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**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND
TECHNOLOGY-KNUST**

FAECAL SLUDGE MANAGEMENT: THE CASE OF MADINA



BY

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MSC THESIS

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FAECAL SLUDGE MANAGEMENT: THE CASE OF MADINA

By

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A Thesis Submitted to the

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In partial fulfilment of requirements for the award of the Degree of

Master of Science

In

Water Supply and Environmental Sanitation

April 2009 ©

CERTIFICATION

I hereby declare that this submission is my own work 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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DEDICATION

To my Parents and Siblings

ABSTRACT

This study was carried out to determine the management arrangements in place for faecal sludge at Madina in the Ga East Municipality of the Greater Accra Region of Ghana.

Five (5) main toilet technologies were identified at the household level in the town: Water Closet (WC) with septic tanks - 47%, Kumasi Ventilated Improved Pit Latrines (KVIP) – 9%, Ventilated Improved Pit Latrines (VIP) – 14%, Pit Latrines – 27% and bucket/pan latrines - 3%.

Results showed that 65% of the people owned and used household toilets (63.1% of these toilets were improved toilet facilities and not shared) and 23% used public toilets (shared toilet facilities) in Madina. Eleven percent (11%) of the respondents practiced open defaecation with 1% practising defaecation in polythene bags.

Excreta from KVIP and WC with septic tanks were collected and sent for treatment using a waste stabilisation pond. The excreta from the bucket/pan latrines, pit latrines and VIPs were collected and transported manually and discharged untreated into open drains, in the bush or in rivers.

The average household spends 8.3% of its annual income on faecal sludge management. Cost recovery mechanisms adopted by the Assembly and commercial toilet operators were user charges from public. However this was not adequate for proper operation and maintenance of the facilities. Schools could not afford the cost of operation and maintenance of their toilets.

Thirty-Two percent and Sixty-Five percent of the respondents were satisfied and not satisfied respectively with the faecal sludge management arrangements in place. The major problem for effective management of faecal sludge was weak enforcement of sanitation bye-laws and regulatory framework.

It is recommended that household latrines should be encouraged. Sanitation bye-laws in the community should be enforced. There should be an integrated approach of stakeholders' participation in both the planning and implementation stages of all faecal sludge management service delivery. Higher priority should be given to faecal sludge management. All public toilet operators should be trained for effective operation and maintenance of the toilets. The performance of the treatment plant should be evaluated for possible reuse and recycling of accumulated sludge.

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LIST OF ABBREVIATIONS

ADB:	Agricultural Development Bank.
AMA:	Accra Metropolitan Assembly
BOOT:	Build Own Operate Transfer
BOO:	Build Own Operate
CWSA:	Community Water and Sanitation Agency
DA:	District Assembly
DACF	District Assembly Common Fund
DANIDA:	Danish International Development Agency
DWST:	District Water and Sanitation Team
EAWAG:	Swiss Federal Institute for Environmental Science and Technology
ECA:	Economic Commission for Africa
FS:	Faecal Sludge
GDP:	Gross Domestic Product
GEDA:	Ga East District Assembly
GES:	Ghana Education Service
GWCL:	Ghana Water Company Limited
JMP:	Joint Monitoring Programme
KNUST:	Kwame Nkrumah University of Science and Technology
KVIP:	Kumasi Ventilated Improved Pit Latrine
MA:	Municipal Assembly
MDG:	Millennium Development Goal
MoESS	Ministry of Education, Science and Sports
MoH:	Ministry of Health.
MSHEP:	Municipal School Health Education Programme
NGOs:	Non Governmental Organisations
O & M:	Operation and Maintenance
OSS:	On-Site Sanitation Systems
PPP:	Public Private Partnership
PSP:	Private Sector Participation
PVC:	Polyvinyl Chloride
SANDEC:	Department for Water and Sanitation in Developing Countries.
SHEP:	School Health Education Programme
SIP:	Strategic Investment Programme

TMA:	Tema Metropolitan Assembly
UNESCO:	United Nations Economic and Social Council
UNICEF:	United Nations Children Fund
VIP:	Ventilated Improved Pit Latrine
WC:	Water Closet
WHO:	World Health Organisation

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1.0 INTRODUCTION

1.1. Background

1.1.1 The Importance of Managing Faecal Sludge

According to the special report by WHO/UNICEF (2008) Joint Monitoring Programme for Water Supply and Sanitation (JMP), the importance of sanitation is indisputable. It is a crucial stepping stone to better health: sanitation offers us the opportunity to save the lives of 1.5 million children a year who would otherwise succumb to diarrhoeal diseases, and to protect the health of many more. It is fundamental to gender equity as it protects women's dignity. It is also key to economic development: investments in sanitation protect investments made in other sectors, such as education and health, and bring measurable economic returns.

1.1.2 Global Trends in Sanitation Coverage

Global statistics estimate that currently the world is not on track to meet the MDG sanitation target, and 2.5 billion people still lack access to improved sanitation, including 1.2 billion who have no facilities at all particularly in sub-Saharan Africa and Southern Asia (WHO and UNICEF, 2008).

Africa (including Ghana) recorded the least progress, with use of improved sanitation increasing from 26 percent in 1990 to 31 percent in 2006 (WHO and UNICEF, 2008).

1.1.3 Sanitation Situation in Urban and Rural Areas in Ghana.

In Ghana Sanitation coverage is about 15% in urban and about 6% in rural areas (WHO/UNICEF, 2008, Table 1.1 – Appendix 1) Accra and Kumasi are partly sewered with only Tema and Akosombo being the only towns which are substantially sewered.

Wastewater treatment is hardly ever accorded any resources. Service delivery is also not keeping pace with population growth and demand. Less than 5% of the households in Accra and Kumasi are connected to piped sewerage systems, while 21% use floodwater drains (gutters) as open sewerage that ends up in nearby water bodies (Keraita and Dreschel, 2004.) Some of the urban dwellers discharge their faecal waste into septic tanks while kitchen and other wastes from the home are usually directed into the nearest open drain. As the majority of the urban drains are open, they often serve as defaecating areas for households that do not have adequate sanitation facilities. According to the joint monitoring report by WHO and UNICEF, in the year 2006, 20% of all households in Ghana practiced open defaecation, reflecting the absence of toilet facilities in many dwelling places (WHO/UNICEF, 2008).

The majority of urban households depend on public toilets and other unimproved latrines. The introduction of private sector management of public latrines in several cities has ensured a general improvement in their standard of services offered but the situation is far from satisfactory. Bucket latrines which were banned over a decade ago are still widely prevalent and tolerated by some DAs.

The improved sanitation coverage in Ghana increased from 6% in 1990 to 10% in 2006 (WHO/UNICEF, 2008).

1.2 Problem Statement

Globally there has been little in-depth field research and evaluation of the entire Faecal Sludge management systems to date. SANDEC acknowledges the non-existence of published documentation of comprehensive assessments comprising pit/vault emptying, haulage, storage or treatment, and use or disposal, based on actual practices. The absence or insufficiency of adequate excreta management in many cities of developing

countries, particularly so in low-income areas, continuously leads to serious health and environmental hazards (Strauss and Montangero, 2002).

In Ghana, sanitation coverage is woefully inadequate with about 15% in urban and about 6% in rural areas as of 2006 (WHO/UNICEF, 2008). The situation is worse in the Peri-urban areas (including Madina) which are often plagued with inadequate water supply and low access to sustainable basic sanitation. Another problem is the use of unacceptable latrine technology options.

There are also instances where faecal sludge are disposed of into the environment (bush and water bodies) untreated. Such practices defeat the purpose of improved toilet facilities and make the management of faecal sludge difficult. At times too beneficiaries of toilet facilities are provided with facilities without giving them the chance to choose what is suitable for them. This normally put them in a situation where they find it difficult to operate and maintain the facilities well and sustainably.

1.3. Research Questions.

Based on the problem context enumerated above this research study sought to answer the following questions:

1. What are the available latrine technologies in Madina and how are they managed?
2. How can the management of faecal sludge be made financially sustainable?
3. How can stakeholders play their roles to make management of faecal sludge effective?
4. Can the final beneficiaries (community people) contribute to make faecal sludge management effective and sustainable?

1.4. Objectives

The main goal of the study was to assess the management arrangements in place for faecal sludge in Madina. The specific objectives of the project were:

- To identify latrine technologies available in Madina and assess their management arrangements.
- To identify the roles and responsibilities of the different stakeholders in faecal sludge management in Madina.
- To assess the cost of sanitation services and the cost recovery mechanisms.
- To assess public perception of current faecal sludge management practices and the incidences of excreta related diseases in the Madina sub-district.

1.5. Justification of the Study

Ghana is way behind in achieving the Millennium Development Goals on Environment (halving the population without access to safe excreta disposal by 2015) and in order to enhance this achievement it is important to assess the current faecal sludge management arrangements pertaining in the Ghanaian environment. The study was important because Madina appeared to be one of the few towns in Greater Accra region which seems to address the end of pipe treatment for some of its faecal sludge removed from on-site sanitation systems. Based on these factors the study sought to assess the factors that affect the effective management of faecal sludge in Madina. Lessons from the assessment will help in proposing recommendations and strategies that will go a long way in increasing the use and coverage of household toilets in Madina, ensuring effective enforcement of sanitation bye-laws, ensuring that commercial toilet operators operate under hygienic conditions to reduce the incidences of excreta related diseases and that all stakeholders are involved in the planning and implementation of faecal sludge management services. The study was also beneficial in that it will help propose ways the Assembly can adopt to finance faecal sludge management services and ensure the sustainability of the toilet facilities. Lastly the assessment was relevant since it will

be able get the views of the public on how they consider the current faecal sludge management practices and also seek proposals from them on ways to improve upon these practices based on their assessment. All these proposals if adhered to and implemented have the potential of enhancing management arrangements for faecal sludge both at the Municipality and community levels. While information on which the analysis was based pertained to the Madina, it is hoped that these recommendations could be applied in other communities of similar characteristics.

1.6. Limitation of Study

Access to data especially for previous years was difficult (due to poor data management) and hindered in-depth analysis of some of the objectives of the study. There was also limited time and resources for data collection.

1.7. Scope of Study

The study was limited in scope to Madina, a suburb of Accra in Ghana. This limitation was a deliberate attempt to make the assignment manageable in terms of quality given the time and resources available to complete it.

The scope of the project focused on an integrated management by all stakeholders including the Municipal Assembly, 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 (Public) toilets in Madina community. It covered all aspects in the faecal sludge management stream viz-à-vis facilities for sludge storage, collection and transportation, disposal and treatment and recycling and re-use of the waste.

1.8. Structure of Thesis.

The report is subdivided into five (5) chapters. Chapter one (1) deals with the introduction which presents the problem statement and gives a background of the study area. It also highlights on the objectives, scope, justification and research questions of the study. Chapter two (2) covers 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 (3). 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 and also from the literature review 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 in this context refers to all facilities and hygienic principles and practices related to the safe collection, removal, or disposal of human excreta (Elledge et al, 2002).

