UNIVERSITY OF GHANA

COLLEGE OF HUMANITIES

THE DETERMINANTS OF OWNERSHIPS OF TOILET FACILITIES AMONG HOUSEHOLDS IN MADINA-ZONGO IN THE LA NKWANTANG MUNICIPALITY, GHANA.

BY

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DECLARATION

I, **DAVID NAMBO**, declare that this thesis titled *"The determinants of ownerships of toilet facilities among households in Madina-Zongo"* is a product of my original work carried out at the Institute of Statistical, Social and Economic Research (ISSER), University of Ghana, under the supervision of Dr. Aba Obrumah Crentsil (ISSER). Indeed, this piece of work could not be completed without reference to previous scholarly works, which have been properly acknowledged. I further acknowledged that this thesis has neither in whole nor in part been presented for another degree in Ghana or elsewhere.

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ABSTRACT

Quite often sanitation issues have been relegated to the background, nevertheless development economists suggest that achieving high sanitation standards can save the economies of low and middle-income countries of almost 5% of their Gross Domestic Products (GDP) (Hutton, 2015; 2012). Indeed, the selected theme *'Toilets and Jobs'* for the 2016 UN World Toilet Day (WTD) emphasized the vital role toilets play in creating strong economies, improving health and protecting people's safety and dignity (UN Water, 2016). This underscores the importance of the present study in Madina-Zongo. The study was conducted to assess the level of access to improved toilet facilities and the factors that influence the ownership of toilets facilities among households in Madina-Zongo. The study used a mixed method strategy. 170 households were interviewed, and the data was summarized in frequencies tables, cross-tabulations and logistic regression. In addition, 5 in-depth and a key informant interviews were conducted to triangulate with the quantitative analysis. The study found that only 30% of the households own improved technologies exclusively reserved for their households. About 24% rely only on public toilets and another 44% depends on shared facilities, which includes 3.53% of facilities considered as unimproved. Compared to poor households, low income and high income households were more likely to own improved toilets, statistically significant at 5% and 1% respectively. Compared to heads of households who had no formal education background, educated households were more likely to own an improved toilet, statistically significant at 5% and 1% for head's with basic/secondary education and higher education, respectively. The chances are that a household size that increases more than 4 in the study area will less likely owned an improved toilet, statistically significant at 5%.

DEDICATION

I dedicate this work to my late grandfather, Nambu Kokroko.
&
Dr. Isaac Osei-Akoto

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I thank Almighty God for all things, especially for how things begin and end in life. My special thanks go to my supervisor, Dr. Aba O. Crentsil. I take this opportunity to thank you in sincerity. You have influenced my way of thinking, academically. Thank you very much! I want to acknowledge the contribution of Benedicta Asamoah for helping me during the data collection exercise, and Thelma Oger Abayeteye, my course mate, for transcribing the in-depth interviews' audio tapes.

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GDP:	Gross Domestic Product
ISSER:	Institute of Statistical, Social and Economic Research
SSA:	Sub-Saharan Africa
WC:	Water Closet
IESS:	Institute of Environment and Sanitation Studies
JMP:	Joint Monitoring Programme
KII:	Key Informant Interview
KVIP:	Kumasi Ventilated Improved Pit
LI:	Legislative Instrument
MLGRD:	Ministry of Local Government Rural Development
SES:	Socio-economic status
WHO:	World Health Organisation
UNICEF:	Children's Fund
WTD:	World Toilet Day
LaNMMA:	La N-Kwantanang Madina Municipal Assembly
GSS:	Ghana Statistical Service

CHAPTER ONE

INTRODUCTION

1.0 Introduction

Low and middle-income countries continue to face major developmental challenges in relation to poor sanitation, one of the main contributing factors to the increasing rate of disease burden and socioeconomic problems in the 21st Century (Tumwebaze et al., 2013; Obeng et al., 2015a; Kema et al., 2012; Adams et al., 2015; Hutton, 2015). Globally, about 2.4 billion people resort to the use of unimproved toilets facilities as well as open defecation, which constitutes the greatest threat to public health (Cameron et al., 2013; Guiteras et al., 2015; Shakya et al., 2015; WHO/UNICEF, 2015). The situation in Ghana is no different. For instance, the Institute of Environment and Sanitation Studies (IESS) of the University of Ghana, citing WSP (2011), estimated that (82%) of Ghanaians lack access to improved sanitation (ISES, 2011). According to WSP (2011), "out of Ghana's population of 24.2 million, 16 million use unsanitary or shared latrines and 4.8 million have no latrines at all and defecate in the open" (ISES, 2011, p.1).

The growing lack of access to improved toilet facilities is eroding government's efforts in investment directed at improving access to good health, nutrition, poverty reduction and economic development (Hutton, 2015). It is argued that an improved toilet facility protects people from a wide range of infections as it prevents human contact with fecal matter, a notable precondition for good health and disease prevention (WHO/UNICEF, 2015; Jenkins & Scott, 2007). Coffey et al (2014) strikingly submit that the consequences of unimproved toilet facilities include the fact that "it kills babies, impedes the physical and cognitive development of

surviving children, and reduces human capital". Globally, the annual economic losses associated with poor water supply and sanitation is about US$260 billion, almost two times the net overseas development aid of US$135.2 billion in 2014 (WaterAiD, 2015).

Prior to the launch of the 2015 World Toilet Day (WTD) in Ghana, the United Nations Children's Fund (UNICEF) noted that the current rate of open defecation (19%) in Ghana makes her the second to South Sudan in Sub-Saharan Africa (SSA)[1]. This is unacceptably high and has huge socio-economic implications for Ghana. Hutton (2015) has posited that poor sanitation and hygiene is likely to cost many countries up to 5 percent of GDP. For instance, according to IESS (2011, p.2), "poor sanitation costs Ghana 420 million Cedis each year, which is equivalent to US$290 million".

Thus, world leaders and global development partners have vowed to provide universal access to improved toilet facilities, and to eliminate the menace and public health risks associated with open defecation by 2030, as stated in target (6.2) of the Sustainable Development Goals (SDGs). This call for effective strategies to increase awareness and investment in sanitation. As part of these strategic moves to raise awareness on toilet facilities and their direct effects on health and economic development, the United Nation officially designated November 19 as the United Nations' World Toilet Day. Thus, the theme 'Toilets and Jobs' for the 2016 UN World Toilet Day reflected the vital role toilets play in creating strong economies, improving health and protecting people's safety and dignity (UN Water, 2016). In this regard, Ghana has subsequently revised the National Environmental and Sanitation Policy aimed at ensuring that households in Ghana have adequate and sustainable access to improved toilets in their homes (MLGRD, 2010).

[1] CITY FM (2015) citifmonline.com/2015/11/18/ghana-ranked-2nd-in-open-defecation/

1.1 Problem Statement

The importance of good sanitation cannot be overemphasized as it directly links to good health, nutrition, poverty reduction, and sustainable economic development. Despite this fact, the world missed the target (77%) of halving the proportion of people without access to improved sanitary facilities under the Millennium Development Goals (MDGs), though worldwide coverage improved from 54% in 1990 to 68% in 2015 (WHO/UNICEF, 2015). Thus, as high as 2.4 billion people in the world are at risks of contracting sanitation related infections because they do not have access to improved toilet facilities, and another 946 million people worldwide depend on open defecation with its attended negative externalities (WHO/UNICEF, 2015).

In Sub-Saharan Africa (SSA), the proportion of people using improved toilet facilities or latrines increased from 24% in 1990 to 30% in 2015, suggesting that only three out of ten people in SSA currently have access to improved toilet facilities. It is alarming that in SSA about 695 million people do not have improved toilets, out of which 217 million people currently engaged in open defecation (WHO/UNICEF, 2015). In fact, SSA's progress on the sanitation ladder has rather been less than satisfactory after only three countries including Cape Verde, Reunion, and Seychelles met target (7c) of MDGs of halving the proportion of people without access to improved sanitation by end of 2015 (WHO/UNICEF, 2015). On average sanitation coverage, SSA is performing better than Ghana. Indeed, improved sanitation coverage in Ghana is less than the SSA's average of 30%, because only 15 % of Ghanaians living in households have access to improved toilets facilities as against the MDG target of 54% for 2015 (WHO/UNICEF, 2015; Obeng et al, 2015a). The proportion of Ghana's population depending on shared sanitation facilities (60%) is the highest in the world (WHO/UNICEF, 2015; Obeng et al, 2015a), but

shared toilets and public toilets facilities are not considered as improved sanitation facilities (WHO/UNICEF, 2015).

Ghana is arguably next to Sudan in SSA in terms of open defecation[2], with about 23% of her population practicing it (Ghana Statistical Service (GSS), 2011; WHO/UNICEF, 2015). The trend is spatially skewed with very high proportion of households practicing open defecation in Upper East (89%), Northern (72%) and Upper West (71%) regions. In contrast to the trends in the three northern regions, open defecation is very low in the Greater Accra region (9%) (GSS, 2011). The three regions in the northern part of Ghana have less than 10% of their population using improved toilets, while the proportion of households living with improved toilet facilities is estimated to be 18%, 17%, 13%, 10%, in Ashanti, Western and Eastern, Central and Brong Ahafo, respectively. Greater Accra region (28%) has the highest proportion of households using improved toilet facilities (GSS, 2011). From 1990 to 2015, open defecation in urban areas has reduced from 10% to 7%, and over the same period it increased from 29% to 34% in rural Ghana (WHO/UNICEF, 2015). On the average, 20% of the urban areas have improved toilet facilities compared to 9% in the rural areas (WHO/UNICEF, 2015).

La N-Kwantanang Madina Municipality is in the greater Accra region, and it is highly characterized as peri-urban (La N-Kwantanang Madina Municipal Assembly (LaNMMA), 2014). About 38% of the households use water closet (WC) and other households (6.7%) in the municipality are reportedly practicing open defecation (LaNMMA, 2014). Another (17%) depend on public toilets, despite the Revised National Sanitation Policy's directive that

[2] CITY FM (2015) citifmonline.com/2015/11/18/ghana-ranked-2nd-in-open-defecation/

households should significantly reduce their patronage for public toilets which are recommended for only people in transit, especially in bus terminals and markets centers (Obeng et al, 2015a; Ministry of Local Government and Rural Development (MLGRD), 2010). LaNMMA (2014) acknowledges that there are households in the municipality who still relied on the long banned bucket/pan latrines, while others resort to using flying toilets (defecating in polythene bags which are later thrown into the gutter or rubbish bins). This is an unacceptable situation! The long-term goal, as indicated in the LaNMMA's Medium Term Development Plan (MTDP) and in the Revised National Sanitation Policy is to ensure that each household has an improved toilet facility for its exclusive use (MLRD, 2010; LaNMMA, 2014). This gives policy credence to target (6.2) of the Sustainable Development Goals (SDGs) which challenges all countries to ensure the provision of equitable, adequate and universal coverage of sanitation and hygiene for all as well as put an end to open defecation. It is against this background that this study seeks to investigate the level of access and the factors most likely to influence ownership of toilet facilities among households in Madina-Zongo in the La N-Kwantang Madina Municipality (LANMMA), Greater Accra region.

1.2 Objectives of the Study

This study aimed at analyzing and understanding factors that influence the level of access and ownership of toilet facilities among households in Madina-Zongo in the La N-kwantanang Madina Municipality, in the Greater Accra Region, Ghana. Specifically, this study sought to:

1. assess the level of access to toilets facilities among households in Madina-Zongo
2. analyze the factors that influence householders' ownership of improved toilets facilities in Madina-Zongo.

1.3 Research questions

1. What is the level of access to toilet facilities among households in Madina-Zongo?
2. What factors determine the ownership of improved toilet facilities among households in Madina-Zongo?

1.4 Significance of the study

In recent years, sanitation has received and continued to attract popular interest among researchers, academics and experts for a number of good reasons. One of such reasons is the realisation that the consequences of poor sanitation is inextricably linked to poor health, nutrition, poverty, economic development and undermines the safety and dignity of a people. Today, access to basic sanitation such as improved toilet facilities that guarantee maximum protection of people against contact of fecal matter is recognized as a basic human right (UN Water, 2016). Stressing on the importance of sanitation-related studies, O'Connell (2014) noted that it helps improves peoples' ability to design, implement and monitor effective behavior change interventions in sanitation. Curtis & Cairncross (2003) argued that there are ideas about what encourage people to install toilets and to adopt new hygiene behaviour, but it remains largely uncertain which factors are the most decisive, taking into account the differences in geography, culture, and level of development of different nations. This underpins the growing literature on sanitation, especially in low and middle-income countries. Certainly, this study attempts to contribute its part to the existing literature on sanitation by looking at the socioeconomic, demographic and environmental factors influencing sanitation demand and how it can be encouraged in Ghana. Understanding factors influencing the ownership of toilet

facilities among households will enable policy makers and program implementers to better develop and adopt programs that will address the sanitation challenges facing the country.

Not much is known about the determinants of ownership of toilets facilities at the district levels in Ghana because past and present studies have generally tended to focus on varied topics of interest at the national level. In this direction, empirical research directed at the district level will help bridge this knowledge gap. For instance, findings from this study could be useful for the successful implementation of the Greater Accra Metropolitan Assemblies (GAMA) Toilet Project at the districts level. The project is a-150 million United States Dollar (USD$ 150 million) Project funded by the World Bank, which currently provides subsidized toilets to households in the Greater Accra Region, including the La N-kwantanang Madina Municipality (Steel, 2017). Thus, the study's findings may be important for sanitation policy formulators in low and middle countries tasked with the responsibility to meet target (6.2) of the SDGs.

1.5 Limitation of the study

Within the limited time and resources, this study concerns itself with the analysis of the socio-economic and demographic factors likely to influence households' access and ownership of toilet facilities.

1.6 Definition of terms

Household: In this study, a household refers to a person or group of persons who live together and share a common living, cooking and eating arrangement.

Toilet facility: A sanitary or toilet facility that can hygienically protect human beings from coming into contact with human excreta

Improved toilet facility: In this study, an improved toilet facility refers to any type of toilet facility or a technological design that can hygienically protect people from coming into contact with fecal matter. A toilet facility will be classified as belonging to the improved toilet category if its design is one of the following technologies: a flush/pour flush into a closed pit, septic tank or piped sewage system, a KVIP and a Pit latrine with slap and it is exclusively reserved for a single household.

Improved (basic) sanitation: In this study, improved or basic sanitation is used interchangeably with improved toilet facility to refer to a toilet facility that can hygienically protect people from coming into contact with human excreta.

Unimproved toilet facility: In this study, a facility will be classified as unimproved if it cannot guaranteed the protection of human beings from coming into contact with fecal matter. Generally, this study considers the following facilities as unimproved: flush/pour flush into open pit or elsewhere, pit latrine without slap, or open pit latrine, and trench with wood across.

Open defecation: In this study, open defecation refers to the practice of defecating in gutters, on available open spaces, in rivers, and along beaches. It is defined in this study to include the use of bucket latrines and flying toilets as people who resort to these practices will finally dispose them in open spaces, dumpsites and in gutters.

Unimproved (poor) sanitation: Generally, in this study, this term refers to the unimproved toilet facilities, and the practice of open defecation.

Ownership or owned toilet: In this study, ownership or own toilet facility refers to the household's right to title and possession of the toilet facility being used by members of his or her household.

Access: In this study, access to toilet facilities describes the availability of sanitary or toilet facilities for households who may opt to use them, though they may not have the right to title and possession of the said facility.

1.7 Organization of the study

The study is oriented in five chapters, with chapter one focusing on background of the study, problem statement, objectives of the study, research questions, and the significance of the study. Chapter two presents the literature review, theoretical and the conceptual framework. The methodology of the study and methods of data collection is discussed and presented in chapter three, while Chapter four concentrate on data analysis and discussion of the results. The findings, conclusion and recommendation are presented in chapter five.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter looks at what constitutes improved toilets versus unimproved toilets, and the benefits and consequences associated with them, respectively. The chapter also discusses socioeconomic, demographic and environmental factors influencing the level of access and ownership of toilets facilities. Following is a brief description of the theoretical framework underpinning the interactions among these variables to determine toilets ownership outcomes. The discussion on the conceptual framework for the study concludes this chapter.

2. 1 Background

A clean environment is arguably a public good (Shakya et al., 2015; Augsburg & Rodríguez-Lesmes, 2015), the sustainability of which could partly be measured by the proportion of households having access to adequate and sustainable safe water, sanitation, and hygiene (Pattanayak et al., 2007). Hitherto, various countries have signed and ratified global treaties, which call for efforts to ensure that their citizens have access to safe water, sanitation, and hygiene. Kema et al (2012) posited that "the declaration of the International Drinking Water Supply and Sanitation Decade launched in the1980s is an integral part of the global efforts seeking to enhance access to safe water and decent basic sanitation" (p.1). Part of these global efforts have been unambiguously stated and clearly emphasized in goal (7) of the Millennium Development Goals (MDGs) which have metamorphosed into goal (6) of the Sustainable Development Goal (SDGs), after the MDGs elapsed in 2015 (WHO/UNICEF, 2015). Under target (6.2) of the SDGs, global efforts and policies are directed at supporting initiatives and programs strategically designed to provide universal access to improved toilets for everyone

household, and as well as eliminate open defecation by 2030 (WHO/UNICEF, 2015; UN Water, 2016). However, Coombes (2010) asserted that the sanitation-related goals will not be met unless until the 23rd century in Sub-Saharan Africa (SSA) where sanitation investment is very low. This would mean that unless African leaders and international governmental organization develop pragmatic and concerted measures, SDGs goal (6) which is widely acknowledged to influence the outcome of global efforts and strategies directed at poverty reduction, improvement in nutrition, health, education, wellbeing, and economic development of low and middle-income countries would not be attainable.

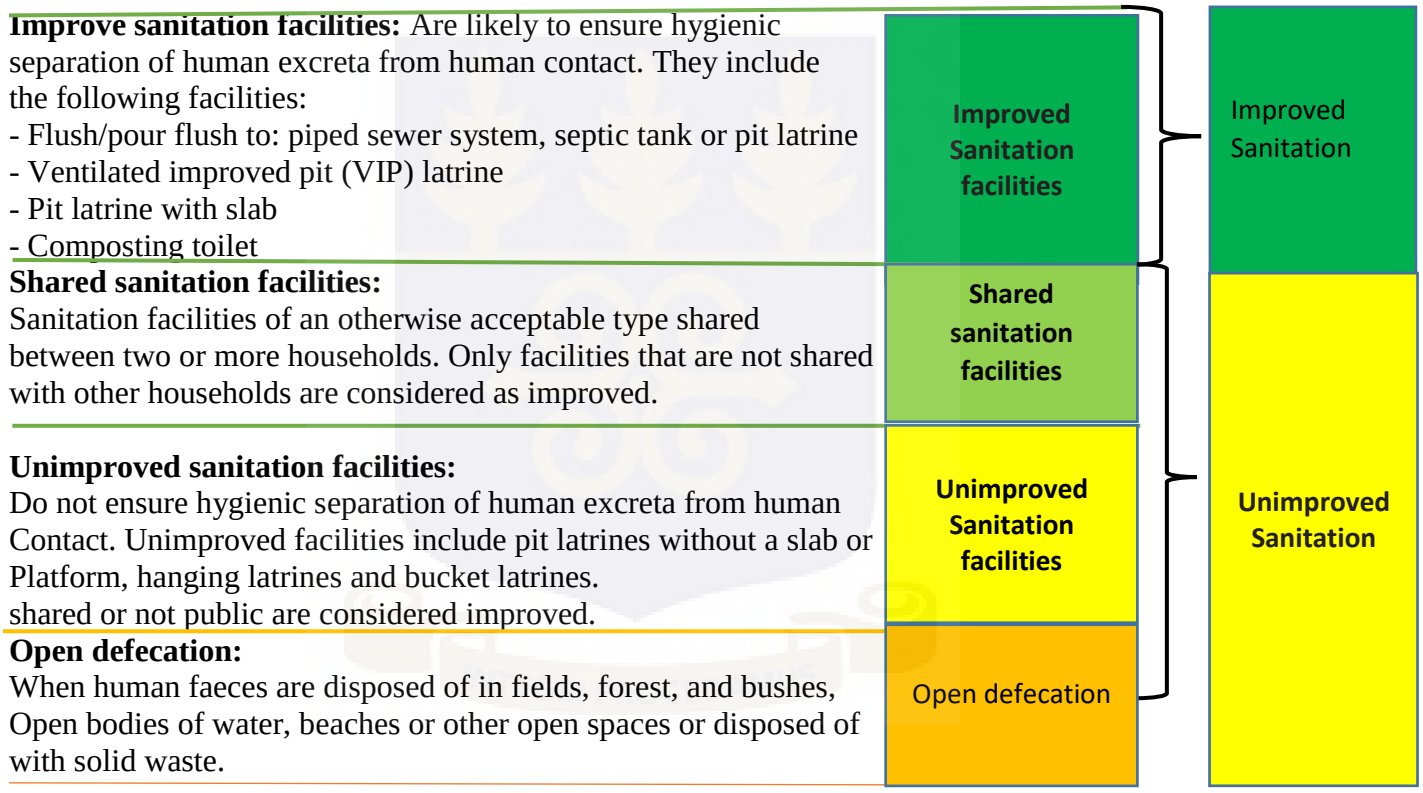
2.2 Improved versus unimproved toilet facilities

The sanitation ladder shows the order of importance, which type of toilet facility is preferred. WHO/UNICEF Joint Monitoring Program on Water and Sanitation have developed standards that dictate that an improved toilet facility should hygienically separates human excreta from human contact (WHO/UNICEF, 2015). An improved toilet is any toilet technology such as flush or pour flush into piped sewer systems, septic tanks or into closed pit latrines. Others are pit latrines with slap, ventilated pit latrine (VIP), Kumasi Ventilated Improved Pit (KVIP), Bio-fil and composting toilets. A toilet technology type from the above listed that is used exclusively by a single household is classified under improved. This definition by WHO/UNICEF JPM has attracted intense debate from scholars such as Exley and others.

