives of this study indicates that, the majority of people within the Tamale Metropolis (target population) fell in the income brackets (1-500 Ghana cedis). The economic situation of the target population does not only prevent households from meeting their basic needs such as food, clothes and shelter, it also limits the consideration of other equally important decisions such as owning a latrine in the household.

The high level of illiteracy as revealed from the study does not only limit the economic power of the study population, it also leads to unskilled labour engagement which is characterized by low income. The study found that majority of the population who are within the working age and working were employed at the informal sector. Depicting the characteristics of the informal sector, a greater proportion of the respondents indicated their source of income was not regular. Data revealed an overwhelming number of households had no latrine. Whether in the case of the former or in the later, the prevailing sanitation issues are very negative to a child’s health.
The economic vulnerability of the people also leads to people living in homes where there are no latrines or where latrines and other toilet facilities are shared among two or more households. Though sharing a latrine may not have the risk compared to not using one at all, the characterized culture of poor maintenance of share sanitation facilities leaves children more vulnerable.

In exploring the willingness to have inbuilt household latrines, almost all reported of willing to have. These responds go to buttress the claim that their low economic situation indeed account for the non-availability of latrines in their households.

Further analysis high figures of occurrence of diarrhea in children of under three years. This could be partly due to their poor economic standing.

### 6.3 Latrine Availability and Its Usage

Generally, the data gathered postulated that latrines availability still remain very low within the Tamale Metropolis. Out of 400 households sampled, less than 70 households reported having a latrine in their home with majority still without this basic sanitation need. While a few people had latrines, it was observed that male headed households possessed latrines as compared to female headed households.

In another vain, it was observed that latrine availability within households in one way or the other depended on the level and regular nature of income. In households that reported of earning higher income. Also, it was observed that households that received regular income had more latrines than households that reported of irregular income.

It was also revealed from the study that educational status served as a factor that influence the availability of a latrine in a household. Data from the study showed that household heads with higher education had more latrines compared to those lower level of education.
Interestingly, the size of one’s family was also observed to be influencing latrine availability. In homes with larger number of family members, latrine availability or the chance of owning one was seen to be low.

By way of latrine usage, most households within the Metropolis do not use latrine due the fact that the facilities are not available at the household level. It was observed that while most people or households do not use because they do not have latrine at home. It was also revealed that members in households who reported of having latrines were not using the facilities. Some members out of the few that have latrines within the Metropolis prefer to openly defecate than to use a latrine.

While several factors such as level of education, number of persons in a household, closeness to the bush and among others accounted for why people with latrines in their homes still defecate in an open. Cultural and individual factors were also reported. Other reasons like bad odor, the perception that the latrine will get full within a short period and among others accounted for why people still defecate in an open despite having a latrine.

On the side of children using latrine, it was noticed that children generally do not use latrines and defecate within compounds, gutters, drains etc. With younger children 36 months and below caregivers either uses chamber ports to assist the children or they are made to defecate anywhere within the compound. The practice is not only as result of the absence of latrine facilities, the design of available latrines is not child friendly and therefore limit children in using latrines.

6.4 Child Stool Disposal Practice among Caregivers
It was noticed that while majority of children defecate in the open either inside or outside household compounds, the disposal practices varied from one household to
another. Irrespective of the variations, the commonly disposal practice among caregivers within the Tamale Metropolis was throwing of child stool into the bush. It was noticed that children are allowed to defecate openly within the household and the stool is collected by either the caregiver or any other person in the household and thrown into either the bush, the drains, gutters or gardens within the compound. Despite the dangers associated with improper disposal of children stool, the practice remains within the Metropolis and thereby making children of under 5 years vulnerable to diarrhea.

6.5 Awareness of Dangers of Improper Disposal of Child Stool
First, among the issue is knowledge of safe ways to dispose of child stool. Data gathered supported the assertion that the majority of respondents did not do the hygienic way of helping children to defecate and for those who helped children to defecate they did so with very little or no disinfection materials. Handling the feces after defecation was also shown to be unsafely done. All these are quiet indicative that a great majority of the communities do not know the safe way to dispose child feces. From the data, it was found that a great majority showed they had a fair idea of the fact that child feces were infectious to other children and also to the adult.