2.1.2. Night Soil.

The term night-soil is mostly used to represent, in general, a mixture of human faeces and urine. In certain instances, the term is also used to represent a mixture of human faeces that has undergone some considerable putrefaction. Mara (1976) and Choi et al (1993) all use the term for a mixture of human faeces and urine. Cairncross and Feachem (1993), states “night-soil comprises only faeces and urine plus small volumes of water if it is used for anal cleansing and pour-flushing”. Choi et al (1996) used the term for contents of cesspool and holding tanks/storage pits in Korea where it is stored for more than three (3) months before being collected.

2.1.3. Toilet Sludge.

In conventional wastewater treatment, concentrating the biosolids into solid and semisolid residuals and then separating them from the bulk liquid accomplish the objectives of treatment. The concentration of the solid and semisolid residuals is referred to as Sludge (Peavy et al 1985, Metcalf and Eddy, 1995). The solid and semi-solid residuals are removed from the bulk liquid after primary and/or secondary treatment. The

sludge has thus undergone some measure of treatment, although it may be inadequate for its ultimate disposal.

In Ghana and some other developing countries where conventional sewerage is mostly absent due to high capital, operation and maintenance costs coupled with the lack of technical and skilled expertise, various forms of on-site sanitation facilities are utilized. These on-site sanitation facilities could be either water dependent, e.g pour flush, water closets and aqua privies, or non-water dependent, e.g bucket, ventilated improved pit (VIP) and vault latrines. The human excreta may be stored in these on-site sanitation facilities for a couple of days to several years depending on the type of facility, its storage capacity, emptying frequency and the collection/transportation system in use.

2.1.4. Septage

The on-site sanitation facilities in homes, offices, commercial houses and institutions are water dependent. In the water dependent on-site sanitation facilities, human excreta are flushed out using water. The resulting wastewater (mixture of flushed water, faeces and urine) is discharged into septic tanks, where the solid fraction settles out and undergoes anaerobic digestion. The effluent from the tank is usually discharged into a subsurface-soil absorption system for final treatment and disposals. The sludge produced in the septic tank as a result of the anaerobic digestion of the settled solids, scum and liquid pumped from a septic tank is known as septage (Pickford, 1995; Metcalf and Eddy, 1995).

2.1.5. Faecal Sludge

The collection and transportation of night-soil, toilet sludge and septage from their various sources to the final treatment/disposal sites is done by vacuum trucks. The vacuum trucks carry loads of only toilet sludge, septage or mixtures of both. Most often the contents of the trucks are mixtures of both toilet sludge and septage and hence it is

difficult to distinguish between the wastes that arrive at the treatment/disposal sites. It is thus appropriate to have a term that would include all types of faecal wastes coming from the on-site sanitation systems that have undergone some measure of digestion. The term “Faecal Sludge”, as used by Strauss et al (1997) and Heinns et al (1998), is used in this review for “all sludge (little or partially digested) collected and transported from on-site sanitation systems (OSS) by vacuum trucks”.

2.1.6. Excreta

The Random House Webster’s College Dictionary defines this as excreted matter, as urine, faeces and sweat.

2.1.7. Excreta Disposal Facilities/Practices.

The following definitions apply for purposes of the joint monitoring programme for water supply and sanitation (JMP) conducted by WHO/UNICEF (2008).

Open defaecation: Defaecation in fields, forests, bushes, bodies of water or other open spaces, or disposal of human faeces with solid waste.

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

Shared sanitation facilities: Sanitation facilities of an otherwise acceptable type shared between two or more households. Shared facilities include public toilets. These toilets are not considered improved.

Improved sanitation facilities: Facilities that ensure hygienic separation of human excreta from human contact. They include:

- Flush or pour-flush toilet/latrine to:
 - Piped sewer system
 - Septic tank

- Pit latrine
- Ventilated improved pit (VIP) latrine
- Pit latrine with slab
- Composting toilet.

2.1.8 Household

For purposes of this study a household is defined to be a family (parents and their children).

2.2 Overview of Faecal Sludge Management

2.2.1 The General Overview of Faecal Sludge Management

According to Strauss and Montangero, 2002, Faecal Sludge management deals with such important issues as the costing, economics and management of entire FS systems, which would include all relevant infrastructure components and services, viz.

- The on-site, household-level installations
- FS collection and haulage
- FS treatment
- Reuse or disposal of FS or of biosolids produced during treatment

2.2.2 The Situation and Problems of Faecal Sludge Management

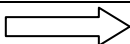
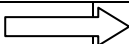
In urban areas of developing countries, the excreta disposal situation is dramatic. Every day, worldaround, several hundred thousand tons of faecal matter from either open defaecation or collected from on-site sanitation (OSS) installations (unsewered family and public toilets, aqua privies and septic tanks) are disposed of into the urban and peri-urban environment. The wastes are either used in agriculture or aquaculture or

discharged indiscriminately into lanes, drainage ditches, onto open urban spaces and into inland waters, estuaries and the sea, causing serious health impacts, water pollution and eye and nose sores.

For those urban dwellers having access to a sanitary facility, private and public OSS systems are the predominant type of installation in Africa and Asia.

All the problems and challenges in FS management rest with all the components of the faecal sludge stream viz. pit/vault emptying, haulage, storage or treatment, and use or disposal. Dealing with these problems involved a number of factors prominent among which are institutional/managerial, financial/economic, socio-cultural and technical (Table 2.2).

Table 2.2: Current FS Management Practices – Causes, Problems and Consequences

FS management component and aspect	Causes 	Problems 	Consequences
Emptying + Collection			
Technical	<ul style="list-style-type: none">Limited or no accessibility to pitsInappropriate emptying equipmentManual, non-mechanised emptying	<ul style="list-style-type: none">Overflowing pitsEmptying frequency often very lowInformal or emergency emptying of pits and indiscriminate disposal of FS	At neighbourhood level, mainly <ul style="list-style-type: none">Health hazards from openly dumped FS and through use of contaminated waterEye and nose soresNon-functionality of infrequently emptied septic tanks → solids carry-over
Institutional / financial	<ul style="list-style-type: none">Poor service managementUsers low affordability for pit emptyingLack of information (e.g. on how septic tanks work)		
Haulage			
Technical	<ul style="list-style-type: none">Traffic congestionLack of suitable disposal or treatment sites at short distance from the area of FS collection	<ul style="list-style-type: none">Collectors dump FS in an uncontrolled manner at the shortest possible distance from where FS was collected	At district or municipal level, mainly: <ul style="list-style-type: none">Pollution of surface and (shallow) groundwaterEye and nose soresHealth hazards from use of contaminated surface water (e.g. for vegetable irrigation)
Institutional	<ul style="list-style-type: none">Lack of urban planning _ lack of suitable disposal or treatment sites at short distance from the area of FS collectionLack of involvement of private sector service ProvidersLack of suitable incentive and sanctions structure		
Financial / Economic	<ul style="list-style-type: none">Collectors minimising haulage distance and time		
Treatment			
Technical	<ul style="list-style-type: none">Lack of proven and appropriate treatment options	<ul style="list-style-type: none">FS is used or dumped untreated	At district or municipal level, mainly: <ul style="list-style-type: none">Health hazards through use of contaminated water sources and water pollution
Financial / Economic	<ul style="list-style-type: none">Where FS treatment exists: private collectors / entrepreneurs avoid the paying of treatment fees		
Institutional / Economic	<ul style="list-style-type: none">Lack of political will to invest in treatmentLack of effective cost recoveryLack of urban planningLack of information	<ul style="list-style-type: none">Non-availability of suitable treatment sitesUse or discharge of untreated FS	

Faecal Sludge Management: The Case of Medina

<i>Use in Agriculture</i>			
Agronomic / institutional / financial /economic	<ul style="list-style-type: none"> • Farmers in want of cheap soil amendment + fertilizer (in many countries, farmers are traditionally accustomed to the use of untreated or only marginally stored FS (nightsoil)) • Private and public providers of FS collection + haulage services interested in generating revenue from selling FS to farmers while avoiding illegal dumping and/or payment of treatment fees • Lack of enforcement of crop restrictions where such exist 	<ul style="list-style-type: none"> • Soils amended and vegetables fertilised with untreated FS 	<ul style="list-style-type: none"> • Potential health risks to consumers
<ul style="list-style-type: none"> • Institutional 	<ul style="list-style-type: none"> • Lack of promotion and marketing of biosolids produced in FS treatment 	<ul style="list-style-type: none"> • Lack of incentives by producers of biosolids and by farmers to trade biosolids 	
Health	<ul style="list-style-type: none"> • Farmers unaware of potential health risks • Lack of hygiene promotion 	<ul style="list-style-type: none"> • Lack of hygiene and health protection 	<ul style="list-style-type: none"> • Actual health hazards to farmers and consumers
<i>Disposal</i>	<ul style="list-style-type: none"> • Lack of implementation of FS treatment schemes, of town planning and designation of suitable treatment sites; lack of adequate fee structure and incentives for haulage of FS to treatment sites • Lack of promotion and marketing of biosolids produced in FS treatment 	<ul style="list-style-type: none"> • Indiscriminate dumping of untreated FS • High-quality biosolids remain unused and need to be landfilled 	<ul style="list-style-type: none"> • Water pollution and risks to public health • Depletion of soil organic fraction and deterioration of soil productivity

Source: (Strauss and Montangero, 2002)

Pit emptying constitutes a major problem in many places, both technically and managerially. Services employed include both mechanised and manual pit emptying in most developing countries. Normally the Mechanised services are rendered by municipal authorities or medium to large-size entrepreneurs while individuals, small groups of individuals or micro-enterprises, offer manual emptying. It is traditionally done with buckets. The manual method of pit emptying is associated with considerable health problems, first to the emptiers themselves and also to the general public. People normally have to or want to rely on this service as a result of services for mechanical emptying not being reliable, too costly, solidified deposits are not removable by suction, or because the pit is not accessible by emptying vehicles.

Another major challenging factor of effective faecal sludge management is the method of collection and haulage. These are very typical in metropolitan centres which often than not have large and very densely built-up and low-income districts. In such cases the challenges are that Emptying vehicles may not have access to pits or suction hoses must be laid through neighbours yards and homes. The accompanying problems are that haulage routes usually become rather long. Traffic congestion further aggravates the problem and renders haulage to designated discharge or disposal sites uneconomical and financially unattractive, leading to uncontrolled dumping of collected FS at shortest possible distance from the area of collection. Proper arrangements through decentralised schemes and institutional set-ups are often needed to solve this kind of problem.

Suitable sites for treatment and use or for final disposal are often difficult to find within the town. Often they are found at the outskirts of the cities at considerable distances. The distance factor forces vacuum tankers to discharge their load at shortest possible

distance from the points of collection to save time and cost. It is very common to find dumping sites for FS close to squatter or formally inhabited low-income areas in many cities. In such cases the health of this ever-growing segment of population is threatened. Children, in particular, are at greatest risk of getting into contact with indiscriminately disposed excreta.

All the above problems according to SANDEC might result due to lack of long-term urban planning and/or enforcement of existing zonal plans. The resulting effect will be the situation where feasible landfilling or treatment sites at reasonable haulage distance will be lacking. Emptying services are also poorly managed.

