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THESIS TOPIC:

**HUMAN EXCRETA MANAGEMENT IN POOR PERI-URBAN
COMMUNITIES – CASE STUDY OF PRAMPARAM TOWNSHIP**



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KUMASI, GHANA

Improving Human Excreta Management in Poor Peri-Urban Communities-

Case Study of Prampram Township

By

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the Department of Civil Engineering,

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Department of Civil Engineering

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Certification

I hereby declare that this submission is my own thesis synopsis towards the MSc and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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TO MY PARENTS, SIBLINGS AND LOVED ONES



ABSTRACT

Human excreta management has long been a problem in developing countries with most people resorting to unimproved sanitation practices. The sanitation situation over the past decade has improved slightly but has been more difficult with the rapid increase in population especially in urban centers where about half of the population lives as against little improvement in infrastructure. As at 2008, the country's population stood at 23.4 million, out of which an alarming 5.4 million Ghanaians were still practicing open field defecation. This study seeks to assess and improve human excreta management in poor peri-urban areas, with Prampram as the case study.

The main objective of this research was to identify the challenges with the management of human excreta, investigate barriers with both the technologies in use and existing management practices and propose sustainable solutions for improvement, in the Lower West, Lower East, Olowe and Kley communities of Prampram. In gathering information for this research, questionnaires were administered to households, key informants within the study area were interviewed and focus group discussions were also held.

The study revealed that generally 43.13% of the correspondents within the study area had access to household toilet, whereas 56.88% depended on available public toilet facilities or resorted to other available sanitation options such as the open field or tying in polythenes and mixing them with the household waste. The predominant technology identified in the household was the ventilated improved pit, followed by the water closet facility. For the predominant technology employed for the public toilet facility is the Kumasi Ventilated Improved Pit. The Assembly members for the various electoral areas were currently those responsible for the management of the public toilet facilities although the District Health and Sanitation department were making efforts to take over. The VIP's generally performed better than the KVIP, as they barely had odour and fly problems. The research showed that technical regulations regarding the use of the KVIP were not being adhered to and that resulted in the odour, heat and flies problem experienced by users. Management of the public facilities was below standard. One could easily see the faecal matter at the brim of the squat hole on visit to the facility. These problems made users prefer the open field and other unimproved modes of human excreta management.

It is recommended that the public toilets attendant be given some education on the use of the KVIP and the general populace also educated on the need for good sanitation practices. Efforts will also have to be made to make the public facilities user friendly for the aged and disabled. The District must embark on regular monitoring and inspection of the toilet facility and give priority to the development of sanitation. The Environmental Health and Sanitation Department must be equipped to work independently in enforcing the sanitation by laws without any political interference.

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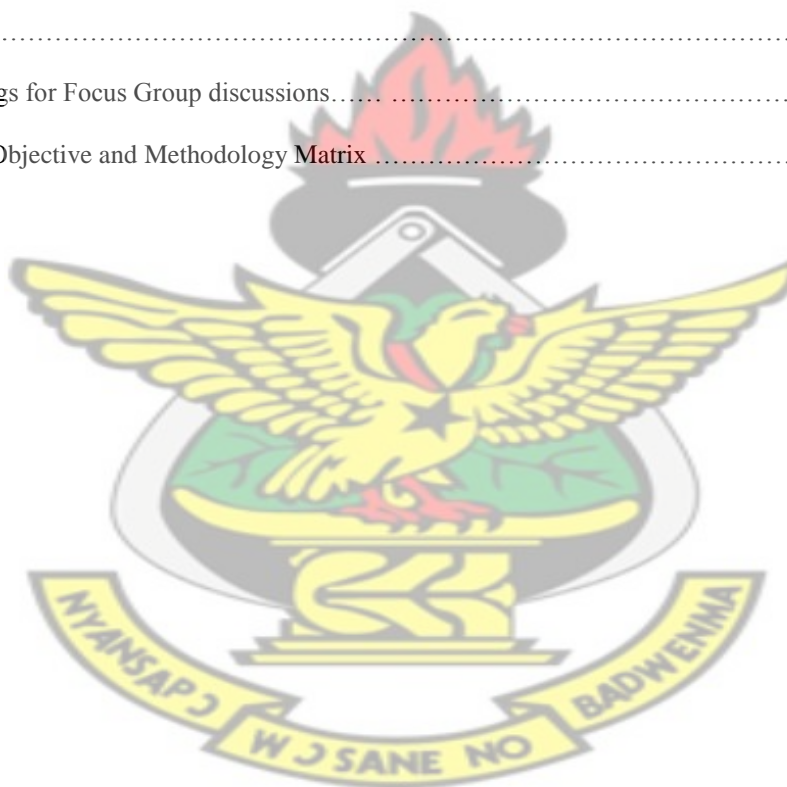
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LIST OF ABBREVIATIONS AND ACRONYMS

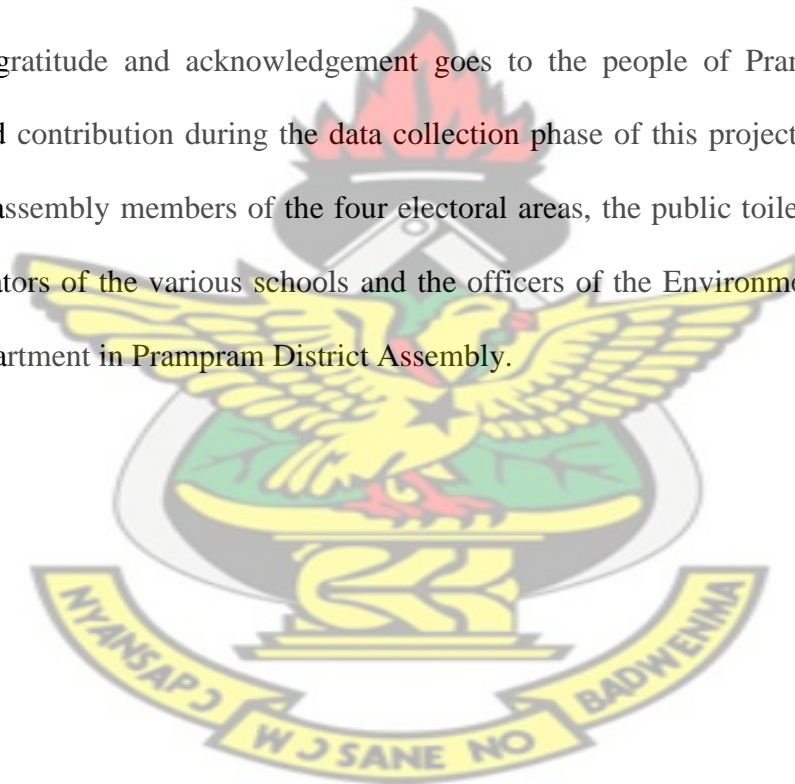
EHO	:	Environmental Health Officer
EHSD	:	Environmental Health and Sanitation Department
FGDs	:	Focus Group Discussions
HHs	:	Households
ISWM	:	Integrated Sustainable Waste Management
KL	:	Kley community
LE	:	Lower East community
LW	:	Lower west community
OL	:	Olowe community
MDG	:	Millennium Development Goals
MLGRD	:	Ministry of Local Government and Rural Development
NESP	:	National Environmental Sanitation Policy
SHEP	:	School Hygiene education Programme
WHO	:	World Health Organization
TMA	:	Tema Metropolitan Assembly
UN	:	United Nations
UNICEF	:	United Nations International Children's Emergency Fund
VIP	:	Ventilated Improve Pit
KVIP	:	Kumasi Ventilated Improve Pit
WC	:	Water Closet
FS	:	Faecal Sludge
SHEP	:	School Health Education and Programme
OFD	:	Open Field Defecation

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1.0 INTRODUCTION

1.1 Background

Developing countries are often divided into two distinct sectors, that is the formal and informal, or urban and peri urban. Peri-urban and informal sector settlements are also commonly referred to as squatter settlements. (Hogrewe et al, 1993).

Peri-urban settlements largely develop outside of government control and do not follow strict formal and traditional urban planning and development processes. These areas are characterized by uncertain or illegal land tenure, minimal or no infrastructure, low incomes, and lack of recognition by formal governments. Families who live in peri urban areas build on the cheaper land outside city limits, on land within city limits that is not zoned for housing, on land that has not been urbanized with infrastructure, or on land considered dangerous or environmentally fragile. (Hogrewe et al, 1993).

The peri-urban population should, therefore, be a focus of concern. Peri-urban areas are growing much more rapidly than formal urban districts; in many cities, the peri-urban sections are already bigger than the formal areas. Their rapid growth and informal status have resulted in low levels of sanitation services. The lack of these services in particular, inadequate excreta (human waste) management threatens the public health and the environment of the peri-urban settlement, as well as the urban area as a whole. Areas that have access to these services also face improper management.

From the WASH technical report number 86 (July 1993) it was reported that an estimated 600 million people in urban areas of the Third World now live in life- and health threatening homes and neighbourhoods, primarily in peri-urban settlements. These homes and neighbourhoods share two characteristics that bear serious potential health effects.

That is

- The presence of pathogenic micro-organisms (especially those in human excreta), caused by lack of infrastructure and related inadequate water supply to remove them
- Crowded, cramped housing conditions

The removal and safe disposal of excreta in peri-urban settlement are critical health and environmental needs which has prompted this research topic targeted at improving the human excreta management in poor-peri urban communities with the Prampram Township in the Dangme West district of the Greater Accra region as the case study.

1.2 PROBLEM STATEMENT

According to the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) an estimated 2.6 billion people or 39% of the world's population lack access to improved facilities for the disposal of human excreta, such as a basic pit latrine, a toilet connected to a septic tank or piped sewer system, or a composting toilet (WHO/UNICEF 2010). It was also reported by the WHO and UNICEF in that same year of 2010 that in low-income regions, where people are most vulnerable to infection and disease, only one in two people is covered by improved sanitation resulting in more than one billion people still practicing open defecation. (WHO/UNICEF, 2010).

There are severe rippling effects of these bad human excreta management practises. In recent times in Ghana cholera has been a major concern for all citizenry, with the major culprits

being people living in such areas of poor sanitation facilities. According to a WHO report in 2005 on intervention to prevent cholera, it is reported that about 1.8 billion people die of diarrhoeal disease each year in developing countries and that 10% of the population of the developing world are severely infected with intestinal worms related to improper waste and excreta management (Murray and Lopez 1996). Baseline studies done within the study area reveals more inhabitants use the sea shore and the bushes for nature's call whereas there are existing toilet facilities for the populace whom do not have access to household toilet. These statistics calls for a proper sustainable sanitation system to protect the health of the populace.

1.3 JUSTIFICATION

In Ghana, 6000 cholera cases and 80 fatalities were recorded across the country from January to August 2011 with government spending over GHC5,000,000 in fighting the pandemic (Ronan Kelly, 2011). With such alarming statistics, excreta disposal and minimum levels of personal and domestic hygiene are essential for protecting public health.

The prevailing increase in peri-urban population calls for much concern in instituting a better or improved human excreta management practises to reduce the soaring statistics on such fatal incidents, such as what happened in Ghana in 2011 with the Cholera outbreak.

It is for such reasons as stated above that the Sustainable Sanitation in Ghana was duly launched at Dodowa in 2010 (SUSA-GHANA), from which this research evolves to help investigate and create an improved human excreta management in these poor peri-urban communities.

1.4 RESEARCH QUESTIONS

The research questions that will be implored to enable the core objective in developing technologies that improve human excreta management in the poor peri-urban communities are:

- What are the economic levels and socio-cultural behaviour of the people?
- What are the existing technologies being used by the people to manage the human excreta generated?
- What are the effects of this technology being used on the health and environment of the people?
- Is this technology being used by the people safe (in terms of health) and sustainable?
- Who are the key stakeholders and what their roles in terms of human excreta management are?
- What are the various sustainable technologies available that can be employed to sync with the socio-cultural behaviour of the people?
- What are the barriers in implementing the selected sustainable technology for the human excreta management?

1.5 OBJECTIVES

The main objective of this research is to identify the challenges with the management of human excreta, investigate barriers and propose sustainable solutions for improvement, in the Lower West, Lower East, Oluwe and Kley communities of Prampram.

Specific objectives:

1. Identify technologies and practices used in human excreta management (all along sanitation value chain);
2. Evaluate performance of technologies and management practices used in human excreta management;
3. Evaluate factors affecting performance of the technologies and management practices;

1.6 Limitation of Study

The Prampram district is one of the forty six (46) new districts that were created in 2012. It was formally part of the Dangme West Districts. This made access to data very difficult since most of departments within the district was now being set up. Access to data at Dodowa which served as the district capital before the creation of the Prampram district also proved futile.

1.7 Scope of Study

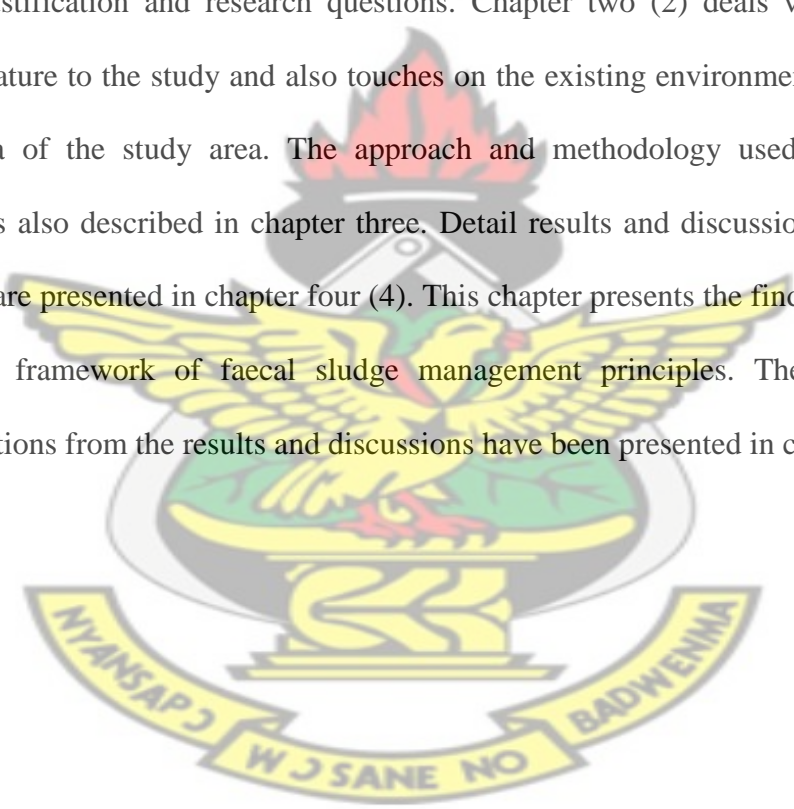
The study was limited to the four demarcated areas of Prampram. That is the Lower East, Lower West, Oluwe and Kley communities. This limitation became necessary considering the quality of output expected within the limited time and resource available.

The scope of the project focussed on an integrated management by all stakeholders including the District Assembly which has the assembly members inclusive, the community and individuals, the Ghana Education Service (GES)/School Health Education Programme (SHEP), the Ghana Health Directorate and the private sector in the provision and management of Household, Institutional and Communal toilets (Public toilet) within the four demarcated

areas of the Prampram community. The study covers the areas of human excreta management, that is considering the human excreta generation point, the sludge storage, collection and haulage, disposal, treatment and re-use of the waste.

1.8 Structure of Thesis

The report is divided into five (5) chapters. The first chapter (Chapter 1) entails introduction which presents the problem statement and gives a background of the study area, objectives of the study, justification and research questions. Chapter two (2) deals with the review of relevant literature to the study and also touches on the existing environmental conditions and baseline data of the study area. The approach and methodology used to undertake the assignment is also described in chapter three. Detail results and discussions of all the study components are presented in chapter four (4). This chapter presents the findings and interprets them in the framework of faecal sludge management principles. The conclusions and recommendations from the results and discussions have been presented in chapter five (5).



2.0 REVIEW OF RELEVANT LITERATURE

2.1 Definitions

The following definitions are provided in the context of human waste and in relation to this study.

2.1.1 Sanitation

Sanitation generally refers to the provision of facilities and services for the safe disposal of human urine and feces. Inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities. The word 'sanitation' also refers to the maintenance of hygienic conditions, through services such as garbage collection and wastewater disposal.

(WHO/UNICEF 2012)

2.1.2 Faecal sludge

It is the general term given to undigested or partially digested slurry or solids resulting from storage or treatment of blackwater or excreta. Faecal sludge comprises all liquid and semi-liquid contents of pits and vaults accumulating in on-site sanitation installations, namely unsewered public and private latrines or toilets, aqua privies and septic tanks. These liquids are normally several times more concentrated in suspended and dissolved solids than waste water. (Eawag/Sandec 2008)

2.1.3 Shared Sanitation Facility

Sanitation facilities of an otherwise acceptable type shared between two or more households.

2.1.4 Unimproved Sanitation facility

Sanitation facilities that do not ensure hygienic separation of human excreta from human contact are termed as unimproved sanitation facility. Pit latrines without a slab, bucket latrines and hanging latrines are examples of such. (Alana et al,2011)

2.1.5 Open Defecation

When human faeces are disposed of in fields, bushes, open water bodies, forests, beaches or other open spaces or disposed of with solid waste. (Alana et al,2011)

2.1.6 Household

For the purpose of this study household is referred to as a family (ie parents with their children)

2.1.7 Excreta

Refers to (semi-solid) excrements devoid of urine or water. (Eawag/Sandec 2008)

2.1.8 Septage

Liquid and solid material pumped from a septic tank, cesspool or other primary treatment source. (Bellagio, 2005)

2.1.9 Cesspit

An enclosed container used for storing sewage. (Eawag/Sandec 2008)

2.1.10 Combined Sewer

A sewer system designed to carry both blackwater from homes and storm water (rainfall). Combined sewers are much larger than separate sewers as they have to account for higher volumes. (Eawag/Sandec 2008)

2.1.11 Black water

It is the general term given to the mixture of water and excreta (urine and faeces). (Eawag/Sandec 2008)

2.1.12 Sewer

An open channel or closed pipe to convey sewage. (Eawag/Sandec 2008)

2.1.13 Sewerage

All the components of a system to collect, transport and treat sewage. This includes the pipes, pumps, tanks etc. (Eawag/Sandec 2008)

2.2 An overview of Human Excreta Management

2.2.1 General overview of Human Excreta Management.

Human Excreta management deals with on-site sanitation systems. Human excreta may be treated in separate treatment works or co-treated with sludges produced in wastewater treatment plants. The whole management process involves the collection, haulage, emptying, treatment and reuse/ storage. (Strauss et al., 2002)

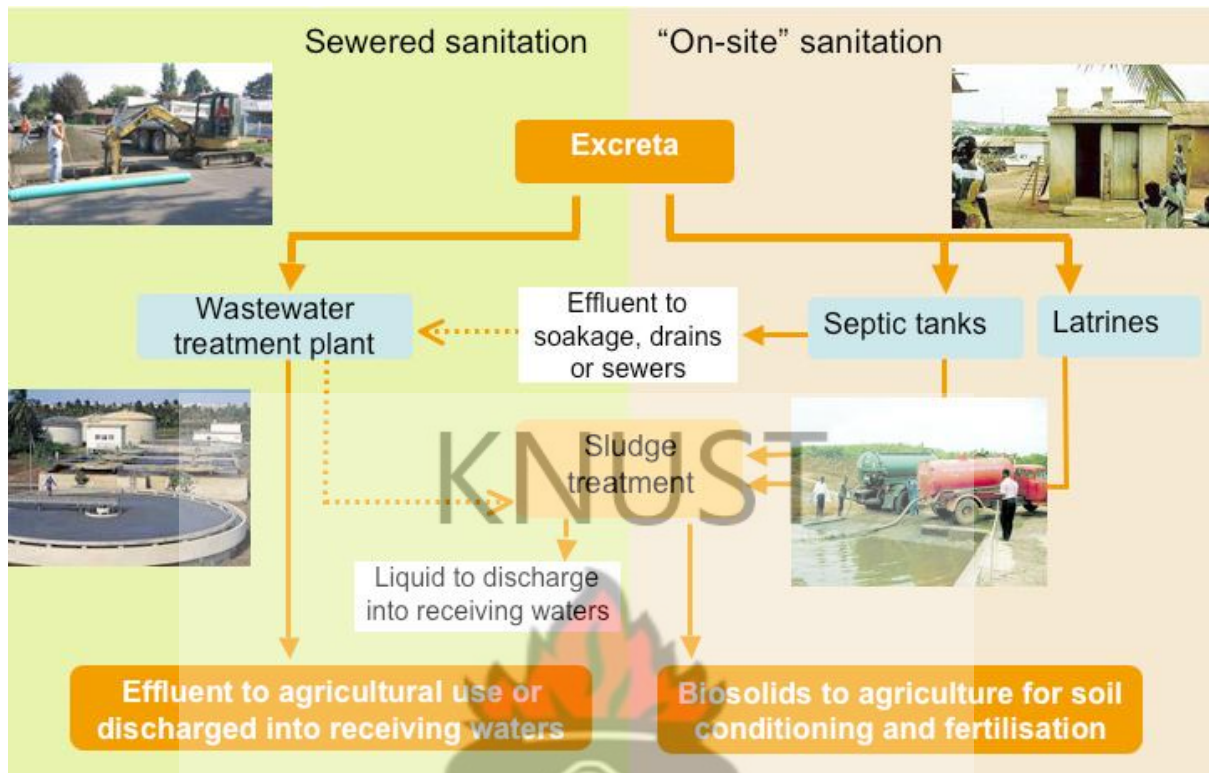


Fig. 1.0: Faecal sludge and wastewater management side-by-side in urban environmental sanitation and their potential links. (Source: Eawag Sandec 2008)

- Human Excreta Value

In our present day sludge is now considered as a problem, but why not consider it as an opportunity. Long before any complete collection scheme was implemented, urban areas had to deal with its organic by-products (human & animal excreta, food leftovers and various wastes from numerous places). Some wastes were directly recycled by source collection meanwhile others were valueless and disposed in special areas.