In recent times, Exley et al (2015) have criticized the WHO/UNICEF JMP method of excluding shared toilet facilities even when the meet the standards of adequately protecting human contact from fecal matter. For instance, estimates points that the proportion of Ghanaians using shared

toilets facilities (whether private or public toilet facilities) is around 60%, the highest in the world (WHO/UNICEF, 2015; Obeng et al., 2015a). However, by a standard point of definition by the WHO/UNICEF Joint Monitoring Program, as shown in figure 2.1, shared facilities are excluded from the category of improved sanitation. This has attracted an intense debate about what really constitute an improved toilet.

Figure 2.1: Sanitation Ladder



Source: Adapted from (WHO/UNICEF, 2015, p.50).

Exley et al (2015) analyzed the presence of *E. coli* on points of hand contact, *helminth* at point of foot contact, and number of flies from a sample of 341 toilet facilities and respondents in rural and urban Tanzania. The analysis was conducted on a combination of improved facilities such as Flush/pour flush to piped sewage system, septic tank, closed pit, and ventilated improved pit,

composting toilet, and pit latrines with slap. The study asserted that the presence of a slab in a shared a facility is protective against fecal-oral exposure, the basis on which the authors out rightly rejected the exclusion of shared facilities of an adequate technology from improved sanitation coverage in the assessment of the MDGs on sanitation. This might be suggestive for the calls to include shared toilets in calculating improved sanitation if the toilet technology is of the improved type.

Presently, WHO/UNICEF (2015) submits that some experts have modified their stance on shared toilet facilities to the effect that limited sharing (between two or five households) should be included in the count towards improved sanitation coverage. For instance, WHO/UNICEF (2015) briefly explains that:

> "*In order to differentiate, some have recommended setting a threshold, such as five or more households, known as 'limited sharing', and to include the population served by limited sharing in the 'improved' category. Others argue that even limited sharing has negative impacts on health and should not be considered improved*" (p.15).

Nonetheless, the position of WHO/UNICEF (JMP) remains that shared or public toilets are not likely to be clean and well maintained to guarantee maximum protection. A study by Kwiringira et al (2014) supports this position. In a cross-sectional study involving Focus Group Discussions (FDG) and Key Informant Interviews (KII) in urban Uganda, the study observed that the lack of proper maintenance and the incidence of many users per shared toilet facilities results in bad odor and maggots which causes people to descend on the 'rungs' to open defecation.

Guiteras et al (2015) joined the debate when they argued that reports on access and ownership of latrines should include even non-hygienic models. They drew the conclusion that, "any latrine use that replaces open defecation is a common policy goal". Given the different shades of opinions about what constitutes improved or unimproved toilet facility, sufficed it to say that any form of an unimproved toilet facility is preferred to open defecation because the negative externalities associated with open defecation are immeasurable (Guiteras et al., 2015; Shakya et al., 2015, Augsburg & Lesmes, 2015). This notwithstanding, sanitation policies should focus their goals to providing improved toilet facilities to maximize potential health benefits associated with them.

Jenkins & Scott (2007) developed the *Preference–Intention–Choice* conceptual framework to guide a study of behavioral indicators of household decision-making and demand for sanitation in Ghana that included households with shared or compound toilets. The authors argued that compound houses comprising multiple households is a common living arrangement in Ghana (Jenkins & Scott, 2007; Obeng et al., 2015b). Explaining this, Obeng et al (2015a) and (2015b) noted that the culture of the extended family system and multiple tenancies in houses encourages the sharing of latrines on compounds. Intuitively, many households in urban areas in Ghana live in rented compound houses, but only the property owners have the expressive rights to undertake investments in toilet facilities as a benefit to maximize rental charges.

Obeng et al (2015b) proposed a latrine ownership ladder to complement the sanitation ladder, advocating a departure from open defecation through simple, low-cost technologies to more advanced options based on the user's socio-economic and geographical context. They posited

that the latrine ownership ladder will typically depict a communal ownership, and progress along the private-public ownership, co-tenant ownership, and finally, household ownership of toilet facilities as the ultimate goal. Obeng et al (2015b) emphasized,

> *"sharing of facilities is incorporated in the latrine ownership ladder concept as a short-term antidote to open defecation and should not be seen as an alternative to the current emphasis placed on the promotion of household latrines. Rather, it is a measure for managing the risks posed to public health by those households who are unable to acquire their own latrines in the short to medium term due to one constraint or another" (Obeng et al, 2015b, p.755-756).*

The argument of 'limited sharing' strikes a point, and remain valid in most cases where the households keep it clean and neat. However, the 'limited sharing' promoters need to factor in the average size of a household which differs substantially across geographical and regional boundaries. What may be reasonablely accepted as limited sharing is less likely to be a universal agreement in different contexts and situations. This present study posits that shared households facilities and public toilets should not be part of the classification of improved toilets as they offer little protection and more likely to exposed users to the risks of contraction of infections, although it is not practical for every household to own a toilet facility as acknowledged by Obeng et al (2015b).

2.3 Effects of Poor Sanitation on Human Health

Coombes (2010) took an alarmist view when she posited: "global targets on sanitation will not be met until 2049, and not until the 23rd century in sub-Saharan Africa", (p.582). It is indeed

alarming if her position on the timeline for meeting the stated goals on sanitation is sustained. This has serious implication for multi-million task of eliminating poverty, improving health and malnutrition, especially among women and children in Sub-Saharan Africa since the region constitute majority of the vulnerable in society and the region where open defecation is high, compared to the developed regions (WHO/UNICEF, 2015). At present, Sanitation is one of the critical issues worthy of attention if we are to make improvements in child health and nutrition.

Coombes (2010) maintained that "without sanitation, one of the important determinants of public health, the chances of meeting many of the other global goals are much reduced" (p.582). Almost 50% of the malnutrition cases among children are caused by poor sanitation (Coombes, 2010; Cameron et al., 2013) as nematode infections and repeated diarrhea reduces normal food consumption and nutrient adsorption leading to impaired physical growth and cognitive development (Cameron et al., 2013). Cameron et al (2013) explained that, "poor sanitation leads to diarrhea and diarrhea can increase the prevalence of anemia because it reduces the absorption of nutritional intake, including the absorption of iron, which is used in the production of hemoglobin", (Cameron et al, 2013, p.24).

The literature (Coombes, 2010 and Cameron et al., 2013) on sanitation has produced incontrovertible evidence that poor sanitation or the use of unimproved toilet facilities endangers health, education, gender equity, nutrition, the environment, and the economy. According to WaterAid, an international Non-Governmental Organization (NGO) in Water and Sanitation, poor sanitation affects women and girls most severely because the unhygienic and unsafe conditions of toilets contribute to infection, especially when they are menstruating. "Aside

safety concerns", as a female participant in a focus group discussion asserted, "unsafe and unhygienic toilets facilities make us to loss our dignity, and we become vulnerable to sexual harassment or assault in the case of open defecation" (WaterAid, 2015).

The cost associated with poor sanitation extends far to the education sub-sector. The burden of disease resulting from poor sanitation undermines children's school enrolment and their attendance and this has resulted in poor quality education delivery in most developing countries as already discussed extensively by several studies (Water-Aid, 2015; Kema et al., 2012).

In many cases, the results of poor sanitation increases the risks of disease burden with its associated pressure on health systems which are in deplorable state in low income countries (Kema et al., 2012; Cameron et al., 2013). Overall, diseases caused by poor sanitation and unhygienic practices are estimated to cost about 5% of gross domestic product (GDP) in low and middle-income countries (Hutton, 2015). Water-Aid observed that the yearly global economic losses associated with inadequate water supply and sanitation are estimated to be US$260 billion, nearly double the net overseas development aid of US$135.2 billion in 2014 (Water-Aid, 2015). The International Labour Organization (ILO) (2003)[3] has estimated that 17% of all workplace deaths are due to disease transmission resulting from poor sanitation and hygiene practices).

2.4 Benefits of improve sanitation

The overwhelming research available (Todaro & Smith 2012; Hutton, 2012; Hutton, 2015; WaterAid, 2015) indicate that human capital, partly measured by the general good health of a

[3] http://www.un.org/en/events/toiletday/

people, increases productivity and the opportunity for accelerated economic development. For example Hutton's (2015) study of *Benefits and Costs of the Water, Sanitation and Hygiene Targets for the Post-2015 Development Agenda* confirms that "drinking water supply and sanitation both generate high economic returns to society, with returns exceeding costs for all interventions" (p.23). It is estimated that the economic returns in terms of gross domestic product (GDP) on a dollar (US$1) spent on eliminating open defecation and providing improved toilet yields a return of US$3 on the lower side to US$6 on the higher side to GDP (Hutton, 2015; Water-Aid, 2015). Improvements in water, sanitation and hygiene yield huge economic benefits because it leads to savings on health care-seeking costs, productive time losses from diseases, and savings related to reductions in premature mortality (Hutton, 2012; Hutton, 2015).

In fact, Cameron et al (2013) posited that "small improvements in sanitation are needed to give rise to large health effects given the benefits that flow across the community as a result of a less contaminated environment" (p.31). For instance, improved toilet facilities can reduce the transmission of pathogens that cause diarrhoeal diseases by preventing human fecal matter from contaminating environments (Cameron et al, 2013).

Indeed, improved toilet facilities reduces the occurrence of diarrhoeal disease more than 33% as well as reduce the adverse effects of other disorders responsible for child mortality (GSS, 2011).

2.5 Factors influencing ownership and acquisition of sanitation facilities

2.5.1 Socioeconomic Status (SES) Factors

Cutting across most research findings, there is a connection between the socioeconomic status (SES) of households and the level of access or ownership of toilet facilities. Based on a global review of research reports from eight countries namely, Cambodia, India, Indonesia, Kenya, Malawi, Peru, Tanzania, and Uganda over the 2006-2012 period, Devine (2009) and O'Connell (2014) concluded, among other factors, that socio-demographic, contextual and background factors do have some influence on who own a toilet facility in rural communities. These studies observed that households that own improved latrines were much wealthier, more educated, and had higher literacy rates than households that own unimproved latrine owners or open defecators.

Education

As found by O' Connell (2014), one of the SES factors is the level of education attained by the head of the household. The argument is that an educated household head is more likely to be informed better about the health consequences associated with unimproved toilet facilities and open defection. Also, his or her accumulated years of learning enhances his employable skills, which place his or her household in a sound financial position when it comes to taking a decision to invest in toilet facilities.

Globally, past and present studies (Roberts & Long, 2007; Nimoh et al., 2014; Adams et al., 2015), irrespective of the methodology being employed, have also consistently and conclusively maintained that there is a positive association between the educational attainment of the head of household and the probability of having access or owning an improved toilet facility. In fact, the literature suggests that for every successive level of education attained by a household's head,

the probability of owning a toilet facility increases. For instance, findings from a mixed method methodology involving a household survey and focus group discussion in Cambodia by Roberts & Long (2007) indicates that there is a positive relationship between the level of education attained by the household head and ownership of toilet facilities. Roberts & Long (2007) reported that households without latrines had less education compared with households with latrines, and that the higher the level of education attained by the household head, the more likelihood that household will own a latrine.

Another study involving 633 respondents in the Ningo-Prampram District in Ghana by Nimoh et al (2014) investigated households' latrine preference and financing mechanisms for improved latrines. In this study, the authors reported that the probability that a household head with some level of education will invest to acquire a toilet is nearly two times compared to a households' head with no formal education. Similarly, a study by Adams et al (2015), which used secondary data drawn from the 2008 Ghana Demographic Health Survey (DHS), reported that respondents with at least secondary school education were (1.08 more times) more likely to have an improved sanitary facility compared with those with no secondary education. The likelihood of owning an improved sanitary facility increased from (2.15 to 2.81) times for those with secondary and tertiary education respectively.

Beyond Ghana, is a study that was conducted in Indonesia by Irianti & Prasetyputra (2015). The study was conducted in Papua and west Papua Provinces of Indonesia, using secondary data from Indonesia's Multi Indicator Cluster Survey (MICS). Their study also reports that the chances of a household's to own an improved toilet facility increases when the educational level

of the head of the household is high. In a more recent study by Holm et al (2016) of adopters and non-adopters of the corbelled pit latrines in 15 districts in Malawi, they came to a similar conclusion that the educational level of the adopters was higher, compared to the non-adopters. Holm et al (2016) concluded that the adopters of the corbelled latrines were more likely to have a higher level of education, while maintaining that their findings were in agreement with O'loughlin (2006) findings in Ethiopia.

Income or wealth

Income is a flow variable, while wealth is a stock variable. Researchers (Roberts & Long, 2007; Cameron et al., 2013; Cameron et al., 2013; O'Connell, 2014) generally agree that progress on the sanitation level tend to be associated with increased level of incomes or reduced level of poverty among households. The studies above have concluded that relatively richer households have better chances of owning a toilet facility than their poorer counterparts.

Recent studies have contended that households repeatedly listed the cost associated with acquiring a toilet facility as the main obstacle to building or upgrading toilets, (O'Connell, 2014; Cameron et al., 2013). Cameron et al (2013) remarked that poor households are credit-constrained and thus, they have a reduced chance to build toilets facilities. Roberts & Long (2007) also maintain that income level of households and cost of latrines has long been key factors influencing a household's investment decisions in sanitation, while admitting that there may be other decisive factors, other than cost alone, which play a role in the overall low coverage of improved toilet.

The cost element may likely suggest the reason why subsidies are dominant in sanitation programs. For instance, the Community Led Total Sanitation (CLTS) which operates at community levels in collaboration with local NGOs, agencies, governments, and sanitation practitioners as well as researchers uses a mix of subsidies and sanitation promotion techniques that consistently play on people's emotion of disgust and the unacceptability of open defecation" (Shaka et al., 2015; Crocker et al., 2016). The CLTS is currently being implemented in 60 villages in the three northern regions in Ghana (Crocker et al., 2016).

Because of the relatively high cost of sanitary products, the role of subsidies and micro-credits in promoting sanitation coverage have been debated recently. Guiteras et al (2015) measured the effects of alternative policies on investment in hygienic latrines using a cluster-randomized trial in 380 rural communities (18,254 households in 107 villages) in the Tanore district of northwest Bangladesh. In their findings, they concluded that subsidies were effective in increasing level of coverage of sanitation, and thus in their own words, these findings are "consistent with a growing literature showing the importance of price as a primary barrier to adoption of health products" (p.905).

Relatively richer households are the ones who can install improved toilet facilities given the high cost of sanitary products in the absence of subsidies. Findings from recent studies such as Holm et al (2016), Adams et al (2015) and Irianti & Prasetyoputra (2015) suggest a unanimous and a consistent chorus that there is a significantly strong positive association between an increase in a household's income level and ownership of an improved toilet facility.

Similarly, a cross-sectional study involving 375 households in Mtwara Rural District, Tanzania by Kema et al (2012) analyzed the factors affecting the ownership and utilisation of improved ventilated latrines among households. The study concluded that households with a monthly income of 50,000 or more Tanzanian Shillings were two times more likely to own an improved latrine, compared to households who earn less in a month. This study is in agreement with another cross-sectional study involving 608 households in Ethiopia by Awoke & Muche (2013). Awoke & Muche (2013) suggest that households with yearly incomes of 5000 or more Ethiopian Birr were nearly two times more likely to own an improved latrine in rural communities in the Bahir Dar Zuria District. A similar trend was observed by Irianti and Prasetyoputra (2015) in Indonesia, where a unit increase in wealth index score significantly increased the probability of a household's access to an improved toilet by 13.10 per cent (95% CI: 11.79, 14.43). Kirigia & Kainyu (2000) also observed that as incomes increase, the log of odds of owning a toilet also increases in South Africa.

For instance, estimates from the WHO/UNICEF Joint Monitoring Program (JMP) indicate that the wealth quintile distribution of improved toilet facilities is peaked at 3% for the poorest households in Ghana and progressively increases to 5%, 6%, 12 % and 45% respectively for the second, third, fourth and richest households (WHO/UNICEF, 2015). Therefore, there is an association between socio-economic status (SES) and the position of households on the sanitation rungs. SES variables such as the level of education attained by the household, employment category (formal or non-formal) and the households' level of income or poverty as measured by wealth or poverty quintiles have shown to have had a very strong positive significant association with the probability of owning a toilet facility.

2.5.2 Socio-Demographic Factors

Gender of head of household

Beyond apparent income inequality in the distribution or coverage of improved toilet facilities, a growing number of studies have taken a step further to investigate the spread of gender balance in the distribution of toilet facilities. Jenkins (2004) study of adopters and non-adopters of latrines in rural areas in Benin observed that adopters of latrines were most likely to be male-headed households who have higher incomes and larger families, and or, might have had some travelling exposure in and within the urban areas in Benin.

Similarly, Roberts and Long's (2007) study indicated that female-headed households had the higher proportion in the distribution of the share of non-owners of latrines in rural Cambodia, compared to male-headed households. Kema's et al (2012) findings confirm Roberts and Long (2007) and Jenkins (2004). Kema et al (2012) found that the likelihood that a female-headed household would own an improved toilet facility was reduced by more than 60% in rural Tarzania.

In 2000, Kirigia and Kainyu analyzed the determinants of toilet facilities in South Africa with data from the Demographic Health Survey in 1994 – a year marking the beginning of freedom in South Africa after a long period of White supremacy rule. They found that male respondents in South Africa had 0.806 higher log of odds owning a toilet than their female counterparts, reminiscent of a period of "entrenched gender discrimination against women especially in matters relating to education and income-generating activities" (Kirigia & Kainyu, 2000).

In reverse, Ghana is different. This trend may not wholly hold in the Ghanaian context as latest studies by Nimo et al (2014) and Adams et al (2015) provide conflicting findings in Ghana. Nimo et al (2014) observed, contrary to Kema's et al findings, that the male-headed household rather had less than a 50% probability of financing the cost of building latrines compared with female household heads. They authors argued that women were more likely to have difficulty with open defecation, moreover; women may have more interest in owning a household latrine than their males counterpart because of their traditional roles of housekeeping management and child care.

Granted that there is no flaw in the methodological approaches adopted by Nimoh et al (2014) and Adams et al (2015), these findings seem to suggest that gender inequality in education and incomes and poverty might be relatively lower in Ghana compared to Tarzania, Cambodia and Benin. The poverty rates analysis of the 6th Ghana Living Standards Survey (GLSS 6) by gender of the head of the household yields evidence that female-headed households has the lowest poverty rates (19.1%) compared to male-headed households in Ghana (25.9%) (Cooke et al., 2016).

Household Size

A household may be a single adult person who lives on his or her own or it may refer to a group of persons living together and shares common housing and cooking arrangement in a dwelling unit, headed by an adult male or female (GSS, 2011). The size of the household reflects the average number of members in the household at a particular point in time. The size of a household has policy implication in all levels of interventions, so a number of studies have often

investigated the association between the average size of a household and ownership of toilet facilities.

For instance, Adams et al (2015) study found that the larger households tended to have better access to improved toilets compared with smaller households in Ghana. Similarly, Irianti & Prasetyoputra (2015) found that "every 10 person increase in number of household members, the probability of having owning an improved sanitation facility increases by 1.08 per cent" for households in Indonesia. Kirigia and Kainyu (2000) reported that the observed coefficient for household size was (-0.034) in South Africa, suggesting that for every one-person increase in household size, the log of odds of owning a toilet decreased by 3.4%, holding all the other explanatory variables constant.

2.5.3 Environmental factors

This section looked at factors which are related to the geographical location of the households, and for which this study has loosely classified as environmental factors. These factors may likely differ from one household to the other because of the geographical spectrum on which they find themselves.

Water supply

Water supply and its availability in sufficient volume and appropriate quality (Roberts & Long, 2007; Adams et al., 2015) is very essential for flushing and cleaning toilets, and largely determines the type of toilet facility a household will acquire (O'Connell, 2014). Thus, water is a "major determinant of a household's general hygiene situation" (Roberts & Long, 2007).

However, Coffey et al (2014) holds a contrary view that the absence of water supply in India is a binding constraint. This view is against the claims in policy discussions and in media accounts that lack of access to water accounts for the large number of open defecators in India. "In our related qualitative research project, which we have conducted on sanitation preferences and beliefs in rural India and Nepal, water was rarely raised as a constraint on latrine ownership in 99 in-depth semi-structured interviews" (Coffey et al., 2014).