In general therefore, the poor knowledge of unsafe ways of disposal of child feces coupled with poor observance of unsafe ways to dispose child feces constitutes a big factor favoring the continual occurrence of child diarrhea.
6.6 Conclusions
Despite the non-availability of sanitation facilities such as latrines in households within the Tamale Metropolis leading to open defecation, a few households do have latrines. While it can be concluded that open defecation still remains high in the Metropolis it is completely not due to limited latrines at homes but also owning latrines and not using.

It is also worth noting that the general population are willing to own latrines though economic barriers remain a major hindrance to the aspirations of owning sanitation facilities at homes. Aside the economic challenges, cultural practices, technical capacities and among others also contribute to why people practice open defecation and other improper sanitation acts within the Metropolis.

Finding from the study also give evidence to conclude that caregivers do not attach much importance to how the stool of children is been disposed and this leads to high prevalence of diarrhea which sometimes result in infant deaths. While caregivers can be blamed for improper disposal of child stool, sanitation or latrine designs does not also encourage usage by children due to the unfriendly designs.

Finding of this study has also established that while there is evidence of knowledge awareness of safe ways of disposing child stool, such knowledge is too scanty and leads to poor adherence to precautions by caregivers to safe regulations and expert advice to safe child-stool handling.

The revelations also imply that any development interventions aimed at improving sanitation must be community led to ensure participation, ownership of interventions and capacity development so as to sustain the initiatives for it intended benefits even after the exist of the projects.
In relating the finding to the objectives of the study, it can be concluded that while there is generally low level of latrine availability in households, about 92.5 percent of caregivers are aware of the dangers associated with improper disposal of child stool. Though latrine coverage remains poor in the Metropolis, 62.7 percent of caregivers with latrines in their households practice proper disposal of child stool with 37.3 percent practicing improper disposal.

**Recommendations**

Based on the above findings the following recommendations have been made.

1. Government institutions (Tamale Metropolis – works department), development agents and stakeholders should enforce building and settlement policies to ensure that structures that are put-up for residential purposes or public use make provisions for basic necessities such as sanitation and hygiene facilities. Considering the education level of the Metropolis, some level of education aimed at increasing public knowledge of the existence of certain polices and the corresponding consequences of violators will be of importance.

2. Sanitation initiative by both government and NGOs such as UNICEF, World Vision, CRS among others targeting the Tamale Metropolis should make provision for economic empowerment programmes that will help improve the economic situation of the population. This has the effect of nipping the issues of poor sanitation in the bud. This issue could be tackled from many angles starting from the government (Tamale Metropolis) through to religious bodies, philanthropic organizations including NGOs coordinating and checking content of development initiatives to ensure a certain standard is maintained. Caregiver should be prioritized or targeted in such initiatives to help reduce the economic gap between men and women in the Metropolis.
3. Health and sanitation inventions from NGOs and other actors in the sanitation sector should include child stool management into programing to help increase knowledge and awareness.

4. Though there seem to be some level of knowledge possessed by caregivers regarding improved sanitation practices, it is not adequate and as such efforts should be made to intensify sensitizations and community level education programs to help increase the knowledge level of parents and caregivers to be precise. Public venues or platforms such as ANC visits period, postnatal events and among others that brings together mothers of children should be targeted to sensitization and education sessions. Also, the institutional level, deliberate efforts should be made to help educate children on the importance and dangers associated with improper sanitation practices. The ministry of health through their outreach programmers can also integrate sanitation education into such programs. To curb the occurrence of child diarrhea, intensified education should be carried out targeting those who take care of under three-year-old children in particular and all children in general.

5. The Tamale Metropolis and development partners working within Tamale should make collaborative efforts to integrate into sanitation programs capacity building programmes that will help solve the problem of limited skills by households in the construction of household latrines. Sanitation packages should also be made affordable to allow even low-income earning households to be able to afford. Considering that any business model to be run by private individual is of profit making and disadvantaging the poor, regulations should be formulated and enacted.
6. The community heads through development agents should collaborate to institute some bye-laws enforcing construction of latrines in the new houses springing up in the study area. This will help ensure that household own latrines and solve the issue of not having space to construct household latrines as revealed during the study. The Metropolis should also make efforts to partner with traditional and religious leaders to solve the issue of culture and also to accelerate adherence as traditional authorities are well respected. Efforts must also be made to operationalize the by-laws or policies meant to check violations.