Briefly going back to history, over 2,500 years ago, the world's first recorded municipal landfill site was opened by government officials in the Greek city-state of Athens, who released a decree stating that waste was to be transported at least one mile beyond the city gates. During the 1st century AC, Pliny wrote in his Natural History that "all authors agree that

human excreta are the best possible fertilisers". In the 10th century, Constantine Porphyrogenete, Emperor of Orient promoted in a book known as the Geoponics that "human excreta should be widely used in agriculture". Apart from technical considerations regarding its use, human excreta were also extremely regulated because of its potential nuisance and health effects. In 1408, French Henry IV's removal order instructed that "refuse should be removed or else forfeited be paid" and, in 1533, a royal decree summoned property owners to construct cesspools in each new dwelling. In Great Britain in 1848, the Public Health Act began the process of waste regulation.

At the end of the 18th century and until the end of the 19th, the increasing development of traditional agriculture called for fertilisers that could only come from cities. Therefore, specialised corporations made business out of human excreta, called poudrette after 3 years maturation in devoted ponds. For instance in France, the MONFAUCON Paris producing site generated an approximate profit of about 50-100 000 € /year at the beginning of the 18th century. So it is clear through history that human excreta has had a very important financial value. But, during the 19th century and later on, with health & sanitation progress (particularly with Pasteur), cities made it clear that water closets were the best option and that human excreta had to be collected as sewage through sewers and managed downstream. This shift took place in parallel with the development of tap water. After a period where sewage was valued through irrigation of cultivated land nearby cities, intensive treatment became soon necessary because of urbanisation development. (Adler, 2001)

2.3 Available Technical Options associated with the management of Human Excreta

Selecting the most appropriate technical option for the management of human excreta requires a thorough analysis of all factors including cost, cultural acceptability, simplicity of design and construction, operation and maintenance, and local availability of materials and skills. If sanitation improvements in rural and urban areas are to be widely accepted, the relevant social and cultural factors have to be taken into consideration during planning and implementation. It is therefore very necessary to understand how a society functions including the communities and households within it, and what factors promote change.

2.3.1 Socio-cultural Considerations

- **Social structure**

Consideration should be given to the institutions of a political, economic and social nature that are operating at the national and/or local level, such as government, the civil service, religious institutions, schools and colleges, and the family, and to the forms of leadership and authority that are generally accepted by the majority of the people. It is also important to consider the various roles and patterns of behaviour of individuals and social groups, and to determine who is traditionally responsible for such areas as water supplies, environmental hygiene, family health and children's defecation habits, etc.

- **Cultural beliefs and practices**

Group and community identity, gender roles, the relative importance attached to different forms of authority and the ways in which it is exercised are all influenced by culture, i.e., all that is passed down by human society including language, laws, customs, beliefs and moral standards. Culture shapes human behaviour in many different ways including the status

attached to different roles and what is deemed to be acceptable personal and social behaviour. In many cultures, for example, the elderly command traditional authority and influence within the family and community. As regards sanitation behaviour, defecation is often a private matter which people are unwilling to discuss openly, while the burying of faeces is widely practiced to ward off evil spirits. Contact with faecal matter is unacceptable to certain individuals in societies, where it is the responsibility of low-income or low-caste groups, while taboos may dictate that separate facilities should be provided for particular social groups. A particular cultural practice to be considered, which has direct technical consequences, is the method of anal cleansing used by the community. Whether water, stones, corncocks or thick pieces of paper are used will affect the design of the sanitation system. Culture also influences how people interpret and evaluate the environment in which they live. Investments in sanitation seek to improve health by providing a clean physical environment for households. There is a logical series of technical questions that need to be asked in order that acceptable technical solutions can be found. It may be confusing, therefore, when sanitation behaviour is found to vary widely between communities within the same physical environment. Predetermined rules cannot be applied. However, the sanitation behaviour of individuals usually has a rational basis, and people are often aware of the environmental causes of ill-health. Many societies have a detailed knowledge of the physical environment as a provider of resources for curative and preventive medicine and as a cause of illness. More than this, they have an understanding of the environment, not only in its physical sense, but also in relation to social and spiritual factors. This holistic view of the environment permeates many of the cultural beliefs and customs that impinge on both water use patterns and sanitation behaviour. Some illustrations of these beliefs are given below.

- **Concepts of hygiene**

Although communities may lack knowledge of modern medical explanations of disease, they often have concepts of what is pure and polluting. With respect to the water resources available to particular households for domestic purposes, running water may be most acceptable for drinking because it is exposed to the sunlight; it is considered to be "alive" and therefore "pure", while water in shallow wells, which does not have these attributes, is deemed suitable only for washing and cooking. Communities have been observed to use the environmental resources available to them, such as bamboo, to bring fast-flowing river water to their villages in preference to more convenient well water that is unacceptable in taste, colour and smell.

Concepts of clean and dirty, pure and polluting, are well developed in the major world religions, and have a ritual and spiritual significance as well as referring to a physical state. When people are told that new sanitation facilities will make their environment "cleaner", it is their own interpretation of this concept that will be used. "Clean" may have quite different meanings to project promoters and recipients. Thus "it is essential to look into traditional categories of cleanliness and dirtiness, purity and pollution before embarking on a campaign to motivate people to accept a project in improved sanitation or to change their behaviour to comply with new standards of "cleanliness" (Simpson-Hebert, 1984).

- **Beliefs about sanitation and disease**

Evidence of the value attached by communities to cleanliness and, by implication, environmental sanitation is found in studies of diarrhoea. People's perceptions of its causes may be divided into three categories, physical, social and spiritual. In many cases, physical causes are identified and, although the germ theory is not explicitly stated, the faecal oral transmission routes of diarrhoea appear to be understood. Households may associate diarrhoea

with a polluted environment including uncovered food, dirty water and flies. Graphic descriptions of pollution have been quoted (de Zoysa et al., 1984):

- "We have to drink the dam water where animals and children bath and the dirty water makes us ill."

- "Flies sit on dirt which they eat then they come on to uncovered foods and spit on to foods which we eat."

As on-site sanitation involves improving the physical environment, it may therefore be readily accepted as one means by which to reduce the incidence of disease.

Equally, social and spiritual causes are perceived to be important, and include, for example, female social indiscretions and witchcraft. But these three apparently unrelated causes of diarrhoea should not be interpreted as mutually exclusive or divergent approaches to disease. They are often closely interrelated in practice, within a holistic interpretation of the environment.

Efforts should be made to determine how a community's beliefs, knowledge, and control over the environment can be harnessed in a positive way. Careful judgment is required to distinguish between those beliefs and ritual behaviour that are conducive to good sanitation practice and those that need to be changed.

- **Forces for change**

All societies undergo adjustments in their social structure and culture over time. This may result from contact between societies or from alterations in the physical environment such as prolonged drought. Further, changes in development practice and in international aid influence national goals and priorities with respect to different sectors and regions. How change is brought about and what it is that changes are important issues that need to be addressed. The profound impact of forces for change on diverse societies finds expression in

patterns of apparently increasing uniformity between countries and cultures. In demographic terms, these include rapid rates of national population growth, and internal migration of people from rural to urban areas coupled with urban expansion.

- **Responses to change**

The responses of individuals and groups to urban life, to factory employment or to new technology are a product of the values, experiences and behaviour patterns that they have assimilated over time as members of particular communities and societies. Some groups and individuals are more open to change and more able to adapt to it than others. Decisions are taken to accept or resist an innovation on the basis of characteristics peculiar to the individual, household or group within the context of the local physical, social, economic, cultural and demographic environment.

Access to education may increase awareness of the health benefits of improved sanitation technology, while income will influence the ability of a household to acquire particular facilities. Personal experience and demonstration of alternative technologies may help to convince people that the benefits of the investment will outweigh any costs incurred. Community organizations and influential leaders can assist in marketing the concept by emphasizing factors valued locally. These may include the status attached to possessing a facility, or its functional value in terms of comfort. Equally, factors such as rapid increase in population which limits privacy may heighten the perceived need for innovations in sanitation.

People resist change for many reasons. There may be resentment towards outside "experts" who know little of local customs and who are perceived to benefit more from the innovation than local people. Leadership may not be united within a community. For example, those with traditional authority who fear a loss of power and status may oppose innovation strongly

supported by political or educated elites. New technologies may be aesthetically unacceptable or conflict with established patterns of personal and social behaviour. Furthermore, households vary widely in the resources of money, labour and time available to them and have their own priorities. For those with limited resources, the costs in the short term of an apparently "low-cost" system may be too great when set against their need for food, shelter and clothing. In addition, in terms of capital investment latrines may be very costly for households if they take a long time to clean, are difficult to use or involve radical changes in social habits (Pacey, 1980). There may also be seasonal variations in the availability of money and labour. Thus the timing of the promotional aspects of a project in relation to, for example, agricultural seasons may be important in determining the local response.

The demographic composition, economic characteristics and attitudes to sanitation of individual households change over time. Experience shows that once people start to improve their houses their interest in latrines is likely to be aroused. Thus some households may be encouraged to install a latrine as one aspect of the modernization process. Projects should be flexible enough to allow households to invest in on-site sanitation not only when they feel motivated but also when they have the resources to do so. Indeed it may be most appropriate to introduce a range of on-site technologies within a particular community from which households can make a choice according to their own changing needs and priorities.

To identify a demand for improved sanitation is more positive than to initiate a supply of technology that is deemed to be good for communities. The former depends upon cooperation between providers and beneficiaries which comes through dialogue and the exchange of information. Individual users are the ultimate decision-makers in the acceptance or rejection of new technology. It is they who determine the success of a project, since the value of the investment depends not only upon community support but, more particularly, on the consent

of households and individual users. They need to be convinced that the benefits of improved sanitation, and the new technology with which it is associated, outweigh the costs. Equally, it is for providers to appreciate the social context and the constraints within which individual decisions are made. They must learn from communities about why improved sanitation may elicit negative responses and also the positive features of community values, beliefs and practices which can be harnessed to promote change. (WHO, 1992)

2.3.2 Technical Options

There are various technical options available when it comes to both on and off site sanitation preference. The following discussions below review how sanitation options have evolved over the years from a nontechnical approach to a more modern and sophisticated technical way, although some of the orthodox methods still exist in our present age.

- **Open defecation**

Where there are no latrines people resort to defecation in the open. This may be indiscriminate or in special places for defecation generally accepted by the community, such as defecation fields, rubbish and manure heaps, or under trees. Open defecation encourages flies, which spread faeces-related diseases. In moist ground the larvae of intestinal worms develop, and faeces and larvae may be carried by people and animals. Surface water run-off from places where people have defecated results in water pollution. In view of the health hazards created and the degradation of the environment, open defecation should not be tolerated in villages and other built-up areas. There are better options available that confine excreta in such a way that the cycle of reinfection from excrete-related diseases is broken.



Fig. 1.1 : Pictorial view of Open Field Defecation. (source : WHO, 1992)

- **Overhung latrine**

A latrine built over the sea, a river, or other body of water into which excrete drop directly is known as an overhung latrine. If there is a strong current in the water, the excrete are carried away. Local communities should be warned of the danger to health resulting from contact with or use of water into which excrete have been discharged.

- **Bucket latrine**

This latrine has a bucket or other container for the retention of faeces (and sometimes urine and anal cleaning material), which is periodically removed for treatment or disposal.

Excreta removed in this way are sometimes termed night soil.

- **Simple pit latrine**

This consists of a slab over a pit which may be 2 m or more in depth. The slab should be firmly supported on all sides and raised above the surrounding ground so that surface water cannot enter the pit. If the sides of the pit are liable to collapse they should be lined. A squat hole in the slab or a seat is provided so that the excrete fall directly into the pit. Table 2.0 in the appendix weighs the merits and demerits of the simple pit latrine.

- **Borehole latrine**

A borehole excavated by hand with an auger or by machine can be used as a latrine.

The diameter is often about 400 mm and the depth 6 8 m.

- **Ventilated pit latrine**

Fly and odour nuisance may be substantially reduced if the pit is ventilated by a pipe extending above the latrine roof, with fly-proof netting across the top. The inside of the superstructure is kept dark. Such latrines are known as ventilated improved pit (VIP) latrines.

Table 2.3 : Merits and demerits of the VIP latrine

Advantages	Disadvantages
Low cost	Does not control mosquitos
Can be built by householder	Extra cost of providing vent pipe
Needs no water for operation	Need to keep interior dark
Easily understood	
Control of flies	
Absence of smell in latrines	

- **Pour-flush latrine**

A latrine may be fitted with a trap providing a water seal, which is cleared of faeces by pouring in sufficient quantities of water to wash the solids into the pit and replenish the water seal. A water seal prevents flies, mosquitos and odours reaching the latrine from the pit. The pit may be offset from the latrine by providing a short length of pipe or covered channel from the pan to the pit. The pan of an offset pour flush latrine is supported by the ground and the latrine may be within or attached to a house.

Table 2.4 : Merits and demerits of the Pour Flush latrine

Advantages	Disadvantages
Low cost	A reliable (even if limited) water supply must be available
Control of flies and mosquitos	Unsuitable where solid anal cleaning material is used
Absence of smell in latrine	Contents of pit not visible
Offset type	Gives users the convenience of a WC
Pan supported by ground	Can be upgraded by connection to sewer when sewerage becomes Available
Latrine can be in house	

- **Single or double pit**

In rural and low-density urban areas, the usual practice is to dig a second pit when the one in use is full to within half a metre of the slab. If the superstructure and slab are light and prefabricated they can be moved to a new pit. Otherwise a new superstructure and slab have to be constructed. The first pit is then filled up with soil. After two years, faeces in the first pit will have completely decomposed and even the most persistent pathogens will have been destroyed. When another pit is required the contents of the first pit can be dug out (it is easier to dig than undisturbed soil) and the pit can be used again. The contents of the pit may be used as a soil conditioner.

Alternatively, two lined pits may be constructed, each large enough to take an accumulation of faecal solids over a period of two years or more. One pit is used until it is full, and then the second pit is used until that too is full, by which time the contents of the first pit can be removed and used as a fertilizer with no danger to health. The first pit can then be used again.

- **Composting latrine**

In this latrine, excrete fall into a watertight tank to which ash or vegetable matter is added. If the moisture content and chemical balance are controlled, the mixture will decompose to form a good soil conditioner in about four months. Pathogens are killed in the dry alkaline compost, which can be removed for application to the land as a fertilizer.

There are two types of composting latrine: in one, compost is produced continuously, and in the other, two containers are used to produce it in batches.

Table 2.5 Merits and Demerits of the Compost latrine

Advantages	Disadvantages
A valuable humus is produced	Careful operation is essential
	Urine has to be collected separately in the batch system
	Ash or vegetable matter must be added regularly

- **Septic tank**

A septic tank is an underground watertight settling chamber into which raw sewage is delivered through a pipe from plumbing fixtures inside a house or other building. The sewage is partially treated in the tank by separation of solids to form sludge and scum. Effluent from

the tank infiltrates into the ground through drains or a soak pit. The system works well where the soil is permeable and not liable to flooding or waterlogging, provided the sludge is removed at appropriate intervals to ensure that it does not occupy too great a proportion of the tank capacity.

Table 2.6 Merits and Demerits of the Septic tank

Advantages	Dis-advantages
Gives the users the convenience of a WC	High cost
	Reliable and ample piped water required
	Only suitable for low-density housing
	Regular dislodging required

- **Aqua-privy**

An aqua-privy has a watertight tank immediately under the latrine floor. Excreta drop directly into the tank through a pipe. The bottom of the pipe is submerged in the liquid in the tank, forming a water seal to prevent escape of flies, mosquitos and smell. The tank functions like a septic tank. Effluent usually infiltrates into the ground through a soak pit. Accumulated solids (sludge) must be removed regularly. Enough water must be added to compensate for evaporation and leakage losses.

Table 2.7 Merits and Demerits of the Aqua privy

Advantages	Dis-advantages
Does not need piped water on site	Water must be available nearby
Less expensive than a septic Tank	More expensive than VIP or pour-flush latrine
	Fly mosquito and smell nuisance if seal is lost because insufficient water is added
	Regular desludging required and sludge needs careful handling
	Permeable soil required to dispose of effluent

- **Sewerage**

Discharge from WCs and other liquid wastes flow along a system of sewers to treatment works or directly into the sea or a river.

Table 2.7 Merits and Demerits of the Sewerage

Advantages	Dis-advantages
User has no concern with what happens after the WC is flushed	High construction costs
No nuisance near the household	Efficient infrastructure required for construction, operation and maintenance
Treated effluent can be used for irrigation	Ample and reliable piped water supply required (a minimum of 70 litres per person per day is recommended)
	If discharge is to a water-course, adequate treatment required to avoid pollution

2.4 Overview of On-site sanitation

Safe disposal of excrete is of fundamental importance, not only for the health of the community, but also because of the social and environmental benefits it brings. However, for many low-income communities, particularly in developing countries, installation of a sewerage system, with its high cost and need for a piped water supply, is not a feasible option. For such communities, on-site disposal - dealing with excrete where they are deposited - offers a hygienic and affordable solution.

Lack of adequate water and sanitation is a major problem in growing cities. Due to rapid urbanization, areas are emerging where the infrastructure cannot keep pace with population growth. Besides hygienic and environmental problems, many of these areas are growing

beyond the municipal borders of the existing city, thereby also creating institutional challenges.

According to William Hogle et al, (1993), an estimated 600 million people in urban areas of developing countries now live in life- and health threatening homes and neighbourhoods, primarily in peri-urban settlements. These homes and neighbourhoods share two characteristics that bear serious potential health effects. That is the presence of pathogenic micro-organisms (especially those in human excreta), caused by lack of infrastructure and related inadequate water supply to remove them. The removal and safe disposal of excreta and wastewater from washing, bathing, and other domestic uses in peri-urban settlements are critical health and environmental needs. Many rivers in Third World cities are literally large open sewers. Surface and groundwater contamination is widespread in many developing countries, and the resulting environmental degradation is more and more apparent along rivers and sea coastal areas.