Location of household

Recent studies suggest that communities that live very close to open space, gutters, beaches, rivers, streams and bushes have the higher tendency to defecate in the open (Cameron et al., 2013; Nimoh et al., 2014; O'Connell, 2014). Households view these resources as relatively attractive, easy, and inexpensive means to dispose of waste (Cameron et al, 2013; O'Connel, 2014). "This suggests that specific strategies focused directly at communities that are in close proximity to water bodies might be needed" (Cameron et al, 2013, p. 31). This probably might suggest why people living in rural areas are less likely to have improved toilets as against their urban counter parts.

In a study by Awuke & Muche (2013), households who live in close proximity (less than 30 minute walk) to health institutions were 2 times more likely to own a toilet facility than those who live far away (more than 30 minute walk) from health institutions - relatively inaccessible areas. It is self-intuitive that health officers help spread the good news about improved sanitation in public health campaigns to those households within reach. Moreover, Kirigia & Kainyu

(2000) and Adams et al (2015) observed that a relatively developed formal settlement or community is more likely to have improved toilet facilities.

Land or Space Availability

Land-space is increasingly becoming scarce for the construction of toilets because of the net inflow of people seeking greener pastures in urban areas. Some property owners are in the habit of converting toilet rooms for sleeping or storerooms because of increased demand for rents in the cities (Obeng et al., 2015a, 2015b). Sometimes spaces allocated or marked as construction sites are prone to flooding making those areas not suitable for any facility of that nature to be put up. For instance, O'Connell (2014) reports that unavailability of space and flood-prone lands make it impracticable to build new latrines when the old once collapsed or overfull. The lack of land-space might suggestively explain the differences in ability to construct or build toilets between property owners and tenants.

Occupancy status

Nimoh et el. (2014) and Obeng et al (2015a) found that property owners were three times more likely to provide space for the construction of toilet facilities than tenants due to the nature of tenancy agreements in most cities in the developing world. Roberts and Long (2007) also found that households "without latrines in urban areas were less likely to have additional spaces for the construction of such facilities".

Conclusion on literature review

A cursory look through the literature indicates that there exist some associations between socio-economic factors, demographics, and environmental factors, and the ownership of toilet facilities. The many evidences from the literature present a picture of uncertainty over the veracity of those claims. To avoid these claims which are inconclusive, this study will investigate the extent to which socioeconomic, demographic, and environmental factors shape households' demand for toilets at the districts level. It is undeniable that other factors such as technical design of toilet facilities, and supply side factors equally play significant roles in influencing the outcome decision of households to acquire toilet facilities but these factors have not been extensively discussed in this study.

2.6 The Theoretical and Conceptual Frameworks

2.6.1 The Utility Maximization Theory

Theoretical foundation of this study is the utility maximization theory borrowed from the works of Pattanayak et al (2007) and Augsberg and Lesmes (2015). Both studies by Augsberg and Lesmes (2015) and Pattanayak et al (2007) investigated the determinants of households toilets ownership uptake in India. Pattanayak et al (2007) adapted the neoclassicist's utility maximization theory, which explains the household production function when they investigated the determinants of household level decisions to build own toilets in Orissa, India. Using a community field experiment, Pattanayak et al (2007) sought to understand factors that account for toilet ownership at the household level in rural Orissa, India. As expatiated by Staudigel (2012), households' production concepts have been utilized as theoretical frameworks to focus on special factors and determinants of non-marketed goods such as environmental quality.

Households' toilet demand is a special case of utility maximization theory. The utility maximization theory or the household production theory assumes that households acquires or demand for utility yielding services such as improved sanitation by combining available means of "production" such as labour, money, capital, subject to optimal constraints. In utility maximizing theory, a rational or self-interested household allocates resources and time to acquire a set of products such as own private toilets. The demand for own toilet is conceptually described as a "type of averting behaviour" (Pattanayak et al., 2007).

Averting behaviour in economic science refers to the actions taken by households to reduce health-related problems when households are faced with environmental risks, such as poor sanitation. Under the assumptions of rationality in utility maximizing theory, households will strive to get their own toilets base on a rational expectation of how risks associated with poor sanitation is perceived and acted upon (Pattanayak et al, 2007).

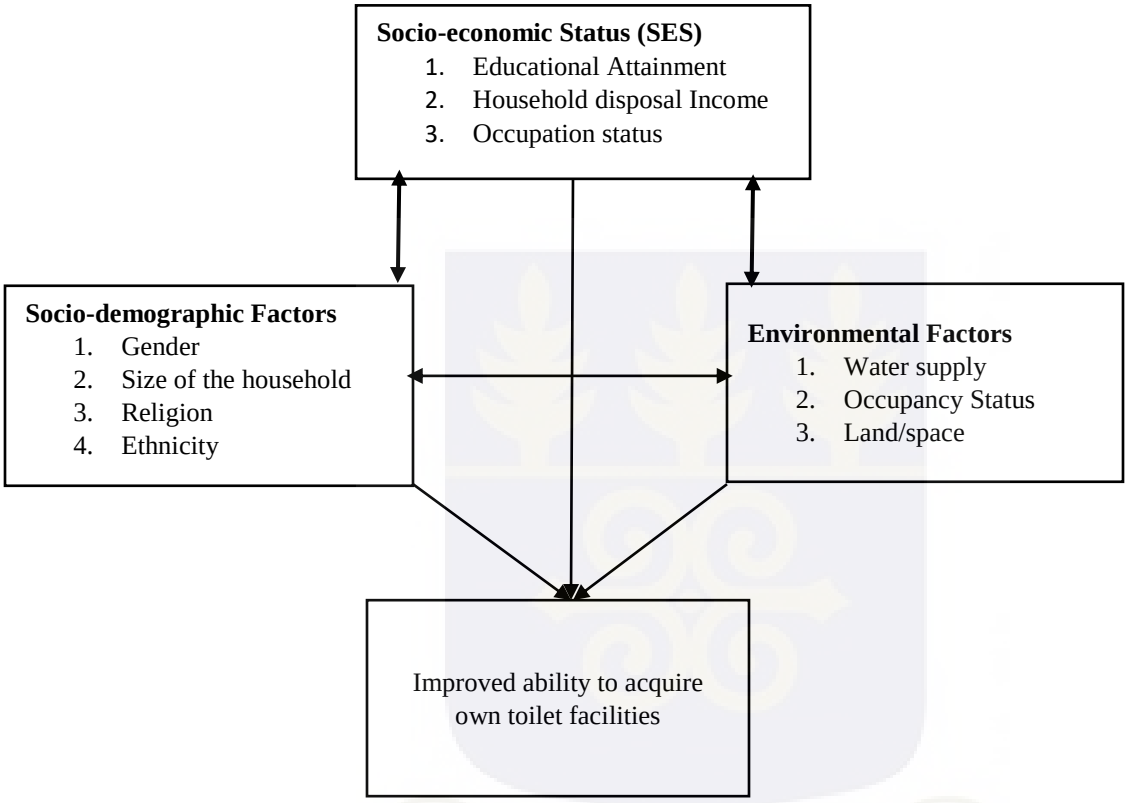
The studies Pattanayak et al (2007) and Ausberg and Lesmes (2015) have maintained that the household utility function is shaped by preference parameters such as demographics and socio-economics. It is against this background that this study adopts the utility maximization theory in investigating and interpreting findings on the determinants of toilet ownership in Madina Zongo.

2.6.2 The Conceptual Framework

The envisioned conceptual framework for this study is drawn from the synthesis gathered from the literature review and the theoretical base of the research. The conceptual framework is constructed on the assumptions that the socioeconomic status of a household, its socio-

demographic characteristics, and other factors [loosely classified as environmental factors in this study] constantly interacts among and between each other in determining household's toilet ownership.

Figure 2.2: The Conceptual Framework for the Study



Source: Author's Construst (2017)

These factors exert influence on each other to determine the likelihood that a household will own a toilet facility, as show in figure 2.2. Hence, ownership of a toilet facility is the response or outcome variable in this study. The predictors of the response variable include the educational level of the household's head, household's income, gender of head of household**,** the household's size**,** religious affiliation of household's head**,** ethnicity of the household's head, the household's access to water supply**,** land/space availability**,** and the household's occupancy status.

2.7 Conclusion

In the preceding sections of this chapter, the study discussed the importance of maintaining good sanitation, the risks of associated with poor sanitation, and the factors that account for the differences among households with and without improved toilet facilities. In conclusion, the study observed that the differences among households with and without their own toilets could be explained by leaning on the theoretical assumptions of the utility maximization theory and the conceptual framework outline above.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter gives a brief description of the study area, the research design, sample size, sampling procedure, methods of data collection and the various statistical methods used in the analysis of the different objectives. It also discusses the analytical model of the survey data.

3.1 Profile of the Study Area

3.1.1 The LI and Boundaries of LaNMMA

On 28th June 2012, the La Nkwantanang-Madina Municipalilty Assembly (LaNMMA) was inaugurated by Legislative Instrument (LI 2131) to run the affairs of the administrative areas in the Municipality. It is geographically positioned stretching from Latitude 5°81'3" N to Latitude 5°67'7" N, and Longitude 0°24'0" W to 0°13'1"W, as shown in figure 3.1. It covers a land area of 74.4 square kilometers. To the Western side of the municipality is the Ga East Municipal, from where it was carved; to the East by Adentan Municipality, the south by Accra Metropolis, and the north by the Akwapim South District (LaNMMA, 2014).

3.1.2 Overview of Political and Traditional Leadership

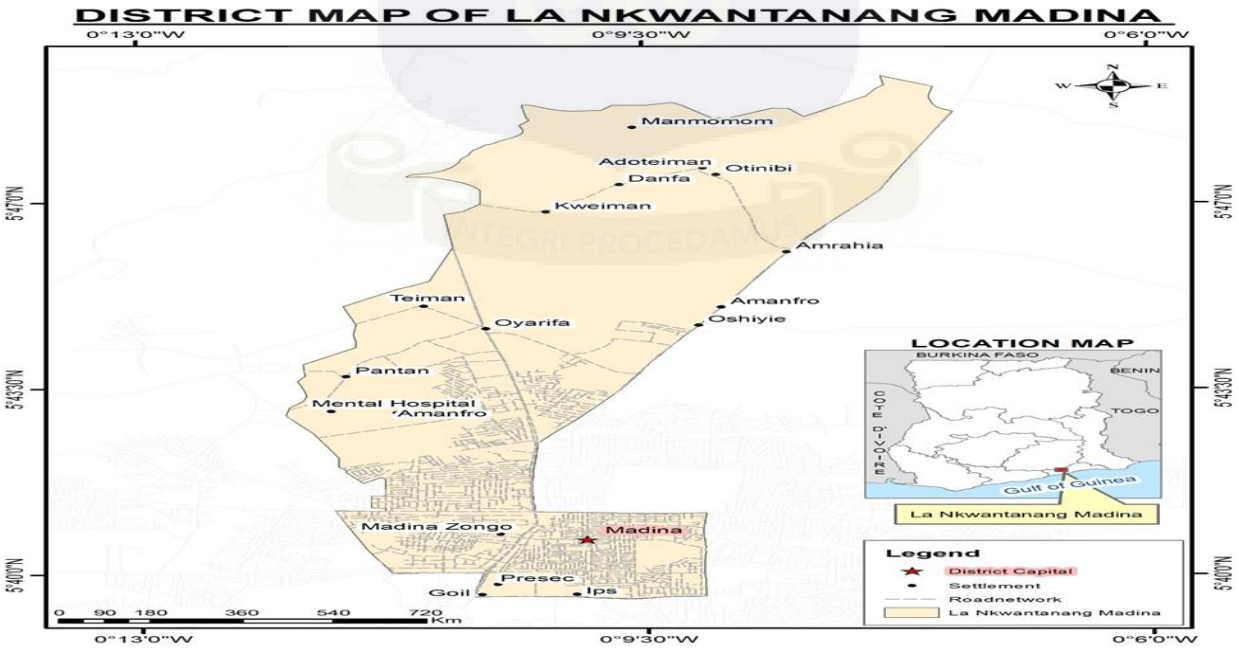
There are five (5) appointed and nine (9) elected Assemblymen from the following electoral areas: Madina West, Oyarifa, Pantang, Tataana, Social Welfare, North Legon, La Nkwantanang, Adenta West and Danfa, which constitute the Municipal Assembly - the highest political and administrative body in the municipality. The municipality has two Zonal Councils, namely the Madina and Oyarifa Zonal Councils. Aside the political leadership, there are three Traditional

Areas, namely the La Stool, the Danfa Paramouncy and the Oyarifa Paramouncy with great influence on the management of the Assembly (LaNMMA, 2014). Land is managed and owned by the chiefs, clan, or family heads. The Municipality is a cosmopolitan area with a variety of ethnic groups, with the Ga-Adangbe dominating.

3.1.3 The Population of LaNMMA

The Municipality has about 35 settlements, which are predominantly urban settlements - an estimated 82% to 84% of the population lives in urban areas (LaNMMA, 2014). With a provisional growth rate of 4.6%, municipality population was estimated at 124,268 in 2014, which consists of 51.5% females and 48.5% males, and an average household size of six (6). In addition, about 67.9% of the population falls within the economically active group and an age dependency ratio of 47.2% (LaNMMA, 2014).

Figure 3.1: The Map of La N-Kwantanang Madina Municipality



Source: La Nkwantang-Madina Municipal Assembly (LaNMMA) (2014)

3.1.4 Access to Water and Electricity Supply; Sources of livelihood

All settlements in the municipality are connected to the national grid. 92% of the rural population has access to potable water either from a borehole or stand-pipe. However, irregular water supply in areas within the municipality is one main challenge. Madina, the capital town, serves as the commercial hub for trading activities for the rest of the people. About 70% of the rural population depends on agriculture as their main source of livelihood, which is severely threatened due to the rapid estate development (LaNMMA, 2014).

3.1.5 Educational and Health Facilities

The municipality has 39 health facilities including a specialized psychiatric hospital at Patang, two Government polyclinics, two health centers, and two Community-Based Health Planning and Services (CHPS) compounds. Malaria is the leading cases of OPD attendance in the Municipality, accounting for about 80% of all cases. The Doctor, nurse, and midwife per population are in the ratio of 1:1,679, 1:265, and 1:1,657, respectively. Educational infrastructure is distributed quite fairly, as the municipality boasts of two public Senior High Schools, three private Senior High Schools and a number of public and private primary basic schools. The Municipality is also home to the National Community Development Training Centre that caters for technical/vocational educational needs of residents (LaNMMA, 2014).

3.1.6 Waste Collection and Management

The municipality collects about 490 tonnes (65%) of the estimated 750 tonnes of waste generated daily. Waste collection and management is dominated by the private sector whose share of the daily waste collected is about 81%. The households in the municipality mostly use the Ventilated

Improved Pit Latrines (13.2%), Kumasi Ventilated Improved Pit Latrines (23.4%), and water closets (38.8%). Public toilets serve as many as 4,963 (17%) households in the Municipality, while the rest of the households (6.7%) engage in open defecation. About 37 (1%) households in the municipality are estimated to be using the bucket or pan latrine. These figures slightly differ as compared to Madina. With Madina's population of 85,663 (est.2014), only 36,647 (42.78%) of the people have household toilets and as many 42,300 (49.38%) depend on public toilets. The others 6716 (7.84%) of the people is believed to be engaged in open defecation. Madina has the most densely populated communities but with very few toilet facilities, compared to other areas in the Municipality. Generally, the trend indicates that there is low coverage of sanitation facilities in some of the urban communities in the municipality (LaNMMA, 2014).

3.1.7 Brief Description the Study Area

The study area is Madina-Zongo, sub divided into four different sections: Main Zongo, Washington, Libyan Quarters and UN, which comprises Chicago and SDA sub sections. The Madina-Zongo falls under the Madina West Electoral Area in the Municipality. Unlike other urban areas in the municipality, Madina-Zongo has mixed tribes including Akan, Ewe, Krobos Gonja, Dagomba, Wala, Akans, and Nzemas (LaNMMA, 2014).

The dominant religion in the Zongo areas is Islam. Educational attainment among people living in Zongo areas in general has been very low, compared to other communities in the Municipality. Majority of the Zongo people are traders and hustlers, who migrate from the northern part of Ghana and neighboring Benin, Togo, and Nigeria- partly attributed to push and pull factors. In terms of housing conditions, the Madina-Zongo can only be described as livable,

compared to other areas in the municipality. Madina-Zongo is described as congested and highly dense in population, a situation likely to have profound ramifications on sanitation in general. The continued influx of people into the area have had an outward demand shift for housing units, compelling some of the immigrants to settle in unplanned and makeshift dueling units. These structures are constructed regardless of the serious implications they have on sanitation and the drainage systems.

Most of the housing units do not have adequate toilet facilities for its households. For instance, according to the Municipality's Medium Term Development Plan, close to 70% of the households living in these areas depend on shared facilities, especially public toilets that are in very deplorable state because due to the increasing pressure on them. The sanitation state in Madina-Zongo is critical, which compelled some residents to dump human excreta into the gutters, according to Adansi-Bonah (2016)[4] and the Medium Term Development Plan (LaNMMA, 2014)

3.2 Research Approach and Design

A research design reveals the strategic plan for a study. The choice of a research design for a study is largely influenced by the research questions, the types of data that need to be collected, and how it will be analyzed in order to answer the research questions in an appropriate manner (Adams et al., 2007; Creswell, 2007; Bhattacherjee 2012). Traditionally, quantitative and qualitative methodologies have been widely used in social science research with vary degrees of

[4] https://advancedprintblog.wordpress.com/2016/02/27/good-layout-poor-drainage-system-the-bane-of-madina-zongo/, February, 27 2016 ~ *By Elijah Adansi-Bonah*

strengths and weaknesses, for which reason some researchers prefer the mixed method which uses the strength of one to counter the weakness of the other (Creswell, 2007). Hence in this study, a mixed method methodology was adopted to help offset the weaknesses associated with using only quantitative or qualitative. Thus, the approach adopted here allow for both breadth and in-depth coverage of the sanitation issues.

The qualitative data provided a clear direction and meaning behind the quantitative results. This calls for method of triangulation (Bryman, 2006). Basically, the two important questions in a mixed method strategy is when and how does mixing occur? Data triangulation can occur at several stages: the data collection, the data analysis, interpretation, or even throughout all the three stages (Adams et al., 2007; Creswell, 2007; Bhattacherjee 2012). The mixed method methodology adopted in this study was at the interpretation level. Thus, during the presentation and discussion of results, the qualitative interviews were interweaved with the quantitative results to bring out the issues clearly and unambiguously in an attempt to find answers to the research questions in this study.

3.3 Sampling

The study employed both probabilistic and non-probabilistic sampling techniques for the quantitative and qualitative studies respectively. For the quantitative strategy of inquiry, the systematic sampling technique – one of the probabilistic sampling techniques - was applied in selecting eligible households for participation in the face to face questionnaire (interview schedule). To some extent, this technique ensured that each household within the study area had

a fair chance of being selected, a characteristic which allow researchers to make inferences and generalization about the population parameter.

3.3.1 Study Population

Though Madina Zongo comprises of four clusters, the study area focused on only the Main Zongo and Libyan Quarters, which were selected out of the four clusters using a simple random sampling technique. Therefore, the study or target population comprised all households residing in Main Zongo and Libyan Quarters. The estimated number of households living in these two suburbs areas is about 1020 households, according to La N-Kwantanang Madina Municipal Assembly (LaNMMA, 2014).

3.3.2 Sample Size calculation

For this study, the sample size was calculated using Yamane's (1973) proposed formula for the determination of sample size (Adams et al., 2007; Anaman, 2014). According to Anaman (2014), the desired sample size (n) = $\frac{N}{1+N(e)^2}$ · Where *N* is the known population, and *e* is the desired level of sampling error, assumed at 10% in this study. Therefore, by substituting *N* for 1020 and e for 0.1, the desired sample size (n) = $\frac{1020}{1+1020(0.1)^2}$ = 91. To ensure enhance statistical power (Bhattacherjee, 2012), the sample size (n) was double to 182.

3.3.3 Systematic Sampling Procedure

Main Zongo and Libayan Quarters are contiguous to each other, and as such, they share homogeneous characteristics in population size and housing units. Therefore, the study sample

91 households from each cluster (182/2). There was no sampling frame, for that matter the study had to settle on an improvised sampling method, analogous to systematic sampling technique. In this case, the housing units were numbered, and systematically selected from which only one household within the selected housing unit was interviewed. Thus the sampling unit was the housing units whereas the households living within them constituted the specific unit of inquiry. The k^{th} household/housing unit was calculated by dividing $(\frac{1020}{182})$. Therefore, the 6^{th} housing unit in the study area was selected for the interview. To obtain the starting point of the k^{th} term (6^{th} household living in the 6^{th} housing structure), the study used simple random sampling technique. The starting point by lottery fell on the first household/housing unit. Thus, beginning from one end of each cluster, the 1^{st} household/housing unit was selected, and afterwards every 6^{th} housing structure, on the lane was visited with questionnaires (interview Schedule) which were administered to the head of the household or spouse or children of the household head, if the head was not available. Only one eligible household living in a housing unit was selected, even if there were more than one households in it. For instance, in a particular housing unit where three (3) households were found, the researcher folded (3) pieces of papers mixed together in a bowl, one containing a "Yes" and the other two containing a "No". Each households then picked a folded piece, and the household which picked the "Yes" was interviewed. This method depicts simple random sampling without replacement, which has some degree of bias - the last household to pick a folded piece had a lesser degree of the probability of being selected. However, this was the best available option for the researcher. It must be mentioned that the systematic sampling method did not introduce any systematic bias because the population was homogenous and there were no need for stratification nor segregation.