2.2.3 Finding appropriate solutions to the current Faecal Sludge Management Canker

Improving on and finding appropriate strategies and solutions in FS management must be dealt with in conjunction with both unplanned and planned urban and peri-urban development, institutional settings, jurisdictional conditions, and expected future sanitation infrastructure and service provision.

In short, an FS management concept should be based on the assessment of (Klingel 2001; Klingel et al. 2002):

- existing sanitary infrastructure and trends
- current FS management practices and their shortcomings
- stakeholders customs, needs and perceptions regarding FS management and use
- environmental sanitation strategy
- prevailing socio-economic, institutional, legal and technical conditions, and
- the general urban development concept

Based on an FS management concept, FS treatment objectives may then be formulated and, consequently, feasible treatment options be evaluated. In most places, a large array of technical, economic and institutional/organizational measures are required to improve the FS management situation.

2.2.4 Framework for measuring Effective Faecal Sludge Management Scheme

The proper management of excreta acts as the primary barrier to prevent the spread of pathogens in the environment. It, thus, directly impacts disease transmission through person-to person contact, water and the food chain.

Improvements in sanitation have been shown consistently to result in better health, as measured by less diarrhoea, reductions in parasitic infections, increased child growth, and lower morbidity and mortality. The expected reductions in mortality can be substantial, particularly in areas with low levels of education.

Proper faecal sludge management also ensures effective hygiene practices

Simple actions such as disinfecting drinking water prior to consumption or preparation of food; cleaning hands, utensils, and surfaces before food preparation and consumption; and cooking food thoroughly can greatly reduce morbidity and mortality rates from hygiene-related diseases, achieving cost-effective public health impacts spread equitably throughout society. For example handwashing with soap can reduce diarrhoea by over 40%. The return on joint investments in water supply, sanitation and improved hygiene behaviours are additive with respect to the potential reductions in diarrhoea (WEDC, 2002).

Effective Faecal sludge management also defines effective O & M activities for specific types of sanitation facilities.

The way sanitation systems are operated and maintained can greatly affect the health of the population, the quality of the environment, the benefits to the poor, and the resources available for investment in expansion. Good O&M can enhance the quality of service and extend the useful lives of facilities.

Proper O&M depends on integrating its requirements in planning, design, implementation and management in which coordination between users, local government and private agencies is essential. Laws and regulations, standardized procedures and technical designs are important for O&M. But actual decisions on the most suitable type of sanitation system and on the organization and management of operation and maintenance should always be based on local conditions, both with respect to technical and socio-economic feasibility and to users' preferences and capabilities.

For faecal sludge to be sustainable, the operations must be financially viable.

Because of the pressure to expand the area served, viability generally implies the recovery of the costs of O&M, as well as capital costs.

There should also be proper institutional arrangements for effective faecal sludge management. There should be clear responsibilities and definition of tasks and accountability among the key stakeholders. Institutional arrangements provide a framework for the various management tasks and tools, as well as for capacity building, raising awareness, and public participation

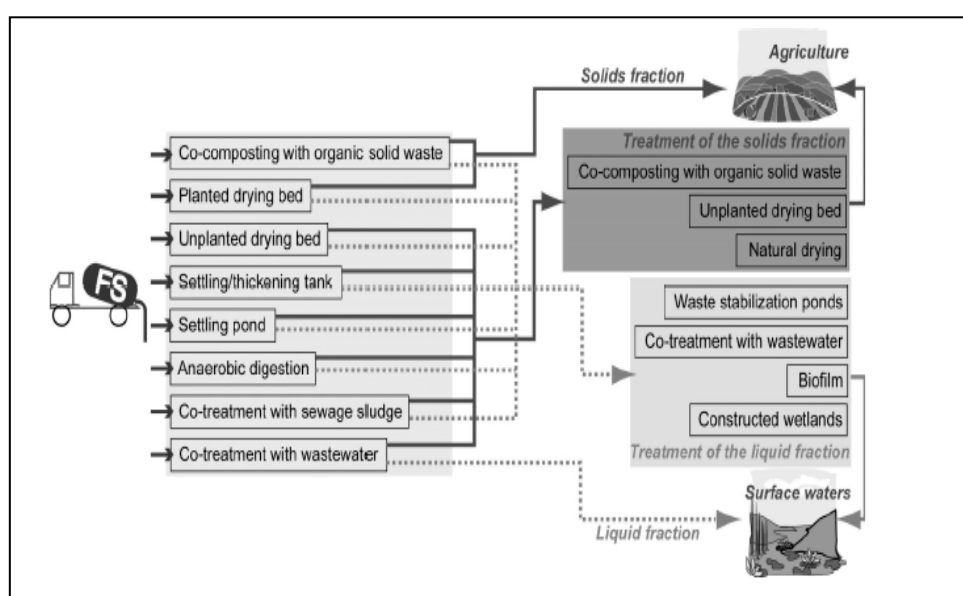
2.2.5 Faecal Sludge Treatment Options for Developing Countries

Contrary to wastewater management, the development of strategies and treatment options adapted to the conditions prevailing in developing countries to cope with faecal sludges (FS) – the by-products of on-site sanitation installations - have long been neglected. In recent years though, an encouraging number of initiatives for improved FS management, including the devising of appropriate FS treatment schemes, have emerged, particularly so in several West African cities (Senegal, Mali, Ivory Coast, Burkina Faso, Ghana), in South East Asia (Nepal, Thailand, Vietnam) as well as in Latin America. These initiatives help urban dwellers and authorities to overcome the challenges posed by what might be designated the “urban shit drama” – the indiscriminate and uncontrolled disposal of faecal sludges into drains, canals, and onto open spaces, thereby creating a “faecal film” prevailing in urban areas and impairing public health, causing pollution and creating nose and eye sores. The authors estimate that in the order of one third of the world population (approx. 2.4 billion urban dwellers) rely on on-site sanitation (OSS) installations, viz. unsewered family and public latrines and toilets, aqua privies and septic tanks. This situation is likely to last for decades to come, since city-wide sewerage sanitation is neither affordable nor feasible for the majority of urban areas in areas (based on literature data and own investigations), in the order of 1,000 m³ of FS should be collected and disposed of in a city of 1 million inhabitants. However, reported daily collection rates for cities much larger than this – e.g. Accra, Bangkok, and Hanoi – rarely exceed 300-500 m³. This indicates that huge quantities if not the major fractions of the FS generated are disposed of unrecorded and clandestinely within the urban settlement area.

Among the many causes for this are the inadequacy of the FS collection and haulage systems; the non-affordability of mechanised pit emptying by the urban populace; the difficult-to access OSS installations for emptying vehicles; excessive haulage distances to designated disposal or treatment sites in large cities, and the lack of satellite treatment sites and low-cost treatment options at affordable haulage distances (Kone and Strauss, 2004).

The treatment processes considered by the authors as potentially suitable for developing countries comprise (Fig. 2.1):

- Solids-liquid separation:
- Settling/thickening tanks or ponds
(non-mechanised, batch-operated)
- Unplanted drying beds
- Constructed wetlands
- Pond treatment of FS supernatants or percolates
- Combined composting (“co-composting”) with organic solid waste
- Anaerobic digestion with biogas utilization



Source: Strauss and Montangero, 2002

Fig 2.1. Overview of potential, modest-cost treatment options for faecal sludge

2.2.6 The Arguments of the Private sector involvement in sanitation services delivery

As a result of rapid urban population growth, the development of informal settlements and growing urban poverty, African governments will need to provide safe water to 210 million and sanitation to 211 million urban residents in order to attain Millennium Development Goal 7 (UNICEF/WHO, 2000).

Public sector domination in the provision of water and sanitation in Africa has been held responsible for the awful state of these services. It has been argued that public enterprises have been characterized by the absence of competition, low levels of government investment, and lack of service expansion resulting in inefficiency and lack of pricing mechanisms to reflect service cost and meet public demand (UNESC/ECA 2005). The past few years, therefore, have witnessed an increase in private sector participation in urban water and sanitation provision in Ghana. The rationale behind involving the private sector is to cut the size of the public sector in search of new technologies and expertise and gain access to increased capital and greater economic efficiency to improve operations and generate revenue.

2.3. Latrine Technology Options (Overview)

Numerous studies have shown that the incidence of many diseases is reduced when people have access to, and make regular use of, effective basic sanitary installations. The provision of adequate excreta disposal systems therefore is to ensure that, disease-causing organisms in faeces and urine of infected people do not reach other people in the community. Therefore, effective excreta management at the household and community

levels produces far ranging societal benefits by helping to protect water resources and the food supply from faecal contamination.

In order to achieve this objective any type of latrine facility should satisfy the following conditions:

- They should be cheap so that the majority of the community members can afford the cost.
- Excreta should not be accessible to flies and animals
- There should be no nuisance from bad smells and unsightliness
- There should be minimal handling of excreta
- There should be minimal use of clean water
- The system should be compatible with local habits and religions
- There should be no contamination of sources of water (rivers, lakes and underground water).
- There should be no contamination of the soil.

2.3.1. Factors Affecting Latrine Technology Choice

According to Harvey et al, 2002, the selection of appropriate excreta disposal interventions is affected by a number of factors among which are socio-political, socio-cultural, available space, ground conditions and water availability. Others include anal cleansing material, menstruation, user-friendliness (for children, disables, etc.), time constraints, design life and mandate of the implementing agency. The rest are financial constraints, availability of local materials, transportation means, human resources and operation and maintenance requirements.

2.3.2 Latrine Technologies available in Ghana

Among the several types of latrine options available in Ghana include the Kumasi Ventilated Improved Pit Latrine (KVIP, Fig.2.4b), Ventilated Improved Pit Latrine (VIP, Fig. 2.4a), Aqua-Privies, Water Closets with Septic Tanks, Enviro-Loo and Pour Flush. There also exists the sewerage system which is very limited and can be found at mostly in Accra, Kumasi, Akosombo and Tema (at some barracks and selected housing estates), Pan or Bucket latrines, simple pit latrines, Biogas latrines and the “Menu Sack” Compost toilet. Open defaecation is still rampant in several communities in Ghana (Mensah, 2008). Pictures of some of these toilet technologies are shown in appendices 2 & 3.

2.4 Elements of Sustainable Environmental Sanitation Development

The Environmental Sanitation Policy (1999) of Ghana identified a number of basic elements and the strategies to promote accelerated development of the sector. The revised Environmental Sanitation Policy (2007) of Ghana is also in response to the various assessments on how effective the implementation of policy objectives and measures has been. Some of the elements and strategies with regards to faecal sludge management in urban settings and relating to this project include:

- (a) Development and strengthening of the community’s role in environmental sanitation;
- (b) Development of human resources and strengthening institutional structures for managing environmental sanitation;
- (c) Assigning delivery of a major proportion of environmental sanitation services to the private sector through contract, franchise, concession and other arrangements;
- (d) Development of a strong legislative and regulatory framework, and capacity for supervising environmental sanitation activities and enforcing standards;
- (e) Promotion of research to review sanitation technologies

- (f) Identification and dissemination of cost-effective, appropriate, affordable and environmentally friendly technologies to address environmental sanitation needs;
- (g) Adoption of the cost recovery principle in the planning and management of environmental sanitation services.