Also Mukami et al (2003) makes reference to the fact that On-site sanitation is the main form of excreta disposal in most sub-Saharan African cities and will remain the most appropriate level of service for the urban poor in the medium term. Despite heavy public investment in sewerage systems in most primary and some secondary cities, typically only 10-15% of the urban population benefit from access to the sewer network. About 80% of the urban population depends on on-site facilities such as septic tanks and pit latrines which, unlike sewers, are usually the responsibility of households.

2.4.1 Technical features of an On-site sanitation facility (VIP)

The Ventilated Improved Pit Latrine (VIP) is the most commonly used on site sanitation facility in most part of the developing world. Its features are designed to make it affordable

and easy to construct as well as user friendly, in terms of flies and odour nuisance. The problem of flies and odour nuisance is eliminated through the incorporation of a vertical vent pipe with a fly screen at the top. Wind passing over the top of the vent pipe causes a flow of air from the pit through the vent pipe to the atmosphere and a downdraught from the superstructure through the squat hole or seat into the pit. This continuous flow of air removes smells resulting from the decomposing excrete in the pit and vents the gases to the atmosphere at the top of the vent pipe rather than through the superstructure. The flow of air is increased if the doorway of the superstructure faces the prevailing wind (Mare, 1984). If a door is fitted it should be kept shut at all times (except when entering or leaving) to keep the inside of the latrine reasonably dark, but there should be a gap, normally above the door, for air to enter. The area of this gap should be at least three times the cross-sectional area of the vent pipe. (Morgan, 1977).

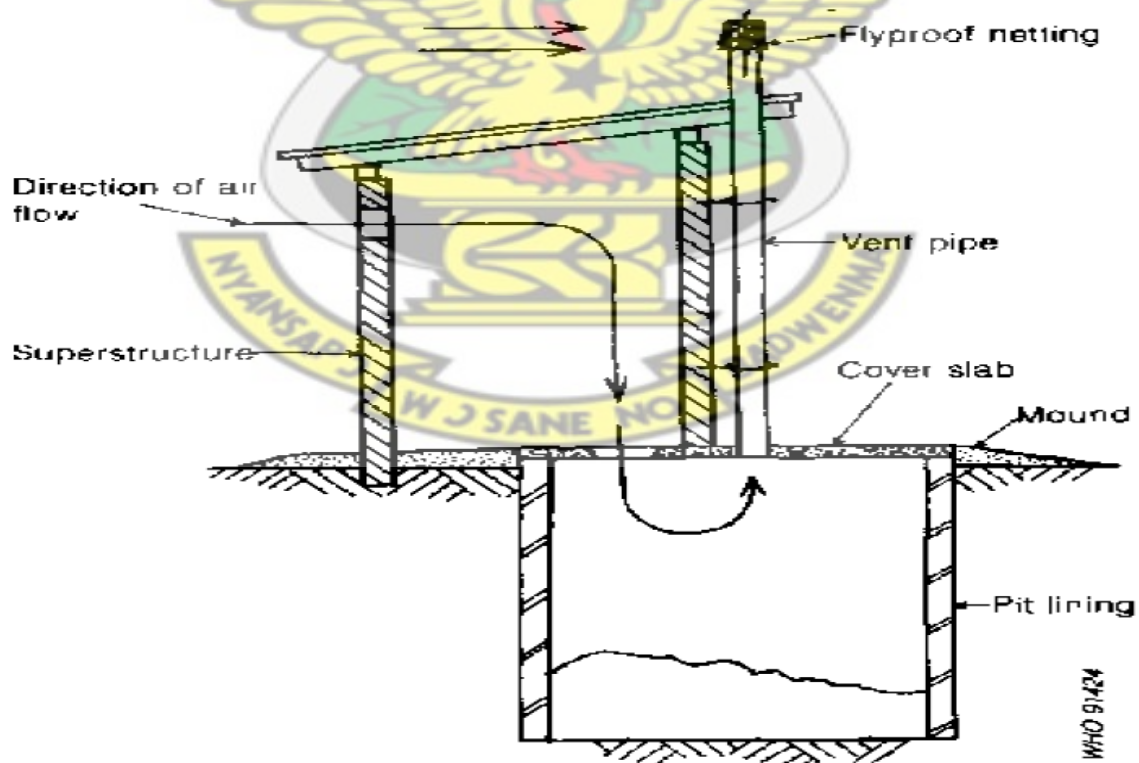


Fig. 2.11 Technical features of Ventilated Improved Pit Latrine (single pit). (WHO,1992)

The defecation hole must be left open to allow the free passage of air. The vent pipe should extend at least 50 cm above the latrine superstructure except where the latter has a conical roof, in which case the pipe should extend as high as the apex. Air turbulence caused by surrounding buildings or other obstructions may cause reverse air flow, leading to foul odours and flies in the superstructure. If mean wind speeds are about 2 m/s, as is fairly common in rural areas, air speeds in the vent pipe are about 1 m/s (Ryan & Mara, 1983).

Air flow may also occur at lower wind speeds because of solar radiation heating the air in the vent pipe, causing the air to rise. The vent pipe should then be placed on the equator side of the superstructure. It may be painted black to increase solar absorption, if the material of the pipe is not itself black. In latrines relying on solar radiation for ventilation, foul odours are sometimes experienced in the superstructure at certain times of the day (usually early morning). This occurs where the outside air temperature is colder than the air in the pit, which may prevent the air circulating. Very little can be done to prevent this, other than sealing the defecation hole at night. In addition to removing odours from the pit, the screened vent pipe significantly controls flies. In Zimbabwe, Morgan (1977) compared the number of flies leaving the squat hole of a VIP latrine with the number leaving a simple pit latrine. The results are shown in Table 2.80.

Table 2.8: Comparison of the numbers of flies leaving the squat holes of a simple pit latrine and a VIP latrine(Morgan, 1977)

Period of Trapping	No. of Trapped in Unvented Privy	No. Trapped in Vented Privy
8 October-5 November	1723	5
5 November-3 December	5742	20
3-24 December	6488	121

Flies are attracted to the pit by the odour coming from the vent pipe but are unable to enter because of the screen. A few flies enter the pit through the squat hole or seat, and lay eggs in the pit. New young flies attempt to leave the pit by flying towards the light. If the latrine superstructure is kept sufficiently dark, the major source of light is at the top of the vent pipe, but the screen prevents the flies from escaping there and they eventually fall back into the pit to die. Well-constructed and maintained VIP latrines combat all the problems associated with simple pit latrines, except mosquitos. However, they are considerably more expensive than simple pits, since a ventilation pipe and full superstructure are required. Because the defecating hole is directly over the pit they accept any form of anal cleaning material without blocking. Routine operation is limited to keeping the superstructure clean, ensuring that the door (where fitted) is kept closed, occasionally checking that the fly proof netting on top of the vent pipe is not blocked or broken, and pouring water down the vent pipe once a year to remove spiders' webs.

1. Design life

Generally pits should be designed to last as long as possible. Pits designed to last 25-30 years are not uncommon and a design life of 15-20 years is perfectly reasonable. The longer a pit

lasts, the lower will be the average annual economic cost and the greater the social benefits from the original input.

In some areas, ground conditions make it impractical to achieve such a design life. If the maximum possible design life is less than ten years, serious consideration should be given to using an alternating double-pit system. In such systems the pits must have a minimum life of two years. In the past, a minimum life of one year was considered sufficient for ensuring the death of most pathogenic organisms, but it is now known that an appreciable number of organisms can live longer. In any event the increased cost of designing a pit to last two years as compared to one designed to last one year is minimal because of decomposition and consolidation of the first year's sludge. (WHO, 1992)

2. Pit shape

The depth of the pit to some extent affects the plan shape. Deep pits (deeper than about 1.5m) are usually circular, whereas shallow pits are commonly square or rectangular.

As the pit gets deeper the load applied to the pit lining by the ground increases. At shallow depths, normal pit linings (concrete, brick masonry, etc.) are usually strong enough to support the soil without a detailed design. Also square or rectangular linings are easier to construct. At greater depths, the circular shape is structurally more stable and able to carry additional loading. Commonly, pits are 1.0-1.5 m wide or in diameter, since this is a convenient size for a person to work inside during excavation. The cover slab required is simple to design and construct, and cheap to build.

2.5 Challenges associated with Human Excreta Management

Apart from a series of technical challenges associated with faecal sludge emptying, haulage and treatment, the inadequate political, organisational and regulatory context are the main causes for the appalling sanitation situation in the urban context of developing countries.

1. Lack of political will and awareness

Faecal sludge management is often neglected in the water supply and sanitation sector. For local politicians, drilling of a drinking water well seems more prestigious than constructing a faecal sludge treatment plant. The importance of an adequate FS management to reduce gastro-intestinal diseases is often underestimated, and awareness of the health and economic benefits (savings in medicine, hospital costs and increased productivity of the population) is still lacking. Furthermore, political and administrative preferences lean heavily towards large-scale, centralised wastewater and sewerage systems (Sasse, 1998), often not suitable or sustainable in the prevalent context of developing countries.

2. Inadequate Legal and regulatory basis

It is evident that countries reveal a paucity of regulatory acts, ordinances and administrative rules on FS management. In some countries, where national acts stipulating the proper disposal of human waste exist, specific agencies are vested with the power to issue the necessary ordinances and exert control. Yet, the institutional responsibilities are often not perceived or performed; hence responsibilities are assigned to several agencies and often overlap, thus leading to institutional interference and paralysis. (Eawag Sandec, 2008).

Since formal attribution of responsibilities to the private sector is generally missing, clarity regarding the distribution of tasks between the public and private sector is also lacking. One of the consequences of the informal character of the private sector is the lack of rules re-

garding, for example, pit emptying, FS haulage and disposal (range of emptying fees, official discharge points, maximum number of trucks etc.). This can lead to abuse (e. g. cartelisation, increase in emptying fees etc.).

For lack of incentives and sanctioning procedures, the different actors involved in FS management do not have the necessary motivation to comply with the existing regulations, and the local governments usually do not have the means either to control or enforce them. In most cases, there is also no provision of land for faecal sludge disposal or treatment.

3. Inadequate financial capacity

Local authorities are often faced with financial difficulties, which impair their ability to ensure services to the population. This is mainly due to a lack of management of the existing resources, and the non-allocation of financial resources to FS-related services.

4. Lack of concerted action between stakeholders

Responsibilities of the different stakeholders are not clearly defined and co-ordination/communication mechanisms between the different actors are nonexistent. Also the responsibilities between regional and local authorities are not clearly formulated. Moreover, some actors in the public sector represented at the regional level are missing at the local level. This slows down the concerting process.

5. Unaffordability of mechanical emptying fees

For a large number of households, standard fees for mechanical pit and vault emptying of on-site sanitation systems are either unaffordable, just barely affordable or the family is not willing to spend the money. Deferment of the emptying frequency of the installations is a widely observed phenomenon among households. Recent studies conducted by CREPA have confirmed that emptying intervals for septic tanks, e. g. five years or more are not uncommon.

The prices charged by public or private emptying enterprises are rarely based on a sound cost calculation. Prices tend to be excessive compared to the costs incurred to those rendering the service. The reason for this is that enterprises rendering mechanized emptying tend to fix the prices in a cartel-like manner, thus excluding a truly competitive market – to the disadvantage of customers, notably low-income families. These families therefore resort to haphazard disposal of FS, and the installations, particularly septic tanks, become overloaded and cease to perform as conceived. All these factors lead to continued environmental pollution and to sustained health risks for urban dwellers. (Eawag Sandec,2008).

CAUSES	Low priority on authorities' agenda	
	Inadequate legal and regulatory basis	
	Lack of concertation between FS stakeholders, (households, service providers and policy/regulatory bodies)	
	Lack of incentive/sanctioning procedures	
	Difficulty in securing suitably located treatment sites	
	Role of private entrepreneurship not adequately recognised, defined and legally secured	
	Non affordability of pit emptying fees	
	Difficulty of accessing pits for emptying	
CORE PROBLEMS	Indiscriminate dumping in urban environment and reuse of untreated FS	
Effects	Terrestrial and aquatic environment contaminated by excreta	
	High risks of transmission of gastro-intestinal infections	
	Morbidity and mortality	

Fig.2.12 Causes, problems and impacts of inadequate or missing excreta and faecal sludge management.
(Montangero et al, 2002)

2.6 The Millennium Development goal and sanitation in Ghana

In the year 2000, one hundred and eighty nine nations (189) including Ghana made a pledge to free it's citizenry from extreme poverty and multiple deprivations by the year 2015. It was this promise that transcribed to become what is now termed as the Millennium Development Goals which comprises of eight (8) goals.

For the purpose of this study Goal seven (7) which aims at ensuring environmental sustainability will be the goal under review in terms of its attainment in Ghana.

According to the 2012 UNDP report on millennium development goal seven (7), the number of people who do not use any sanitation facility and resort to open defecation has reduced by 271 million worldwide since 1990 . However there still remains an estimated 1.1 billion people or 15 percent of the global people with no sanitation facilities at all. (UNDP, 2012)

With reference to the millennium development goal report by Ghana to the UNDP in 2010, It is stipulated that the national coverage on sanitation has increased from 4% in 1993 to 12.4% in the year 2008. Also among the urban populations, access to improved sanitation coverage has increased from 10% in 1993 to 17.8% in 2008, while the rural population with access to improved has increased 1% to 8.2% between 1993 and 2008. (UNDP,2012)

On the other hand, open field defecation declined marginally from 24.4% in 2006 to 23.1% in 2008. With the population of Ghana then estimated around 23.4 million (2008), It implied that about 5.4 million Ghanaians still practised open defecation. (UNDP, 2012).

The millennium development goal report by Ghana to the UNDP in 2010 further elaborates that, although Ghana had made significant strides in reducing the proportion of its population without access to improved sanitation the target may not be achieved by 2015 if the current trends continue. Now at the current trend, the proportion of the population with access to improved sanitation will reach 21.2 % by 2015 instead of 52%, while the proportion of urban population with access to improved sanitation will be 23.4% instead of 55% by 2015.

With respect to the rural areas only 20.6% would have access to improved sanitation instead of the 50.5%.

The gap between the present national coverage on improved sanitation of 12.4% and the 52% target by 2015 indicates that there must be approximately five (5) times increase in effort to be able to achieve the set target. (UNDP2012)



3. STUDY APPROACH AND METHODOLOGY

3.1 Description of Study Area

3.1.1 Location And Size of the Study Area :

Prampram is the district capital of the Ningo Prampram district, one of the newly created districts that were carved out of the Dangme West district in 2012. Majority of the inhabitants are Ga-Adangmes' and they share common cultural values. However the study was limited to the Prampram township which comprised of four (4) communities, mainly Lower East, Lower West, Kley and Oluwe with an estimated total land area of about 4.1 km².

Oluwe Community:

GPS: 5° 42' 49.03"N,
0° 06' 21' 07"E
Population: 1507 (DHRC, 2009)

Kley Community:

GPS: 5° 42' 58.81"N, 0° 06' 28.88"E
Population: 1,446 (DHRC, 2009)
Land area: 0.62sq.km



PRAMPRAM

Lower West Community:

GPS: 5° 42' 23.19"N, 0° 06' 38.74"E
Population :1,413 (DHRC, 2009)
Land area: 0.49sq.km

Lower East Community:

GPS: 5° 42' 30.34"N, 0° 06' 55.06"E
Population: 2,967
Settlement type: Nucleated

3.1.2 Population, Household Size and Growth Rate

According to planning department of the Dangbe West District, Prampram has a population of 7,787 (DHRC, 2011). It has a growth rate of about 2.1%. This is not different for the growth rate for the Dangbe West District. Prampram has an average Household size of about 4.8.

Occupation

The predominant occupation of the people of Prampram is Fishing and Trading (Fish selling). Other occupations include farming and skilled and unskilled labor.

3.1.3 Settlement and Housing

The Prampram community can be demarcated into two areas; the upper and lower. The lower part of the community which comprises of lower East and West forms the old settlement. This part of the community is densely populated with most buildings clustered. Most buildings within this section of the community are mostly mortar bricks and wooden structures. A large number of the buildings do not have inbuilt bathrooms and often have a small detached wooden or concrete structure as an open bathroom. Those who did not own one patronized the public bathrooms which they paid to use.

The Upper community, which comprises of Oluwe and Kley, has a blend of the old and new settlements but with the new settlements being predominant. A lot more modern structures are found within this part of the community. Most of the schools, hospitals etc. are found within this part of the community.

3.1.4 Climate

The Southeastern coastal plain is one of the hottest and driest parts of the country and this is where the study area is found. Temperatures are appreciably high for most parts of the year with the highest during the main dry season (November - March) and lowest during the short dry season (July - August). They average a few degrees lower on the coast and close to the Akwapim range than they do over most of the plains. The absolute maximum temperature is 40° C. (GhanaDistricts.com-MLGRD).

Generally rainfall is very low with most of the rains, very erratic in nature and coming mostly between September and November. Mean annual rainfall is 762.5 millilitres on the coast

3.1.5 Economic and Natural Resource potential

The Prampram community offers great opportunities for both international and local investors. The inhabitants residing within the old town are mostly fishermen due to their location close to the sea. They harvest a good quantity of fish but often face the challenge of getting people to buy them. Although they get the fish mongers purchasing them most often it would have been a great economic benefit to them and any other investor if they could have a processing factory close to the shore where they could always have ready buyers for their fishes.

Its strategic location to the sea gives a good opportunity to create good tourist sites as well as hotel investment. Although those in the upper part of the community are petty traders, there are vast flat lands for good agricultural purpose.

3.1.6 Water and Sanitation Situation

The major source of water to the community is from the Ghana Water Company Limited. Although there are well connected pipe lines linking the community, inadequate flow characterizes most part of the year. Inhabitants go through most of the year without water flowing through their taps.

This has pushed most inhabitants to either construct concrete reservoirs or purchase various sizes of poly tanks. Those that cannot afford such reservoirs resort to storing water in barrels or 25 litre gallons. During such periods of the taps not flowing, resident resort to buying water from the water tankers. Those that cannot afford such huge quantities, buy from those who sell from their reservoirs.

A transect walk through the community revealed that most inhabitants especially those in the lower part of the community did not have access to household toilets and resorted to the use of public toilets or in the open field. Those that did have sanitation facilities in their homes due to the inconsistent flow of water resorted to the use of VIP latrines.

The communal system of solid waste collection was what was being employed within the study area. Inhabitants pay a token depending on your quantity of waste when you dump at the communal sites. It was then hauled away by two private waste management firms who were contracted by the district assemblies to operate within the township.

3.2 Research Methodology and Data collection tools

The study area comprised of four (4) communities. This study adopted a combination of desk study and literature review, household questionnaire administration and field observation. The

study was based on both quantitative and qualitative methods of data collection. The scope of the assessment of the sanitation situation covered residential and public areas, primary and junior high schools, hotels and guest houses and health institutions.

3.2.1 Field Observation

An observation checklist was developed and used to visually observe some technical requirements of these sanitation facilities. This was done to also observe if the technicalities involved with the usage of the various sanitation facilities were being adhered to. It was also to observe the general hygienic conditions of the various sanitation facilities visited and verify the information or assertion made by key informants.

3.2.2 Interview with key stake holders

Relevant interview guides were developed from which in depth interviews were conducted with key informants in sanitation sector of the study area. This was to gain firsthand information on the general sanitation problem and specifically sanitation issues related to human excreta management within the Prampram township.

Key informants interviewed included the Prampram District Health Officer, all the four assembly men from the four electoral areas of the community, the Principal nurse at the Prampram District Hospital, School Health Education and Programme coordinators (SHEP) of the various schools visited,. The others were the public toilet attendants (public and government) and the facility treatment supervisor at the Tema Metropolitan Assembly Faecal Sludge disposal/treatment plant.