3.3.4 Purposive Sampling

The purposive sampling technique was used to select the participants for key informant interviews (KII) and in-depth interviews (IDI). Using this technique, one key informant was selected, and five in-depth participants - two property owners and three tenants - , comprising two ladies and three men. This ensured that the participants with broad and in-depth knowledge and experience about the sanitation challenges of the study area were selected for their informed opinions and balance of judgement.

3.4 Methods of Data Collection

The data for the write up was drawn from both primary and secondary sources.

3.4.1 The Primary Sources of Data

The primary sources of data for both the qualitative and quantitative was collected in June, 2017. Interviews were the main methods employed to elicit information from the respondents in each case. Specifically, the interviews were of three kinds, namely face to face interviews, in-depth interviews (IDI) and key informant interviews (KIIs). During these interviews, two main instruments were used for the purposes of collecting data. For the quantitative aspect of the study, a face to face questionnaire or better still an interview schedule was used; whilst an interview guide was employed in the in-depth and key informant interviews to obtain qualitative data.

The face to face questionnaire, otherwise known as an interview schedule, that was used in this study comprised of three parts taking the objectives of the study into consideration, as shown in

appendix I. The first part deals with the background information of the respondents and seeks to obtain information on certain socio-economic and demographic variables such as size of household, age of the respondent, gender, marital status, religion, level of education , occupation and household asset. The theoretical perspectives and the literature review (see chapter two) show that these variables might have strong influence on ownership of toilet facilities. It was thus considered a priority to obtain such information for the analysis. The second part of the questionnaire consists of questions relating to the ownership of toilet facilities in Madina-Zongo whilst the third part contains questions seeking to identify binding constraints and suggestions for improvement in the provision of toilet facilities. The questions were pre-coded but allowed for '*other-specify option*' so that respondents would have the option of providing answers that might not have been included on the list of possible answers.

As mentioned earlier, in-depth and key informant interviews were also employed to gather qualitative data. These interviews were used to solicit detailed information from key informants and selected property owners and tenants. Two separate interview guides (see appendix II and III) were used for the in-depth and key informant interviews. One for the Director of the La Nkwantanang Municipal Environmental Health Unit. The other interview guide targeted two property owners (landlords) and three tenants, comprising two women and three men. The interview guides directed how the issues were to be discussed while allowing for fresh and interesting ideas that were related to the issues being discussed to be accommodated. As in the quantitative interviews, the participants of the in-depth interviews were equally relaxed and interacted openly with the interviewer. Once rapport was obtained, the discussants spoke their minds and openly pour out their feelings and frustrations with regards to households' owning

their own toilets. Thus, the study was able to view from the perspective of the interviewees what the sanitation issues were.

3.4.2 The Secondary Sources of Data

Secondary data serves as reference points, thus allowing for comparison of the methodologies and the results obtained from such methodologies in different studies and contexts under which the problem was investigated. To effectively do this, the study gather secondary data from published and unpublished sources including journals, books, official reports, articles, and internet sources. Majority of these types of data were used during the literature review where the major concern was to show how the problem studied appeared in different sections of society, and to present the views of earlier researchers on the topic. In subsequent chapters, most of these views were used to explain the findings.

3.5 Data Analysis

3.5.1 Data Management and Preparation for Analysis

The researcher checked the questionnaires for completeness, accuracy, and logical consistency on a daily. Where discrepancies, errors, and inconsistencies in responses were detected in the questionnaires they were promptly dealt with on the following day by contacting the household head for verification and correction. Objectively reviewed, verified and completed instruments were keyed into Stata Version 13, a data analysis software capable of handling both simple and complex statistical analysis. The generated data set was used for the quantitative analysis presented in chapter four.

3.5.2 Data Analysis Techniques and Tools

The data collected in this research was analyzed qualitatively and quantitatively. For the quantitative presentation, analytical techniques such as frequency tables, graphs, percentages and other analytical tools. Cross tabulations with statistical tests of significance were also performed in some instances. Stata Version 13 was employed in all the statistical analysis, and to create a wealth index for the households, using a list of assets attached in the appendix I, Q10. The steps to construct the wealth index and the command written by the researcher to estimate the logistics regression of the independent variables on the dependent variable-toilet ownerships- are attached in appendix IV.

For the qualitative presentation, the researcher transcribed the audio-recordings, and summarized the transcripts into meaningful formats, and interweaved the results during the interpretation and discussion of the quantitative analysis. Quotations are used to emphasize certain statements and assessments.

3.6 Limitation of the data collection Process

The field data collection exercise coincided the period of Holy Month of Ramadan, a period in which Muslims dedicate their entire time and life to fasting and prayers. This takes a lot of energy from them, and as such most of the Muslim households could only be contacted only during the hours of 10:00 am to 15:00 pm. They mostly complained of tiredness, and would not be willing to talk in the very early hours or late hours of the day, thus delaying the field data collection behind schedules.

The survey took place during the rainy seasons, which hindered the smooth coordination and operation of the data collection process. No doubt, there are reasons to believe that some of the households' responses to the questions could have changed had the interviews been conducted during the dry season.

The last limitation was the limited time and resources available for the researcher, hindering the study partly. For instance, under normal circumstances a proper and full listings of all households within the study area should have been undertaken, from which a sampling frame with the detailed information about all households would have been obtained for sampling. In the absence of this, the study had to rely on approximations techniques in the sampling process, which, to some extent, can affect representativeness and generalization.

3.7 Research Ethnics

Research Ethics is the moral code which makes a distinction between right and wrong (Bhattacherjee, 2012; Anaman, 2014). Ethical standards established in the scientific inquiry discipline frown on short cuts, acts and all forms of dubious means before, during, and after the data collection and analysis stages that undermine or bias the outcomes of the study (Anaman, 2014; Bhattacherjee, 2012). To this end, the study collected, analyzed and reported findings in language and format compatible with the rules governing scientific and social research. The ethical principles of seeking informed consent from respondents before the interview, maintaining and protecting their anonymity and confidentiality during the data collection and analysis stages were strictly adhered to in this study. Corrective measures were put in place to ensure compliance to protect the dignity of human subjects. For instance, the researcher's supervisor reviewed the survey instrument to be sure that its contents conform to the laid down

procedures required of on the field. Aside this, before commencement of the fieldwork, the researcher obtained confirmed consent from the La Nkwantanang Madina Municipal's Assembly which was given the opportunity to inspect the survey instrument. The Assembly Member for Madina West Electoral Area, within which the study area falls, was informed through a phone call before the survey.

3.8 The model specification for the study

"To some extent, there is some trial and error involved in choosing the "right" model for empirical analysis" (Gujarati, 2004, p.75). Sometimes the choice of the model depends on the scale at which the dependent (response or outcome) variable is measured, that is whether it is a binary (dummy or categorical) variable. A binary response variable is a dependent variable with a probability outcome lying between zero (0) and one (1) (Gujarati, 2004). For instance Y, the response variable reflects the existence or otherwise of some quality, and can take the value of (Y=1) when that quality exists or (Y= 0) for otherwise. In this circumstance, when the investigator is faced with a binary response variable (Y), he can choose one of these models: the linear probability model (LPM), the probit probability model (BPM) or the logistic (logit) probability model (LPM) (Kirigia & Kainyu, 2000; Gujarati, 2004; Wooldridge, 2012). The linear probability model is simple to estimate and use (Wooldridge, 2012), but its practicability and usefulness is limited (Wooldridge, 2012; Gujarati, 2004). The binding weakness of the linear probability model (LPM) lies in its inability to constrain the estimated probabilities (P_i) of Y within the meaningful range of (0) and (1) (Wooldridge, 2012; Gujarati, 2004; Kirigia & Kainyu, 2000). The coefficients or partial effects of the predictors can take any real values below (0) or above (1), unless complex restrictions are imposed on them (Gujarati, 2004). According to

Gujarati (2004), the assumption of linearity imposed on a probability scale fixed at (0) and (1) also makes use of the linear probability model problematic. For example, it assumes that probability (Pi) of Y increases linearly as the predictors (X) increases and so the partial effects or marginal or incremental effects of X remains constant (Kirigia & Kainyu, 2000; Gujarati, 2004; Wooldridge, 2012). To solve these two binding constraints of the LPM, an investigator can use complex binary response models such as the logistic or the probit models (Wooldridge 2012; Kirigia & Kainyu, 2000; Gujarati, 2004). Logit and Probit Models tend to yield similar results, the basic difference lies in the distribution functions. Logit model follows a cumulative standard logistic distribution; probit model follows a cumulative standard normal distribution (Bhattacherjee, 2012; Gujarati, 2004; Wooldridge, 2012). Thus, the preference for one model over the other depends on the distribution function one prefers (Bhattacherjee, 2012). Compared to the probit model, the logit model is easier to compute and interpret (Bhattacherjee, 2012; Gujarati, 2004).

In this model, improved toilet facility (Y) is the response variable with two binary outcomes: Y is one (1) when a household has an improved toilet facility, and Y is zero (0) when the household does not have an improved toilet facility. The Independent Variables are the predictors for the response or outcome variable Y, which are educational level, household wealth index, type of employment, sex; size of household, religious affiliation, and marital status. Let Y be the response variable for toilet ownership. The probability that a household has a toilet is given as (Y_i) and the alternative other outcome is (1- Y_i).

Then the odds ratio (OR) in favour of owning a toilet is (OR) is given as:

$(OR) = \left(\frac{Y_i}{1-Y_i}\right) = \beta 0 + \beta_1 Xi.$ …… ***Equation (3.3.4.1)***

According to Gujarati (2004, p.596), taking the natural log of the odds ratio (OR) gives us the logit model: $ln\left(\frac{Y_i}{1-Y_i}\right) = \beta 0 + \beta_1 Xi + ui$ ……***Equation (3.3.4.2).***

Where, *'ln'* is the natural logarithm, Y_i is the probability that a household owns a toilet, ***(1-Yi)*** *is the otherwise probability,* $\beta 0$ denotes the intercept parameter, the *Xi* denotes the explanatory variables, β_1 denotes the coefficients to be estimated, and *ui* is the error term. From equation (3.3.4.2), the model specification for estimation in this study is as follows:

In (Yi/1-Yi) = ß0 + ß1householdsize + ß2age + ß3gender + ß4religion + ß5maritalstatus + ß6educationallevel + ß7wealth + ß8employmentsector +ui……***Equation (3.3.4.3).***

Where *'In'* = the natural logarithm; *Yi/l-Yi'* = the odds ratio; *'ß0'* = the intercept term showing the probability of toilet ownership if all the explanatory variables were equal to zero. *'ß1- ß8'* = explanatory variables' coefficients measuring the impact of a one-unit change in each explanatory variable on the log of odds in favour of owning an improved toilet facility, holding all the other variables constant, while '*ui*' is the random error term capturing data measurement errors and omitted variables. 'ui' is assumed to be insignificant (Kirigia & Kainyu, 2000; Gujarati, 2004; Annaman, 2014).

3.8. 1 Description of Variables used in the Model

Household size is a count variable and it is measured at an interval level scale. Age of a respondent is also a count variable and it is measured at the interval level scale. Gender of the respondent is a dummy variable, with males coded as '1' and females '0'. Religious affiliation of

respondent is also a dummy variable, all other types of beliefs system is coded '0', and a Muslim is coded '1'. Marital status is also dummy variable, with '0' representing all other categories and '1' for married respondents. Educational level of respondent is measured at an ordinal level scale. Respondents with no formal education background is coded as '0', those who have completed primary education and/or junior high school are coded '1', those with secondary school level certificate are coded '2', all other respondents who completed training colleges, university and or, technical and vocational schools are code as '3'. The wealth status is a categorical variable measured at the ordinal level, the low income group is coded as '1', the middle income group is coded as '2', while the high income group is coded as '3'. Lastly, the sector of employment of a respondent is a categorical variable, measured nominally. The respondents' main occupation reported in the survey was reclassified along the lines of those on pension, coded as '0', the informal sector coded as '1' and the formal sector coded as '2'. For a summary of the expected signs of the variables used in the logit model, see table1.

Table 3.1: Definitions of variables and their expected signs

Independent Variables	*Construct*	*A Prior Expectation*	*Plausible Explanation*
Household size	Number of people in the household	An increase in house size will likely reduce the chances of owning a toilet, hence the a prior sign (−) will be expected	The study area is urban, and larger household may be reflective characteristic of low standard of living.
Gender	Sex of a person	Women will more likely have a better chance of owning a toilet than males, hence the prior sign (+) is expected.	The absence of toilet affects women's privacy, safety and comfort.
Age	Number of years attained since respondent last birth day	An increase in years will increase the chance of owning a toilet, the sign (+) is therefore expected.	As age increases, the desire for comfort, safety and improved health increases, hence the need to have own latrine.
Religion	One's Religious Beliefs as in Islam, Christianity, or	The prior sign of sign (+) is expected for a respondent religious back.	All things being equal, religion will significantly be associated a person's

	otherwise		chances of owning a toilet.
Marital status	A recognized and approved union between a man and woman	Married respondents will have more chances of owning a toilet compared to others in the study area, hence the prior sign (+) is expected.	This may be due to the combined effects of the age and gender, and the fact that married couples are more likely to pool resources together to acquire toilet
Wealth	As measured by a list of assets	A more wealth person will have greater chances of owning a toilet, therefore the prior sign (+) is expected.	The economic theory of demand. The quest for own toilet will more likely be backed by the ability to pay for the cost involved.
Occupation	Classified based on formal and informal sector, or otherwise	People in formal sector will more likely own a toilet, compared to the others. Therefore, the prior sign (+) is expected.	People working in formal sector spend a number of years in schools, which teach them the need for maintaining good sanitary practices.
Level of education	Having received formal training in a school	An advanced level of education in reference to no formal education will have greater chances determining toilet ownership	First they schools teach them to maintain good sanitation. Secondly, an educated person increase his chances of accumulating wealth in a decent job

3. 9 Conclusion

In this chapter, the study has discussed the profile of La N-Kwantanang Madina Municipality and the study area, albeit briefly. In addition, the study has demonstrated the research was designed in terms of methodology; data was collection, management, and analysis. From the theoretical understanding of binary response models, the model specification for the study is in line with the theoretical and the conceptual framework discussed in chapter two, and thus chapter three is concluded on this note.

CHAPTER FOUR

PRESENTATION AND DISCUSSION OF RESULTS

4.0 Introduction

This chapter focuses on data analysis, presentation, and discussion of results. As stated in chapter one, the purpose of this study was to investigate the factors that determine households' ownership of toilet facilities in Madina-Zongo. The objectives were (1) to assess the level of access to toilet facilities among households in Madina-Zongo and (2) to analyze the factors that influence householders' ownership of toilet facilities in Madina-Zongo. To effectively analyse these objectives, the study collected data from Main-Zongo and Libya Quarters, using both qualitative and quantitative methods, which have been analyzed, and therefore presented and discussed in this chapter

4.1 Background Information of Respondents

The total sample size of the households interviewed was 170, representing a high response rate (93%) of the total sample size of 182. To better understand the factors at the households level that significantly influence ownership of toilet facilities, the study targeted the head of the households or in their absence any knowledgeable adult member of the household who could provide accurate information about the household in general, and specifically, about the head of the household. As summarized in Table 4.1, four out of every five respondents that is 82.35% were heads of households, 12.94% were spouses, whilst 4.71% were children of heads of the household. Apart from the main survey, qualitative data was also captured which included a key informant interview (KII) with the director of the Environmental Health Department, La Kwantanang Madina Municipal Assembly. The other qualitative instrument included five in-

depth interviews with two land lords and three tenants; in terms of gender distribution, there were two only two women and they were all tenants. The remainder of this section is in four main parts namely, socio-demographics, socio-economic, and housing characteristics, and sources of information and knowledge about sanitation by the respondents.

4.1.1 Socio-demographic

The socio-demographic variables presented and discussed in this section include household size, age, sex of respondents, marital status, and religious affiliations of respondents.

4.1.1.1 The Household size

The mean household size of the respondents was four members in a household. Compared to the average household size for the La N-Kwantanag Municipality, the average household size (4) reported in this study is less than the average household size (6) for the entire municipality (LaNMMA, 2014). It may be attributed to the fact that the study area is an urban setting, and thus the reported household sizes are likely to be lower, compared to the general household size in the municipality, which has 18% of the households living in rural areas (LaMMA, 2014).

4.1.1.2 Age of respondents

The mean age of the respondents was about 40 years. As noted in previous chapters, the Madina-Zongo area serves as a hub for youthful and enterprising young men and women who migrate mostly from the northern part of Ghana in search of greener pastures, and therefore the average age of 40 years, described as an economically active age, likely depicts an accurate observation of Madina-Zongo. As in other urban settings, Madina-Zongo is a hustling ghetto environment, so

it is common to find the economically active age group dominating in various livelihood activities.

4.1.1.3 Sex of household head

More than half (55%) of the respondents indicated that their households were headed by males, and the rest (45%) were females' headed households. Gender differences continue to dominate policy discussions on access to necessities such as basic sanitation; therefore, an analysis of gender dimension in the distribution of ownership of toilet facilities is very informative for policy makers, for which reason a bivariate analysis of households who owned improved toilets and gender was conducted. From the sample of those who own an improved toilet (51), the bivariate analysis show that 43% were female's headed households and the rest were males' headed households (57%), however this observation was not statically significant (Pearson Chi Square =0.0725, P-value of 0.788).

4.1.1.4 Marital status of respondents

More than half of the respondents (65.88%) were married, while only (12.94%) were single, meaning they answered that they were not in any form of a relationship, whether dating or co-habiting, as shown in Table 4.1. Of the total number of respondents, (11.59%) were dating or co-habituating, others (5.88%) were divorced, and 8 respondents representing (4.71%) were widowed. This shows that the distribution of respondents on marital basis had at least one respondent representing one or the other category, albeit the married couples dominating. If marriage correlates with age, we should expect this observation since the average age of the

respondents in the sample is about 40 years - a period expected to be just around the early years of marriage in Ghana.

Table 4.1: Summary of socio-demographic characteristics

Variable		**Frequency**	**Percentage**
Gender			
	Male	94	55.29
	Female	76	44.71
	Total	*170*	*100*
Status of Respondents			
	Household Head	140	82.35
	Spouse of the Household Head	22	12.94
	Child of the Household Head	8	4.71
	Total	*170*	*100*
Marital status			
	Married	112	65.88
	Single	22	12.94
	Dating & Cohabiting	18	10.59
	Divorced	10	5.88
	Widowed	8	4.71
	Total	*170*	*100*
Religious Affiliation			
	Moslem	101	59.41
	Christian	66	38.83
	Traditionalist	3	1.76
	Total	*170*	*100*
Summary of Reported Household Sizes and age of respondents			
Variable	observations	Mean	SD
HH size	170	4.44	1.97
Age	170	39.76	10.21

Source: Field Data (2017)

4.1.1.5 Religious Background

In its design, the study sought to measure the religious beliefs of the respondents as religious differences might provide contextual information about the distribution of toilet ownership in the study area. It was also necessary for the study to observe religious trends in the study area since it is historically known to be dominated by Islam. As the summary shows in Table 1, more than

half (59.41%) of the respondents identified themselves as Muslims, and about (39 %) reported that they were Christians and only 2% of them practice African Traditional Religion, the oldest religion in Ghana and Africa. From the sample of households who own private toilets (51), the bivariate analysis shows that 72.55% were Muslims and the rest were Christians (27.45%), none of the Traditionalist's headed households had a toilet for their exclusive use. The observed pattern here was statistically significant at 10% (Pearson Chi Square = 5.8293, P-Value = 0.054).

4.1.2 Socio-Economic Characteristics

The socio-economic features of the households presented and discussed here include the educational level, occupation, and household wealth index.

4.1.2.1 Educational Level of Respondents

Regarding the educational level of sampled respondents, majority (28%) of the respondents surveyed had attained Junior High School (JHS) education and those with Senior High School (25%) followed them, as shown in Table 4.2. The results further shows that, in terms of tertiary education, most of the respondents were Diploma holders (12%), followed by First Degree holders representing 7%, and the only 2% having Masters' degrees. Those with vocational and technical training were 3% of the total respondents surveyed. Surprisingly, one would expect that those without any formal schooling in the area to be very low because it is at the center of the municipality, but this was not the case as 16% of the total respondents surveyed indicated that they had no formal education.