Along with the above the following expected outputs and targets were also defined:

- (a) All excreta are disposed of either in hygienic on-site disposal systems or by hygienic collection, treatment and off-site disposal systems;
- (b) All pan latrines are phased out;
- (c) At least 90% of the population has access to an acceptable domestic toilet and the remaining 10% has access to hygienic public toilets;
- (d) Hygienic public toilets are provided for the transient population in all areas of intense public activity;
- (e) Environmental standards and sanitary regulations are strictly observed and enforced;
- (f) The majority of environmental sanitation services are provided by the private sector.

2.5 The Millennium Development Goals and Sanitation.

In September 2000, 189 States, including Ghana, signed the Millennium Declaration, committing to achieving the MDGs spelled out in the declaration by 2015. The eight MDGs focus on many aspects of poverty around the world and work to promote sustainable development by establishing targets and selecting indicators to measure gains in income, education, access to global trade and markets and environmental sustainability.

The Millennium Development Goals (MDGs) represent a renewed commitment of the international community to overcome persistent poverty. It has been widely recognized that the improvement of water supply and sanitation is a core element for poverty reduction as well as for conflict prevention. Halving 'by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation' has therefore been defined as one of the numerical and time-bound targets for the MDGs.

In sub-Saharan Africa, decreasing the number of people without access to safe drinking water and basic sanitation has proved to be a significant challenge. The region is lagging behind the rest of the world with respect to achieving the Millennium Development Goals (MDGs) on water supply and sanitation, which aim to halve the proportion of people without access to safe drinking water and basic sanitation by 2015. While some impressive progress towards meeting the MDGs is noted, the continent, as a whole, still requires more focused efforts towards meeting the global targets.

The MDGs do not outline a strategy for achieving sustainable development. Rather, the MDGs provide a framework for implementing practical, measurable and comprehensive solutions at the national level. They act as a yardstick for measuring development efforts. The MDGs require countries to monitor, evaluate and share progress on key indicators that can be used to measure the extent of poverty in the country. Each of the eight goals is divided into targets; the monitoring of selected indicators tracks progress in achieving the goals.

The main objective of this current research relates to goal seven (7) of the MDG.

This goal (Goal 7) talks of **Ensuring environmental sustainability**

The goal has three (3) targets (targets 9-11). The 10th one deals directly with water and sanitation. Target 10: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and sanitation

The indicators for this target are: i) Proportion of population with sustainable access to an improved water source, urban and rural and ii) Proportion of the population with access to improved sanitation, urban and rural.

3. STUDY APPROACH AND METHODOLOGY.

3.1 Description of Study Area.

3.1.1 Location and Size of Study Area

Madina is one of the over 65 settlements in the Ga East Municipal Assembly which is one of the six Districts in the Greater Accra Region (Fig. 3.1). The Municipality used to be part of the defunct Ga District Assembly, which was split into two. Ga East Municipal Assembly was established in 2004 by an Act of Parliament (LI 1589).

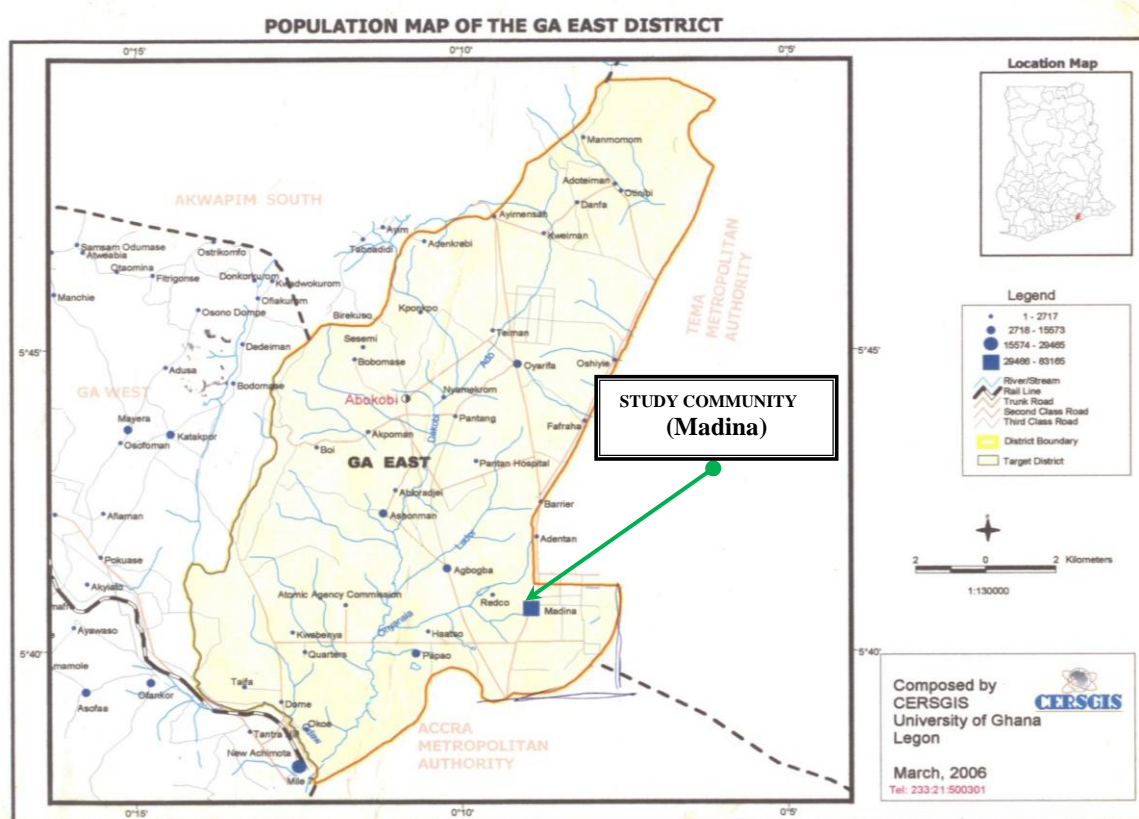


Fig 3.1 Population Map of the Ga-East Municipal Assembly

The Municipality covers a land area of 166sq.km and is boarded on the west by the Ga West district, on the east by the Tema Municipal Assembly, the south by Accra

Metropolitan Assembly (AMA) and the north by the Akwapim South District Assembly.

3.1.2 Climate

The district and for that matter Madina falls in the savannah agro-ecological zone. Rainfall pattern is bimodal with the average annual temperature ranging between 25.1⁰C in August and 28.4 ⁰C in February and March. February and March are normally the hottest months.

3.1.3 Size and Distribution of population.

The 2008 estimated population of Madina was 91, 999. In 2008 the estimated population of the municipality was 241,752 (from the 2000 population census). The Municipality has however estimated the district population to be 450,200 due to the very rapid population growth emanating from commercial activities and urbanization in the district. The population is concentrated mainly along the urban and peri-urban areas of the district particularly along the border with AMA. The percentage of female population is 49% while the remaining 51% forms the male population.

3.1.4 Settlement Pattern

The Ga East Municipal Assembly has over 65 settlements with about 73% of the population living in the peri-urban/urban areas. The remaining 27% occupies the rural areas towards the Akwapim Hills. The District capital Abokobi is approximately 29 kilometers from the countries capital city Accra. Madina is the Largest and the highest ranked community with most basic facilities and services. It functions as a commercial

center because of its threshold population that can support almost all economic activities.

3.1.5 Culture

The Ga East Municipal is a municipality that wears a cosmopolitan hat. Almost all the ethnic groups in Ghana exist in the district although Akans seem to have a slight majority over Gas and Ewes in that order. Others are Dangbes and the Gurs. This situation is especially true for areas like Madina, Dome, Taifa and other urban communities. Though the Municipality has a strong Islamic presence especially in and around Madina, Christianity remains the most dominant form of religion for the people of the district. Pockets of people however maintain they are traditionalists and Krishnas, whilst others profess no religion at all.

3.1.6 Health

The District Health Management Team is responsible for health services delivery in the district. The district is divided into four sub-districts for the organisation of primary health care services namely;

- Madina
- Danfa
- Dome
- Taifa

The Population to Doctor ratio is 134,926:1 whilst Population to Nurse ratio is 2,522:1

In general the health sector in the district is plagued with inadequate health facilities, personnel and inadequate office space for the Health Management Team.

3.1.7 Economic and Natural Resource Potential

The Ga East District has a great deal of opportunities for both private investment and joint venture with the public sector. This is due to the enabling factors for development coupled with the infrastructure set-up and the district's proximity to the nation's capital, Accra.

There are four main economic activities in the district viz commerce, agriculture, service and industry.

Farming is the major economic activity for about 55% of the economically active population. About 70% of the rural population depends on agriculture as their main source of livelihood with about 95% of them being small holders. The major agricultural activities are crop production and livestock production (poultry, turkeys and cattle)

Among the wide range of vegetables produced are pepper, tomatoes, cabbage, okra and garden eggs. The production of cash crops like maize, cow pea and cassava are also very encouraging.

3.1.8 Poverty

The socio-economic characteristics of the population categorises people into four poverty main groups. Areas such as Madina, Adenta West, North Legon and Dome are placed in the first class group.

3.1.9 Water Situation: Opportunities and Challenges

The major sources of water in the District include piped systems, boreholes, hand dug wells, tanker services, streams, rivers and spring water. Though very arguable, the District is said to have an approximate potable water coverage of hundred percent

(100%). This is because whereas almost the whole part of the rural and peri-urban areas enjoy uninterrupted pipe water supply from the three small town schemes, the urban enclaves have an erratic and irregular supply from the GWC. People in these areas therefore have various forms of receptacles to store water (Plates 3.1a&b, Appendix 3). Pipe borne water supplied by the Ghana Water Company Limited (GWCL) to Madina, Adenta West, North Legon, West Lands among others, all in the first class area of the district is unreliable due to irregularities related to supply.

Opportunities

- Availability of underground water and high water table.
- Climatic region in which the District falls makes room for good rainfall pattern.
- Existence of GWCL in the urban communities.
- Strategic location of District close to the Akwapim Ridge
- Inflow of new investments
- Availability of funds from the District Assembly Common Fund (DACF) and other donor funds.
- Rich human resource capacity in the DWST and the DA.

Challenges

- Pressure on available water facilities as a result of rapid growth rate in the district.
- Scarce financial resources to undertake projects.
- Land acquisitions problems.
- Inadequate understanding of principles and concepts underlying water management
- Irregular supply of water at urban areas.

3.1.10 Sanitation Situation

3.1.10.1 Liquid Waste

There are three councils in the Municipality. These are Abokobi zonal council, Madina zonal council and Dome zonal council. Toilet technologies at the household level in Madina included Ventilated Improved Pit latrines (VIPs), Kumasi Ventilated Improved Pit latrines (KVIPs) and Water Closets (WCs). Public and institutional facilities have also been looked at.

3.1.10.2 Wastewater Management

The field observations also covered wastewater management at the household level. Most of the households visited were using various improvised forms of soakaway (not engineered) or plastic containers (very common) connected to the bathhouses with PVC pipes (plates 3.4a & b, Appendix 3). The containers are emptied when they become filled up. Some of the householders also channel their wastewater into the stormwater drains through PVC pipes or block work drains connected to their bath houses. Waste water from the kitchen (after washing of plates and bowls) are collected and thrown on the bare ground. The same method is used for waste water from laundry.