7. The effects of openly defecating ranges across all levels of life and as such must be given more attention by all actors in development. Pragmatic initiatives and concentric efforts towards behaviour change should be prioritised by both governmental and non-governmental organization working within the Water, Sanitation and Hygiene sector. Traditional authorities in the Metropolis have a major role to play by enforcing their authority towards ending bad and unhealthy cultural practices that perpetuate open defecation. Also, considering the absence of most government institutions in the rural areas makes it more appropriate for institutionalization and enforcing of traditional authorities.

8. Further researches should be centered on the behavior of people within Tamale Metropolis in relation to the usage of latrines. Also, intentional efforts to research and invent where feasible packages that make provision for the sanitation needs of children must also be of interest to all actors in the Sanitation sector.
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Introduction
Hello. My name is Chanimbe Benamba a Masters student at the University for Development Studies (UDS) and am here to conduct a study on Latrine availability, it usage and disposal practice of stools from children among caregivers within the Tamale Metropolis. The study is in partial fulfillment of my academic requirements. By participating in the study, you will provide vital information that might be helpful to the Metropolis. Policy makers can use the study as source of information for decision making.

It is for this purpose that I am kindly requesting for your participation by answering a few questions related to the study which may take about 40 minutes of your time. In case you choose to participate, your name or identity will not be revealed to anyone. In addition, your participation in this study will not attract any financial rewards but will be on voluntary basis, you can choose not to answer any of the question(s). Just like those who may choose not to participate in answering any of these questions, their decision will be respected. Be assured that the information you give will only be used for purposes of this academic study.

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

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

YES, I have agreed to participate:

Signature/Right thumb Print ___________ DATE: ___________

NO, I have refused to participate

Signature/Right thumb Print ___________ DATE: ___________

Person Administering Consent:
I, _______________________, confirms that the above consent was read and signed in my presence: ____________________
### Household Questionnaire