4.1.2.2 Employment Status of Respondents

Though the national unemployment rate of 23.3% is still high as compared to international standards (GSS, 2015), most of the respondents were working, albeit in the informal sector. Because Madina is a trading hub for most commercial activities in the municipality, majority of respondents (31%) indicated that they were traders in both second hand clothing, merchandise, and other assorted items. Others are hairdressers (2.95%), and tailors and dressmakers (7.65%) who were also in the informal sector or self-employment. In the formal sector of the economy of the area, only 12% of the respondents were civil and public servants, Nurses and Teachers represented 3.12% and 3.53% respectively. The results also indicated that 5.89% of the total respondents were pensioners.

Table 4.2: summary of socio-economic status of respondents (SES)

Variable	Frequency	Percentage
Educational Level Distribution		
No Formal Education	27	15.88
Primary Education	14	8.24
Junior High School	47	27.65
Senior High School	42	24.71
Tertiary Level (Diploma)	20	11.76
Tertiary Level (1St Degree)	12	7.06
Tertiary Level (2nd Degree)	3	1.76
Vocational & Technical Training	5	2.94
Total	170	100
Occupational Distribution		
Teacher	6	3.53
Civil and Public Servants	20	11.76
Nurses	7	4.12
Carpenter	4	2.35
Driver	12	7.06
Electrician	5	2.94
Mansion	5	2.94
Mechanic	3	1.76
Hairdresser/Barber	5	2.94
Seamstress/Dressmaker	13	7.65
Trader	52	30.59
Food Seller	8	4.71
Laborers & Security Guards	20	11.76
Pensioners	10	5.89
Total	*170*	*100*

Wealth Status based on assets		
Low income households	60	35.29
Middle income households	96	56.47
High income households	14	8.24
Total	170	100

Source: Field Data (2017)

4.1.2.3 Household Wealth Index

The study also measured the wealth[5] of the households taking into consideration various assets owned by the households. Some of these assets included land, houses, and selected household appliances, see appendix I (Q.10) for the full list of assets. With the list of assets, the study conducted a Principal Component Analysis using Stata Version 13, out of which a 3-quintile wealth index was created to measure how wealthy households were and how they were to perform on the distribution of ownership of improved toilets. The results are summarized below as shown in Table 4.2. Of the total number of households surveyed, 8.24% were in the high-income group, 56.47% were classified in the middle-income group, and 35.29% households occupied the low income category. From the sample of those who own improved toilet (51), the share of Low income households was 13.73%, that of Middle income was (66.67) and High income (19.61%), this patter was observed to be statistically significant at 1% (Pearson chi Square = 22.3866, P-Value = 0.000).

4.1.3 Housings conditions and characteristics

The background information in this section looks at the types of houses the households lived in, their occupancy status and the sources of water for drinking and for general purposes. In other studies (Obeng et al, 2015a; Adams et al., 2015), these variables were found to reflect the

[5] The study conducted principal component analysis with Stata Version 13, which was used to construct a wealth index for the households.

wellbeing of a household and how that household progresses to towards good sanitations practices such as washing, and cleanliness of toilets.

4.1.3.1 Types of Housing Units

This variable was an observatory variable, in which case the researcher observes the type of house the respondent lived in, but where uncertainty clouds in, it was necessary to ask respondents directly to state the type of house they were living in. Of the total number of respondents surveyed (170), nearly three out of four households (73.53%) lived in compound houses, the rest (20%) of them were living in apartments or self-contained houses, and only (6.47%) were living in improvised homes, such as kiosks. As stated in previous chapters, Madina-Zongo is gradually turning into a slum, and it is not surprising to witness as high as (6%) of the respondents living in improvised homes. These results have implications for ownership of toilet facilities because those in apartments and compound houses would be expected to have better toilet facilities than those living in kiosks. From the sample of households who own improved toilet facilities (51), the bivariate analysis show that the share of those living in improvised homes was only 1.96%, followed by compound houses (52.94%) and Self-contained dwelling units (45.10%). The Pearson-Chi test for statistical significance of association returned 1% as the significance level (Pearson Chi Square = 29.4368, P-Value= 0.000).

4.1.3.2 Occupancy Status

Respondents were further asked about the type of tenure of their residency and the results showed that those who owned their dwelling units were 33.53%, and majority (45.88%) were living in rented houses, with only 20.59% indicating that the housing unit was provided for free;

meaning it was a family house (see Table 4.3). The study investigated the association between households' occupancy status and the ownership of improved toilets. Of those who own improved toilets (51), the bivariate analysis show that the share of households in owner-occupied units was 78.43%, followed by 9.80% for tenants, and 11.76% for households who reported that they living in provided-for-free dwelling units. The pattern as observed here was statistically significant at 1% (Pearson chi Square = 67.2346, P-Value = 0.000).

Table 4. 3: Summary of Housing Characteristics

Variable	Frequency	Percentage
Type of Housing		
Kiosk	11	6.47
Compound House	125	73.53
Apartment/Self-Contained	34	20
Total	170	100
Type of tenure		
Living in Own House	57	33.53
Renting	78	45.88
Provided for Free (Family House)	35	20.59
Total	170	100
Source of Water for Drinking		
Piped to dwelling	10	5.88
Piped to Yard/Neighbour's yard	58	34.12
Public Tap/Stand Pipe	5	2.94
Bottle Water	4	2.35
Sachet water	93	54.71
Total	170	100
Sources for general use		
Piped to dwelling	17	10
Piped to Yard/Neighbour's yard	125	73.53
Public Tap/Stand Pipe	12	7.06
Protected Dug Well	11	6.47
Rain Water Collection	2	1.18
Water Tanker	3	1.76
Total	170	100

Source: Field Data (2017)

4.1.3.3 Sources of drinking water and general use

Respondents were also asked to indicate their source of drinking water and the results is summarized in table 4.3. More than half (54.71%) of the households relied on sachet water vendors who operate in the area for their drinking water. 5.88% got their drinking water from piped water connected to their dwelling, 34.12% got theirs also from piped water connected to the yard or from a neighbour's yard, and 2.35% got their water from bottled water. As to water used for other purposes, 73.53% indicated that their source of water for other uses came from piped water to the yard or neighbours yard, 10% got theirs from piped water to the dwelling, 7.06% had theirs from a public/stand pipe. The rest include 6.47% of the households which use water from protected dug wells for bathing and washing, 1.18% households presently harvest rainwater for general uses, and only 1.76% households relied on water tank services (see Table 4.3).

4.1.4 Sources of Information and knowledge relating to sanitation

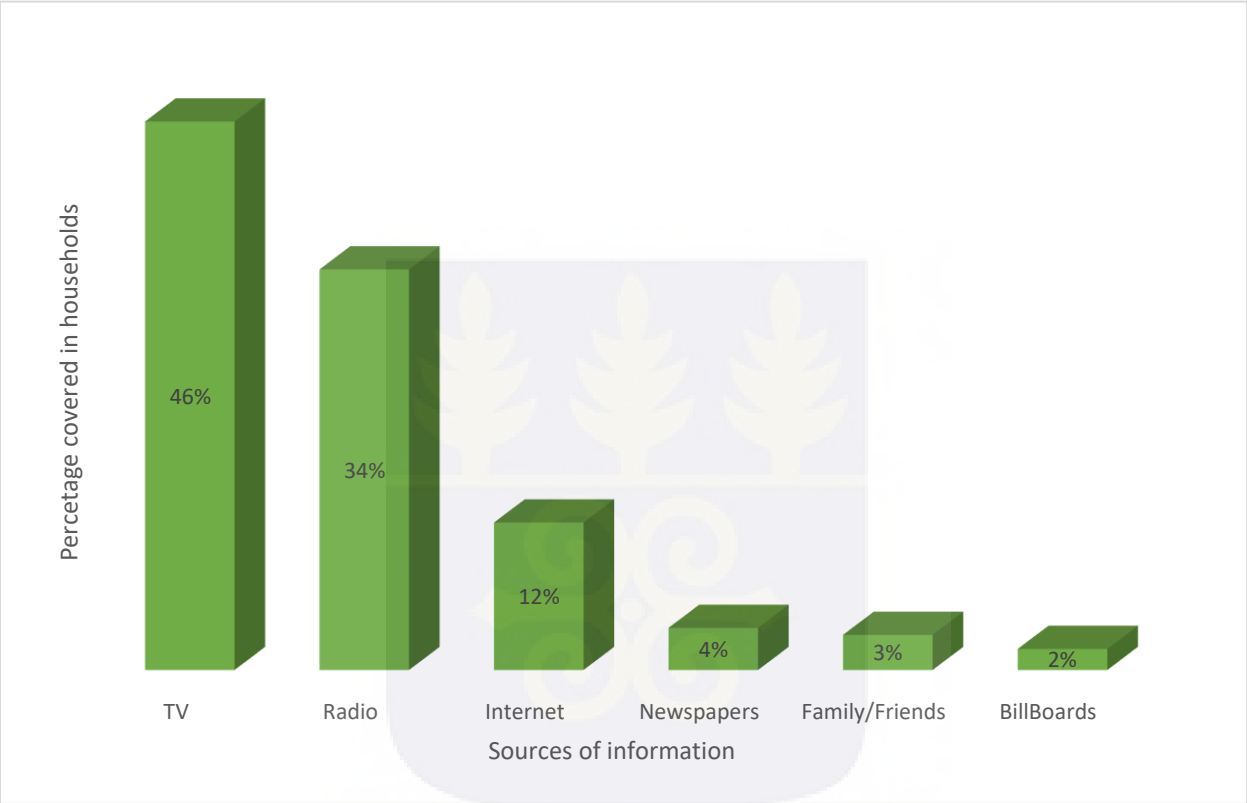
4.1.4.1 Sources of information

Information is a key driver of change of social life; the information exchange channels available to households would help them to understand their living environment and the sanitation issues affecting their daily lives. For these reasons, the study sought to understand the sources of information available to the respondents and their household members.

Out 170 households, 46% of them indicated that their primary source of information was the Television, while 34% of them indicated that they get information from the radio stations. The

internet and social media accounted for 12% of the available sources of information to households, as shown in figure 4.1.

Figure 4.1: Sources of information available to households

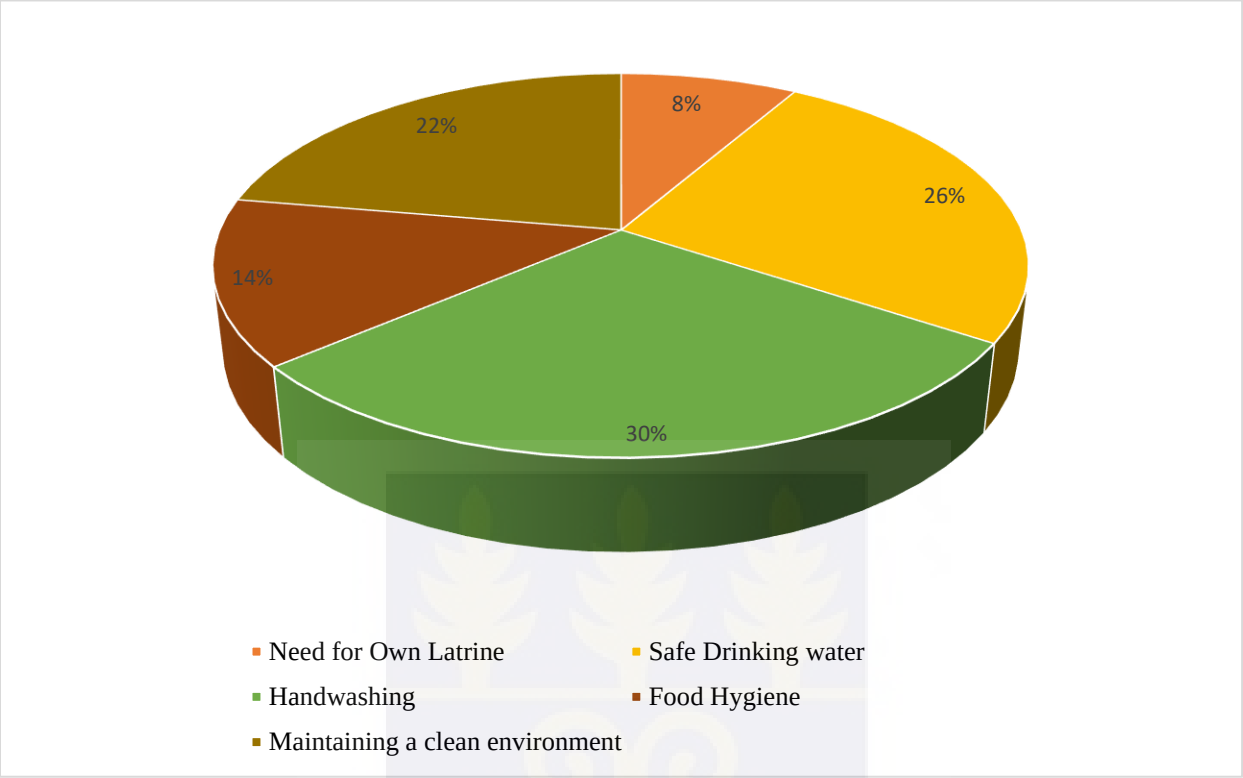


Source: Field Data (2017)

4.1.4.2: Sanitation related information received by respondents

They respondents were asked to indicate the type of sanitation information they receive from the sources, as show in figure 4.2. The results showed that (30%) of them received information relating to handwashing, 26% on safe drinking water. Only 8% of them indicated that they received information on the need for a household to have its own toilet, as shown in in figure 4.2.

Figure 4.2: Types of sanitation-related information received by respondents



Source: Field Data (2017)

4.2 Level of access to toilet facilities

4.2.1 Introduction

As indicated at the introductory section of chapter four, one of the objectives of this study was to assess the extent to which the study area is served by the various types of sanitation facilities available to them, taking into account the technology types and their ownership status. In this section, the order of presentation is as follows: first, the study presents the type of toilet facilities covered in the study, the households' ownership status of these facilities, and the sanitation ladder. The second part deals with shared facilities, the number of toilet facilities in a household,

number of households per a shared facility, location of the toilets, number of minutes it takes to use public toilets and the common nuisances of the toilet facilities.

A summary of the results show that the average number of toilet facilities in a household was 1.25 per household, while the average number of households per shared facilities was 6. The average household size in households with shared facilities was about 5, that of the average number of household size in households which did not share their facilities was about 4, and finally the average length of time taken to walk to a public toilet, use and come back was 20 minutes (see Table 4.4).

Table 4. 4: Summary of households with and without toilet facilities

Variable	Observation	Mean	SD
Average Toilets in a Households	126	1.25	0.45
Average number of Households Per Shared Facility	75	5.66	2.72
Average Household Size in Households with Shared Facilities	75	4.79	2.02
Average Household Size in Households who do not share their Facilities	51	4.43	2.21
Average length of time taken to walk to a public Toilet, use and come back	40	20.33	14.4

Source: Field Data (2017)

4.2.2 Types of Toilet Facilities

This part focuses on the type of toilet facility usually used by members of the households, the ownership status, and the sanitation ladder.

4.2.2.1 Toilet facilities found in the study

Of the total number of households interviewed (170), 60 (35.29%) households were served by KVIP, and 42 (24.71%) households had access to flush/pour flush into septic tank, while another 23 (13.53%) households were served by flush/pour flush into closed pit latrine. The other 35 (20.59%) households had access to pit latrine with slap, and 6 (3.5%) had access to pit latrine without slap (see table 4.5).

Table 4.5: Types of toilet facilities found in the study

Types of Toilet Found in the study area		
Flush/Pour Flush to Septic Tank	42	24.71
Flush/Pour Flush to Pit Latrine	23	13.53
KVIP	60	35.29
Pit Latrine with Slap	35	20.59
Pit Latrine without Slap	6	3.53
No Facility (use gutters and Buckets)	4	2.35
Total	170	100

Source: Field data (2017)

One would not have expected that households within the heart of the municipality would not be served with any kind of toilet facilities, but the results defied this expectations as 4 (2.35%) households indicated that they had no toilet facility and did not patronized public toilets either, as shown in table 4.5. Based on the type of toilet technology, pit latrine without slap is classified as unimproved toilet facility as it presents high risks of users being exposed to fecal matter. The figures in table 4.5 indicate that if the study were to classify improved toilet facilities based on the type of technology, about 94% of the facilities reported by households would have been described as improved. Nevertheless, improved toilet facilities are normally classified based on

two criteria: (1) type of the technology and (2) the households' sharing status. An improved toilet therefore is any of the facilities that can hygienically prevent human contact with fecal matter, and exclusively reserved for a single household. By this definition, only 51 households were found to own unshared improved toilet facilities in the study area (see table 4.6).

Table 4.6: The distribution of households based on ownership of toilet facilities

Based on Technology Type	Shared/public (Unimproved)	Unshared (Improved)	Total
Improved types:	N (%)	N (%)	N (%)
Flush/pour flush into septic tank	26 (21.85%)	16 (31.37%)	42
Flush/pour flush into septic tank	8 (6.72%)	15 (29.41%)	23
KVIP	44 (36.97%)	16 (31.37%)	60
Pit latrine with slap	31 (26.05%)	4 (7.84%)	35
Unimproved types:			
Pit latrine without slap	6 (5.04%)	_____	6
No Facility	4 (3.36%)	_____	4
Total	119 (100%)	51 (100%)	170

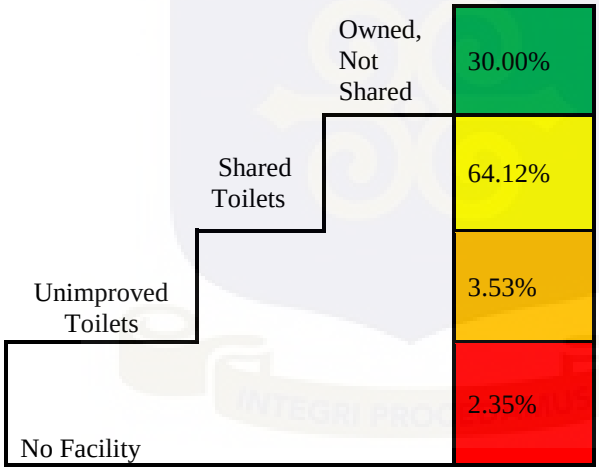
Source: Field Data (2017)

4.2.2.2 The sanitation ladder

The sanitation ladder indicates rungs, which connotes the sanitary practices by households as they move away from unacceptable practices such as open defecation through a number of steps towards the ultimate goal in sanitation. The ultimate goal in sanitation is for every households to own an unshared improved toilet facility. Thus, respondents were asked to indicate if they share their toilet facilities with other households, or with the public or the toilet facilities were

exclusively reserved for members of their households only. The results as shown in figure 4.3, indicates that more than half (64%) of the households shared their toilet facilities with other households and the general public. Of the percentage of those using improved shared toilets (public toilets constituted 37%, and shared with other households constituted 63%, as shown in figure 4.3. These figures are typical of a Ghanaian compound houses where there may be one toilet facility for the entire membership of that household (Obeng et al., 2015a, 2015b; Jenkins & Scott 2007). Generally, these figures are similar to the results obtained by Obeng et al (2015a) and Nimoh et al (2014) conducted in Ningo-Prampram Municipality of the Greater Accra Region.

Figure 4. 3: The sanitation ladder found in the study



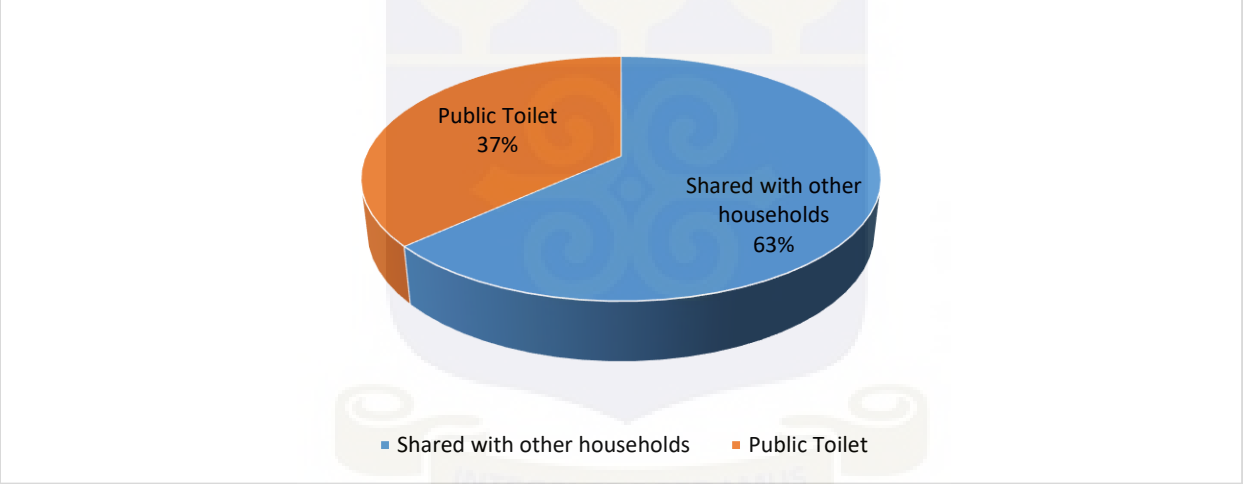
Source: Author's construct (2017)

Of the remaining number, only 2% resort to other demeaning forms of defecation such as bucket/pans and flying toilet, which this study classifies as open defecation popularly called. The argument is that the contents of such buckets and polythene bags ends up in gutters and dustbins which could be considered as open defecation. Here, it is emphasized that some of the respondents (all single households) indicated that defecate in polythene bags and buckets and

later empty their contents into the gutters. This practice may be popular among people in urban-slum settlements as the availability of open spaces are limited. In a Key Informant Interview (KII), the Municipal Environmental Health Director (KII) stated that the sanitation situation was worsening because many households were resorting to risky sanitation practices. He emphasized,

> *"Households' toilet coverage is very low; households that have toilet facilities are below 50%, especially in Zongo. Most of the households are resorting to public toilets and shared facilities, but public toilets are not meant for households, they are meant for those in transient population" (Director, Environmental Health Unit).*

Figure 4.4: Distribution of shared toilet facilities



Source: Field Data (2017)

In general terms, the findings in this study are consistent with WH/UNICEF JMP (2015) which estimates that 60% of Ghanaian households are served by shared toilets, and only 30% of Ghanaians living in households have improved toilets.