3.2.3 FOCUS GROUP DISCUSSIONS

As described earlier, due to the existing division of the community into the upper and lower sections, the focus group discussions were held in that pattern. It was much convenient that way and in all eight (8) discussions were held. Below is a groupings of how the focus group discussions were organized.

Table 3.0 : Groupings for focus group discussions

	Lower West and East Communities(Lower section of the community)	Olowe and Kley communities (Upper sections of the community)
Group 1	Opinion Leaders	ACI, Zoil and Zoomlion sanitary workers
Group 2	ACI, Zoil and Zoomlion Sanitary workers	Church groups (Methodist, Assemblies of God)
Group 3	Fishermen group	Community Leaders
Group 4	Tailors and seamstress, hairdressers associations	Association members

The discussions focused on:

- the history of human excreta management;
- the pertaining situation now with respect to human excreta management.
- barriers/challenges to human excreta waste management;
- performance of management practices and technologies;
- proposed sustainable solutions to improved human excreta management.

Voice recordings were taken at these group discussions for transcription. Content analysis was carried out on the transcripts.

3.2.4 Sampling size and Household questionnaire administration

As part of the quantitative methods, questionnaires were administered to the households within the study area. In all two hundred (200) households were interviewed within the study area. Both the purposeful and random sampling was adopted. The sample sizes for the measurements and the household surveys were determine using :

$$n = \frac{N}{1 + N(1 - \sigma)^2}$$

n = sample size

N = Population

σ = confidence level

NB: a confidence level of 90-95% was used.

However the sampling was done in such a way that there was a fair or even distribution of interviewees from the 4 parts of the study area, which is the lower East and West, Kley and Oluwe. Within each of these four (4) sectional areas of the study area sampling was done in the best way to cover wider areas, ensuring there was an even spread from one end to the other of each section. Areas covered in the questionnaire were the availability and type of toilet facilities at residence, motivation as well as constraints encountered for wanting to own a household toilet and health and hygienic practices. The others were the perception of the public toilets in terms of the rate being charged and hygiene and the constraints encountered in its usage.

3.2.5 Analytical framework for Data Analysis

Questions for the household interviews were a blend of the open end and close end questions. This was to also afford respondents a chance to express their views and perceptions freely. The data collected was collated and analyzed using both qualitative and quantitative research methods. The quantitative analysis dwelled more on the household questionnaire and was analyzed using Microsoft Excel Statistical.

The various analytical tools and method used for the research objectives and the variables measured are presented in the table below.

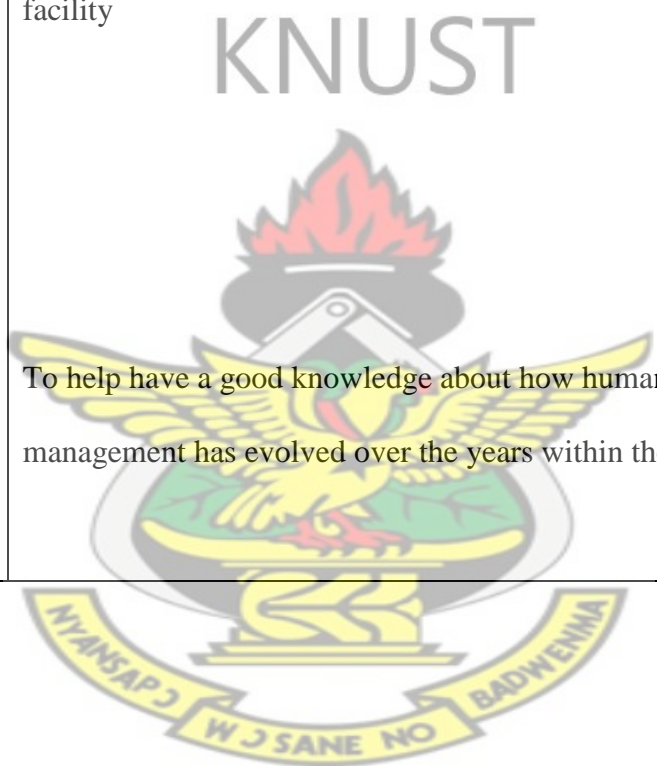


Table 3.1: Project Objective and Methodology matrix

➤ **OBJECTIVE 1** : Identify technologies used in human excreta management

Variables of investigation	Aim for analysis	Methods of Measurement (Tools)
Availability of toilet facility	To establish the existence of toilet facilities within the Prampram township	Interview with key stake holders, household questionnaires.
Type of toilet facility available	To look at the type of toilet facilities being employed by the inhabitants.	Interview with key stake holders, household questionnaires
If toilet facility is not available, how the inhabitants handle their human excreta.	To look at the handling of human excreta by inhabitants who do not have access to toilet facility	Household questionnaires

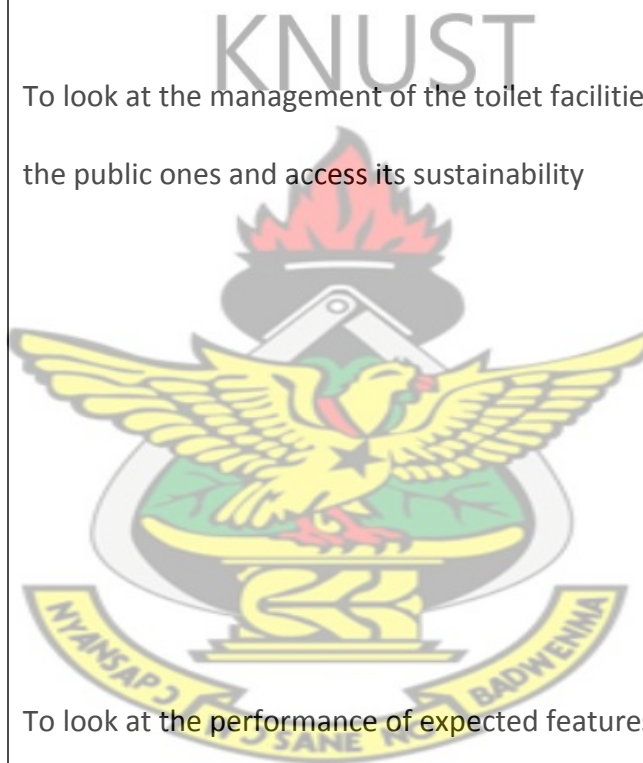
Cost incurred as a result of managing the facility and its affordability. As well as frequency of desludging.	To help in looking at the management practices of the toilet facility	Interview with key stake holders, household questionnaires
History of human excreta management within the community	To help have a good knowledge about how human excreta management has evolved over the years within the community	Interview with key stakeholders and Focus group discussions (FGDs)



➤ **OBJECTIVE 2** : Evaluate the performance of technologies and management practices used in Human Excreta Management

Variables of investigation	Aim for analysis	Methods of Measurement (Tools)
Number of persons using the toilet facility as against the total population or expected users	To access the adequacy of the toilet facility with respect to the available population. Looking at whether people have to queue for long before having access.	Interview with key stake holders
Environmental friendliness (any environmental pollution as a result of the usage of the toilet facility)	To look at the environmental impacts of the technology used in human excreta management	Household questionnaires, interview with key stake holders and observation sheet, Focus Group discussions (FGDs)
Any concept of reuse	To look at the sustainability as well as benefits(financial) in terms of human excreta management	Interview with key stake holders

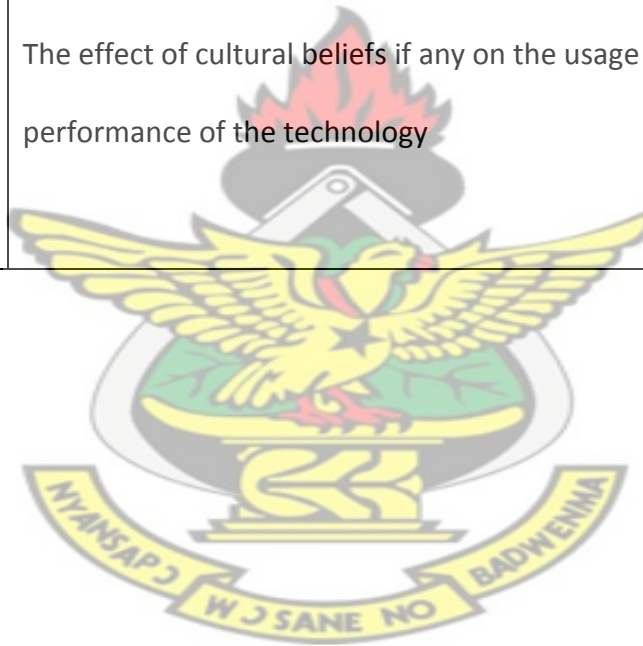
Hygienic conditions of the facility	How hygienic the facility is to users.	Household interview and FGDs
Sustainability of management practices being employed (charges if it's a public toilet, frequency of dislodge, maintenance plans, how the monies accrued are handled etc)	To look at the management of the toilet facilities, especially the public ones and access its sustainability	Interview with key stake holders
Accessing certain expected features of the structure depending of the type of technology being employed	To look at the performance of expected features of the facility depending on the technology being employed	Observation sheet developed by the researcher



OBJECTIVE 3: Evaluate the factors affecting the performance of the technologies and the management system.

Variables of investigation	Aim for analysis	Methods of Measurement (Tools)
Socio-cultural acceptance (people's view)	It is to find out the people's perception about the existing technologies, their acceptance and willingness to use the facilities and whether their perception affects performance	FGD's, household survey
Accessibility and affordability	It is aimed at investigating the effect the location of the facility has on its patronage and also whether the rates being charged have any effect.	FGD's, in-depth interview with key informants and household questionnaire
Availability of needed utility services	It is to find out the effect of the absence or presence of needed utility service such as water on the performance of the technology	Interview with key informants, household survey

Socio-economic impact	It is to ascertain the impact of the socio-economic level of the inhabitants on the performance and management of the facilities.	Household survey and interview with key informants
Cultural practices	The effect of cultural beliefs if any on the usage and performance of the technology	FGD's, interview with key informants.



4.0 RESULTS AND DISCUSSION

4.1 Human Excreta Technologies and Practices

The household interviews revealed that 43.13% within the whole study area generally had access to household toilet while 56.88% did not. Considering the situation per community, 30% of the people interviewed in Lower East had access to household toilets whereas 70 % did not. However the situation in Lower West was directly the opposite, although the two form part of the communities along the shore, 74.5% had access to household toilet and 25.5% did not.

In the Oluwe community which had much of traditional houses depicting more of the earlier settlers only 26% of the correspondents had toilet facilities in their house whereas 74% did not. 42% had toilet facility in their household at the Kley community whereas 38% did not. Although Oluwe and Kley form part of the upper community, the difference can be attributed to new structural developments in the Kley community. It hosts more modern houses which has inbuilt toilet facilities.

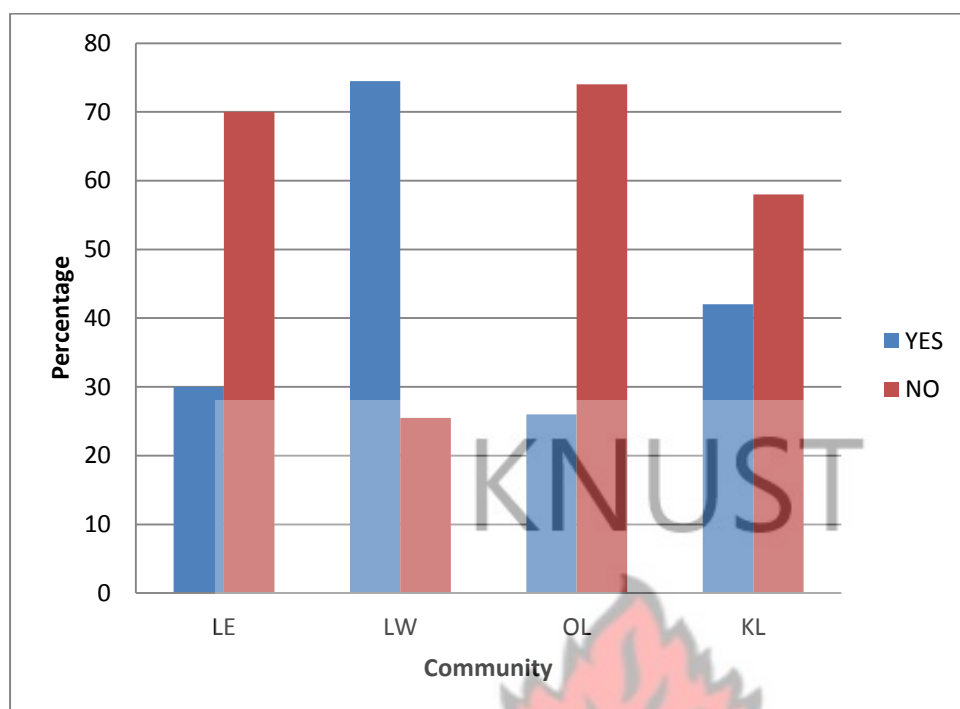


Fig 4.0 Availability of Toilet facility at home.

4.1.1 Human Excreta Technologies in Prampram.

There are several sanitation facilities used all around the world, both dry and wet systems, with some being considered as improved and others unimproved.

As discussed earlier in the literature review the World Health Organization (WHO) defines “improved sanitation” as access to personal sanitation facilities that are able to hygienically separate human waste from human contact. (WHO, 2008). These include flush and pour-flush toilets that empty into a sewer, septic tank or soak away pit, as well as pit latrines with slabs, ventilated improved pit latrines (VIPs) and composting toilets. Whereas unimproved sanitation includes no sanitation facilities at all, known as “open defecation”, pit latrines without slabs, hanging toilets, buckets, and shared or public facilities of any type.

The situation within the study area was not any much different, as most of the sanitation facilities mentioned in the definitions by the WHO were readily identified. In the Lower East area, 80% of the household visited had the ventilated improved pit (VIP) as a sanitation facility whereas 20%

owned the flush toilets or otherwise known as the water closet (WC). The situation was however very different at Lower West as all the household visited used the ventilated improved pit (VIP), thus representing 100%.



Plate 4.0 Flush toilet



Plate 4.1 Ventilated Improved Pit



Plate 4.2 Pit Latrine

In the Oluwe community 92.86% of the households visited owned VIP's whereas 7.14% of them had pit latrines without slabs. The sanitation facilities identified in the Kley community was not different from the Lower west community as all the households owned VIP's.

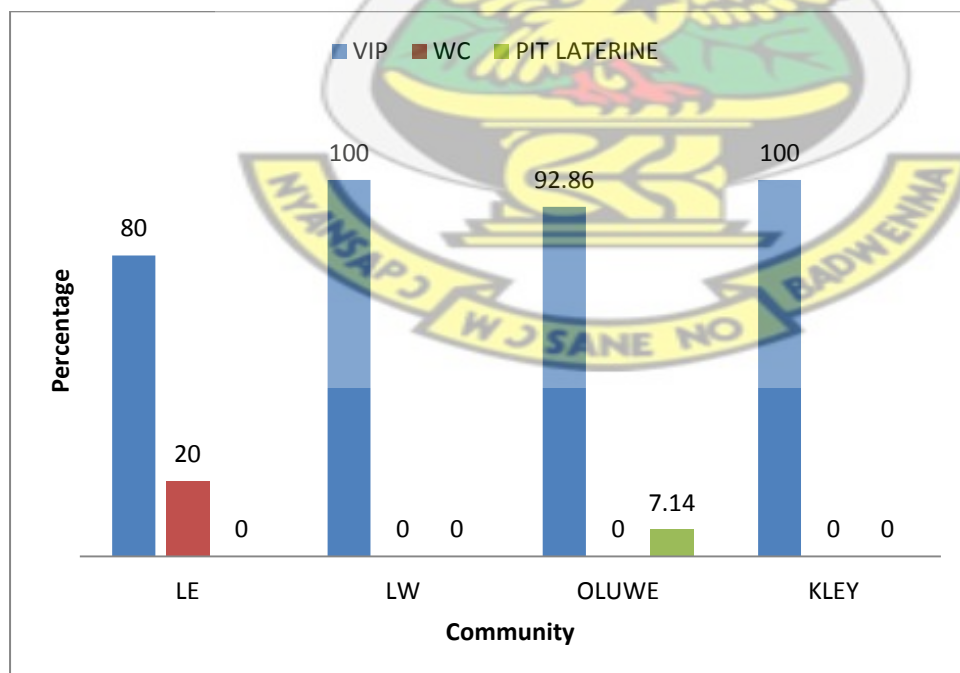


Fig 4.1 Types of household toilet facilities available

Majority of the households visited within the study area can be termed as improved per the definition stipulated by the WHO because they could hygienically separate the human faeces from human contact and were not shared by more than one household. Most of them in ensuring their security had padlocks on their doors. This is with the exception of the 7.14% households identified in the Oluwe community which were pit latrines without a concrete slap to separate the human faeces from human contact. a typical example of such can be found in plate 4.2 above.

All the people interviewed within the study area that owned toilet facility in their homes had containers for storing their anal cleansing materials but burned them when they were full. Having the container for storing the anal cleansing materials within the privy room especially with the VIP is not the best and contrary to the design principles as these could invite flies and bring about odour in the room. It is more appropriate to drop the anal cleansing materials into the pit as they are factored in the designing of the pit size. If the anal cleansing materials are handled this way it will help do away with them being burnt as that process could end up littering the environment as the wind blows them around and litter the environment during the burning process since not all the material ends up being totally burnt. (WHO1992).

Although most of the owners of the VIP did not understand the principle governing its usage they were kept neat and their doors shut most often. Most of them had the privy room relatively dark with less openings and vent pipes installed with the exception of a few who always kept their doors opened, which resulted in fly nuisance.



Plate 4.3 Household VIP



Plate 4.4 Pit latrine without a slab

4.1.2 Human excreta management options for those without household toilets

With reference to the discussions above it is evident that not all the inhabitants interviewed owned household toilets and the following discussion below will be delving into how both adults and children alike handle their human excreta in areas where no toilet exist.

The study revealed that 64.9% of the adult interviewees in Lower East resorted to open field defecation whiles 35.1% of them used the public toilet. A higher percentage of 82.9% was however recorded at lower west using the open field as against 17.1% using the public toilet. The percentages was however different for the upper part of the community, that's Oluwe and Kley. That is, 51.4% of the people interviewed whom were adults resorted to the open field as a means of defecating whereas 48.6% used the public toilet. The situation was not much different from the Kley community where the percentage of adults resorting to the open field was 48.3%, with 48.3% as well using the public toilets available and 3.4% of them often tied their faeces in polythenes and added them to their household refuse.