3.1.10.3 Environmental Sanitation Education

The current sanitation education programme is targeted at every household within the Municipality. The subject areas of education include the following:

- General sanitation
- Food Hygiene
- Waste Management (Liquid and Solid)
- Water Storage

- Personal Hygiene
- Community Cleaning

The absence of logistics and other necessary inputs is limiting the access of Environmental Sanitation Education by all citizens in the Municipality.

3.1.11 Local Legal Framework Regulation

There are byelaws which are yet to be gazetted on sanitation in the Municipality and persons who defraud it will be prosecuted. Some of these byelaws are:

- Defecating in or at banks of water sources and unauthorised places shall be an offence liable to a fine of 2 penalty units or in default 3 months imprisonment or both.
- Washing of clothes and bathing in public or public water sources shall be an offence liable to a fine of 2 penalty units or in default 3 months imprisonment or both.

3.2 Data Collection Tools and Research Methods

The Study adopted combinations of desk study and literature reviews, checklists and interviews, questionnaire administration and field observations. The study was also founded on qualitative and quantitative methods of data collection. The scope of assessment of the situation covered the residential areas, public and commercial places, basic schools and health delivery establishments. The scope of data gathered from the above areas is presented in Box 1 below. A detailed checklists and questionnaire prepared for the study have also been attached as appendix 4 of this report.

Box 1: Scope of Data gathered in Study Area.

- **General Information**
 - Local geography, demographic trends, housing patterns
 - Industrial activity and agricultural development,
 - Socio- cultural aspects, socio- economic etc.
 - Educational and health facilities
- **Types of Latrine Technologies, Methods for Wastes Collection and Transport**
 - Assessment of existing toilet technologies (household, communal, institutional and commercial places)
 - Existing methods of faecal sludge collection and transportation
 - Means of wastes transportation to disposal sites, types of vehicles, vehicle maintenance infrastructure etc.
 - Assessment of physical infrastructure and equipment for collection, transportation and disposal including operation and maintenance
- **Methods of Organisation and Management**
 - Assessment of Actors involvement in ,construction of latrines, collection, transportation, and final disposal of faecal sludge
 - Organisational and management procedures for wastes management
 - Identification of specific problems related to current faecal sludge management practices in residential, public and institutional areas.
- **Wastes Treatment and disposal**
 - Assessment of existing methods for treatment, recycling and recovery of wastes
 - Final disposal/dumping sites for human waste
 - examination of existing operation and maintenance schemes including costs
- **Financial Sustainability and Cost Recovery Mechanisms**
 - Review of existing methods of financing sanitation services and cost recovery mechanisms.
 - Operation and maintenance cost of managing faecal sludge
- **Organizational Provisions and Legal issues relating to Faecal Sludge Management**
 - Review of municipal bye- laws and regulations and their enforcement etc.
 - Assessment of involvement of NGOs and private organizations

3.2.1 Data Type and Source

All the collected data were from three main sources namely primary data source, secondary data source and tertiary data source. Specific documents that were used and which fall under these sources have been tabulated below:

Table 3.1: Data Type and Source

Data type	Sources and examples used
Primary Data	<ul style="list-style-type: none">• Interviews of key informants• Questionnaire administration to householders
Secondary Data	<ul style="list-style-type: none">• Books, journals, publications, Research documents, reports etc.
Tertiary Data (Search Tools)	<ul style="list-style-type: none">• These tools help identify or provide a summary of primary and secondary data.• Indexes, bibliography, dictionaries, Internet (e.g. wikipedia).

3.2.2 Literature Review

The review of literature was undertaken to identify key concepts most relevant to the study. Documents reviewed included but not limited to publications, technical/scientific papers, scholarly journals, theses, government agencies documents and reports and books. The whole content of the faecal sludge management stream covering collection, haulage and transportation, disposal, treatment, recycling and reuse was reviewed. Issues bordering on financing and cost recovery and legal regulatory framework for faecal sludge management were also looked at. Case studies with regards to faecal sludge management in developing countries including Ghana were also reviewed. The outcome of the literature review dictated to the structure and methodology of this study.

3.2.3 Interviews with Key Stakeholders

Relevant checklists were developed from which interviews were conducted with key informants (stakeholders) in the sanitation sector to bring to light the present state of management practices of faecal sludge in Madina with regards to successes, problems/challenges and strategies for the way-forward. The duration for the interview varied for different informants due to the scope and content of the questions. Key informants interviewed included the Ga-East Municipal Assembly, Madina Urban Council-the Environmental Health Unit, Private Operators of Cesspit Emptiers and the Municipal School Health Education Program Coordinator (MSHEP) of the Ghana Education Service (GES). The rest were the Ghana Health Directorate of the Ga-East Municipal Assembly, Public Toilet Attendants (private and government) and the Facility Treatment Supervisor at the Tema Metropolitan Assembly Faecal Sludge Disposal/Treatment Site. Categorised areas of faecal sludge management that were looked at using this method have been presented in Box 1 above. The interview was also a tool to establish the validity and reliability of some of the secondary data collected from various sources.

3.2.4 Field Observations

The study methodology also employed visual inspection and observations mainly to determine the technical requirements of siting these sanitation facilities (latrines and disposal/treatment plants). This activity was also undertaken to have a fair idea about the general hygiene and also ascertain some of the secondary data collected and assertions made by key informants from the interview.

3.2.5 Sample Size and Questionnaire Administration

The questionnaire administration targeted only households in the community. In all 100 householders (sample size) were interviewed. Both the purposeful or stratified and random sampling were adopted. The sampling was done in such a way that there was fairly uniform distribution of interviewees from the 20 sectional areas (Table 3.2, Appendix 1) out of about 25 in Madina. It must be noted that at each of these sectional areas the sampling was done in as much as possible to cover wider area in the section. Where there were major roads dividing the area, respondents were chosen at either side of the road so as to have a fair representation of the sanitation situation in the area. Areas covered in the questionnaire included availability and types of household latrines, motivation for having or wanting to own a household latrine, constraints to household sanitation and financing and cost recovery. The other aspects were health and hygiene practices and the general level of service of sanitation delivery to the community people and by the Municipality.

3.2.6 Analytical Framework for Data Analysis

Data collected was collated, synthesised and analysed using both qualitative and quantitative research methods. Questions for the interviews were open-ended to allow active participation and also afford respondents to express their views and perceptions freely unlike in structured questionnaires.

The quantitative analysis focused more on the household questionnaires and used SPSS and Microsoft Excel Statistical softwares. The different analytical tools and methods used for the research objectives and the variables measured have been presented as the objective and methodology matrix table in Table 3.3.

TABLE 3.3: PROJECT OBJECTIVES AND METHODOLOGY MATRIX

Project Specific Objectives	Variables Measured	Data Collection Methods for specific objectives
1. To identify latrine technologies available in Madina and assess their management arrangements.	<ul style="list-style-type: none">• List of all existing latrine options and treatment facilities of faecal sludge• Management arrangements for each of the latrine technologies.	<ul style="list-style-type: none">• Interviews with MA, Urban Council and Private toilet operators and attendants• Visual Inspection and Observations of sanitation facilities• Qualitative and Quantitative analysis and interpretation of findings.
2. To identify the roles and responsibilities of the different stakeholders in faecal sludge management in Madina.	<ul style="list-style-type: none">• List of all stakeholders involved in faecal sludge management in Madina• Roles and responsibilities of each of the stakeholders• Organisational structure in place for managing faecal sludge at the MA and PSP arrangements.• Capacity of the MA and the private sector in managing faecal sludge.• Problems faced by stakeholders in managing faecal sludge in Madina.• Policy framework for faecal sludge management	<ul style="list-style-type: none">• Interviews with MA, private sector and householders• Through MA's reports and other documentations• Qualitative analysis and interpretation of findings

3. To assess the cost of Faecal Sludge and the cost recovery mechanisms	<ul style="list-style-type: none"> • Initial investment cost of latrines • Recurrent Cost (cost of O & M). • The content of the O & M cost • Financing options and Existing Cost recovery mechanisms and their adequacy and effectiveness 	<ul style="list-style-type: none"> • Interviews with MA, Urban Council, CWSA. • Stakeholders documented reports. • Questionnaire administration to householders. • Annual Cost comparism of tariffs and O & M activities. • Quantitative analysis and interpretation of findings
4. To assess public perception of current faecal sludge management practices.	<ul style="list-style-type: none"> • Household expenditure on latrine use • Willingness and ability to pay for latrine use services • Users' assessment of desludging rate and O & M arrangements. • General perception and satisfaction of users about management arrangements for faecal sludge. 	<ul style="list-style-type: none"> • Questionnaire administration to householders • Qualitative and Quantitative analysis and interpretation of findings
5. To assess the incidences of excreta related diseases in the Madina Sub-district.	<ul style="list-style-type: none"> • List and incidences of common excreta related diseases for 2007 and 2008. 	<ul style="list-style-type: none"> • Interviews with the Municipal Health Directorate • Questionnaire administration to householders • Qualitative and Quantitative analysis and interpretation of findings

4. ANALYSES OF DATA (RESULTS AND DISCUSSIONS)

4.1 Assessment of existing toilet technologies and their management arrangements in Madina.

4.1.1 Defaecation Practices in Madina.

Out of the 100 respondents 65% had access to household toilets, 23% used public toilets, 11% practiced open defaecation with the remaining 1% practicing defaecation in polythene bags after which they discard it into the bush or on a refuse dump (Fig.4.1). From the literature review (Revised Environmental Sanitation Policy of Ghana, Draft Final, May 2007) some of the key outputs of a sustainable environmental sanitation development of any Ghanaian town are the following:

1. All excreta are disposed of either in hygienic on-site disposal systems or by hygienic collection, treatment and off-site disposal systems;
2. All pan latrines are phased out;
3. At least 90% of the population has access to an acceptable domestic toilet and the remaining 10% has access to hygienic public toilets;
4. Hygienic public toilets are provided for the transient population in all areas of intense public activity;

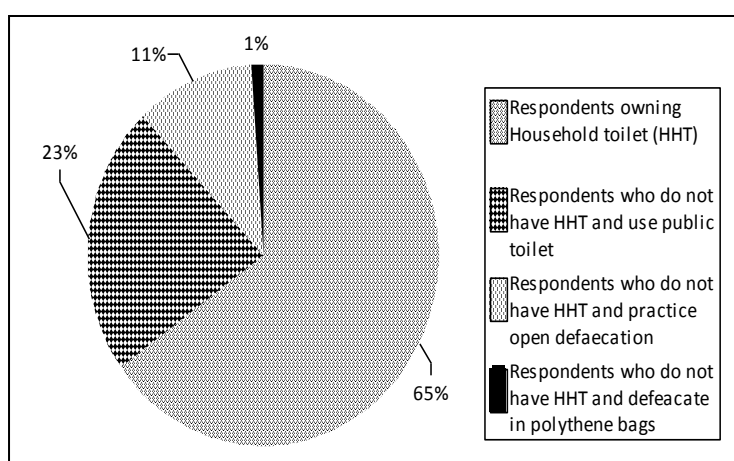


Fig. 4.1: Defaecation Practices in Madina

With regards to outputs 3 and 4 of the environmental sanitation policy the study results clearly show that more effort must be put in place before those targets can be achieved (90% household toilets and 10% hygienic public toilets). Coverage of household toilets needs to increase by 25% while the number of people having access to hygienic public toilets be reduced by 13%. Currently most of the public toilets in Madina cannot be considered hygienic since they are plagued with odour and fly nuisance.