4.2.3 The General distribution of Facilities found on the field

The part deals with the shared facilities, the number of toilet facilities in a household, number of households per a shared facility, location of the toilets, and the common nuisances of the toilet facilities.

4.2.3.1 Number of households with Toilets (Shared and Unshared)

The study also assessed the number of toilet facilities in a household and sharing status, the results of which is summarized in Table 4.7. Out of the 126 facilities, the results indicate that as high as 95 (75.4%) of the households had only one toilet facility within the household, 30 (23.81%) of the households had two toilet facilities, and only 1 (0.79%) of the household had more than two toilet facilities.

4.2.3.2 Number of households per shared toilet

Out of the 95 households who had one toilet facility, the results indicated that 65.33% of them shared this facility with other members. 33.33% of respondents with two toilet facilities shared with other members, and 1.33% of respondents with two or more toilet facilities shared with other members (see table 4.7).

Table 4.7: Summary of toilet facilities: unshared, shared, and public use

Variable	Freq.	(%)
Number of households with Toilets (Shared and Unshared)		
Households with Only 1 Facility	95	75.40
Households with 2 Facilities	30	23.81
Households with More than 2 facilities	1	0.79
Total Households with Toilet Facilities	*126*	*100.00*
Number of households which share their Toilets with other households		
Households with Only 1 Facility	49	65.33
Households with 2 Facilities	25	33.33
Households with More than 2 facilities	1	1.33

Total Households with shared Facilities	*75*	*100.00*
Number of households which do not share their facilities with others		
Households with Only 1 Facility	46	90.20
Households with 2 Facilities	5	9.80
Households with More than 2 facilities	_	_
Total Household's Facilities That Are Not Shared	*51*	*100.00*
Reasons for more than 1 Toilet in a HH (both shared and unshared households)		
Users are many	22	70.97
Don't Like to Share with Others	3	9.68
Separate for Males & Females	6	19.35
Total Households with more than 1 Toilet Facilities	*31*	*100.00*
Reasons for more than one Toilet Facility (in Households with Shared Facilities)		
Don't Like to Share with Others	_	_
Users are Many	21	80.7692
Separate for both sexes	5	19.2308
Total	*26*	*100*
Reasons for more than one Toilet Facility (in households who do not share their Facilities)		
Don't Like to Share with Others	3	60.00
Separate for Males & Females	1	20.00
Users are many	1	20.00
Total	*5*	*100.00*
Location of Household Toilets		
In own Yard	98	77.78
In own Dwelling	28	22.22
Total	*126*	*100.00*

Source: Field Data (2017)

4.2.3.3 Number of households per shared facilities

The results indicated that 65.33% of households with only one toilet facility shared this facility with other members. 33.33% of respondents with two toilet facilities shared with other members, and 1.33% of respondents with two or more toilet facilities shared with other members (see table 4.7). As for those who did not share their toilet facility with others, 46 (90.20%) of those with only one facility did not share, and 5 households representing 9.80% of those with two toilet facilities did not share.

4.2.3.4 Reasons for more than 1 Toilet in households

Respondents surveyed were also queried as to the reasons for having more than one toilet facility for those in households with both shared and unshared facilities. The results indicates that 22 (70.97%) respondents among those with more than one toilet facility answered that they simply do not want to share with others, whilst 19.35% asserted that they did so in other to create convenience for males and females hence the need for more than one toilet facility. The same reasons were required for households with only shared facilities and the result indicated that 80.76 said that the users were many, and 19.23% indicated there was the need to separate the facilities for men and women. Those households who do not share their facilities gave varied responses 70.97% reasoned that the users of such facilities are too many hence the need for more than one. Of the total number of respondents surveyed, 60% indicated that they did not like to share, 20% said they needed to separate them for males and females, and another 20% said the users of the facilities were many hence the need for more than one.

4.2.3.5 Location of toilet facilities

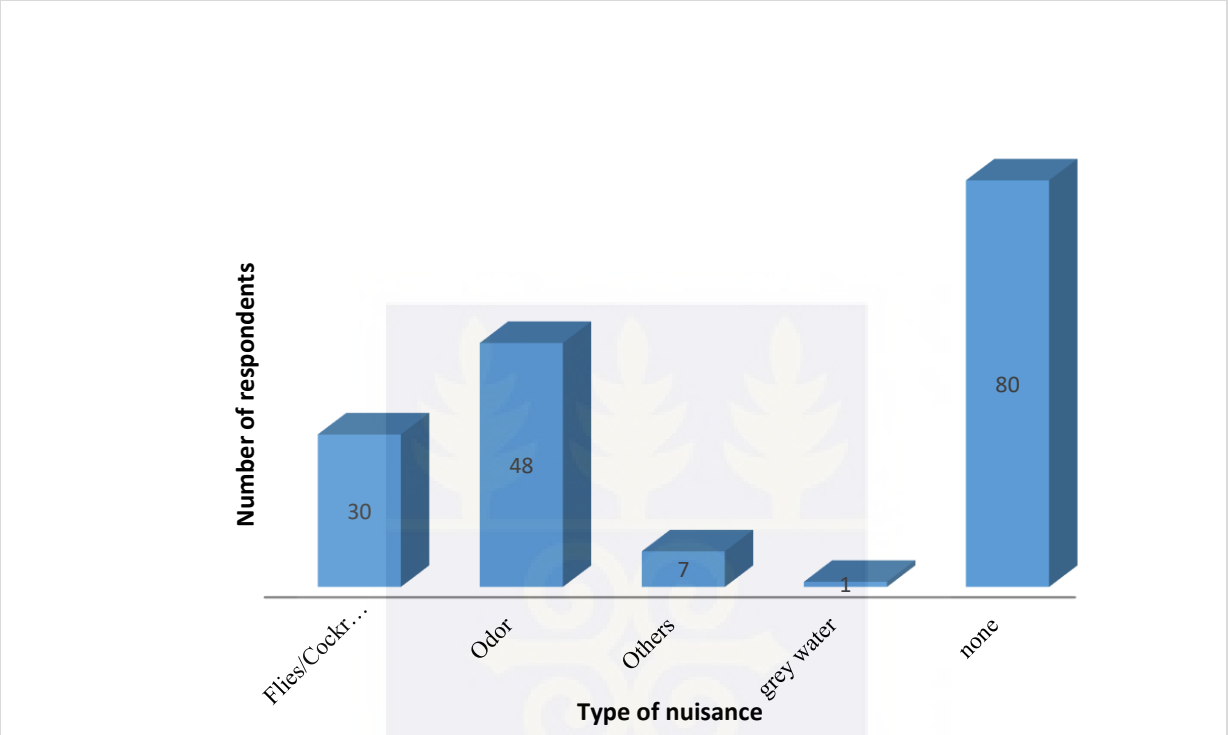
In one survey, respondents were asked to indicate where household toilet facilities were located. 98 respondents representing 77.78% revealed that toilet facilities were located within their own yard and 22.22% indicated they were located within the dwelling.

4.2.3.6 Nuisance relating to toilet facilities

Information was also sourced from respondents concerning some of the sanitation issues they encounter in their facilities. The results indicated that 80 respondents said there were no problems with their toilet facilities; meaning their facilities were properly constructed and

maintained, so no known issues were raised. However, 48 said there was the issue of odor that in their toilet facilities, 30 were of the opinion that their facilities attract flies and cockroaches.

Figure 4.5: Nuisance reported by respondents



Source: Field Data (2017)

7 were also of the opinion that the issues they faced were of different scales apart from the aforementioned and they cited issues of overcrowding among others, whilst only 1 was of the opinion that they got grey water seeping out of their facilities (see figure 4.5). For example, regarding the odor, a respondent explained that it is a very bad situation especially visiting the public toilet, he said:

> *"using the public toilet is not hygienic, because of the odor. I normally remove my shirt before going inside and when I come out of it, I have to bath immediately if not if someone come close to me he will not like my body odor" (Respondent1, in-depth Interview).*

Table 4.8: cross-tabulation of nuisances by sharing status

	Odor	Flies And Cockroaches	Grey Water	Others	None	Total
Not Shared	7 (14.58%)	7 (23.33%)	————	————	37 (46.25%)	51
Shared with Public	17 (35.40%)	10 (33.33%)	1 (100%)	4 (57.14%)	8 (10%)	40
Shared with other households	24 (50.00%)	13 (43.33%)	————	3 (42.86%)	35 (43.75%)	75
Total	48 (100%)	30 (100%)	1 (100%)	7 (100%)	80 (100%)	166

Source: Field Data (2017)

Out of respondents who indicated that their toilets had odor (48), 35.40% of such toilets were unshared facilities, while 50.00% were shared with other households, and 35.40% were public toilets. Among the sub-population of those who complained of flies and cockroaches (30), about 76% of them were shared toilets and only 22.33% were unshared as shown in Table 4.8. From Table 4.8, it can be deduced that 85% of those who reported that they had problems with odor were using shared toilets. The issue of odor in shared toilets is explained satisfactorily in Kwiringira et al (2014). Kwiringira et al (2014) found that the lack of proper maintenance and the incidence of many users per shared facility results in bad odor and maggots, thus forcing people to descend on the rungs of the sanitation ladder.

4.3.1 Perceived Advantages of owning a toilet

Majority (23%) of the respondents said owning a toilet improves their general health, while 20% indicated that they enjoy their privacy if they owned a toilet facility in their household. Another 20% were of the opinion that owning a toilet facility improves hygiene in general. 19% said it was more comfortable, 12% said it was more convenient and that it saves time, and 3% each said

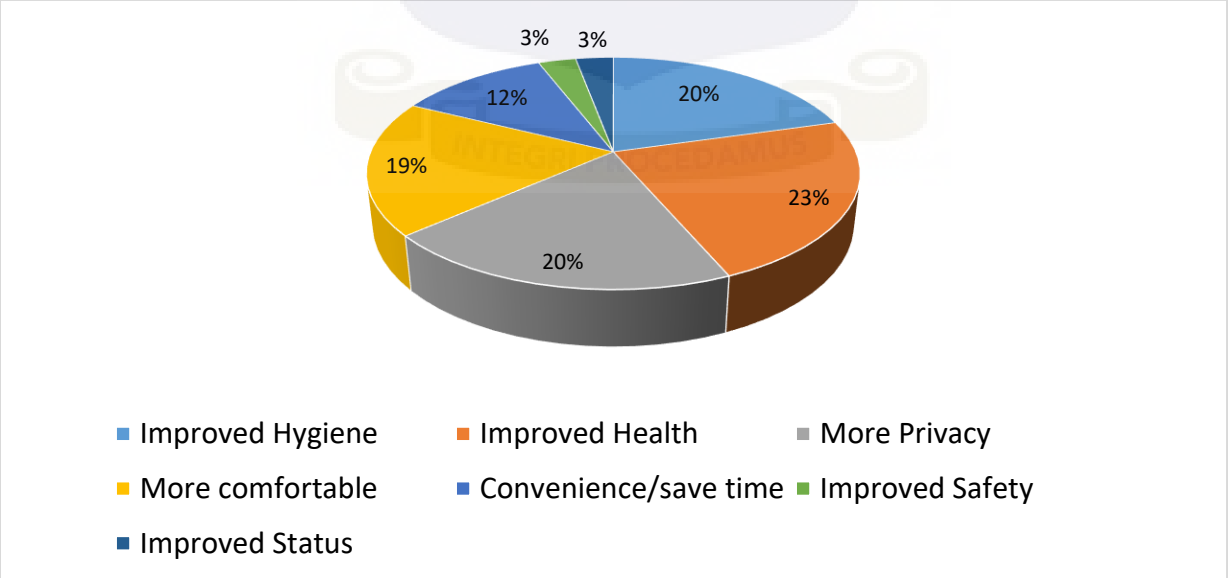
it improved their safety and also their status in the community respectively (see figure 4.6). To summarized it all, a respondent in the an interview indicates,

> *"If you have your own toilet it is very advantageous, you have privacy and you can keep it clean all the times, if the toilet facility is neat it will prevent people from contracting infectious diseases such as whites, especially for us ladies" (Respondent 2, in-depth interview).*

Another respondent explained that it is very convenient, hygienic and safe in times of bad health, he explained how the absence of a toilet affects him currently,

> *"see, my brother had an accident and he is lying down in the room, he cannot walk to the public toilet, so he defecates in a bucket and I later throw it into the gutter. If there was a toilet facility in our house here, I would not go through this hell" (Respondent3, in-depth interview).*

Figure 4.6: Perceived advantages of owning a toilet

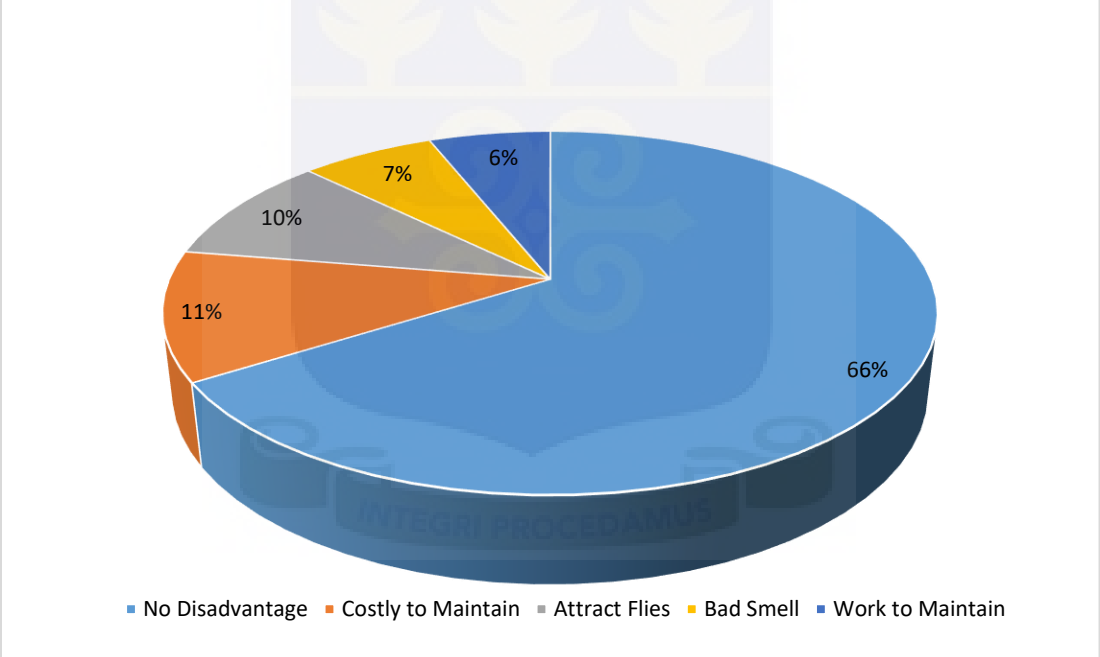


Source: Field Data (2017)

4.3.2 Perceived disadvantages of having toilet

On the other hand, respondents also gave their views concerning the disadvantages of owning a toilet facility and the results are summarized in figure 4.7. It indicated that people were generally of the opinion that owning a toilet facility presented no known disadvantage as shown by the number of respondents who subscribed to this opinion (66%). However, 11% were of the opinion that toilet facilities were costly to maintain so it makes sense if it was a shared facility because in that case the responsibility would not rest on an individual.

Figure 4. 7: Perceived disadvantages of having own toilet



Source: Field Data (2017)

As it was explained by a respondent in the in-depth interview:

> *"the problem with having your own toilet facility is that when it gets full, it becomes very costly to pay for the removal of the sludge, so if you are many you can contribute to pull it out" (Respondent 4, in-depth interview).*

Nevertheless, a land lord disagreed with this view, when he suggested that there are big problems with sharing a facility with other households, he indicates:

> *" a problem with sharing a toilet facility is that when it is time to pull the toilet out, some tenants would not contribute, this brings a lot of problems, and they don't keep the place clean" (Respondent5, in-depth interview).*

4.4 Determinants of Toilet Ownership

As indicated in the introductory section of chapter one, the second objective of this study was to assess the factors that determine ownership of toilet facilities among households in Madina-Zongo. Improved toilet, the dependent variable means a toilet facility that is constructed of the right technology, reserve exclusively for a single household. Of these technology types, only 51 households owned and exclusively reserved them for members of their households. The improved technology type covered in the study-included flush/pour flush into septic tank (31.37%), flush/pour flush into closed pit (29.41%), Kumasi Ventilated Improved Pit (KVIP) (31.37%), and Pit Latrine with Slap (7.84%).

The study used Stata Version 13 to model a logistic regression of the independent variables on the dependent variable (ownership of an improved toilet facility), for a summary of the independent variables, see Table 4.9. The results of the analysis are presented in Table 4.10. Thereafter, a discussion of the results.

Table 4. 9: Descriptive analyses of variables for logistics model

Dependent Variable	**Sub-sample**	**Total Sample**	**mean**	**Value Label**
Toilet Ownership status		170		
Own a household Toilet	105			0
Own no household Toilet	65			1
Independent Variables:				
Household Size		170	4.44	
Age		170	39.67	
Gender		170		
Female	76			0
Male	94			1
Marital status		170		
All other categories	58			0
Married	112			1
Religion		170		
All Other Regions	69			0
Moslems	101			1
Occupancy status		170		
Tenants & Perchers	113			0
Landlord	57			1
Educational level		170		
No formal education	27			0
Basic Level	61			1
Secondary Level	42			2
Tertiary Level	35			3
Technical Vocational Training	5			4
Employment Sector		170		
Pension/unemployed	10			0
Informal sector	127			1
Formal Sector	33			2
Income based on wealth index		170		1
Very Poor	47			1
Poor	47			2
Rich	62			3
Very Rich	14			4

Source: Field Data (2017)

Table 4.10: Results of Logistics Regression

Independent Variables	Marginal Effects	Standard Errors	Z	P-Value	(95%	CI)
Household Size	-0.050	0.021	-2.4	0.016**	-0.091	-0.009
Age of household head	0.002	0.005	0.37	0.711	-0.007	0.011
Male [A]	-0.050	0.094	-0.54	0.593	-.235	0.134
Muslim [B]	0.146	0.078	1.89	0.059*	-0.006	0.298
Married [C]	0.120	0.086	1.39	0.164	-0.049	0.289
Educational Level [D]**:**						
Basic Level	0.113	0.053	2.15	0.031**	0.010	0.216
Secondary Level	0.155	0.068	2.28	0.023**	0.022	0.289
Tertiary Level	0.720	0.100	7.2	0.000***	0.524	0.916
Sector of work [E]**:**						
Informal Sector	0.076	0.188	0.62	0.410	0.685	-0.292
Formal sector	-0.046	0.189	-0.24	0.808	-0.416	0.325
Wealth Status [F]**:**						
Middle income	0.145	0.070	2.06	0.039**	0.007	0.283
High income	0.660	0.155	4.27	0.000***	0.357	0.963

Logistic regression	Number of observations	=	170
	LR chi2(12)	=	71.88
	Prob > chi2	=	0.0000
Log likelihood = -67.90638	Pseudo R2	=	0.3461

Source: Field Data (2017)

Notes:
***, **, * Represent P-values statistically
Significant at 1%, 5% and 10% respectively

Base/Reference:
A= Female,
B= other religions,
C= unmarried,
D= No Formal Education,
E= On Pension, and
F= Low Income Households

4.4 Discussion of the results of the logistics regression

4.4.1 Socio-Demographics

Gender

Gender has been at the center of policy discussions, and it gained prominence during the implementation of the MDGs and SDGs of the United Nations. Social protection and services relating to sanitation, for example, subsidizing the price of toilets for households, have often been justified because most households headed by females are among the vulnerable in society. These measures are indeed justified, if they are aimed at addressing the inequitable distribution of basic sanitary facilities between females' and males' headed households. Quite recently, a number of studies (Adams et al., 2015; Roberts and Long' 2007) have sought to investigate the gender differences in access to essential services such as education, health and sanitation, as this may be important for policy formulators. Similarly, this study investigated the gender differences in toilet ownership, and the results presented here show that males as compared to females were less likely to own toilet facilities in the study area. Holding all variables constant at their mean values, the probability that a male headed household would own an improved toilet facility decreased by 5%, however the observed pattern was not statistically significant, even at 10%. Even though the observed pattern is not statistically significant, the magnitude and direction are, however, consistent with Adams et al (2015) and Nimoh et al (2014). These two studies in Ghana have found that females' headed households had a better chance of owning a toilet facility than males' headed households. The interpretation is, however, exercised with caution as the discussion on gender difference is based on the magnitude and the direction, and not the statistical significance. Nevertheless, statistical significance should not deprived researchers from making interpretation when it makes sense to do so with economic theory. The literature

suggest that females are prone to infections from poor sanitary conditions, which makes sense as the theory of "averting behaviour" and "utility maximization theory" suggest that households who are exposed to risks from poor sanitation would be rationally expected to invest in acquiring improved toilet facilities.