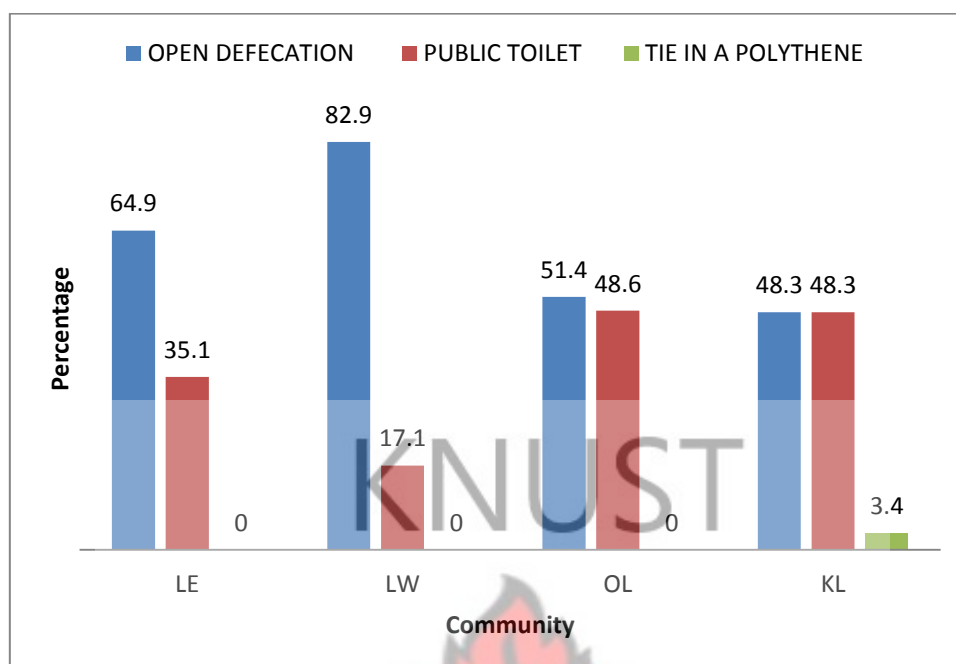


Fig 4.2a Adults without access to household toilet

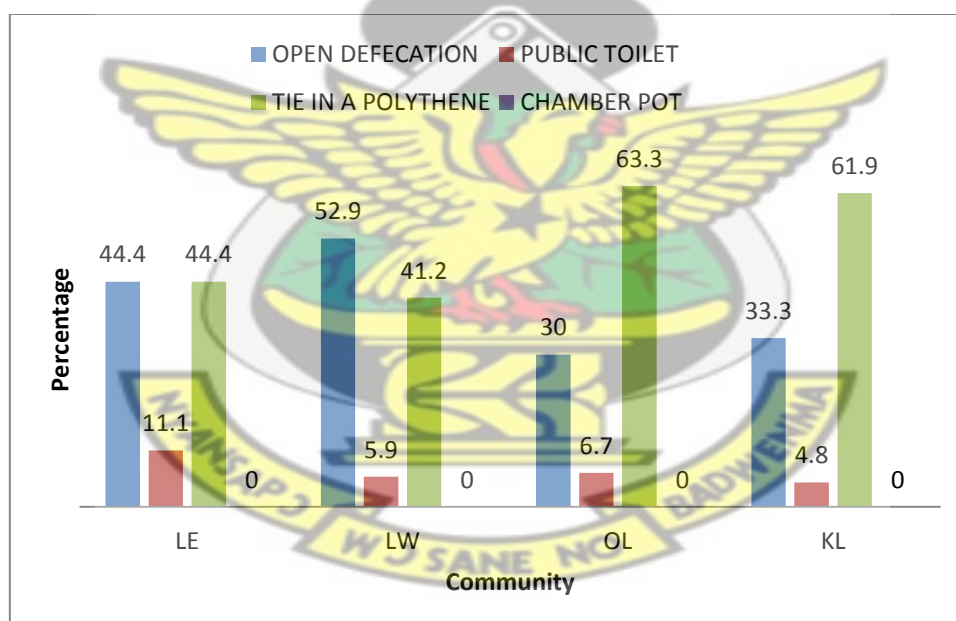


Fig 4.2b Children without access to household toilet

Analyzing the percentages of those resorting to the open field defecation across the community, it is realized that the figures down the coastal line are higher than that of the upper community. More attention is being given to this because, according to the WHO it is an unimproved way of sanitation and can cause serious epidemic such as cholera (WHO

1992). This difference was due to the fact that there is no public toilet available within the Lower west community, and it is evident that they recorded 82.9%, which is the highest. The only public toilet available within the Lower West community was abandoned even before its usage. Residents, most of them being the fish mongers living along the coastal line have resorted to using it as a store room for their baskets and other stuff they use during the work. A picture of the abandoned public toilet is shown in plate 4.5.



Plate 4.5a: Abandoned Public toilet in LW

Plate 4.5b: An inhabitant being interviewed

Plate 4.5c: A cubicle of the Public toilet



Plate 4.5d: Activities behind the abandoned toilet

Plate 4.5e: Activities adjacent the abandoned toilet

An interview with the inhabitants (plate 4.5b) revealed that most of them were unhappy with where the public toilets was sited. It was sited very close to where they smoke their fishes

when they get them from the shore. They also complained that they think the soil was not suitable enough to sustain the super structure of the public toilet, which in totality they believe made the public toilet structurally weak, hence the reason to abandon it. It has never been used till date. Residents have to then use the only public toilet at the Lower East. This means majority of the people in the Lower west would have to traverse long distances to gain access to a toilet facility which they already claim not to be hygienic. Hence they feel more comfortable using the shores of the beach, where they could enjoy the fresh breeze as well. Although some of the inhabitants were not happy with this practice they were compelled to do so under the current circumstance of not having access to a toilet facility close. One resident interviewed referred to the situation as being very worrying and embarrassing. She said sometimes when you use the shores early in the morning as a means of defecating, you just turn left and there you might have your in-law squatting just next to you and it is most at times very embarrassing.

An observation conducted by the researcher at the shore also proved this high rate of open defecation. An observation was conducted between the early hours of 4:30 to 8:00am and 4:30-7:30pm in the evening with an observation chart which can be seen as plate 4.6b. During this observation the researcher positioned himself at a location with a good view across the shore and out of the public sight and counted the persons as they strolled to defecate. This was done every day over a week including weekends and it was observed that on average 500 people (including children) used the beach shores as defecating location every morning and an average of 120 people in the evening. This was mostly at the part of the shore at the edge of the Lower west community. A further discussion with a worker from ZOIL (a subsidiary of ZOOMLION responsible for cleaning beaches) touched on the fact it

has become somehow of an accepted practice and what they can only do is to rather direct the people as to which part of the shore they could use.



Plate 4.6a: OFD at the seashore

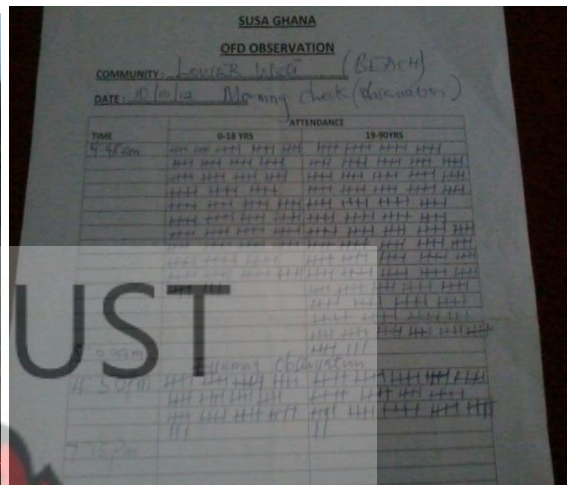


Plate 4.6b: Sample of observation sheet used

The same exercise as discussed earlier was repeated in the upper part of the community as well and interesting figures were recorded too. Two (2) OFD sites were located within the Oluwe community. The first one located right behind the public toilet and the other some few meters from the same public toilet. A good view of it is shown in plate 4.7, which depicts a generated sanitation map of the community showing all the public toilets and areas where open field defecation takes place and those sites are labeled OFD.



Plate 4.7: Sanitation Map of the study area. (PT- Public toilets)

The first site close to the Public toilet recorded an average of 70 in the morning and 70 in the evenings. However this was different from the second site close to the Assemblies of God church where an average of 130 people were recorded during the morning session and an average of 80 during the evening session.

In all 10 public toilets were identified within the study area. Six (6) were currently operational, 2 had been abandoned, one (1) at Lower East and the other at Oluwe. Two new ones had been constructed but were not in use during the period of study. One (1) at lower East which was the WC type and the other at Kley which was a KVIP.

It was also observed that ‘the wrap and throw’ concept was more among the children without access to household toilet. This is very evident in fig 4.2b above. Although some of them resorted to using the open field, most of them tied their faeces in polythene and either throw them into nearby bushes or add them to the household refuse which eventually finds its way

into the communal containers. This is a very bad practice and subsequent proposals will aim at doing away with this practice.

4.1.3 Existing Technologies in Schools and Hospitals

Human excreta management within the schools is not much different from what exists within the community. A visit to all the schools within the study area revealed that the KVIP technology was what was being adapted in most of them with the exception of two kindergarten schools which were using the water closet.

Currently the toilet facilities were being managed by the school authorities. However due to the existing problem within the community with respect to Human excreta management, the schools face several challenges. One of such school is the Prampram Presby school, although authorities lock up the toilet to ensure security, they only return to find them broken. Due to the lack of toilet facilities in most residents and the inadequacy of the public toilets, inhabitants living around the school force the facility open and use them. Those that are not able to force the lock opened defecate around the facility.

The toilet facility was generally very clean and odour free when inspected. The alternating pit concept was also being employed properly with only one pit being used at a time within a cubicle. But one major problem which runs through a visit to most of the schools was that the toddlers or the kindergarten children for fear of falling into the pits were not allowed to use the KVIP but were rather encouraged to use the nearby bushes. An interview with the School Health Education Programme (SHEP) coordinator revealed that efforts have been made to get the teachers in charge of these classes to assist the children when they want to use the facility but due to the inadequate teacher student ratio as well as the work load, they are not able to.

She also explained that they scrub and clean the facility every Friday together with the students and also ensure that the place is swept and tidied every morning.

The situation was very different at the cluster of schools, where three schools namely Prampram Freeman Methodist Basic School, Wesley Methodist School and the Prampram D/A Basic 'B' school shared two toilet facilities. Despite the inadequacy of the toilet facilities for the schools the inhabitants living around forcefully use the facilities too. Due to the improper manner with which the inhabitants use the facility, there is human excreta often scattered indiscriminately in the cubicle, corridor and on the surroundings of the facility. This has forced the school authorities to abandon one of the two facilities as efforts to ward off the public proved futile. This has forced the three schools numbering about a thousand (1000) pupils to share the only 4 seater KVIP left which is woefully inadequate. The situation has forced a chunk of the students to use nearby bushes for nature's call. A picture of the abandoned toilet is exhibited on plate 4.8.



Plate 4.8a:Abandoned school toilet

Plate 4.8b:The school toilet in use now

Plate 4.8c:Abandoned school toilet

The major hospital within the study area which is the Prampram Government hospital was using the water closet, but this was definitely not going to be without the general water problem within the study area. This was a major problem for the hospital as patients or

workers at the hospital had to fetch water in order to be able to use the toilet facility and this hampered attempts being made to ensure its cleanliness.

4.2 Institutional Management for Human Excreta Management

The Environmental Health and Sanitation Department (EHSD) of the Prampram district assembly is tasked with the responsibility of managing the sanitation situation within the study area, which has the public toilets inclusive. Interactions with the head of the unit and some workers revealed that the public toilets currently are being managed by the area councils, due to the old settlement pattern. Although efforts are being made by the unit to take over fully and manage them, it has been difficult due to the new nature of the assembly. The assembly is yet to develop its long and short term goals which will have the assembly's direction for the district in terms of sanitation. Then from there they could gradually take over and manage the sanitation facilities.

But currently in the absence of this system, the assembly members for the various electoral areas are managing the various public toilets existing within their electoral area. Proceeds from the toilet usage are given to them, from which some are used to desludge and purchase anal cleansing materials as well as cleaning items. Change in hands during election of assembly members will definitely mean change in management and if the assembly member's priority is not on sanitation then the management of the sanitation facility becomes a big problem. Lack of technical knowledge of the facility by the assembly members is also a major cause of the management problems.

From the part of the EHSD, political interference is another major problem facing the department, in terms of enforcing the law on inhabitants who breach the sanitation by-laws

within the district. The head of the EHSD explained that most often when culprits are summoned to court, some influential people within the community interfere and order their release. This has made it very difficult for the department to stomp authority within the community in terms of sanitation, resulting in most inhabitants having a freeway in terms of sanitation.

4.3 Performance of the technologies and management practice

A thorough glance through the research within the study area brings to bare three technologies. That is the VIP which was mostly used in homes, the Water closet and the KVIP which were used as the public toilets. However the predominant technology within the community due to the water constraints was the KVIP and VIP. Both technologies having a lot of basic features in common offer improved sanitation by eliminating flies and odour which is something anybody using a toilet facility would not want to experience.(Simon Farmer, 2010)

4.3.1 Technical performance

4.3.1.1 Odour

As described earlier per the technical design of the VIP and KVIP, they are supposed to be odourless or may be, have a very minimal amount during certain times of the (usually early in the mornings) due to the air temperature outside being colder than that in the pit, thereby preventing effective air circulation (WHO, 1992). Wind passing over the top of the vent pipe causes a flow of air from the pit through the vent pipe to the atmosphere and a downdraught from the superstructure through the squat hole or seat into the pit. This continuous flow of air removes smells resulting from the decomposing excrete in the pit and vents the gases to the

atmosphere at the top of the vent pipe rather than through the superstructure. The flow of air is increased if the doorway of the superstructure faces the prevailing wind (Mare, 1984). If a door is fitted it should be kept shut at all times (except when entering or leaving) to keep the inside of the latrine reasonably dark, but there should be a gap, normally above the door, for air to enter. The area of this gap should be at least three times the cross-sectional area of the vent pipe (WHO, 1992, Simon Farmer, n.d). Hence during effective performance of the technology there should not be retained odour in the structure.

Such can be said about the VIP latrines found in houses with household toilets within the sturdy area. Physical observation carried out in the residents visited by the researcher as seen in plate 4.9 showed most of them having very little or no odour. Household VIP latrines with any amount of odour on visit was as a result of them



keeping the container containing the anal cleansing materials **Plate 4.9: Household observation**

within the chambers of the facility. This however is contrary to the design principles of the VIP latrine. Since the doors of the facility needs to be kept shut to allow less penetration of light, retaining the anal cleansing materials container within the chambers will definitely circulate some odour in the chamber. Most preferably per design principles it is more appropriate to drop the anal cleansing materials into the pit. (WHO,1992).

With the KVIP 69.2% of the correspondents in Lower East per their perception had a problem with the odour, where as 37.5%, 56.3% and 46.2% of the correspondents in Lower

west, Oluwe and Kley respectively expressed their perceptions on the odour as being their major problem.

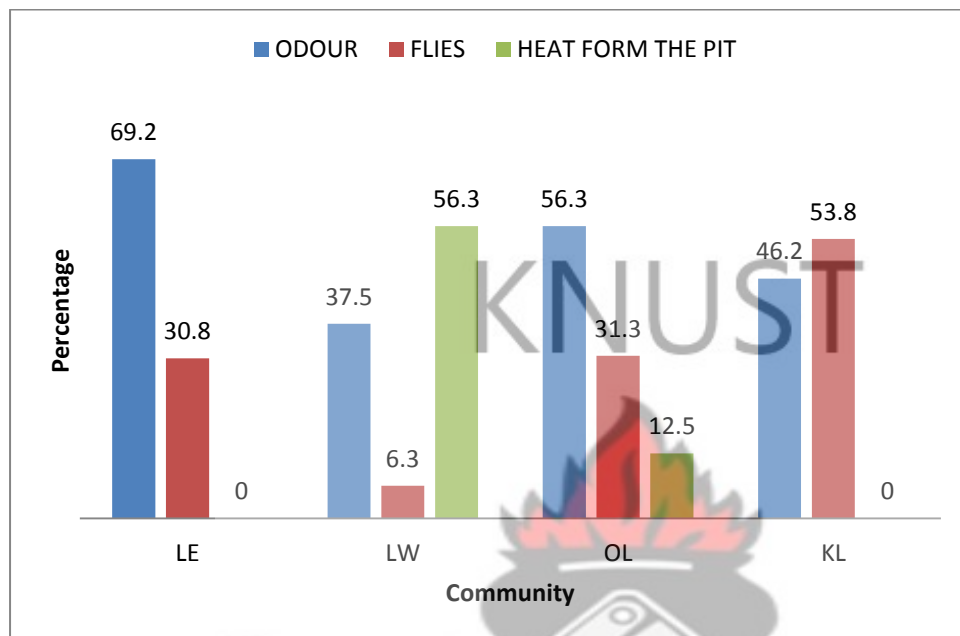


Fig. 4.3 User Perception on the hygienic problems on the KVIP public toilets.

Physical observation carried out at the public water closet facility within the study area show minor odour. This was partly to do with the type of water being used to flush, which was dirty water.

4.3.1.2 Flies within chamber of the Facility

Any VIP or KVIP latrine technically functioning properly must not have flies hovering about within its chamber. It is designed such that the doors of the facility must be kept shut most of the time so that the major source of light into the chamber would be through the vent pipe, which must have a fly screen. The structure of the toilet means that any flies attracted to the pit through the openings will try to escape by heading towards the strongest light source, which comes from the chimney/vent pipe. The flies exit is blocked by the wire mesh which is

wrapped around the edge of the vent pipe, so the flies eventually die and fall back into the pit (Simon Farmer, 2008).

With the household VIP latrines, physical observation by the researcher showed majority of them having no problem with flies. Those identified with problems with flies were the latrines that had too many openings and those that kept the door to the facility opened most of the usage period.

With the user perception of the KVIP concerning fly nuisance 30.8%, 6.3%, 31.3% and 53.8% were fractions within the Lower East, Lower West, Oluwe and the Kley communities respectively that expressed the fly nuisance as a major problem. This can be seen in figure 4.3 above. This is as a result of the doors to the chambers of the KVIP latrine being left open. This readily defeats the design concept of having the doors shut to reduce the amount of light within the chambers, so the escaping fly could only leave through the source of light with high intensity. But with the doors opened flies enter and leave the chamber at will, thereby inconveniencing users. Even if the chambers are kept sufficiently dark, new developed flies which might have developed in the pit (since such with excreta is a convenient arena for their development) will only try to escape through the nearest source of light which will be the vent pipe, instead of flying out through the squat hole and inconveniencing users if the doors are opened constant. One obvious problem hindering the technology from dealing with the fly nuisance was the absence of a wire mesh meant to act as the fly trapper at the tip of the vent pipe. Most of them were opened at the tip into the atmosphere.

4.3.1.3 Heat from Pit

From figure 4.3 it is realized that 56.3% of the 50 correspondents within the Lower West community who use the KVIP public toilet complained about the unbearable heat from the

pit, whereas 12.5% complained as such. Nothing of such nature was recorded in Lower east and Kley.

With the design nature of the KVIP technology users must not be inconvenienced by the heat from the pit which is as a result of the decomposition process of the human excreta within the pit. Air entering the super structure through the openings above the door way enters the pit through the squat hole, forcing the generated heat in the pit out through the vent pipes. However having too many openings on the superstructure could cause short circuiting and halt the effective process of venting out the generated heat through the vent pipe and not the squat hole.

4.3.2 Desludging Frequency

The pit of the VIP and the KVIP is designed such that for longevity it must be dislodged periodically. Its frequency depends on the pit size designed. In order to ensure economic sustainability it should be such that it will be at reasonable intervals.

It is noted in figure 4.4 below that 46.7% of the people interviewed within Lower East that owned toilet facility had never disludged before although the interview revealed most of them had owned it for more than a year. 13.3% desludged annually, 33.3% once in 2yrs and 6.7% disludged once beyond 2 yrs. 75% of the correspondent who owned household toilets in the Lower west vicinity of the study area had never disludged, 16.7% and 8.3% had desludged once in a year and once in 4 years respectively. For Oluwe, 41.2% of the people who owned toilet in their houses had never disludged them, whereas 23.5%, 5.9% and 29.4% had desludged once in a year, once in 4 years and once in 2 years respectively. But in Kley all the people who owned household toilets had never desludged.

The reason for the high percentages of those not having desludged their pits, could be due to the fact that the number of household users as compared to the volume of the designed pit could be less. Hence the pit being able to sustain longer without having to be desludged. Because an observation made at the VIP latrines did not show the pits anywhere near full and were very convenient for use.