Again the practices of open defaecation and defaecating in polythene bags are contrary to the sanitation bye-laws of the Municipality which forbid people from defaecating at inappropriate places and also disposing off stools contained in polythene bags at unauthorised places. Open defaecation is also frowned upon globally and is considered inappropriate as excreta disposal method or practice (WHO/UNICEF, 2008). It is also the underlying principle of Community Led Total Sanitation (CLTS) which seeks to make communities achieve open defaecation free status. This sanitation strategy is being championed by Kamal Kar who stated that “If we defaecate in the open we are eating our own shit” (Kamal Kar, 2008).

4.1.2 Household toilets in Madina.

The study outcome showed that 65% of the 100 respondents used household toilets. There were basically five (5) types of household toilets in Madina. These technologies included the Ventilated Improved Pit latrines (VIPs) -14%, Kumasi Ventilated Improved Pit Latrine (KVIPs) - (9%) and Water Closets (WCs) - (47%). The others were pit latrines (27%) and bucket/pan latrines - 3% (Fig. 4.2). Most of the VIPs and WCs were simply built with sandcrete blocks. Even though these toilets (VIPs) had all the basic components including the vent pipe their construction did not make them function as VIP (Plate 4.1, Appendix 3). There were lots of spaces in the latrine

building which defeat the working principle of VIPs. Flies which enter the room could therefore escape through other spaces instead of being trapped by the fly screen on top of the vent pipe.

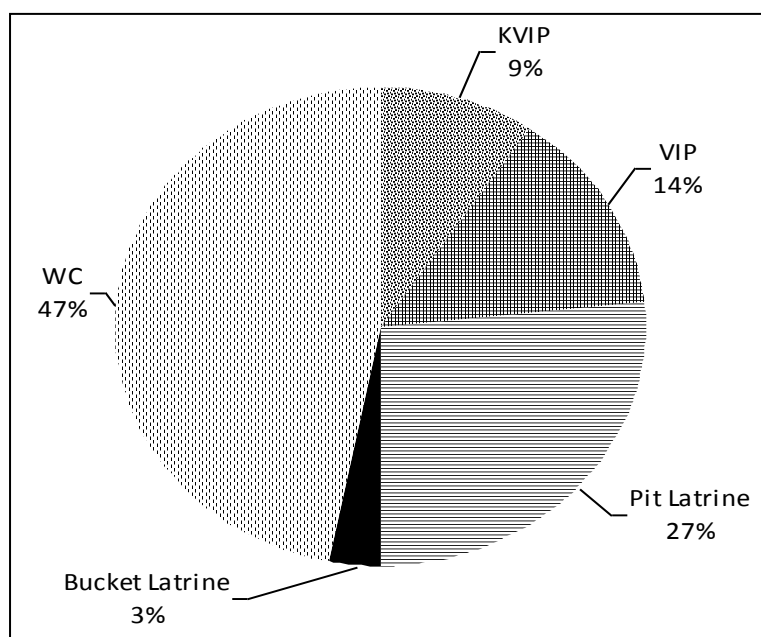


Fig. 4.2: Types and Percentages of Household Latrines in Madina

The WCs were comparatively better managed (in terms of preventing odour and fly nuisance) than the VIPs. Some of these household toilets were structurally weak. Most users of the VIP did not know how it operates. Almost all the people interviewed kept basket in the privy rooms to contain the anal cleansing materials contrary to putting the anal cleansing materials back into the pit as in the case of VIP toilets. This invites flies and also retain odour in the room. Again most of the supposed VIPs had a lot of spaces in the latrine building. This means that the idea of the room being kept relatively dark with light coming from only the vent pipe and the ventilation space on top of the door was defeated.

Irrespective of the above problems most of these toilets were always kept neat and clean and are free from odour and flies.

Again the results showed that more effort must be put into place to wipe out the existence of pan latrines in the town. The use of these latrines are against the Environmental Sanitation Policy of Ghana which requires that all pan/bucket latrines be phased out by 2010 and that excreta should be disposed of in hygienic disposal systems (on-site or off-site). The finding was also against the Municipality's sanitation bye-laws which forbid any person to engage in the removal and carrying of pan latrines and was also contrary to the assertion made by the Municipality that all pan latrines had been phased out in Madina.

4.1.3 Public and Commercialized Toilets

The household questionnaire revealed that 23% of the respondents used public toilets. These public toilets had been commercialised and included 6 WC with septic tanks which were constructed by the Municipal Assembly. There were also about 17 commercial private toilets including 4 WCs (e.g. Plate. 4.2a, Appendix 3) and 13 KVIPs (Plate 4.2b and Table 4.1). The public toilets have been constructed at vantage points such as the markets and lorry parks. The public toilets had a host of problems ranging from construction to operation and maintenance (O & M) issues. These issues have been tackled under the challenges faced by operators of public commercialized toilets.

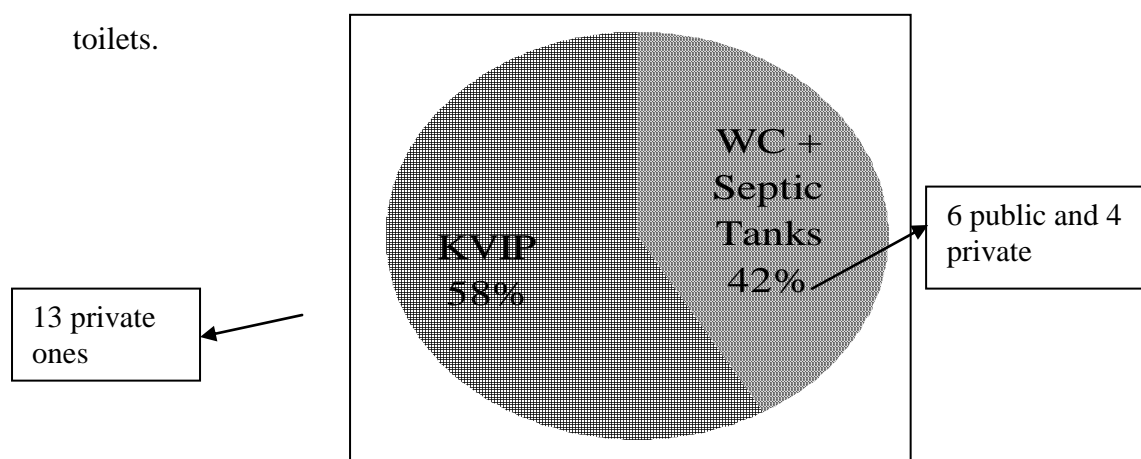


Fig. 4.3: Types and percentages of public Latrines in Madina

4.1.4 Toilet Facilities in Schools

As part of the field assessment there was a reconnaissance visit to 20 of the schools with toilet facilities in Madina. There was also an interview with the Municipal School Health Education Coordinator (MSHEP) for Ga East Municipal Assembly.

A common feature of most of the schools worth noting is that even though most of them were mentioned as one school, on the ground they were a cluster of schools. Thus the number that the facility had to serve was large. This has implication for the size of facility that is provided in those types of schools. A typical example is the case of Nkwantanang cluster of schools. An 8-seater WC toilet facility has recently been provided for the school which has a population of more than 1000. This is definitely not adequate if the maximum threshold user population per squat hole of 50 is anything to consider. If anything at all this facility should have been provided for a school of maximum population of 400. Aside this there were other challenges the school was grappling with in terms of the O & M activities.

About 70% of the schools had toilet facilities with 30% not having. Table 4.2 shows some of the schools with toilet facilities. For those who have, 50% were WCs with the remaining 50% being KVIPs (Plate. 4.3a & b, Appendix 3). Though a lot of the schools had toilet facility, these were mostly in very deplorable conditions. The assessment showed that most of the institutional toilets in Madina were inadequate as compared to the enrolment figures of these schools. The resulting effect is that some of these schools had reserved the institutional toilets for use by only the teachers. The large number of pupils had to therefore find their own toilets whenever they had to attend to nature's call. In general the sanitation situation is good and better in the government schools than in the private schools.

4.2 Management of Toilet Technologies and Faecal Sludge in Madina

For each of the latrine technology identified in Madina, management practices covering collection and desludging methods, transport and disposal methods and treatment and reuse. The problems and challenges faced by the operators of these technologies were also looked at. An overview of the management activities for the various latrine technologies in Madina had been presented in Table 4.3.

4.2.1 Operation and Maintenance (O &M) of Household Toilets

It is a requirement that every householder maintains his/her toilet facility in order not to pollute the environment or cause diseases to people in the vicinity. O & M activities for household toilets in Madina included sweeping and cleaning of floors with or without water, disinfecting of the toilet seat (especially WCs) and adding ash to the contents of VIP/KVIP, pit and bucket latrines. The others included flushing the contents of WC toilets and desludging when the toilets become full. O & M materials used were water, disinfectants, anal cleansing materials, brooms and scrubbing brushes. Depending on the kind of O & M activity it could be done on a daily, weekly, fortnightly or monthly basis. Some of the activities were also periodically done. Householders could also clean their toilet with or without water (Fig.4.4).

The study showed that only WCs with septic tanks and KVIPs were deslugged using cesspit emptiers. Water was added to the contents of the KVIP before the desludging was done. For pit latrines private persons were contracted by householders to empty the pit manually when they were full.

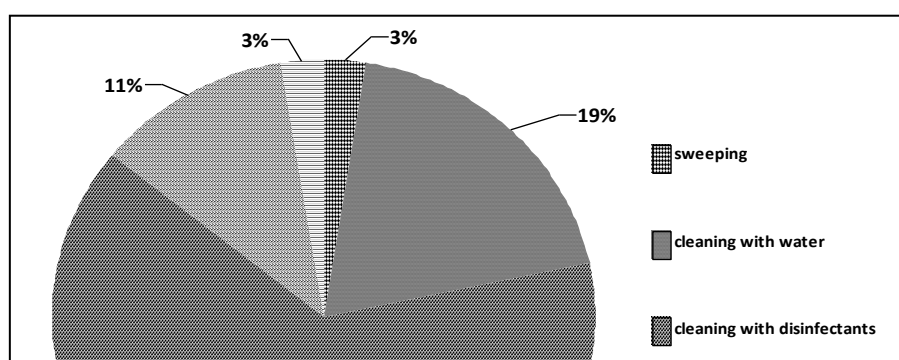


Fig 4.4 How householders clean their toilets

Buckets used to contain the faeces are also emptied manually as and when they become full. Householders had no idea as to where the contents are discharged to. Operators of KVIP/VIP and pit latrines used ash to prevent odour and also reduce the volume of sludge in the pit. Some also pour kerosene into the pit to remove the gases built in the pit. Anal cleansing materials are put into the toilet or kept in basket (after which they burn, bury or dump on a refuse dump) in the privy rooms of the latrines. Householders disposed off anal cleansing materials in several ways as depicted by figure 4.5. Majority (86%) of them disposed off their anal cleansing materials by burning.