Age

The results as shown in Table11 suggest that a unit increase in the age of the head of the household would increase the probability of owning a toilet facility by 0.2%, holding all variables constant at their mean values. However, the standard errors and the P-values are not statistically significant. Comparatively, the data set used in this study is smaller as observed by other studies who have investigated the determinants of ownership of toilets worldwide, hence the observed statistical insignificance may be due to lack of statistical power. However, the predicted pattern in this study confirms that of Kirigia and Kainyu (2000, p.671) who suggested that "a one year increase in the age of respondents increases the log of the odds that he/she owns a toilet by 0.021, holding all other explanatory variables constant". Again, the present study cautiously interprets the observed pattern here along the lines of economic theories, and not on statistical significance. The "health economics theory stipulates that as individuals' age increase, their stock of health depreciate at an increasing rate" (Kirigia and Kainyu, p.671), while the utility maximization theory and averting behavioral theory would expect the average rational household head who derive utility from physical, mental, and psychological wellbeing to invest in goods and services which can improve their wellbeing. Therefore, it makes sense that as the age of a head of household increases, he/she will be rationally expected to acquired improved toilets, which is considered as one of the preventive measures against poor health arising from

poor sanitation, as suggested by (Pattanaya et., 2007; Ausberg and Lesmes, 2015; Kirigia and Kainyu, 2000).

Household size

Hold all other explanatory variables constant, a unit increase in the size of a household will decrease the probability of owning a toilet by 5%, statistically significant at 5%. A larger household size in an urban setting is probably symptomatic of a deplorable living condition. As the analysis in the previous section shows, the average household size (6) in households sharing facilities is higher than the average household size (4) in households who do not share their facilities with any other household. The study draws from this pattern that large household size may constraint household's income budget, especially if the composition of the household size is largely made up of dependents, other competing needs for the family's limited income may dominate the need for own toilet. For instance, respondent five in the in-depth interview had this answer when he was asked about what constrained him from having own toilet,

> *"…however due to money problems, we only have one toilet that is used by a lot of people. Fees for self-contained are too high and I have dependents on me. I have no option than to pay for a lesser rent and use the public toilet facility" (Respondent 2, In-depth interview).*

Marriage

The study also investigated marriage as one of the parameters influencing the outcome of toilet ownership. As the results in Table 11 shows, a change from the marital status of a respondent from unmarried to married increases the respondent's probability of owning a toilet facility by

12%, when all covariates are held constant. But the observed standard errors and p-values are not statistically significant. However, based on the direction and magnitude, one can plausibly explained that, owning an improved toilet is quite expensive, and so married couples are in a better position to pull resources together to get their private toilets. In addition, Ausberg and Lesmes (2015) suggest that when a female joined a household as in marriage in India, the probability of that household owning a private toilet increases. Married couples are more likely to be concerned about safety, privacy and comfort, and as such sharing a toilet facility with other households would endanger these concerns, as a respondent in the in-depth interviews indicated,

> *"I told my husband to let us acquire one of the toilets the council[6] is selling, I am not comfortable with our shared toilet. I feel very uncomfortable cleaning the toilet because I am afraid of some of the things I see in that toilet when I go to clean it" (Respondent 2, in-depth interview).*

Religion

Religion is a very sensitive issue in a world characterized by religious politics and extremisms. For this reason, the study precedes to comment on its findings on religion with great care and respect for all types of religions. In statistical language, it is not uncommon to commit a type II error, that is to claim that evidence exist when in fact it does not exist and ought not exist, because such evidence runs counter to logic and theory.

Nevertheless, the logistics regression results as presented in Table 11 show that a shift from a non-Muslim headed household to a Muslim headed household increases the probability of owning a toilet by 27%, statistically significant at 10%, while all other covariates are held

[6] Council is a common name used by the people in the study area to refer to the Municipal Assembly. She was referring to the GAMA subsidized toilets for poor an low income households.

constant at their means value. This results is consistent with Mahama (2013) who conducted a similar study in a Muslims dominated area; the author found that Muslims were more likely to own a toilet facility over other religions, statistical significant at 10%.

4.4.2 Socio-economic Status (SES)

The Socio-economic Status (SES) of a household has an important role in a household's ability to live in comfort and dignity. It is the driving force of most desirable things in live, such as having a prestigious home fixed with a modern toilet. The socio economic status of households continue to shape the dynamics of public and private life, lifestyle and wellbeing. It influences many aspects of life. Researchers (Roberts & Long, 2007; Cameron et al., 2013; Cameron et al., 2013; O'Connell, 2014) have had a unanimous findings which suggest that owning an improved toilet, exclusively used by a household is a function of the households' SES.

Education

Thus, this present study premised that socio-economics factors, as measured by educational level of the head of the household and household's wealth would have significant impact on households' ability to own a toilet. The results presented here confirm previous studies, incontrovertibly. For instance, the results show that as educational level increases from no formal education to Basic, Secondary and Tertiary Level, the probability of owning a toilet increases successively from (11%), (16%), and (72%), respectively, while holding all other covariates constant at their mean values. This observed pattern is statistically significant at 5% for those in basic and secondary level, and at 1% for those in tertiary level. This results is consistent with Pattanayak et al (2007), Roberts and Long (2007), Awuke and Muche (2013), Hussain (2015),

Nimoh et al (2014), Adams et al (2015), Ausberg and Lesmes (2015), and Holm et al (2016). These studies are unanimous in their findings that educational level of households' head have significant influence on toilet ownership. The observed pattern is consistent with the utility maximization theory. The theory assumes that a unitary household is a rational economic agent, and common sense suggests that rational economic agents evaluate decisions on a benefit-cost analysis. The predicted pattern as shown by the results suggest that an educated household's head is more likely to be aware of the consequences of poor sanitation and are more likely to have a reasonable knowledge of how to avert the risks of poor health associated with poor sanitation. Thus, in keeping with economic principles outlined above, educated households may be more inclined towards making the necessary investments for their households to have better sanitation facilities.

Wealth

It is a known fact that the wealth status of a households determines the household's living conditions, such as the availability of improved toilets in the household. Poverty hinders many households from owning or even accessing the necessities of life, such as improved sanitation, while wealth enables them. The benefits of owning an improved toilet need not be repeated as it have been well expatiated by the literature reviewed in chapter two. The literature summarized that rich households have advantage over poor ones with respect to owning improved sanitation facilities, as well as meeting other basic needs.

In order to investigate the chances of owning an improved toilet on the basis of how poor or rich a house is, the study constructed a wealth index from the list of assets provided by households. As the results show in Table 11, as wealth status of households change from low to middle and

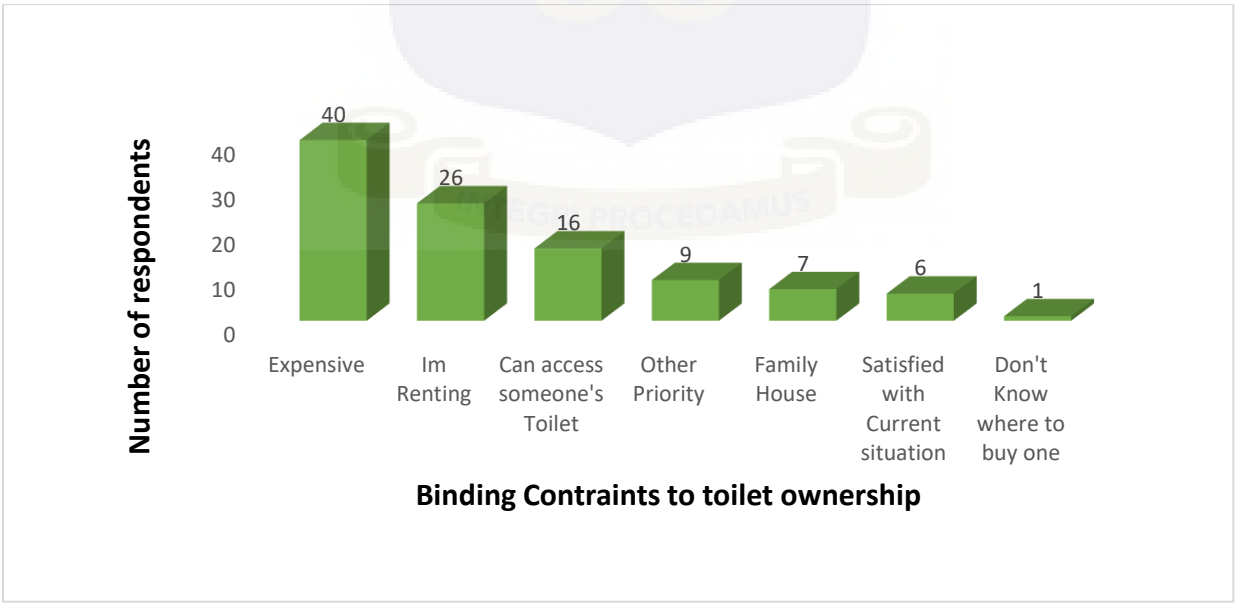
high incomes, the associated probabilities of households owning an improved toilet increases by 15% and 66% respectively. As expected, the magnitude of the probabilities increased as the wealth quintile change from the base. These results are statistically significantly at 5% and 1%. The results as indicated confirm other scholarly works. For instance, Kigira and Kainyu (2000), Hussain (2014), Adams et al (2015), Irianti and Prasetyoputra (2015), and Ausberg and Lesmes (2015) all found that the higher the affluence of the household, the more likely it would own an improved sanitary facility. These results indicate that poorer households are less likely to own improved sanitation facilities compared to richer households in Madina-Zongo. From the above findings, it can be deduced that the results resonate with economic theory which expect households to buy economic goods, that is goods with positive marginal utility (see Hussain, 2014), such as a toilet facility. Economic theory suggests that there will be an increase in consumption of economic goods when income increases. In line with economic theory, richer households derived more utility such as comfort, privacy, and prestige from improved sanitary facilities, as reported in the literature. The poor households have high desire for these utilities too, but they cannot pay for them at higher costs, and are thus deprived of owning one. The empirical evidence suggest that only higher incomes or wealthy households would be able to afford an improved toilet. This phenomenon underscores the importance of extending social services and protection programmes to poor areas in Ghana. Presently, the GAMA project is targeting about 1000 households in low incomes areas including Madina-Zongo, in the La N-kwantanang Madina Municipality, with subsidised improved toilets.

4.5. Binding Constraints to households' toilets ownership

Aside the discussion above, there is the need to look at other binding constraints which prevents households from acquiring own toilets, holistically. One of the common reasons for not installing toilet facility is attributed to insufficient financial resources, which is reiterated here. From the results of the quantitative analysis of the sample who reported that they had no toilet (105), majority (40) of them indicated that acquiring a toilet facility was excessively expensive. Later, in the in depth interviews, a respondent supported this claim:

> *"I am a tenant; I feel it is a good thing for me to have my own toilet facility. If I had a personal toilet facility, I would be very happy with it, but financial constraints prevent me from having one. In fact, it all has to do with money" (Respondent 3, in depth interview).*

Figure 4. 8: Purported reasons for households' inability to construct own toilets



Source: Field Data (2017)

The findings in the study is consistent with O'Connell (2014) who suggested that households repeatedly listed cost as an obstacle to obtaining individual household latrines. The rest of the quantitative frequency analysis showed that 16 were of the opinion that they had access to a neighbours' facility and that was why they saw no need to acquire one. 9 of the respondents said they had other priorities like housekeep than owning a toilet facility (see figure 4.8).

The study raised the issue of high price of toilets with the Environmental Health Officer during the KII. He suggested that there are other underlying factors other than the cost component. He explained that some of the people complaining that toilets are too expensive can pay for them, but, does not want to do so because some of them are used to free-things.

He summarized:

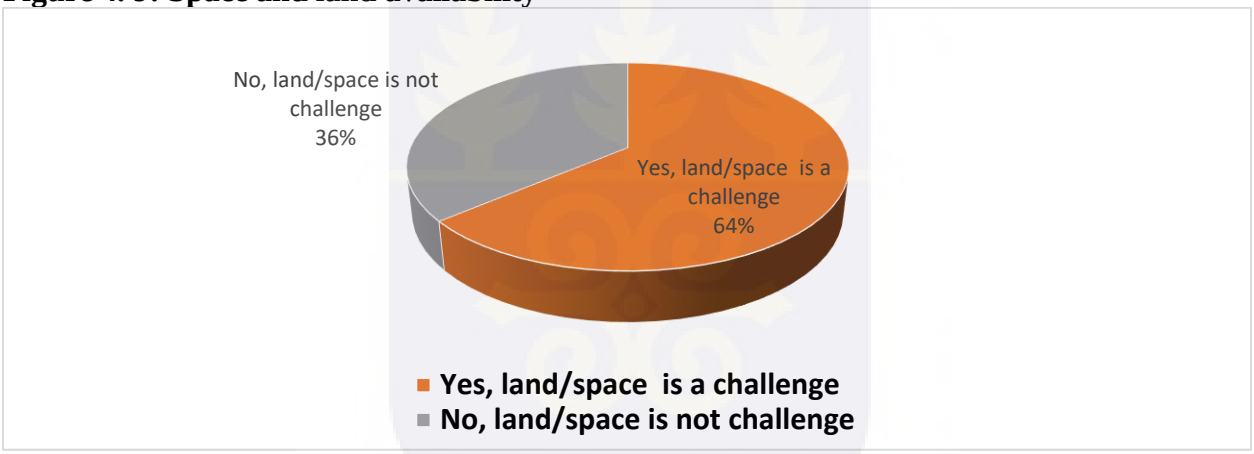
> *"In the GAMA project that is on-going in the Municipality, some households are claiming that they cannot afford but they can afford. They like free things; they are used to free things and the public toilets. It is the way our mentality is framed; we are used to the public toilets previously provided by the government for free. We encourage those who registered their names to save down 50% and later we reduced it to 30% of the cost, and after which we moved in to construct the toilet. But only 120 households out of 1000 households who registered for it have paid and we constructed their toilets for them" (KII with Director of the Environmental Health Department).*

The discussion above indicates that some households do not prioritize the need for own toilets, either they feel there is an alternative to use a public toilet or shared facility. This is expected if people do not have real knowledge of the serious implications associated with poor sanitation.

Some prefer to safe money to buy their own plots of land now than used it to buy a toilet. For these reasons, the private motivated business minded individuals have moved in to provide public toilets services to meet the high demand. For example, a respondent explained that,

> *"For the public toilets, the land lords and land ladies build them and charge fees any time we want to use the facilities, it is not built by the government. Most of us are using such toilets. They start operating at 4am and close at 11pm" (Respondent 1, an in-depth interview).*

Figure 4. 9: Space and land availability



Source: Field Data (2017)

A constraint worthy of note is the issue of spacing. Because of the gradual increase in the population of the slum dwellers coupled with the construction of unplanned structures, the space available for constructing new toilets is diminishing in Madina-Zongo. For example, out of 105 who answered about whether land/space was availability for constructing a new toilet if they wanted to, 64% of them said there was no space at all (see figure 4.9). In the in-depth interview, all the five respondents touched on the fact that there was hardly any space left in their houses, and generally a characteristic of the Madina-Zongo, for constructing a new toilet. For instance, one of them said,

"even if I want to build my own toilet, my land lord will allow me, but he has no more space for himself, what more about me. Just look around where is the space in this house for someone to construct a new toilet (Respondent 3, In-depth interview).

But the lack of space for constructing a new toilet will not prevent new household formations. The issue of land availability and space are similarly reported in Obeng et al (2015b) and Roberts and Long (2007). These scholars suggested that urban dwellers were more constraint on land availability than their rural counterparts.

To sum up the binding constraints, the Environmental Health Director posited:

"In Madina-Zongo, acquiring a toilet has some constraints. One is the unavailability of space, because of how the houses were built, and later some extensions are made to the houses, leaving very little space. This makes accessibility another constraint, in the sense that even if they acquire facilities like WCs and it get full, dislodging becomes an issue. The waste trucks find it difficult to get to these places. Also, the soil condition in most these places like Libyan Quarters, UN, Washington and part of Madina-Zongo area, the water table is very high and this does not help in putting up toilet technologies like KVIP and WCs, because you dig and water comes in. Fortunately, with the GAMA project, we are promoting some technologies that do not need to dig deep before you fix the receptacle, and water do not come from the ground to fill it." (KII, Director, Environmental Health Department).

Thus, it can be deduced from the results and discussion in this chapter that, indeed social, economic and environmental factors do have some binding constraints on ownership of toilet facilities among households.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATION

5.0 Introduction

The study had the objectives of assessing the level coverage of sanitation facilities and the factors that determine the ownership of improved toilets among households in Madina-Zongo. To address these objectives, primary and secondary data was obtained, analyzed and discussed. These objectives were addressed by using cross tabulations and frequencies tables as well as a logistics regression. In this chapter, the findings from the study are summarized and policy recommendation are made.

5.1 Summary of findings

The study found that the commonest technology type used by households was the flush/pour flush into septic tank; flush/pour flush into closed pit and KVIP, accounting for 74% of all available technologies. However, only 30% of the households own improved technologies exclusively reserved for their households. About 24% rely only on public toilets and another 44% depends on shared facilities, which includes 3.53% of facilities considered as unimproved. Though the average household size for the sample was 4, that of the households who share facilities with other households was about 6, with an average number of households sharing a facility standing at 5. Many of the households have a desired to get their own toilets, but the issue is the cost element, most indicated that they could not afford for own household toilets because they described themselves as being poor. The logistics regression results indicated that wealth, education and household size determine households which would have improved

technologies, reserve only for members of their households only. Compared to poor households, low income and high income households were more likely to own improved toilets, statistically significant at 5% and 1% respectively. Compared to heads of households who had no formal education background, educated households were more likely to own an improved toilet, statistically significant at 5% and 1% for head's with basic/secondary education and higher education, respectively. The chances are that a household size that increases more than 4 in the study area will less likely owned an improved toilet, statistically significant at 5%.

5.2 Conclusion

To reiterate the importance of owning an improved toilet, the study draws conclusion form Cameron et al (2013) and Hutton (2015), who make it clear that every dollar spent on basic sanitation can bring a five-fold return on that investment. Indeed, investing in improved sanitation is a down payment on a sustainable future, especially meeting the targets of the SDGs. Too often sanitation issues are relegated to the background, but development economist suggest that achieving high sanitation standards can save the economy of Ghana of about 200million dollars yearly (IESS, 2011). Therefore, government efforts to arrest the deteriorating state of sanitation in the country are desperately desired, as a way to achieving socio-economic development, sustainably. Sanitation is a basic need and is considered a fundamental human right by the United Nations, for which reason it is necessary for government to develop strategies to ensure that households can have and should have their own toilets. This is possible by ensuring that the human development potentials inherent in all individuals are thoroughly enhanced through education and job creations, a long-term strategy to get many more households

that cannot to pay for essential products such as an improved toilets now to afford them in the future.

5.3 Suggestions and Recommendations

- **Sanitation Bye-laws and Courts: Sanctions and Enforcement**

It necessary to emphasis that the existing bye-laws on sanitation be strengthened and supported in capacity to effectively carry out their mandate. This is a short-term strategy to deal with the growth in slums and poor sanitation. Slums growth and poor sanitation inextricably represent serious challenges in the development front. Sanctions, if well applied, can encourage households to guard their sanitation needs very jealously. As O'Connell (2014) posits, "in certain situations, sanitation behaviours may be influenced by law enforcement and other regulations as mentioned in Tanzania, and the three Indian states". Drawing from these examples, it is recommended for policy-makers to re-examine the existing bye-laws on sanitation and let them work appropriately. As Steel (2017), commenting on the success of the GAMA project and the sanitation in general, urged policy makers to establish a culture of compliance and prevent the problem from getting worse by strict legal enforcement of the regulations on new construction.

- **Behavioral change through awareness campaign**

Following Curtis & Cairncross (2003) submission, the policy experts should team up with the private sector to be involved in promoting and advertising toilets facilities as it does adverts on consumable goods. The private sector can help attenuate the growing tendency to rely on public toilets, and market the need for a toilet facility as any other survival good in every household.