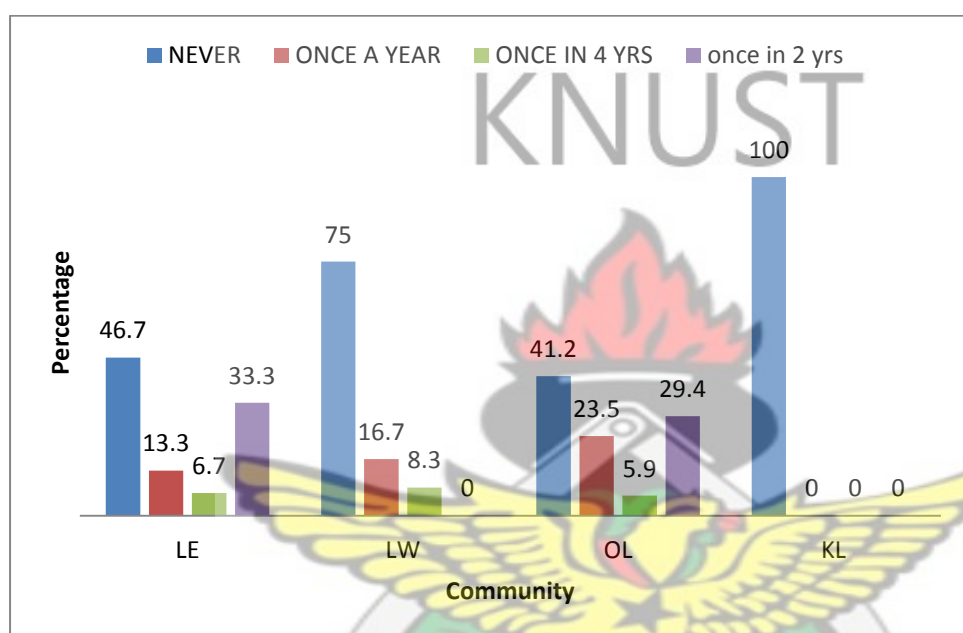


Fig. 4.4 Desludging frequency of household VIP

For the KVIP public toilets, the existing one within the Kley community had been operational for 6 years and had been desludged 5 times but one was unsuccessful. A private commercial VIP in a household at Kley had also been operational for 8 years and had been desludged 3 times. Lower east has two public KVIP's, the first which is in the old town of the Lower east community had been operational for 4 years and had been desludged once. The other existing KVIP public toilet located close to the cemetery for the Lower east community had been operational for two years and had been desludged once. That for Oluwe had been in operation for about 5 years but all attempts to desludge it had not been successful. This can be due to

the greater part of the content in the pit being consolidated into solid material which virtually makes it difficult for the cesspit emptier to do its work.



Plate 4.10: Faecal Matter at the brim of squat hole

The attendant in charge of the facility explained that in

order to keep the facility operational anytime its

almost full, chemicals such as carbide were sprinkled in the pit and left over a period of time after which the faecal matter in the pit shrunk. Then it would be opened to the public again for use. During a recent visit to the study area, this particular facility had been closed down and a new one constructed next to it had started being used.

4.3.3 Cleaning of the facility

Hygiene is obviously an important issue wherever the toilet is located but more so where there are many users. Faecal borne diseases take more lives and create more suffering than war or natural disaster, but do attract as much media coverage. Due to the number of fatalities, it is important to consider hygiene and cleanliness. A dirty latrine is not only unpleasant to use, especially bare foot, but smells and attract flies, bringing more diseases.

An observation on the VIP latrine within the households showed an appreciable level of cleanliness, mostly due to the sense of ownership. Once the facility belongs to an individual, he definitely takes good care of it so as to ensure its cleanliness.

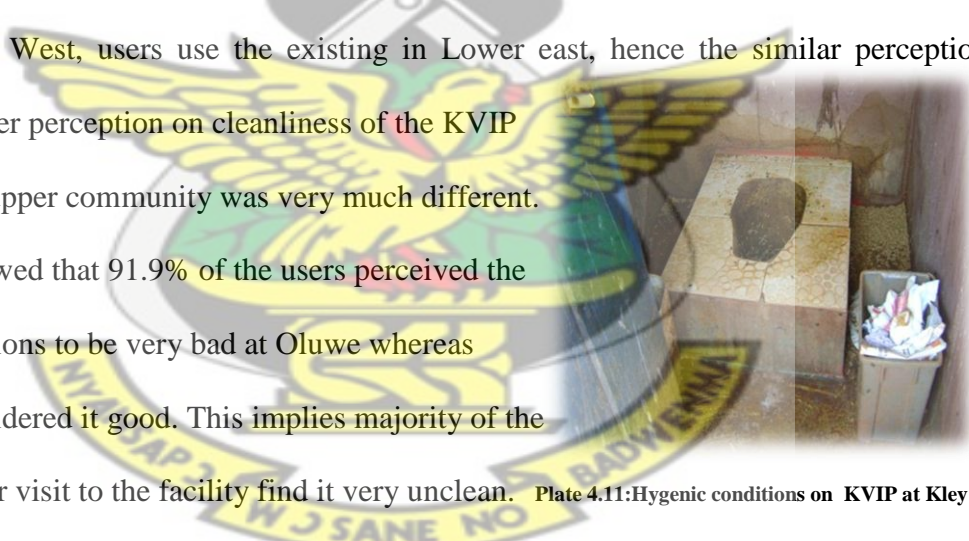
The hygienic condition on the water closet facility was not as good as that of the VIP latrines in the household. Most likely due to the fact that the water closet facility is a public facility. Even if the management should ensure its cleanliness on the mornings they get untidy few hours after.

Lack of sense of ownership on the part of the people makes them use the facility anyhow. Observation at the only working water closet facility, showed scattered anal cleansing materials within the cubicle, whereas there were containers placed for anal cleansing material in the cubicle.



Plate 11: Water closet facility

The hygienic conditions at the KVIP public toilets were not good. From figure 4.5, 75% of the users of the facility at Lower east described the cleanliness level as poor whereas 25% described it as good. Good in the sense that they are satisfied with the manner in which it was kept tidy and the felt comfortable using it. Similar perception was captured in Lower west where 73.5% of the users considered the cleanliness level to be bad with 26.5% of them considering it to be good. This is partly due to the fact that since there are no KVIP public toilet at Lower West, users use the existing in Lower east, hence the similar perception. However the user perception on cleanliness of the KVIP latrines in the upper community was very much different. The survey showed that 91.9% of the users perceived the hygienic conditions to be very bad at Oluwe whereas only 8.1% considered it good. This implies majority of the users upon their visit to the facility find it very unclean. **Plate 4.11: Hygienic conditions on KVIP at Kley**



So was the situation at Kley where 85.7% of the users considered the facility to be very unclean, while only 14.3% claimed otherwise.

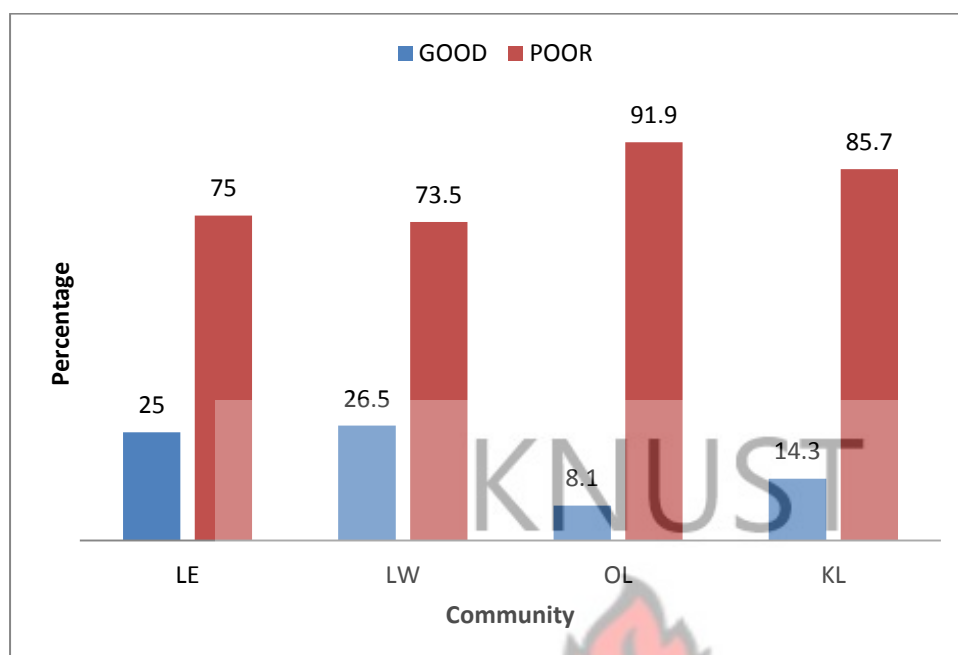


Fig. 4.5 User perception on cleanliness of the KVIP latrine

4.4 Factors Affecting performance

4.4.1 Lack of Technical understanding of the technology

Throughout the observations and interactions with the public toilet attendants it was evident that all of them had little or no technical understanding of the working principle behind the KVIP technology. Most of them are just concerned about cleaning the facility in the morning and hoping to make good revenue at the end of the day without paying much attention to the effective operation of the technology. Much emphasis is being laid on the KVIP technology because the study showed that through the entire study area, on average more than 70% of the correspondents did not own household toilets and relied heavily on the existing public toilets. Hence their effective operation will go a long way in improving sanitation standards within the study area in terms of human excreta management.

Although other technical factors such as the orientation of the structure towards the direction of the wind can result in the odour problems being faced by users, lack of proper understanding of certain basic principles governing the use of the technology could be a result as well. Odour and fly nuisance which was the major problem of users of the KVIP as discussed earlier, could have been handled if the attendants understood the technical principle of keeping the doors shut and only opening them on entry, then the principle of keeping the chambers relatively dark as discussed earlier to enhance the control of flies would have worked. Also keeping the container with the used anal cleansing materials in the chambers, would retain some stench and attract flies which is part of the current problems, but if attendants understood the design principle of dropping the anal cleansing materials in the pit after usage then those conditions would have been improved. Also having much technical understanding of the technology can inform attendants on reporting the need for repairs anytime parts of the superstructure gets damaged. Because most of the wire mesh meant to be at the tip of the vent pipes were visibly absent on observation. Most of the doors to the cubicles and vent pipes were damaged as well.

Although operation of the VIP in homes was generally good, mass education on the technology would definitely make it better.

4.4.2 Lack of Accessibility to the toilet facility and Reliability

Accessibility to the KVIP latrine is a major problem within the community. Most people who used the bushes or the sea shore when interviewed explained lack of access to the sanitation facility as factor. From plate 4.6 below, it is evident that majority of the people within the areas with the KVIP latrine have to travel beyond 150m (areas beyond the pink line drawn around the location of the Public toilet (PT) on the satellite image) before accessing the facility. For the inhabitants in Lower west, the situation is worse since they have to walk

hundreds of meters to Lower east before having access to one. Interactions with the residents showed that most of them looking at the conditions especially when one has tummy upset, cannot walk that long distance and would rather look for an alternative source which would end up being a bush or along the sea shore. This explains the low patronage of the KVIP facility. An observation carried out showed an average of 70 persons a day for most of the public toilets with the exception of Kley (5°43'3.30"N, 0°6'31.82"E) which recorded an average of 280 a day. And that was the only public toilet with queues during the peak hours of 5am-8am. This poses a big challenge for the management of this facility since the low patronage affects the revenue generated, hence the difficulty in maintaining the facility as well even paying for its desulphage because the attendants are also paid from the revenue generated.

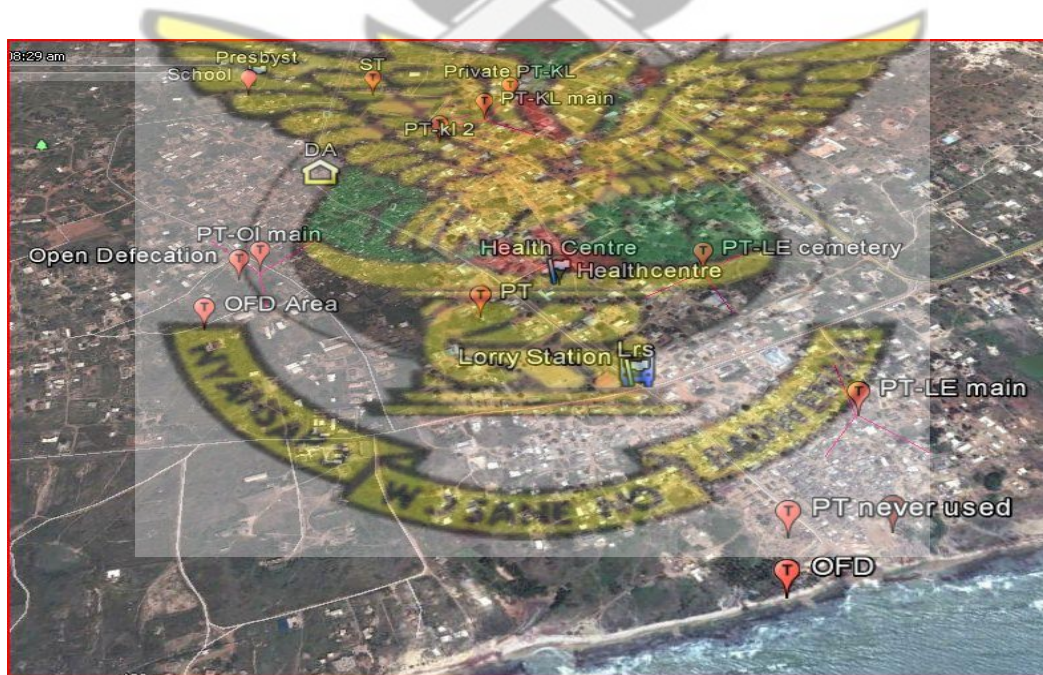


Fig. 4.6 :Accessibility map of Prampram

4.4.3 Unhygienic conditions of the Public Toilets

Despite the financial constraints of the inhabitants, majority of them who did not have household toilet facilities were willing to pay to use the public ones only if the hygienic conditions were improved. Figure 4.7 below shows high percentages of respondents across the community are willing to pay to use the facility.

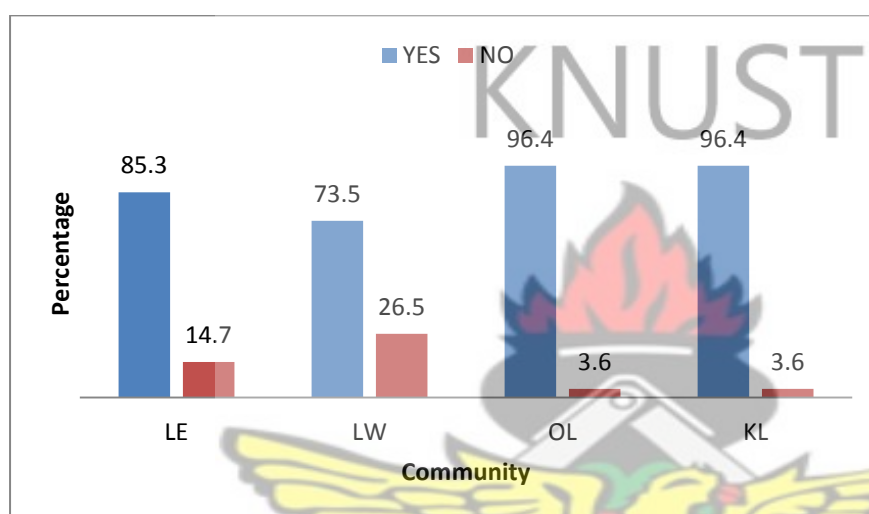


Fig.4.7: Willingness to pay for use of public toilet

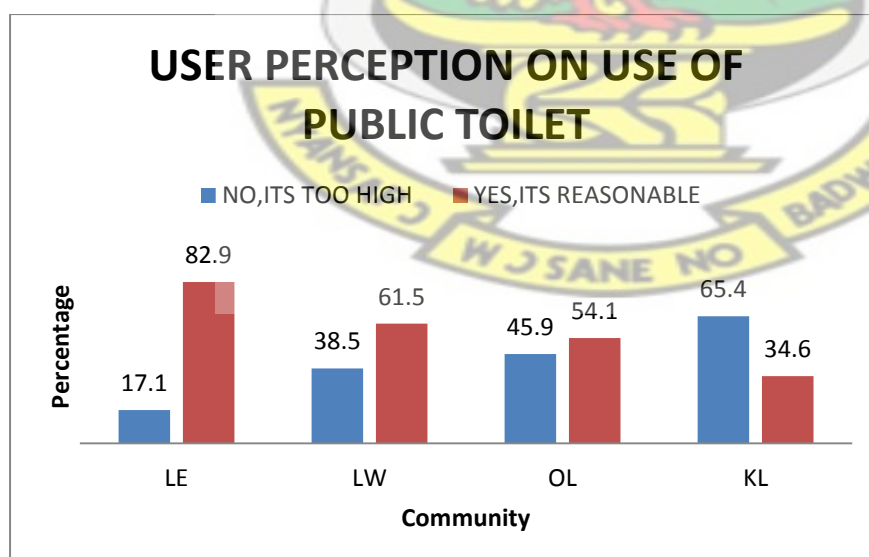


Fig.4.8: User perception on charges

Also figure 4.8 confirms the earlier assertion on the willingness of the users, as majority of them across the community are comfortable with the current charges of 10 pesewas for the use of the KVIP and 40 pesewas for the use of the water closet. This leaves one of the obvious obstacles of them not patronizing, to be the unhygienic conditions of the facility. Most of them have to even remove their shirts before entering the facility or take a bath again before continuing the day's activity due to the odour especially. This seriously affects the management of human excreta within the community as more tend to use unimproved sanitation options such as bushes and the shore.

4.4.4 Lack of Enforcements of the sanitation by-laws and Political interference

This is a vital problem that is hindering the effective management of human excreta within the Prampram township. Aside the obvious logistics constraints that face the environmental health department (EHD) of the district assembly in enforcing the sanitation by-laws, political interference by influential people within the community is also a factor. This makes people go unpunished for bad sanitation practices that pose health threat to the public.

4.4.5 Lack of a Monitoring system

There is no proper monitoring system in place to check the operation and maintenance of the sanitation facilities within the Prampram township. The environmental health officers are to periodically visit these sanitation facilities to ensure their cleanliness, desludging rate, maintenance and adherence to technical specifications on its usage. But the EHD is handicapped in ensuring all these. The assembly members for the various respective electoral areas are left to handle manage the toilet facilities under no technical supervision.

4.4.6 No sense of ownership on the part of community members

The misuse of the public toilets by users can partly be attributed to the lack of the sense of ownership. Drawing some analyses from the household VIP's, majority of them were very neat on observation which could be attributed to them having a feel of owning them, hence taking conscious efforts to properly manage them. But in the case of the public ones, the perception of it belonging to the government and not the community makes them not take responsibility for these facilities. Public toilet attendants complained users sometimes defecated and urinated anyhow around the squat hole instead of directing them into the pit. In the case of the water closet facility users squat on the seats instead of sitting on them, this had led to most of the seats being broken and the flushing components destroyed. If the community is involved integrally on future facilities so they feel their contributions resulted in its construction they will have that sense of belonging and take good care of them anytime they use it.

4.4.7 Bad attitude by inhabitants towards sanitation

One basic problem with the management of human excreta within the community is the bad attitude of the inhabitants towards sanitation. Interactions during the focused group discussions showed that the community (especially those in the old settlement) had practiced unimproved sanitation practices such as using the bushes and the shore for nature's call long before the introduction of better sanitation facilities such as the KVIP around 2006. And that had gotten them used to the system of feeling more comfortable using the bushes or the sea shore better than making conscious efforts to use the sanitation facilities available. Even in some schools, the children are made to defecate in the bush without conscious efforts to stop, how else can this trend change when they grow up. Although the schools face huge

challenges in terms of facility provision and adequacy, more efforts must be put into ensuring these practices by the children stop.

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5.0 Conclusion and Recommendation

5.1 Conclusion

The main components of this study looked at the existing latrine technologies and management practices being used by the inhabitants within the Prampram township in terms of their human excreta management, evaluating the performance of these technologies and management practice identified and taking a critical look at the factors affecting the performance of these technology and management practices leading to the low level of sanitation within the study area.