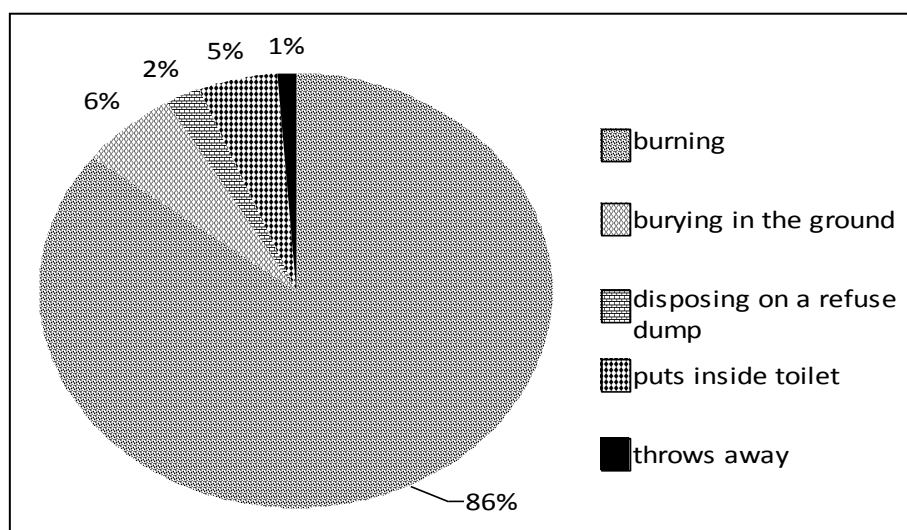


Fig.4.5: Methods of Disposing off Anal Cleansing Materials

Table 4.3: Overview of Management Activities for Different Latrine Technologies in Madina

Latrine Technology/Management Type	Desludging Methods	Method of Disposal	Treatment & Reuse	Problems/Challenges
Household and Public managed WC with Septic Tank	1. By the use of cesspit emptiers owned and operated by private people.	Householders do not have an idea about where the excreta is finally disposed off. Operators of the cesspit emptiers however disclosed that they discharge the toilets at the Tema waste treatment plant.	1. By the use of waste stabilization pond at the Tema treatment & disposal site. 2. Recycling and reuse of the waste is yet to start since the treatment plant is fairly new. Arrangements are however advanced to recycle the waste into compost.	1. Vehicle accessibility was sometimes a problem. 2. There were also times when cracks develop in the septic tanks resulting in overflow of waste with its health and environmental effects.
Household and Public managed KVIP	1. By the use of cesspit emptiers. Some had to add water to liquefy the contents before desludging is done. 2. Some householders had to also ramp the toilets intermittently to soften the contents and to make desludging easier. 3. Some public operators have put toilets seats on one or two of the seaters and used water to flush. This water liquefies the toilet in the pit and therefore makes desludging easier.	Householders do not have an idea about where the excreta is finally disposed off. Operators of the cesspit emptiers however disclosed that they discharge the toilets at the Tema waste treatment plant.	1. By the use of waste stabilization pond at the Tema treatment & disposal site. 2. Recycling and reuse of the waste is yet to start since the treatment plant is fairly new. Arrangements are however advanced to recycle the waste into compost.	1. High cost of desludging 2. Difficulty in getting the private operators to desludge on time. At times delays results in cracks and overflow of waste.

	4. Some operators of public toilets also used kerosene to remove the gases in the toilet.			
Household Managed VIP	By the use of cesspit emptiers. Some had to add water to liquefy the contents before desludging is done.	Householders do not have an idea about where the excreta is finally disposed off.	No treatment and reuse of the excreta	Delays in getting a cesspit emptier operator to desludge the toilets when full.
Household Managed Pit Latrines	1. People use buckets or any other receptacle (manually) to scoop the toilet out when it is almost full 2. Various forms of chemicals are added to the toilet to reduce the volume. When it is almost full the toilets are then emptied into dug manholes and buried.	The excreta are discharged into nearby drains at night. This practice is very common especially during the rainy season.	No treatment and reuse of the excreta.	1. There have been times when explosion had occurred due to the chemicals added and the volume of waste in the pit. 2. Those who empty these toilets are always soiled by the toilets which affect them. 3. The toilets sometimes overflow and cause a lot of health and environmental hazards.
Household Managed Pan/Bucket Latrine	1. Private individual persons are contracted to empty the toilets manually.	1. Excreta are discharged into open drains especially during the rainy season. Some also dumped the toilets into the bush. 2. Others also discharged the toilets into nearby rivers.	No treatment and reuse of the excreta	1. Charges by these private operators could sometimes be high. 2. There are times when the toilet overflows the buckets/receptacles. Some even used wooden receptacles which pose much danger to the operators.

4.2.2 Operation and Maintenance (O &M) of Public and Commercial Toilets

All the public toilets in Madina were managed by private persons. This provision underlines the Environmental Sanitation Policy of Ghana advocacy to assign the delivery of a major proportion of environmental sanitation services to the private sector through some form of contract including franchise, concession and other arrangements.

At the public toilets there were toilet attendants and cleaners who see to the day-to-day O & M activities of the facilities. The number of attendants depended on the size of the toilet facility and the number of people who visit the toilet daily. Some of the attendants run shift services on a daily basis.

Most of the commercial toilets were opened around 4:30 GMT and closed at 20:00 GMT on the average every day. At times the closing time could extend beyond or before the usual time depending on how busy the day will be. This was very typical with the market toilets.

Users of public toilets paid between 10Gp and 20Gp for their use and were provided with anal cleansing materials (newspapers and toilet rolls) and water for handwashing.

The user charge was slightly higher for those who wanted toilet roll instead of soft papers. Muslims who also patronized these commercial toilets were given papers but in addition water to wash themselves. This was normally done in the privy room and the water directed into the pit. The anal cleansing materials were put into a basket or plastic dustbin which was always kept in the privy room of the toilet. The cleaner of the toilet facility picked and dumped them daily onto the refuse skip located close to the toilet facility.

Madina had severe water problems with regards to the services provided by the Ghana Water Company. Even though the water distribution lines were laid in the town, hardly does the water flow. Most of these operators therefore depended on tanker services by private operators. On the average an operator of a 17-seater WC toilet at the market buys a full tank (about 9000 litre capacity) of water at a cost of GH¢40 every 3-4 days. Poly tanks and concrete tanks were the common storage facilities for water. All the commercial public toilets had some form of handwashing facilities. The commonest ones at these toilets were plastic containers (20 or 25 litres) from which users poured the water. Almost all of the public WCs had sinks installed as part of the toilet facility. There were also soaps for users to wash their hands.

According to one of the toilet operators at the market they had to stop users from using the sinks because of misuse on the part of the users (Plate 4.4a, Appendix 3). Users open the sink and at times leave it on for a considerable time whiles they do other things. This attitude of users was having a telling effect on their expenditure on water for maintenance. It also made the septic tanks fill up fast.

The WC cisterns had also been abused by the users and a number of them were not functioning (Fig. 4.7b, Appendix 3).

All the toilet operators had a cleaner(s) who sees to it that the toilet facility is always kept tidy and hygienic. There was daily cleaning of the facilities as well as general cleaning on specific days of the week. Some of the operators also undertake general cleaning after close of work if it was not too late for that. For the immediate vicinity of the toilet facility the cleaners sweep and weed at times. The cleaners also sweep the corridors and the privy rooms of the toilet facilities. Some of the operators cleaned the toilet themselves and do so as and when there was dirt. There was also cleaning of the

WC squatting bowls. The cleaners also used disinfectants like dettol and parasol among others for thorough cleaning of the facility.

At one of the public toilets the attendant had bought shorts and trousers and gives to those who soil themselves when they visit the toilet. According to this attendant this situation normally arises when people had problems locating the toilet facilities or when all the seaters are being used. This was to forestall discomfort and embarrassment before the person gets to the house.

4.2.3 Operation and Maintenance (O &M) of School Toilets

Most of the schools had duty rosters for the pupils to clean the toilet facilities. There was daily sweeping at the facilities as well as cleaning with water and disinfectants. The schools also undertake minor maintenance activities on the facilities. The Parent Teacher Association helps in the maintenance activities when the need arises.

Most of the schools do not have water supply system and therefore depended on private tanker services for O and M activities of the toilet facilities especially the WC type. This operational requirement had put a lot of financial burden on most of these schools which find it very difficult to meet the cost of water from the tanker operators. Some of these schools had therefore reserved the use of the WCs to the teachers in order to cut down on the cost of water. This however should not have been the case since the facilities were meant to benefit more especially the pupils.

The main anal cleansing materials used by the schools were Toilet rolls and soft approved papers (e.g. newspapers). Pupils of most of the schools especially the government schools were made to bring Toilet rolls at the beginning of each term. These toilet rolls were kept at the schools store room and given to the pupils to use when schools are in session.

Unlike other schools in other municipalities none of the government schools in Madina had commercialised its toilet facility to the public.

For the pre-school pupils, the teachers assist them in defaecating using the latrines which normally have the same squatting hole size as those for the primary and Junior High School. The very young ones often defaecate in chamber pots which were emptied into the latrines.

4.2.4 Desludging of Toilets

Only excreta from KVIPs and WCs with septic tanks were emptied mechanically using cesspit emptiers unlike those from pan/bucket latrines, pit latrines and VIPs which are manually emptied by private persons.

The desludging of septic tanks was comparatively easier than that of the KVIP since already the waste was in its liquid form. The desludging of the KVIPs however posed problems since users at times dumped in all sorts of solid materials (non-degradable) which could block the hose of the cesspit emptiers. It also increases the time of desludging. It was however not known whether this had effect on the charge of desludging.

For this reason excreta from KVIPs was first mixed with water and all solid materials removed before final desludging is done.

The rate at which the toilets were desludged depended on the number of seaters of the facility as well as the number of people patronising it. For a 34-seater WC at the market where on the average about 300 - 400 visits were paid to the toilet facility the desludging is done almost every two weeks. Charges for desludging depended on the capacity of the cesspit emptier used. The capacities of the cesspit emptiers included 6m^3 and 10m^3 . Few of the private cesspit emptier operators had vehicle capacities of

about 20m³. The cost of desludging ranged from GH¢95 to GH¢130. At the market every single desludging was done at a cost of GH¢120 for the double - axle tanker (20m³). There were no specific times of the day that the desludging was done. The operators responded to demands from clients as and when necessary. During desludging of the toilets users could still use the toilet since the point of desludging does not interfere with the passage of the users.

Staff from the Municipal Assembly ensured that operation and maintenance activities of the toilet operators were in consonance with environmental standards and also within the guidelines and laws on environmental sanitation in Ghana.