The private can partner with policy makers to focus on spreading awareness about the importance of having toilet facilities and better hygiene practices; that being the case, the media especially TV and Radios should step in. Both publicly owned and the privately owned media houses should as a matter of concern, allot airtime for discussion sanitation issues daily, they can do this as part their corporate social responsibilities (CSR). Illiteracy rates are still high in Ghana, only the media can help rich the uneducated households about the consequences of poor sanitation and the benefits one derives if his or her household own a private toilet. It is very clear that some households can buy improved toilets for themselves but they have prioritized other assets such as TV, Mobile phones over basic sanitation. The media will be effective in generating high demand for improved households toilets by modeling messages which emphasizes the health and non-health aspects of improved households toilets such as dignity, privacy, and security. As Holm et al. (2016) concludes that sanitation education is of prime importance to draw the linkage between and among improved sanitation, good health, and poverty reduction – in the event that sanitation is not adequately promoted, all other resources may be spent on accessing medical care.

- **Subsidizing the price of toilets for households**

Considering the potential return on investment on improved sanitation, it is in the best interest for government to allocate budgetary expenditure that can effectively deal with the growing poor sanitation. In the meantime, government should shift away from the construction of public toilets, and use such funds to subsidies the price of toilets for households to acquire them.

- **Ensuring regional balance development**

The increasing diminishing of space in Madina-Zongo, if not checked now will soon be a full-blown slum settlement. This is attributed to the continue influx of people into the area, especially from the northern part of the country. This has policy implications for the government. There is the need for the government to coherently develop policies to ensure a balance regional level of development, so that immigrants from the northern part of the country to Madina in particular, and Accra in general, can be halted. The continue influx of youth into these areas does not only put pressure on the limited social services and amenities, but has a tendency to 'disfigure' the environmental shape of the capital city.

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Appendix I: The Field Questionnaire

THE DETERMINANTS OF OWNERSHIP OF TOILET FACILITIES AMONG HOUSEHOLDS IN MADINA-ZONGO

HOUSEHOLD QUESTIONNAIRE

INTRODUCTION AND SEEKING FOR CONSENT

Hello, good……. (morning, afternoon or evening) madam/ sir! My name is ……. I am a student of the University of Ghana and currently working on my thesis titled, ***the Determinants of ownership of toilet facilities among households in Madina-Zongo.***

The information I seek from you and your household is strictly for academic purposes. I assure you that any information you provide is strictly confidential, and at the analysis stage only aggregates are used which makes it impossible for anyone to identify your specific responses, situation, and context. This project has nothing to do with assessing your household situation for taxes purposes or for any kind of support from government or NGOs.

The interview will last for about 45minutes. You can take a break or attend to other things during the interview. Should you have any question, I would be privileged to answer them now.

For Official Use

Please record the questionnaire ID#: _ _ _ _ _ _ _ _

Permanent House Address, including Street Names and other landmarks

……
……
……
……

Tel #1_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Tel #2_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Date of Interview dd/mm/yy: __ _/_ _ _/_ _ _

Please Record

Beginning Time in GMT [24hrs]: ____:____

Ending Time in GMT [24hrs]: ____:____

Section A: Household

Demographic Characteristics

To be administered to the household head or most knowledgeable person in the household.

Introduction

Q1. What is the total number of people who live in this household? [___]

Q2. Sex of respondent? 1. Male 2. Female [___]

Q3. Age of respondent in years? [___]

Q4. Status of the respondent [___]

1. Household head
2. Spouse of the Household
3. Child
4. Other_Specify_____

Q5. Occupation? [___]

1. Teacher
2. Nurse/Doctor
3. Civil/public Servant
4. Carpenter
5. Driver
6. Electrician
7. Mason
8. Mechanic
9. Hairdresser/Barber
10. Seamstress/dressmaker
11. Farmer/fisherman
12. Trader/Market woman
13. Food seller/caterer
14. Retired/Pension
15. Other _Specify

Q6. Religion? [___]

1. Moslem
2. Christian
3. African Traditional Believer
4. Other beliefs, not classified here
5. Atheist (No religion)

23. Refused

Q7. Marital status? [___]

1. never married (not in relationship)
2. cohabitating/ Dating
3. married
4. separated/divorced
5. widowed
88. Refused

Q8. What is the highest level of education completed?
Interviewer see codes below and record in this box. [___]

1. No formal education
2. Primary School
3. Middle School/JSS
4. SSS/SHS
5. Polytechnic/Teacher/Nursing Training College
6. University (1st Degree)
7. Post Graduate Degree (2nd Degree, PhD)
8. Vocational Technical School such as NVTI
9. Others Specify_____

Q9. What were the most common diseases affecting the household members in this year? [___]

1. Diarrhea
2. Worms
3. Cholera
4. Typhoid
5. Eye diseases
6. Dysentery

Section B Socioeconomic Status (SES)

In this section, we will be talking about your household assets. I will ask about the some of assets own by household members. Remember that all information ***will be kept strictly confidential.***

Q10. Does your household own any of the following items? [*Check all that apply, and record number and value of each item*]

Item Code	Item	Number	Market Value (GHC) est.		Item Code	Item	Number	Market Value (GHC) est.
1	Sewing machine	[____]	[_____]		**17**	Video/DVD player	[____]	[_____]
2	Generator	[____]	[_____]		**18**	Television	[____]	[_____]
3	Refrigerator	[____]	[_____]		**19**	Radio/stereo	[____]	[_____]
4	Electric fan	[____]	[_____]		**20**	Sofa set	[____]	[_____]
5	Wardrobe	[____]	[_____]		**21**	Dining set	[____]	[_____]
6	Decoder (DSTV/MultiTV)	[____]	[_____]		**22**	Air conditioner	[____]	[_____]

7	Laptop	[____]	[_____]		**23**	Land (non-farm)	[____]	[_____]
8	Electric Cooker	[____]	[_____]		**24**	House	[____]	[_____]
9	Microwave	[____]	[_____]		**25**	Jewelry	[____]	[_____]
10	Cattle	[____]	[_____]		**Specify other Assets not classified above**			
11	Electric Iron	[____]	[_____]		**26**		[____]	[_____]
12	Car	[____]	[_____]		**27**		[____]	[_____]
13	Motorcycle	[____]	[_____]		**28**		[____]	[_____]
14	Bicycle	[____]	[_____]		**29**		[____]	[_____]
15	Row boat	[____]	[_____]		**30**		[____]	[_____]
16	Cell phone	[____]	[_____]		**31**		[____]	[_____]

Section C (i) Housing Characteristics

I would like to ask you some questions about your dwelling or home and about other housing characteristics.

Q11. What type of dwelling unit does the household live in? See codes below [___]

1. Separate house
2. Semi-detached house
3. Flat/Apartment
4. Compound house (rooms)
5. Huts/buildings(same compound)
6. Improvised home (Tent, kiosk, container)
7. Living quarters attached to office/shop
8. Other (specify) _____

Q12. Is your dwelling unit…… [___]?

INTERVIEWER: read options to the respondent.

01. Owned by the household
02. Rented
03. Provided free of charge
04. Other, specify

Q13. What is the main source of drinking water for members of your household? [___]

(Record only the main source)

01. Piped water into dwelling
02. Piped water to yard/plot
03. Public tap/standpipe
04. Borehole
05. Protected dug well
06. Unprotected dug well
07. Rainwater collection
08. Bottled water
09. Small scale vendor

10. Water truck or tanker
11. Other, specify

Q14. What is the main source of water for members of this household for other purposes such as handwashing?(*Record on main source*). [___]

01. Piped water into dwelling
02. Piped water to yard/plot
03. Public tap/standpipe
04. Borehole
05. Protected dug well
06. Unprotected dug well
07. Rainwater collection
08. Bottled water
09. Small scale vendor
10. Water truck or tanker
11. Other, specify_____

Q15. What type of toilet facility do members of your household usually use? *If the respondent indicates "flush" or "pour flush", ask: "Where does it flush to"?* [___]

(a) Flush or Pour-flushed to

20. piped sewer system
21. Flush/pour flush to septic tank
22. Flush/pour flush to pit latrine
23. Flush/pour flush to other location unknown place/not sure.

(b) Pit Latrine

24. KVIP
25. Pit latrine with slab
26. Pit latrine without slab
27. Open pit with wood across
28. Composting toilet
29. Bio-fil
30. Bucket latrine
31. Hanging toilet/hanging latrine
32. Free Range >>Q24.
87. Other, specify:_____

Q16a. Do you own this toilet facility? [___]

1. Yes
2. No

Q16b. Do you share this toilet facility with other households? [___]

1. No Skip to Q18
2. Yes, public toilet skip to Q21
3. Yes , with other households

Q17. How many households use this toilet facility? [____]
1. If less than 10, record the exact figure
2. If 10 or more households, code 99
3. If don't know, code 98

Q18. How many are the toilet facilities? [____]
1. Only one, skip to Q20
2. More than one

Q19. If there is more than one toilet facility, why? [____]
1. Users are many
2. Do not like to share
3. Other specify_____

Q20. Where is this toilet facility located? [____]
1. In own dwelling
2. Own yard/plot
3. Elsewhere

Q21. How long does it take to go there, use it, and come back? Record in Minutes [____]
1. If in own yard/dwelling, code 00
2. If don't know, code 99

Q22. What are the common nuisances related to the sanitation facility currently used? [____]
1. Odor
2. Flies/ cockroaches and other vermin
3. Gray water
4. Other _ Specify_____
5. none

Q23. If gray water/sulage is a problem, where does it come from?
a. Hand washing facility (1) Yes (2) No [____]
b. From bathroom (1) Yes (2) No [____]

Section C (ii) Toilet Ownership Perceptions by Households. To be administered to all respondents.

Q24. What do you think are (would be) the advantages of owning a toilet facility? [Do not read options; take up to three main advantages in ranking order] **See Codes for Q24 below**

01. Improved hygiene/cleanliness
02. Improved health
03. More privacy
04. More comfortable
05. Convenience/save time

06. Improved safety
07. Improved status/prestige
08. No advantages
09. Don't know
10. Other (specify) _____

Record in the order of importance: 1st [___] 2nd [___] and 3rd [___]

Q25. What do you think is (would be) the disadvantages of owning your own latrine? [Do not read options; take up to three main advantages in ranking order]. **See Codes for Q25 below**

01. Attracts flies
02. Bad smell
03. Costly to maintain it
04. Work to maintain it
05. Other people come to use it
06. Affects groundwater quality
07. No disadvantages
08. Don't know
09. Other (specify) _____

Record in the order of importance 1st [___] 2nd [___] and 3rd [___]

Households who do not own a toilet facility should answer Q26 and Q. 27question. Verity from Q.16a.

Q26. Why don't you and your household own a toilet facility?
Use codes for Q25. [Please do not read options, probe well]

01. Too expensive/don't have enough money
02. Have access to someone else's latrine already
03. Satisfied with current practice/don't see a need
04. Lack information on where to purchase latrine
05. Other priorities come first (competing needs e.g. need to add more rooms or build own house)
06. Don't know
07. Other (specify) _____

Record in the order of importance: 1st [____] 2nd [____] 3rd [____]

Q27. Does your household have land or space within or inside the house on which you can construct a toilet facility if you needed to? Enter 1 for yes, and 2 for no. [___]

Section C (iii) **Media & Information Channels. For all respondents**
Now, I would like us to about how you and your household get information concerning health and sanitation issues.

Q28.What are the three most important sources of news or information for you and your household? *Interviewer, do not read list accept up to three responses, probe twice, also probe for clarity.* ***See Codes for Q28. below***

01. Newspaper/Journals/Magazine
02. Radio
03. Television
04. Billboards
05. Church/Religious Organisations
06. Clubs/Groups/Associations
07. Business/work associations
08. Family/Relatives
09. Friends/Neighbours
10. Government officials/NGOs
11. Health Centers/Clinics/ Hospitals
12. Schools/teachers
13. Internet
14. Don't Remember source
15. Other (specify) _____

Record in the order of importance: 1st [___] 2nd [___] 3rd [___]

Q29. What kind of information have you received relating to sanitation?
[Do not read options; check all that apply]

01. Drink safe water	[___]
02. Need for own latrine	[___]
03. Handwashing	[___]
04. Food hygiene	[___]
05. Other(specify) _____	[___]
06. None or no information	[___]

Thank you very much!!! End of Interview

THANK YOU SO MUCH FOR YOUR TIME AND THE INFORMATION YOU HAVE PROVIDED.

I confirm my commitment to maintaining complete confidentiality. I wish to stress that the information you have provided will be strictly used for an academic exercise involving the writing of a Thesis Report in partial fulfilment of the requirements for the award of MA Development Studies' Degree from the University of Ghana, ISSER.

Please write useful comments and observations here

Appendix II: The In-depth Interview Guide

Interview Guide

IN-DEPTH INTERVIEWS TO BE ADMINISTERED TO 5 RESPONDENTS IN MADINA ZONGO

Part A: Demographics

a) Gender
b) Age
c) Status of the respondent
d) Occupation
e) Educational level

Part B:

1. What are the advantages /disadvantages of a household owing their own toilet facility?
2. What are the advantages/disadvantages of a household not owning their own toilet facility?
3. In your opinion, why do households share the same toilet facility? What are the disadvantages of t sharing a toilet facility with other households or with the public?
4. Is land space for construction a new toilet facility a major challenge in Madina-Zongo?
5. Will a landlord agree for a tenant to construct his or her own toilet in the landlord's house? Why or why not? Will a tenant agree to construct his or her own toilet in a landlord's house? Why or why not?
6. What are the various sources of information outlet that you access to get information on toilet facilities?

Appendix III: Key Informant Interview (KII)

TO BE ADMINISTERED TO THE MUNICIPAL ENVIRONMENTAL HEALTH OFFICER, LA NKWANTANANG MADINA MUNICIPAL ASSEMBLY (LANMMA)

Part A: Bio Data

a) Gender
b) Age
c) Educational level
d) Job Tittle
e) Position
f) Department

Part B:

1. What is the situation regarding ownership of toilet facilities among households in the Municipality?
2. What are the binding constraints for households in Madina-Zongo who want to acquire their own toilets? Are the zongo areas in your municipality a special case? What makes them so?
3. Are there any by-laws, programmes, or policies in place to address these challenges?
4. Does your outfit sensitize households on the need to have own toilets? Which platforms do you normally used?

Appendix IV: List of Stata Commands and output

```
/* calculation of wealth index using principal component analysis*/
use "E:\Work-In-Progress\Dataset & Analysis\Analyis\FinalandFinal_dataset_Regression.dta"
pca sewing_machine_qty generator_qty refrigenerator_qty fan_qty wardrobe_qty ///
 decoder_qty laptop_qty electriccooker_ qty microwave_qty cattle_qty electriciron_qty ///
 car_qty motorbike_qty bicycle_qty cellphone_qty dvdplayer_qty tv_qty radiostereo_qty ///
 sofafurniture_qty diningset_qty aircondition_qty plot_qty house_qty jewelry_qty ///
 washingmachine_qty
rotate
predict score1
xtile score1_cat = score1, nq(3)
recode score1_cat (1=1 "Low income Households" ) (2=2 "Middle Income Households" )///
 (3=3" High Income Households"), gen (wealthindex2)

tab score1
Scores for  |
component 1 |      Freq.     Percent        Cum.
------------+-----------------------------------
  -1.150012 |         47       27.65       27.65
  -1.150012 |         13        7.65       35.29
   .4140043 |         34       20.00       55.29
   .4140044 |         62       36.47       91.76
   .4140046 |          2        1.18       92.94
   1.978021 |          2        1.18       94.12
   1.978021 |          4        2.35       96.47
   1.978021 |          3        1.76       98.24
   3.542037 |          2        1.18       99.41
   3.542037 |          1        0.59      100.00
------------+-----------------------------------
      Total |        170      100.00
tab wealthindex2
3 quantiles of score1 |      Freq.     Percent        Cum.
----------------------+-----------------------------------
   Low income households |         60       35.29       35.29
Middle income households |         96       56.47       91.76
  High income households |         14        8.24      100.00
------------------ Total |        170      100.00
```

```
logit improvedtoilet hhsize hhhage hhhgender hhhreligion hhmaritalstatus i.educationalstatus
i.hhhsectorofwork i.wealthindex2, vce(oim)allbaselevels formats(%9.3f) pformat(%5.3f)
sformat(%8.3f) showtolerance difficult


Iteration 0:   log likelihood = -103.84693
Iteration 1:   log likelihood = -70.724612
               vtol           =   .3159112
Iteration 2:   log likelihood =  -68.06529
               vtol           =  .03707684
Iteration 3:   log likelihood = -67.906784
               vtol           =  .00229501
Iteration 4:   log likelihood =  -67.90638
               vtol           =  5.871e-06
Iteration 5:   log likelihood =  -67.90638
               g inv(H) g'    =  7.401e-16


Logistic regression                             Number of obs   =        170
                                                LR chi2 (12)    =      71.88
                                                Prob > chi2     =     0.0000
Log likelihood  = -67.90638                     Pseudo R2       =     0.3461

------------------------------------------------------------------------------
improvedtoilet |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
---------------+--------------------------------------------------------------
        hhsize |     -0.314      0.134   -2.334   0.020       -0.577      -0.050
        hhhage |      0.011      0.029    0.369   0.712       -0.046       0.067
     hhhgender |     -0.242      0.452   -0.536   0.592       -1.128       0.644
   hhhreligion |      0.911      0.495    1.842   0.066       -0.059       1.880
hhmaritalstatus |      0.749      0.540    1.386   0.166       -0.310       1.807
                |
educationalstatus |
No Formal Education  |      0.000  (base)
  Basic Level  |      1.890      1.124    1.682   0.093       -0.312       4.092
Secondary Level  |      2.207      1.147    1.924   0.054       -0.041       4.456
 Tertiary Level  |      4.800      1.232    3.895   0.000        2.385       7.216
                |
hhhsectorofwork |
    On Pension  |      0.000  (base)
 Informal Sector  |      0.489      1.390    0.352   0.725       -2.236       3.214
```

```
           Formal Sector |     -0.395      1.466   -0.269   0.788       -3.268       2.478
                         |
             wealthindex2 |
   Low income households  |      0.000   (base)
Middle income households  |      1.124      0.608    1.849   0.065       -0.068       2.317
  High income households  |      3.402      0.994    3.423   0.001        1.454       5.351
                         |
                   _cons |     -5.020      2.448   -2.050   0.040       -9.819      -0.221
------------------------------------------------------------------------------------------


. predict margins
(option pr assumed; Pr(improvedtoilet))

. margins, dydx (*) atmeans

Conditional marginal effects                    Number of obs   =        170
Model VCE    : OIM

Expression   : Pr(improvedtoilet), predict()
dy/dx w.r.t. : hhsize hhhage hhhgender hhhreligion hhmaritalstatus 1.educationalstatus
2.educationalstatus 3.educationalstatus
               1.hhhsectorofwork 2.hhhsectorofwork 2.wealthindex2 3.wealthindex2
at           : hhsize          =    4.441176 (mean)
               hhhage          =    39.76471 (mean)
               hhhgender       =    .5529412 (mean)
               hhhreligion     =    .5941176 (mean)
               hhmaritals~s    =    .6588235 (mean)
               0.educatio~s    =    .1588235 (mean)
               1.educatio~s    =    .3588235 (mean)
               2.educatio~s    =    .2470588 (mean)
               3.educatio~s    =    .2352941 (mean)
               0.hhhsecto~k    =    .0588235 (mean)
               1.hhhsecto~k    =    .7470588 (mean)
               2.hhhsecto~k    =    .1941176 (mean)
               1.wealthin~2    =    .3529412 (mean)
               2.wealthin~2    =    .5647059 (mean)
               3.wealthin~2    =    .0823529 (mean)
```

	Delta-method				
	dy/dx	Std. Err.	z	P>|z|	[95% Conf. Interval]
hhsize	-.0503151	.0209438	-2.40	0.016	-.0913642 -.009266
hhhage	.0016989	.0045915	0.37	0.711	-.0073003 .0106981
hhhgender	-.0504552	.0943055	-0.54	0.593	-.2352906 .1343802
hhhreligion	.1461315	.0775171	1.89	0.059	-.0057992 .2980622
hhmaritalstatus	.120081	.086288	1.39	0.164	-.0490404 .2892023
education					
Basic Level	.1131247	.0525131	2.15	0.031	.0102009 .2160485
Secondary Level	.1550728	.0681237	2.28	0.023	.0215528 .2885927
Tertiary Level	.7204125	.1000207	7.20	0.000	.5243756 .9164494
hhhsectorofwork					
Informal Sector	.0764473	.188215	0.41	0.685	-.2924474 .4453419
Formal Sector	-.0458351	.1891023	-0.24	0.808	-.4164688 .3247987
wealthindex2					
Middle income households	.1450209	.0703393	2.06	0.039	.0071584 .2828834
High income households	.6598923	.1545075	4.27	0.000	.3570632 .9627214

Note: dy/dx for factor levels is the discrete change from the base level.