From the analysis and discussions of the results it was realized that 43.13% of the populace had access to household toilet facility whereas 56.88% did not and relied heavily on the existing inadequate public toilet facilities. Out of all the on-site sanitation identified 43.13% of them on the average across the study area were improved latrines, 39.08% of them were unimproved sanitation technologies, whereas 17.79% of them were shared latrine facilities.

The predominant technology which was the KVIP latrine was not technically performing as expected. The wire mesh at the tip of the vent pipes meant for trapping flies attracted to the light was visibly absent in most of public toilets visited. The vent pipes must be kept in good condition and the wire meshes put in place at outer edges since this will go a long way to reduce the fly nuisance. The doors leading to the cubicles on the toilet was either broken or left opened when not in use contrary to the technical specification of keeping them shut to ensure relative darkness in the cubicle. The orientation of the KVIP structure also did not allow for good air circulation as an effective circulation of the air can help remove the odour retained in the cubicles. But most of the KVIP visited were not in the direction of the moving

wind and that did not promote good air circulation. An assessment of its operation revealed how users experienced serious odour and flies problem whenever they used the facility primarily to most of the reasons elaborated above. The VIP latrine and the water closet latrine performed much better, with user more comfortable with its usage. In terms of their management, it was concluded that much efforts needed to be made to formalize its management. As monies collected by attendants were given to the assemblymen who in turn rendered accounts to no body. Efforts by the environmental health department of the district assembly to take over the public toilets needed to be hastened before they deteriorated any further because most of the assembly members were not placing these sanitation facilities as priority.

The percentage of the people using unimproved sanitation option was mostly due to the low economic status of the inhabitants which made it very difficult for them to construct their own household toilets. Those who could even construct one if helped financially found it difficult due to the lay out of the area, mostly in the lower part of the community which houses the early settlers. The buildings are clustered with no space at all for such construction to take place. The unhygienic conditions of the public toilets also deterred majority of the inhabitants without household toilets from using them, forcing them to defecate in the bushes and sea shore. Political interference by politicians in the enforcement of the sanitation by-laws when culprits were taken to court was a major reason why the EHD could not have a strong grip on the populace in terms of making them adhere to the sanitation by laws.

Management of human excreta in the schools was a major worry. The public encroachment on the sanitation facilities in the schools had to be seriously looked at. Stakeholders such as the district education office, district environmental department, the assembly members and

the district assembly had to make efforts at solving this problem in the schools aside the inadequacy of the facilities provided.

Although no major health epidemic such as diarrhea/cholera which are sanitation related diseases had not hit the area yet, as found out at the district health center, it would probably just be a matter of time for such cases to be on emerge within the area due to the rise in poor sanitation.

5.2 Recommendation

Based on the above conclusion the following recommendations/proposals were given :

- I. The public toilet operators and the general populace should be given training on the use of the VIP and KVIP latrine, to ensure the effective operation and maintenance of the facilities.
- II. The KVIP technology should be made user friendly for the aged and disabled as most of them cannot squat to use the facility due to their age. A wooden seat can be made for such age group so they can be placed above the squat hole for them to sit and use it. An example of this is shown in plate 13, although not the best can be improved upon. The younger ones should also be considered in the construction of future facilities, as most of them fear they will fall into the pit through the squat hole. At least two (2) cubicles

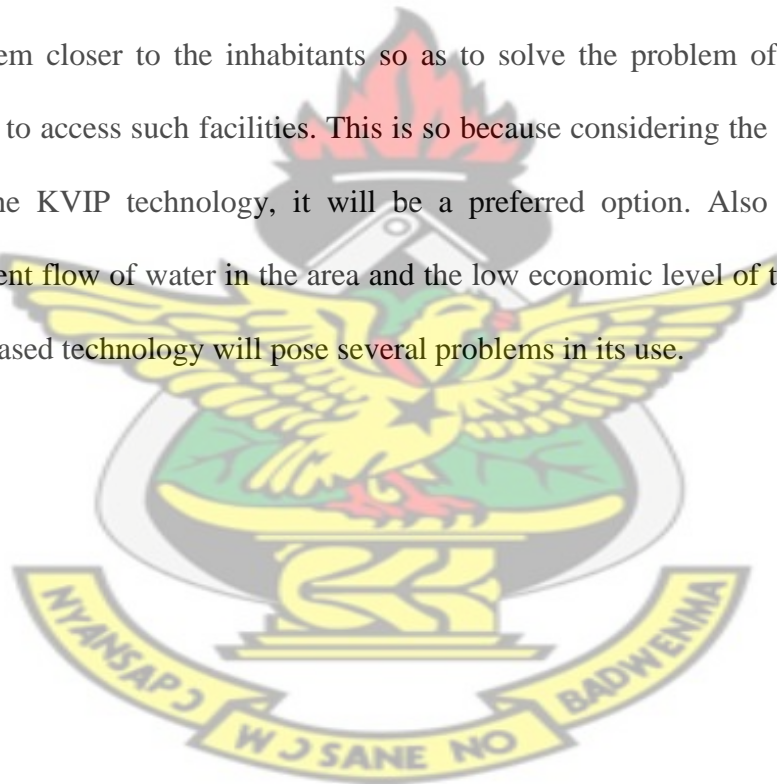


with a smaller squat hole for children can be considered in future facilities and existing. The standard and proposed squat hole dimensions are shown below in figure 5.1 and 5.2

process WATSAN committees can be formed in the four areas (Lower west and East, Oluwe and Kley), trained and tasked with the responsibility of ensuring the effective management of the facility.

- IV. The assembly must empower and equip the EHD to work independently without the interference of politicians in enforcing the sanitation by-laws. This will help deter people from engaging in bad sanitation practices such as culprits such as those defecating in the bushes and sea shores will be made to face the law.
- V. The district assembly must also enforce the building codes, so that new structures under construction would have in built toilets. This will also go a long way in helping Ghana achieve the millennium development goal on sanitation as shared sanitation facilities are not considered as improved.
- VI. There should be an integrated approach that will involve all beneficiaries or stakeholders from the planning to the implementation phase. This will give the community members some sense of ownership and ensuring them taking good care of the facilities when they are put to use.
- VII. The District assembly itself must place priority on sanitation so they can educate the populace to do likewise. Financial support for sanitation by the assembly must also be increased so as to help the EHD work effectively at improving the sanitation within the Prampram Township.
- VIII. Although as described earlier, public toilets by the WHO is considered as a shared facility and hence an unimproved sanitation option, but considering the economic level of majority of the people living within Prampram who are low income earners constructing a household toilet will be difficult.

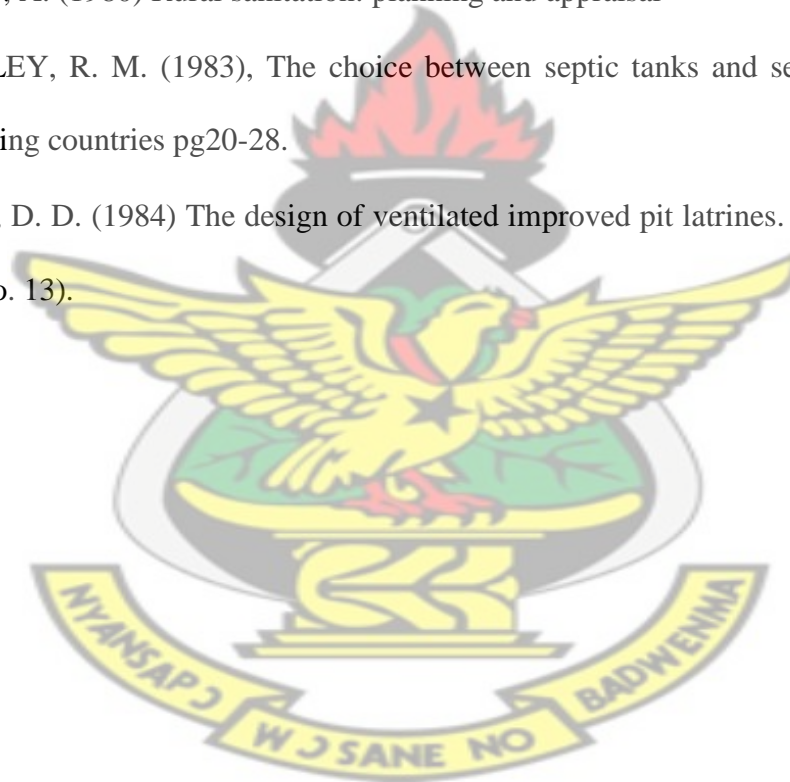
Even, those who might be able to afford such facility in their homes will have no or limited land space to do so due to the clustered nature of the layout. As conscious efforts are made by the assembly to ensure houses springing up at the new sites have inbuilt toilet facility, plans will definitely have to be in place to help those in the old settlements to gain easy access to toilet facilities, so as to prevent them from resorting to the bush and the sea shore. The assembly must consider building more KVIP's (taking into considerations recommendations made earlier concerning community participation and user friendlies of the technology for the aged and disabled) and locate them closer to the inhabitants so as to solve the problem of walking longer distances to access such facilities. This is so because considering the simplicity in the use of the KVIP technology, it will be a preferred option. Also considering the inconsistent flow of water in the area and the low economic level of the people, using a water based technology will pose several problems in its use.



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APPENDICES



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APPENDIX 1

(LIST OF TABLES)



APPENDIX 1: LIST OF TABLES

Table 2.1: Advantages and Disadvantages of the Simple pit latrine

Advantages	Disadvantages
Low cost	Considerable fly nuisance (and mosquito nuisance if the pit is wet) unless there is a tight-fitting cover over the squat hole when the latrine is not in use
Can be built by householder	Smell
Needs no water for operation	
Easily understood	

Table 2.2 : Advantages and disadvantages of the Borehole latrine

Advantages	Disadvantages
Can be excavated quickly if boring equipment is available	Sides liable to be fouled, with consequent fly nuisance
Suitable for short-term use, as in disaster Situations	Short life owing to small cross sectional area
	Greater risk of groundwater pollution owing to depth of hole

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APPENDIX 2

(LIST OF FIGURES)



APPENDIX 2: LIST OF FIGURES

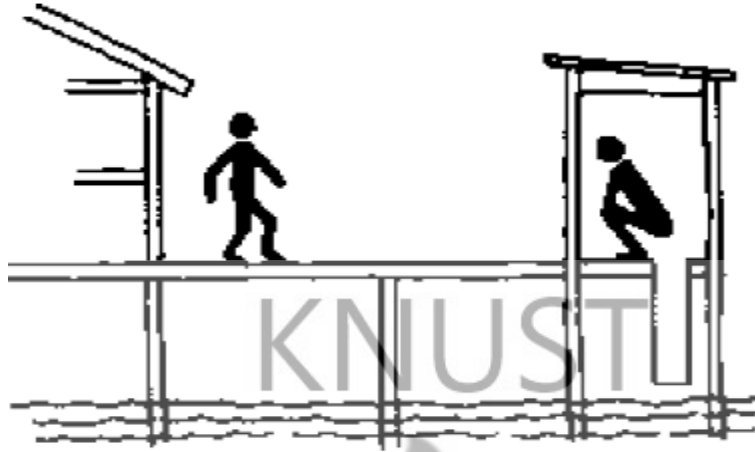


Fig. 2.2: Overhung Latrine. (Source: WHO,1992)

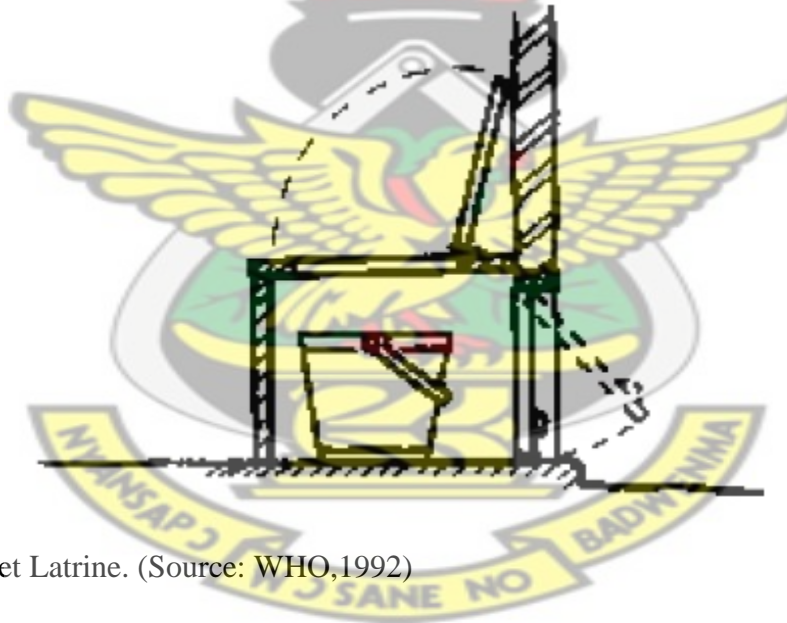


Fig. 2.3 : Bucket Latrine. (Source: WHO,1992)

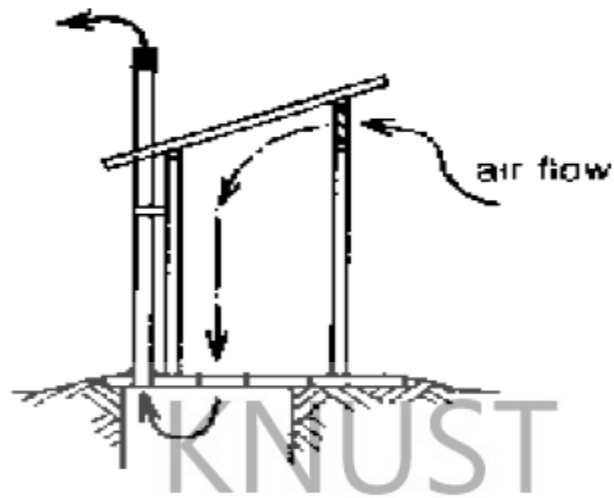


Fig. 2.6: Ventilated Improve Pit. (Source: WHO,1992)



Fig. 2.7 Pour-flush Latrine. (Source: WHO,1992)

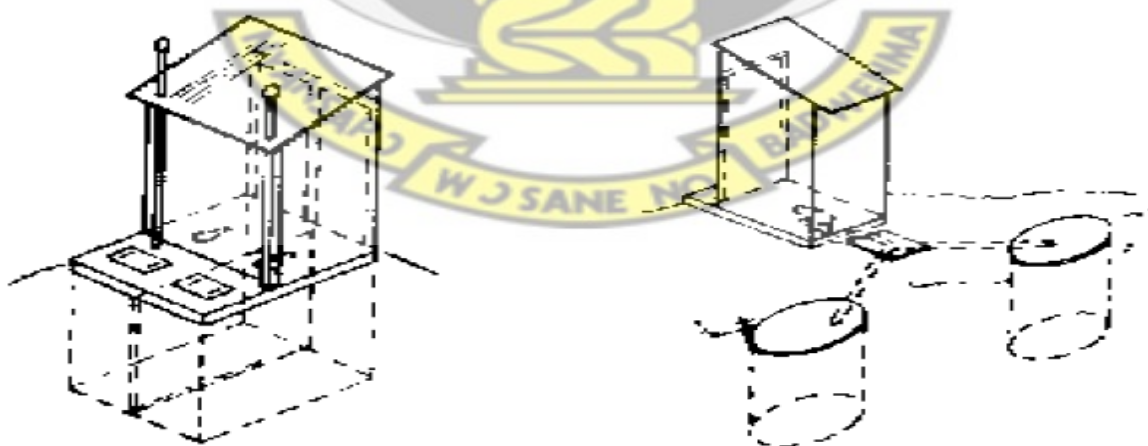


Fig. 2.8 A single and double pit latrine. (Source: WHO,1992)

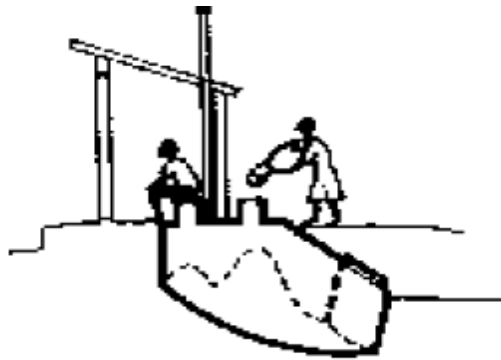


Fig. 2.9 Compost Toilet. (Source: WHO,1992)

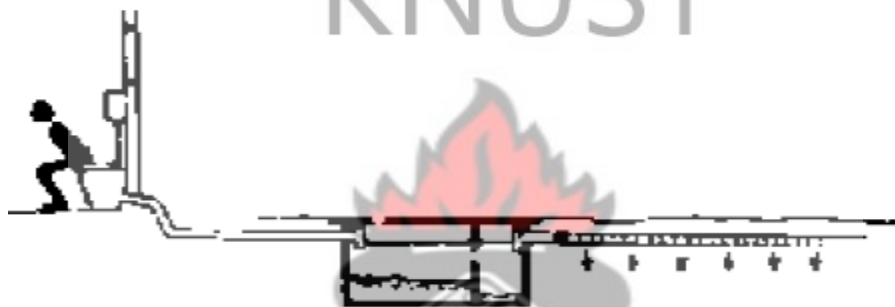


Fig. 2.10 Pictorial view of the Septic tank. (Source: WHO,1992)

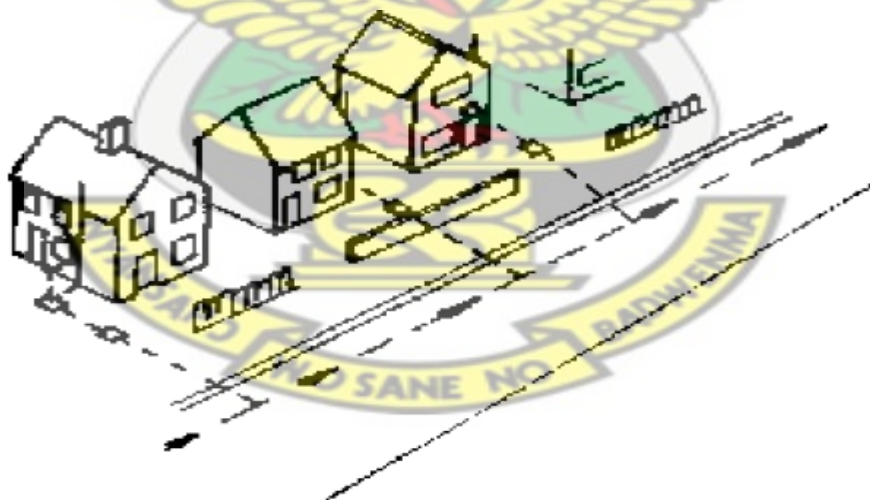


Fig. 2.11 A pictorial view of sewerage connecting houses. (Source: WHO,1992)