#### BACKGROUND INFORMATION

<table>
<thead>
<tr>
<th>Name of Interviewer</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Interview</td>
<td></td>
</tr>
<tr>
<td>Respondent ID</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q#</th>
<th>Question</th>
<th>Responds</th>
<th>code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What is the gender of household head?</td>
<td>1. Male</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Female</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>What is the highest level of education by household head?</td>
<td>0. No education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Primary</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Junior High School</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Senior High School</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Tertiary</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Informal education</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>What is the gender of respondent?</td>
<td>1. Male</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Female</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>What is the highest level of education of respondent?</td>
<td>0. No education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Primary</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Junior High School</td>
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<tr>
<td></td>
<td></td>
<td>3. Senior High School</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Tertiary</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Informal education</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>What is your marital status?</td>
<td>1. Single</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Married</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Living together</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Divorced/separated</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Widowed</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Do you have regular income?</td>
<td>1. Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0. No</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>What is your household average monthly income? <em>(currency in Ghana cedis)</em></td>
<td>[.........................]</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>What do you mostly spend your money on?</td>
<td>1. Food</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Health care</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. House repairs</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Household upgrades</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Land purchases</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7. Agricultural purchases</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8. Social events,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>96. Others</td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Options</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 8 | Who is responsible for providing the needs of your family | 1. Father  
2. Mother  
96. Others. Specify |
| 9 | How many persons are you in your household? | ............................ |
| 10 | How many children are in your household? | .......... [Boys ...... Girls.........] |
| 11 | How many children are under 3 years in your household? | .......... [Boys ...... Girls.........] |
| OBJ1 | Section Two : Latrine Availability and Usage |
| 13 | Does your household own a latrine?  
If No skip to Q20 | 1. Yes  
0. No |
| 14 | If Yes, What kind of latrine does your household use? | 1. Flush or pour flush to piped sewer system  
2. Flush or pour flush to septic tank  
3. Flush or pour flush to pit latrines  
4. Ventilated Improved Pit (VIP) latrine  
5. Pit latrine with slab  
6. Composting toilet  
7. Flush or pour flush to elsewhere  
8. Pit latrine without slab or open pit  
9. Bucket or pan latrine  
10. Hanging toilet/latrine  
11. No facilities/bush/field (open defecation)  
95 = Don’t Know  
96. Other (Specify)...............................  
.... |
| 15 | Do all members of your household use the latrine? | 1. Yes  
0. No |
| 16 | If No. What category of people do not use | 1. Children  
2. Adults,  
3. Older people,  
4. Disable people.  
96. Others. Specify: |
<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 Where do these category in Q16 defecate?</td>
<td>1. Share with another household&lt;br&gt;2. In a public latrine&lt;br&gt;3. In an open(any place outside a latrine)&lt;br&gt;95. Don’t Know&lt;br&gt;96. Others. Specify</td>
</tr>
<tr>
<td>18 Do you share your household latrine with other households?</td>
<td>1. Yes&lt;br&gt;0. No</td>
</tr>
<tr>
<td>19 If Yes, how many households use this latrine facility?</td>
<td>[.........]&lt;br&gt;Code 1 if &lt;=2&lt;br&gt;Code 2 if &gt;2</td>
</tr>
<tr>
<td>20 Where do you and your household members defecate?</td>
<td>1. Share with another household&lt;br&gt;2. In a public latrine&lt;br&gt;3. In an open(any place outside a latrine)&lt;br&gt;95. Don’t Know&lt;br&gt;96. Others. Specify</td>
</tr>
<tr>
<td>21 Why does your household not have a latrine?</td>
<td>1. Can’t afford one&lt;br&gt;2. Don’t need one&lt;br&gt;3. Prefer OD&lt;br&gt;95. Don’t know&lt;br&gt;96. Others. Specify</td>
</tr>
<tr>
<td>22 Do you and your household intend to own a latrine?</td>
<td>1. Yes&lt;br&gt;0. No</td>
</tr>
<tr>
<td>23 Do you and your household have the capacity (skill, labour, resources) to construct a latrine?</td>
<td>1. Yes&lt;br&gt;0. No</td>
</tr>
<tr>
<td>OBJ2 Section Three: Child Stool Disposal Practice</td>
<td></td>
</tr>
<tr>
<td>I am going to ask you a few questions about your children. Please forgive me if this question makes you to remember of any bad moments in the past</td>
<td></td>
</tr>
<tr>
<td>24 Do you have a child/children 3 years and below?</td>
<td>1. Yes&lt;br&gt;0. No</td>
</tr>
<tr>
<td>25 In the last two weeks, did any child in your household defecate in an open?</td>
<td>1. Yes&lt;br&gt;0. No</td>
</tr>
<tr>
<td>26 If yes, how frequent</td>
<td>1. Daily</td>
</tr>
</tbody>
</table>
I am going to ask you a few questions about your child who has or is being diagnosed of diarrhea.

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>27a What is the sex of your youngest or index child</td>
<td>1. Male 2. Female</td>
</tr>
<tr>
<td>27b Is your youngest child able to walk or crawl unaided or unable to walk?</td>
<td>1. Walk unaided, 2. crawl only, 3. unable to walk or crawl. 4. Disabled</td>
</tr>
<tr>
<td>29 Which other people in the house may help your youngest child to pass stools at home? (select as many as applied)</td>
<td>1. Child self 2. Mother 3. Father 4. Sibling 5. Grandmother 96. Others (specify)…………………</td>
</tr>
<tr>
<td>30 Is your youngest child able to use the latrine in your household?</td>
<td>1. Yes 0. No</td>
</tr>
<tr>
<td>31 When was the last time your child passed stools at home?</td>
<td>1. Today, 2. Yesterday, 3. Two days ago, 4. More than two days ago, 90. Don’t remember 95. Don’t know</td>
</tr>
<tr>
<td>32 The last time at home your child passed stools, where did he/she defecate?</td>
<td>1. Into a latrine or toilet, 2. Child potty in courtyard/garden, 3. Child potty in house 4. In the household garden/courtyard (without a potty or latrine) 5. Inside the house (without a potty or latrine) 6. Open space outside the household garden 7. Bush or forest or field 8. Into a nappy or diaper,</td>
</tr>
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<td></td>
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</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
| 33 | Is this the place usually your child passes stool? | 95. Don’t know  
96. Others (specify)…………., |
| 34 | What are other common places that your child passes stools? | 1. Into a latrine or toilet,  
2. Child potty in courtyard/garden,  
3. Child potty in house  
4. In the household garden/court yard (without a potty or latrine)  
5. Inside the house (without a potty or latrine)  
6. Open space outside the household garden  
7. Bush or forest or field  
8. Into a nappy or diaper,  
96. Others (specify)………….,  
95. Don’t know |
| 35 | The last time your child passed stools at home, what was done to dispose of the stools? | 1. Child used latrine  
2. Put/rinsed into latrine,  
3. Put/rinsed in to drain or ditch,  
4. Thrown in to garage/compound,  
5. Buried,  
6. Left in the open,  
96. Other (specify)…………….. |
| 36 | How long after the defecation process did you dispose of your child stool? | Hours/minutes……………..  
96. Don’t know |
| 37 | After the last time your child defecated at home, how did you handle the stool? | 1. Hands only/bare hands,  
2. Hands and cloth or paper or leaves,  
3. Scrap material to scoop stool,  
4. Used potty,  
5. Used spade,  
6. Did nothing,  
7. Left in the open,  
8. Child used latrine,  
96. Other (specify)……….. |
| 38 | The last time your child passed stools at home, did you clean him/her bottom? | 1. Yes  
0. No |
| 39 | If yes with what did you clean him/her bottom? (select as many as applicable) | 1. Bare hands  
2. Water  
3. cloth  
4. soap |
| 40 | The last time your child defecated at home, did you wash your hands after you cleaned child bottom? | 1. Yes  
0. No |
| 41 | If yes to question 40, how did you wash your hands? | 1. Water only  
2. Water and soap  
3. Water and ash  
96. Other (specify)……….. |
| 41 | Under what situation did you come in contact with your child’s stool? | Cleaning the child, Disposing of the child’s stool, Other(specify) |