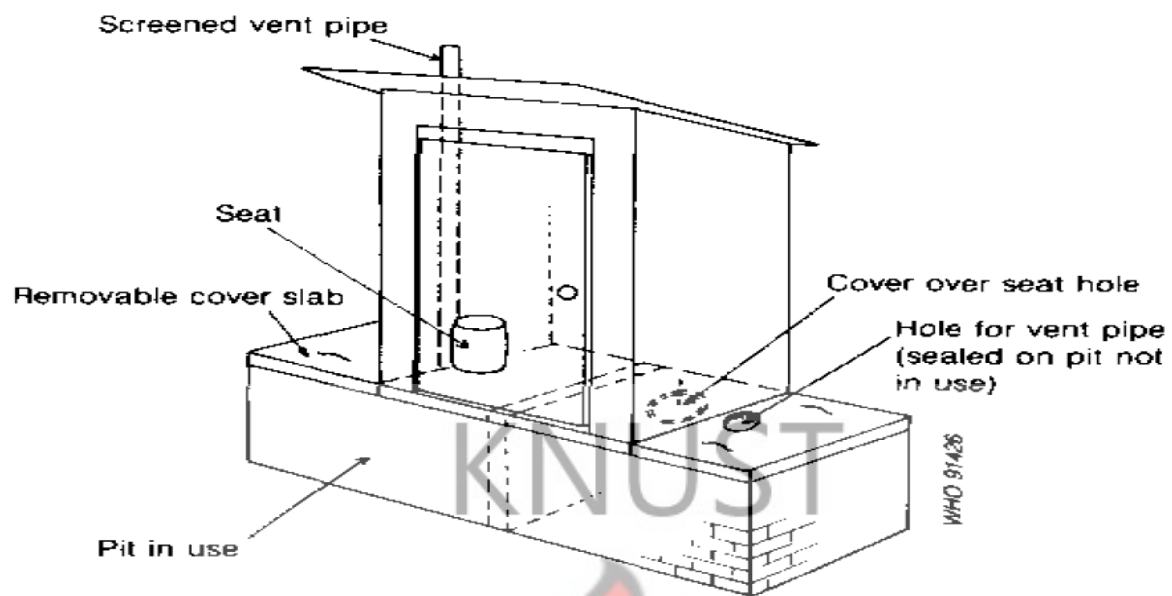
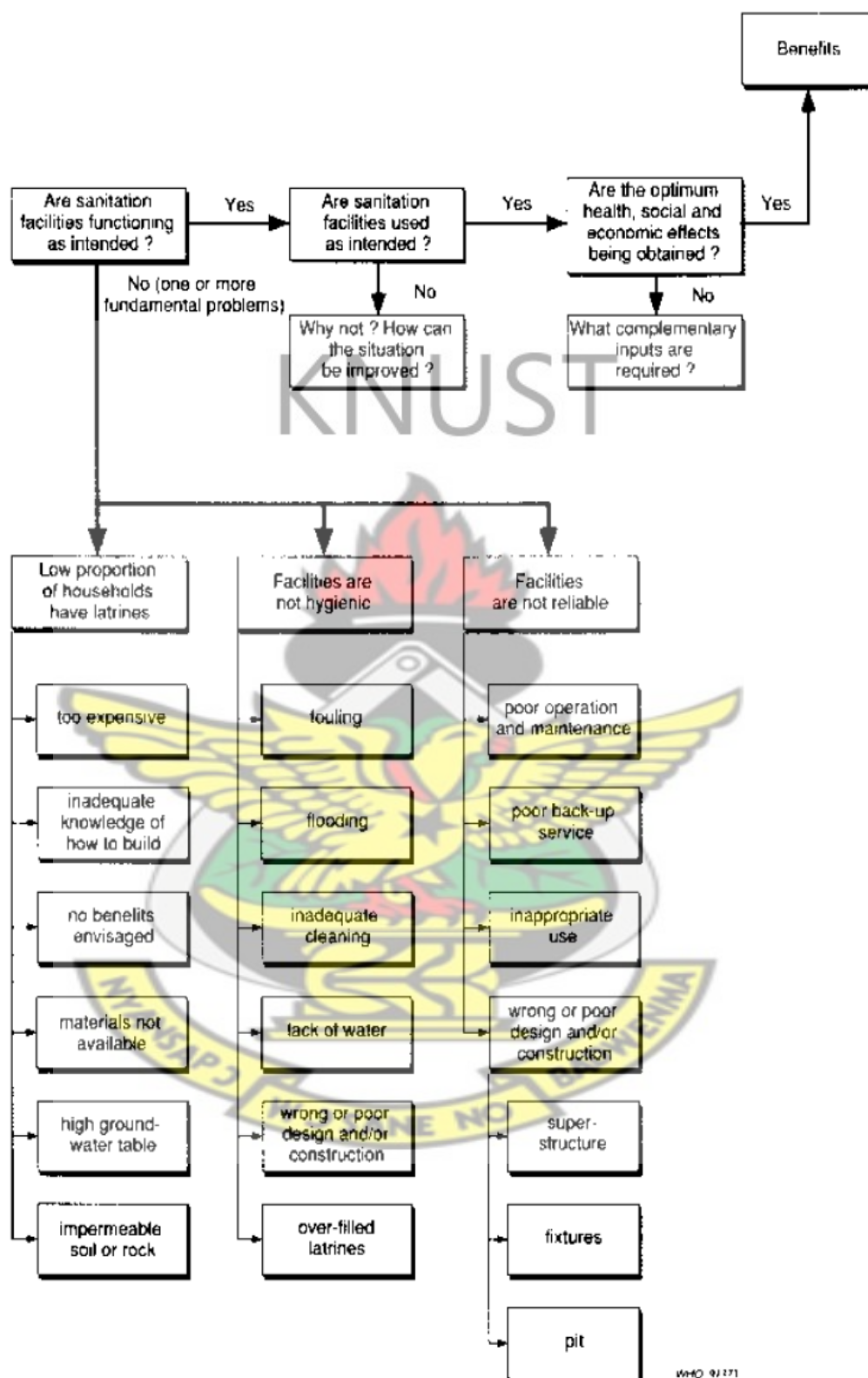


Fig. 2.12 Ventilated Improved Pit Latrine (double pit). (WHO,19)

Fig. 4.9 Evaluation of Sanitation facilities (WHO1992)





APPENDIX 3 (FIELD PICTURES)



APPENDIX 3 : FIELD PICTURES



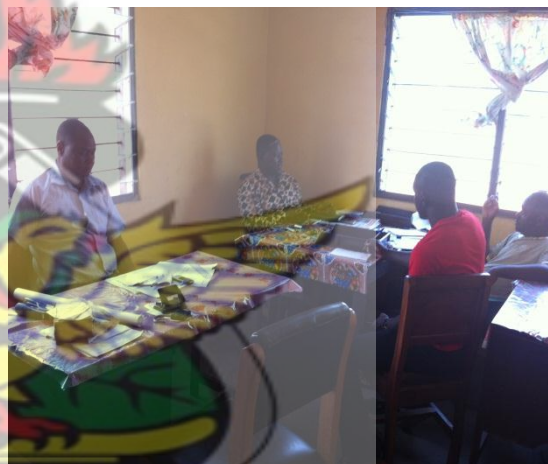
Alternating pit not in use



School KVIP cubicle



A cubicle of the hospital WC



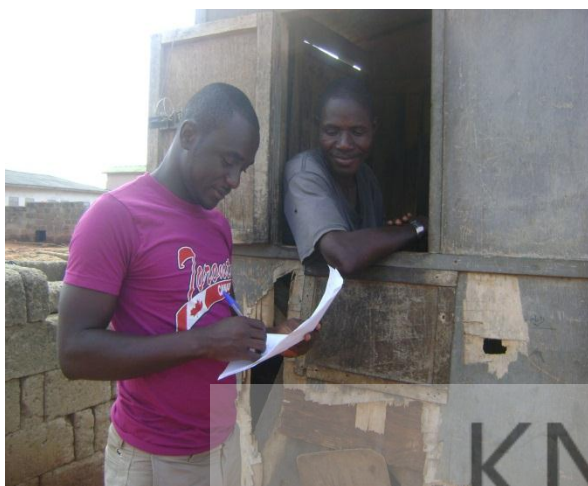
Discussions with key stakeholders



Water being used to flush Public WC



New Public WC toilet yet to be in operation in LW



Interview with Public toilet attendant



Fly trapper absent from tip of vent pipe



**Signing of consent form before
commencement of the household interview**



Household interview in progress



Discussions with a section of the community



Human Excreta mixed with household waste



Abandoned school toilet in Oluwe



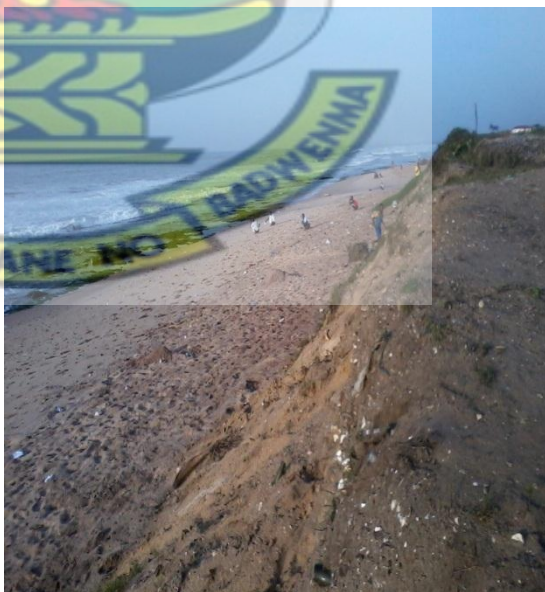
Abandoned Public toilet at Lower West



Activities adjacent to the abandoned public toilet



People walking to the bush to defecate

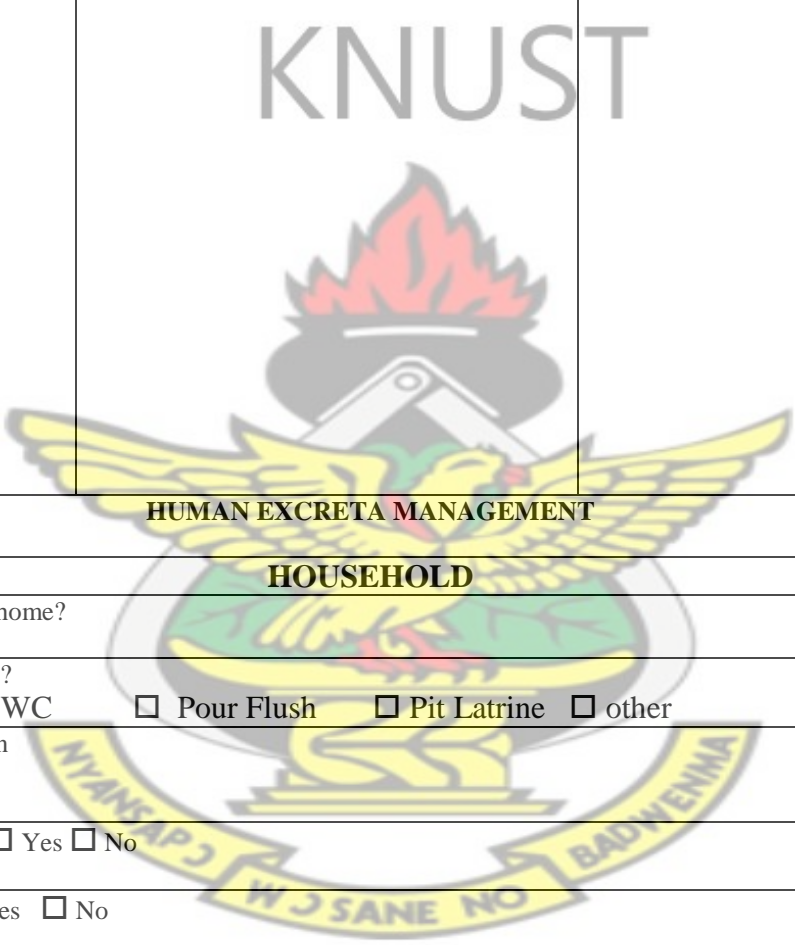


People defecating at the shores of the beach

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APPENDIX 4A OBSERVATION CHECKLIST

Data		
Date:	Community :	Observation Checklist No:
Suburb:		
Observation Team		
Research Team	Community members	District Assembly and other institutions
		
HUMAN EXCRETA MANAGEMENT		
HOUSEHOLD		
1. Any toilet facility at home? <input type="checkbox"/> Yes <input type="checkbox"/> No		
2. Type of toilet facility? <input type="checkbox"/> KVIP <input type="checkbox"/> WC <input type="checkbox"/> Pour Flush <input type="checkbox"/> Pit Latrine <input type="checkbox"/> other		
3. Is it in good condition <input type="checkbox"/> Yes <input type="checkbox"/> No		
4. Odour problems? <input type="checkbox"/> Yes <input type="checkbox"/> No		
5. Flies nuisance? <input type="checkbox"/> Yes <input type="checkbox"/> No		
6. Storage container for anal cleansing materials? <input type="checkbox"/> Yes <input type="checkbox"/> No		
COMMUNAL TOILET		
1. What type of technology? <input type="checkbox"/> KVIP <input type="checkbox"/> WC <input type="checkbox"/> Pour Flush <input type="checkbox"/> Pit Latrine		
2. Is it in good condition <input type="checkbox"/> Yes <input type="checkbox"/> No		
3. Is it sited properly? <input type="checkbox"/> Yes <input type="checkbox"/> No		

4. Odor problems? <input type="checkbox"/> Yes <input type="checkbox"/> No
5. Flies nuisance? <input type="checkbox"/> Yes <input type="checkbox"/> No
6. Enough Illumination? <input type="checkbox"/> Yes <input type="checkbox"/> No
7. Storage container for anal cleansing materials? <input type="checkbox"/> Yes <input type="checkbox"/> No
8. Any vent pipes? <input type="checkbox"/> Yes <input type="checkbox"/> No
9. Condition of vent pipes? <input type="checkbox"/> Good <input type="checkbox"/> Bad
10. Is anal cleansing materials littered all over the toilet ? <input type="checkbox"/> Yes <input type="checkbox"/> No
11. If anal cleansing materials are stored in a container, what is it's condition? <input type="checkbox"/> Good <input type="checkbox"/> Bad
12. Pit well covered by slab? <input type="checkbox"/> Yes <input type="checkbox"/> No
13. Any overflow from pit or septic tank? <input type="checkbox"/> Yes <input type="checkbox"/> No
14. Any attendant present? <input type="checkbox"/> Yes <input type="checkbox"/> No
15. Any hand wash facility? <input type="checkbox"/> Yes <input type="checkbox"/> No
16. Any soap or detergent present for hand washing? <input type="checkbox"/> Yes <input type="checkbox"/> No
17. If Water Closet any water storage facility?? <input type="checkbox"/> Yes <input type="checkbox"/> No
18. Condition of water closets? <input type="checkbox"/> Good <input checked="" type="checkbox"/> Bad
19. If Water Closet is the flushing component working? <input type="checkbox"/> Yes <input type="checkbox"/> No

APPENDIX 4B: Household Survey Questionnaire

A. Survey Data		
1.Name :	2.Interviewer:	3.Questionnaire No:
4.Date :	5.Community :	6. Suburb:
7.Classification of area:		
B. Respondent and Household		
9.Sex: <input type="checkbox"/> M <input type="checkbox"/> F	10. Age:	11. Occupation:
12. What is your household or family size?		
C. HOUSEHOLD WEALTH		
13. What is your status in the house? <input type="checkbox"/> Owner <input type="checkbox"/> A tenant <input type="checkbox"/> Rent free (Family relation, friend, other).		
14. What is the type of housing structure (by observation)? <input type="checkbox"/> Modern (block detached, block semi-detached, flat apartment) <input type="checkbox"/> Traditional (compound house)		
15. What is your religion? <input type="checkbox"/> Christian <input type="checkbox"/> Muslim <input type="checkbox"/> Traditional <input type="checkbox"/> Others (Specify)..... (Family relation, friend, other).		
16. How long have you been living in this house?		
D. HUMAN EXCRETA MANAGEMENT IN HOUSEHOLD		
17. Is there a Latrine in your house? <input type="checkbox"/> Yes <input type="checkbox"/> No		
18. If No to (17) what is the reason for not having a toilet within your household? <input type="checkbox"/> Lack of funds <input type="checkbox"/> Limited land space <input type="checkbox"/> Others		
19. Would you like to own your own toilet in the near future? <input type="checkbox"/> Yes <input type="checkbox"/> No		
20. If Yes to (17) which type? <input type="checkbox"/> KVIP <input type="checkbox"/> VIP <input type="checkbox"/> Pit Latrine <input type="checkbox"/> Bucket Latrine <input type="checkbox"/> WC <input type="checkbox"/> Others (Specify).....		
21. What construction materials were used to construct the toilet structure? <input type="checkbox"/> Cement Blocks <input type="checkbox"/> Wood <input type="checkbox"/> Others (Specify).....		
22.What type of toilet facility were you using before and why did you stop?(house owner)		
23.How much did it cost you to build your toilet facility? (house owner)		
24.What are some of the benefits of owning your own toilet facility? (house owner)		

25. How often do you dislodge it? <input type="checkbox"/> Daily <input type="checkbox"/> Monthly <input type="checkbox"/> Every two months <input type="checkbox"/> Yearly <input type="checkbox"/> More than a year
26. Do you have a container where you keep the toilet papers after use? <input type="checkbox"/> Yes <input type="checkbox"/> No
27. What do you do when the containers are full? <input type="checkbox"/> Burn them <input type="checkbox"/> dig pit and bury them <input type="checkbox"/> add them to the household refuse <input type="checkbox"/> others.....
28. Do you reuse the toilet for any purpose such as fertilizer or any other? If yes what? <input type="checkbox"/> Yes <input type="checkbox"/> No
29. If No to (17), why and where do you defecate? <input type="checkbox"/> In a polythene <input type="checkbox"/> In a chamber pot <input type="checkbox"/> Open Defecation <input type="checkbox"/> Public toilet <input type="checkbox"/> Others (Specify)
30. What type of anal cleansing materials do you use when using the open field? <input type="checkbox"/> Newspapers <input type="checkbox"/> Toilet roll <input type="checkbox"/> rag <input type="checkbox"/> Others (Specify).....
31. If OFD how do you handle the anal cleansing materials? <input type="checkbox"/> leave it on the open field <input type="checkbox"/> Dig hole and bury it <input type="checkbox"/> Others
32. How about your children and babies, how do you handle their human excreta? <input type="checkbox"/> Tie in a polythene and add to refuse <input type="checkbox"/> Open Defecation <input type="checkbox"/> Public toilet <input type="checkbox"/> Others (Specify)
33. How much do you pay for using the public toilet? <input type="checkbox"/> 10 Gp <input type="checkbox"/> 20 Gp <input type="checkbox"/> 30 Gp <input type="checkbox"/> 40Gp
34. If Public toilet what is your perception about it's condition? <input type="checkbox"/> Poor <input type="checkbox"/> Good <input type="checkbox"/> Very Good
35. If public toilet, how far is it from the house? <input type="checkbox"/> Less than 100m <input type="checkbox"/> b/n 100-200 m <input type="checkbox"/> b/n 200-300 m <input type="checkbox"/> b/n 300-400 m <input type="checkbox"/> b/n 400-500 m <input type="checkbox"/> Other.....
36. How long do you queue or wait for your turn in using the toilet facility? <input type="checkbox"/> 1 min <input type="checkbox"/> 2 min <input type="checkbox"/> 3min <input type="checkbox"/> Others(specify)
37. Do you find it difficult paying for the toilet use? <input type="checkbox"/> Yes <input type="checkbox"/> No (If no state reason)
38. Are you willing to pay for use of the public toilet if one is available and close? <input type="checkbox"/> Yes <input type="checkbox"/> No (If no state reason)
39. What type of anal cleansing materials do you use at the public toilet? <input type="checkbox"/> Newspapers <input type="checkbox"/> Toilet roll <input type="checkbox"/> rag <input type="checkbox"/> Others (Specify).....
40. How do you dispose of the anal cleansing materials? <input type="checkbox"/> In a container provided on the public toilet <input type="checkbox"/> drop in the pit hole <input type="checkbox"/> disposing on a refuse dump
41. What are the problems you face using the Public toilet? <input type="checkbox"/> Odour <input type="checkbox"/> flies nuisance <input type="checkbox"/> toilets not dislugged on time <input type="checkbox"/> Others(Specify).....
42. Do you think the charge on toilet use is reasonable? <input type="checkbox"/> Yes, it is reasonable <input type="checkbox"/> No, it is too high <input type="checkbox"/> No, it is too low
43. Do you wash your hands with soap after using the toilet?

<input type="checkbox"/> Yes <input type="checkbox"/> No
44. What are the diseases that you or most of the people in your household often get? <input type="checkbox"/> Malaria <input type="checkbox"/> Cholera <input type="checkbox"/> Diarrhea <input type="checkbox"/> Worm infections <input type="checkbox"/> Others (Specify).....
45. Do you have a tap in your house? <input type="checkbox"/> Yes <input type="checkbox"/> No
46. If no how much do you pay to get water?

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