**OBJ 3**

**SECTION FOUR: Awareness of dangers of improper disposal of children’s stool**

| 43 | Do you think that stool of children under three years is harmful? | 1. Yes  
0. No |
| 44 | Is there anything wrong with throwing children’s stool in an open? | 1. Yes  
0. No |
| 45 | In your own opinion give 3 reasons you think is wrong with disposing stool of children under three years around the compound? | 1)  
……………………………………  
2)  ………………………………………  
3)  ………………………………………  
…… |
| 46 | Do you think that stool of children under three years can be dangerous to household members? | 1. Yes  
0. No |
| 47 | If Yes, which category of people can it be more dangerous to? | 1. Adults,  
2. Children  
3. Blind people  
96. Other. Specify……………… |
| 48 | If No, what makes you think so? | ………………………………………  
……………………………………  
…………………… |
| 49 | If children are also susceptible, what category of children? | 1. Children above five years who eat food and can walk  
2. Children who crawl and are breastfed,  
3. Child how crawl, breastfed and eat food, |
<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>What makes these category of children susceptible to the dangers of exposing stool of children (3 years and below)?</td>
<td>1. Children under years can put anything into their month, 2. Children under years eat any food even if flies are on the food, 3. Children under years eat food without washing their hands, 96. Other, Specify………………..</td>
</tr>
<tr>
<td>51</td>
<td>Tell me, what is the safe way to dispose of children’s stool?</td>
<td>1. Put/rinsed into latrine, 2. Put/rinsed into drain or ditch, 3. Thrown into garage, 4. Bury, 5. Leave in the open, 96. Other. (Specify)</td>
</tr>
<tr>
<td>52</td>
<td>Did any of your children under three years suffer from diarrhea in the last three months?</td>
<td>1. Yes, 0. No</td>
</tr>
<tr>
<td>53</td>
<td>If yes, what was the age of the child in months?</td>
<td>[………………….]</td>
</tr>
<tr>
<td>54</td>
<td>What did you attribute this diarrhea illness to?</td>
<td>1. Poor sanitation, 2. Poor personal hygiene, 3. Water quality, 96. Others (Specify)</td>
</tr>
<tr>
<td>55</td>
<td>Aside what you mentioned in Q54 what again do you think can cause diarrhea?</td>
<td>1. ………………….., 2. ………………….., 3. ………………….., 4. …………………..</td>
</tr>
</tbody>
</table>
Appendix 2: Interview Guide for Focus Group Discussions

Informed Consent Form

Introduction
Hello. My name is Chanimbe Benamba a Masters student at the University for Development Studies (UDS) and am here to conduct a study on Latrine availability, its usage and disposal practice of stools from children among caregivers within the Tamale Metropolis. The study is in partial fulfillment of my academic requirements. By participating in the study, you will provide vital information that might be helpful to the Metropolis. Policy makers can use the study as source of information for decision making.

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

**Signature**

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

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

YES, we have agreed to participate:

**Signature/Right thumb Print**  ________________ DATE: ______________

NO, we have refused to participate

**Signature/Right thumb Print**  ________________ DATE: ______________

I, ______________________, confirms that the above consent was read and signed in my presence: ____________________

Date: ____________________
FOCUSED GROUP DISCUSSION AND KEY INFORMANT GUIDE

Interviewer Initials       Date

FGD/KII Code No       Sub Metro

Section Name

Questions

SECTION A: Latrine Use

1. How will you describe the general defecation habit of people in this area?
2. Are there people in your area who do not have latrines? What could be the main reasons for this?
3. Have people changed or remained the same regarding latrine use? How?
4. Are there groups of people in this area who are known not to use latrines? What are some of the reasons?
5. For those who have latrines in this your area and are not using, what could be some of the reasons for not using them?
6. What are the general characteristics (common) of people who own and use latrines in this area?
7. What are the general characteristics (common) of people who do not own or use latrines in this area?
8. Do you think people in this area have the capacity necessary to own latrine facilities? (Probe: skills, ability, materials, funds)
9. Who are the main people who promote latrine use and construction in this area?
10. In what way do they promote latrine use and construction?
11. Whose responsibility do you think it is to improve access to latrines in your area?
SECTION B: Latrine Use Associated Factors

1. What do you consider to be the benefits of using a latrine?
2. What motivates people to construct and use latrine?
3. In your opinions, what problems could be attributed to people having a latrines and not using them?
4. What factors are known to negatively influence latrine use in your area?
5. How do mothers/caregivers dispose stool of children in your homes?
6. What are your perceptions about this practices by mothers/caregivers?
7. What are the dangers of children’s stool cause harm?
8. What are the common diseases that affect children in this area?
9. In your opinion, what causes diarrhea in our homes?
10. In your opinion, can improper disposal of children stool cause diarrhea? How?
11. Do you think you at risk of getting diarrhea if your neighbor does not use a latrine or improperly dispose children stool? How is that possible
12. How can diarrhea be prevented?
SECTION C: Others

12) What other information do you want to share with me regarding latrine.
Please tell me

..........END OF SURVEY. THANK YOU ALL FOR YOUR TIME..........
Examiner Recommendations and changes effected

The table below contains recommendation from both internal and external examiners and corrections effected.

<table>
<thead>
<tr>
<th>No.</th>
<th>Recommendation</th>
<th>Action Taken</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>External Examiner</strong></td>
</tr>
<tr>
<td>1</td>
<td>The objectives especially the objective four would have to be properly organized for clarity</td>
<td>Modification has been made on the 4th objective of the study and can be seen on page 7.</td>
</tr>
<tr>
<td>2</td>
<td>There are a few sentences that needed to be reframed. Assistance must be sought to edit the final work since there are serious editorial issues to be dealt with</td>
<td>Editing has been made throughout the document. Pages with such changes include: iv, 1, 2, 3, 4, 5, 6, 7, 18, 21, 40, 41, 52, 61, 65, 69, 71, 72, 76, 77, 79, 103, 104 - 115</td>
</tr>
<tr>
<td>3</td>
<td>Candidate must consult the APA version 6 available online to correct all the reference</td>
<td>References has been corrected in line with APA version 6 and can be traced on page 117 to 132.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Internal Examiner</strong></td>
</tr>
<tr>
<td>1</td>
<td>Qualitative data must be presented in chapter four and not in chapter 5.</td>
<td>These changes have been affected and can be seen on page 67 and 68.</td>
</tr>
<tr>
<td>2</td>
<td>Thesis recommendation in chapter six must be specific to study objects</td>
<td>Recommendations provided and very general has been reorganized based on specific study objectives</td>
</tr>
<tr>
<td>3</td>
<td>Sections of chapter 6 seems a repetition of chapter 5</td>
<td>All portions in chapter 5 which is same as in chapter 6 has been taken out from chapter 5.</td>
</tr>
</tbody>
</table>