4.2.5 Faecal sludge transportation to disposal sites

There were two main contractors stationed in Madina. Each of these contractors had two cesspit emptiers with capacities of 6m³ and 10m³. At times they went in for larger capacities like the 20m³ when the need arises. Some of these vehicles were relatively old with only one being new. The old ones often break down almost every 3-4 days and must be repaired and maintained before it could be used again. The rate and time at which the broken down vehicles could be put back on the road depended on the part which needed repairs, availability of spare parts and the cost involved. Each of these two companies had its own central mechanic shop where these vehicles are maintained. Most of the other private operators who were not stationed in Madina were using comparatively newer cesspit emptiers for their operations and as such vehicle breakdowns for these operators were rare or very minimal. The number of cesspit emptiers operating in Madina was adequate as at times some had to sit idle.

The Municipality did not have its own cesspit emptier. According to some of the operators and householders owning latrines the cost of desludging would have been comparatively cheaper if the Municipality were to have its own emptier.

4.3. Treatment and Recycling of Faecal Sludge

4.3.1 Background and location of Disposal/Treatment Site

The septage before 2005 was dumped at a site in Achimota which was manned by the Accra Metropolitan Assembly (AMA). However with a new site at Borteima near Ashare Botwe and closer to Madina most of these private contractors have shifted to this site.

Operations at the Tema Septage Treatment Plant/Facility started in 5th May, 2005 and the current treatment facility supervisor has been at post since then. The facility serves areas including the Tema Metropolis, Ashaiman Municipality, Ga East Municipality, Adentan Municipality and parts of Accra Metropolis (Airport residential area). The site is located between the University of Ghana Farms and the Animal Husbandry/Livestock but specifically at Nungua Farms (Borteima) close to Ashare Botwe.

4.3.2 Treatment and Recycling of Waste

The Ga East Municipality does not have a disposal and treatment facility on its own and for now had not considered the option of reusing the toilet waste.

The treatment facility managed by TMA is a Waste Stabilisation Pond (Plate 4.6b & Plate 4.7a, Appendix 3). This treatment facility has eight (8) ponds in all – 2 facultative ponds, 2 aerobic ponds, 1 anaerobic pond and 3 maturation ponds. Treatment of the waste at the site was purely by biological processes. Effluent moves from one pond to

the other through 6”diameter pipes laid at appropriate depths and slopes. The final effluent leaves the maturation ponds also through a 6” pipe to join a bigger drain which sends the waste into the Sakumono Lagoon. The effluent is finally discharged into the sea. The scum and sludge left is processed into a composting product or manure. The composting is started by either siphoning the waste with cesspit emptiers or by using pumps to pump the waste onto the drying beds also at the site. Underneath the drying beds (Plate 4.5, Appendix 3) are different grades of gravels with sand at the topmost. The scum is removed from the drying beds when they get very dried up. This is mixed with sea sand (salinity content is removed before it is used) and sawdust and grinded into powdered form. The product can also be moulded into pellets. Since the inception of operations at the site the supervisor had only tried this recycle and recovery process once using just a small quantity of the sludge.

Desludging of the ponds was yet to be done as of the time of visiting the site (September 2008).

4.3.3 Operation and Maintenance of Disposal/Treatment Facility Site

Operations at the disposal site were controlled by workers (Labourers) of the Tema Municipal Assembly. There was a security person at the site. When there is the need for more workers at the site, the Assembly brings in floating workers (e.g workers to weed the site) to help. These workers were supervised by the facility treatment supervisor. The facility treatment supervisor reports to the monitoring team at the TMA. The monitoring team consists of the Head of Waste Department, Liquid Waste Manager, Head of Revenue and the Sewer Manager.

Operations at the site were done on a 24-hour basis. This was not the case but had to be instituted unofficially to prevent the situation where operators of cesspit emptiers dump the waste at unauthorised places including on the main haulage route to the site. Operators of cesspit emptiers were required to stand in the discharge bay before discharging the septage into the discharge chamber (Plate 4.7b, Appendix 3). Normally the driver is helped by two labourers when discharging the septage (Plate 4.6a, Appendix 3). Depending on the vehicle type the driver could at times discharge the waste without assistance from other people.

Labourers at the site were given safety clothing and materials to help them work under safe and hygienic conditions. On a yearly basis the Municipality gave to the workers at the site two (2) protective uniforms, hand gloves, nose masks and wellington boots. They were also given detergents and disinfectants every month. Apart from ensuring that the vehicle operators dump the waste at the appropriate places, they also made sure that foreign materials did not block the screens. They also remove weeds from the discharge bay chamber (Plate 4.7b, Appendix 3) and also in the ponds.

4.4. Quality Assurance of Faecal Sludge Management Facilities.

The Madina Urban Council inspects and approves of all latrine designs and siting considerations before actual construction is done. They also monitor the construction of the latrines.

The Municipality also uses the sector design manual for small towns (Ministry of Works and Housing/Community Water and Sanitation Agency (CWSA)) and the Operational Manual for Planning, Budgeting, Monitoring and Evaluation of Water and Environmental Sanitation (Ministry of Works and Housing/CWSA and the National Development Planning Commission) as design guidelines for latrines.

There were also sanitation bye-laws and regulations that were used to check sanitation offenders. Enforcement of these legal regulations and bye-laws was however weak as asserted by the populace (28%). This was the major problem out of over 8 main problems hampering effective management of faecal sludge in Madina. Almost all the populace were of the opinion that offenders of sanitation practices be prosecuted.

4.5 Assessment of Roles and Responsibilities of Stakeholders in Faecal Sludge Management in Madina.

4.5.1 Key Actors in Faecal Sludge Management in Madina

The principal identified actors in faecal sludge management were the householders, the Ministry of Local Government, Rural Development and Environment (MLGRDE), Ga East Municipal Assembly (GEMA)/Madina Urban Council, CWSA, GES/SHEP, the private sector and external donors or Support Agencies (Fig 4.6).

The figure below shows how these actors relate among one another in their service delivery. The organisational structure for the waste management department is also shown by figure 4.7.

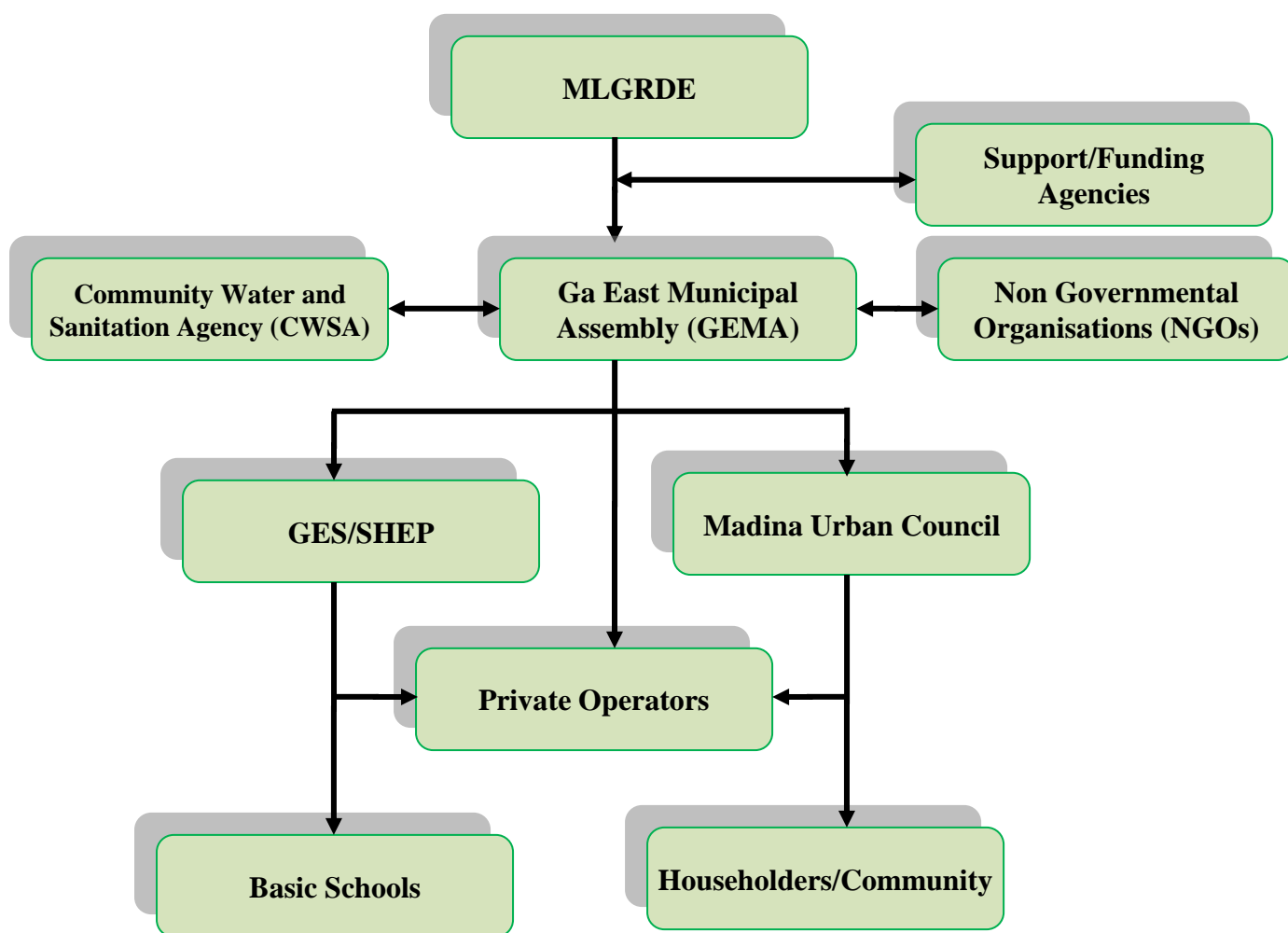


Fig 4.6: Relationship between Key Actors in Faecal Sludge Management in Madina

The specific roles and responsibilities for each of the actors are presented below.

4.5.1.1 Householders in Madina

- They are expected by the Municipality to construct their own toilet facilities in conformity with existing building regulations.
- They are also to ensure the proper operation and maintenance of the facilities and always keep their environment clean. Community members without access to household latrines are the main beneficiaries of public latrines.

4.5.1.2 Ministry of Local Government Rural Development and Environment (MLGRDE)

- Co-ordination and formulation of environmental sanitation policy including monitoring and evaluation;
- Developing and issuing technical guidelines on environmental sanitation services and their management;
- Promulgation of national legislation and model bye-laws;
- Direction and supervision of the National Environmental Sanitation Policy Co-ordination Council
- Facilitating the mobilization of funds for sector plans and programmes

4.5.1.3 The Ga-East Municipal Assembly

- Has the overall responsibility for ensuring the provision of adequate latrines. The provision falls in the categories of institutional and public latrines. They also undertake health and hygiene education to the public. The assembly also facilitates the provision of household toilets in the municipality but not to support them financially.

- The Municipality at times collaborates with CWSA and provides WC with septic tanks instead of providing KVIP (CWSA provides KVIP for schools) for schools.
- It also collaborates with GES/SHEP in the assessment and selection of beneficiary schools for toilets. This also ensures participation of stakeholders which has links to facility sustainability.
- The Assembly contracts private operators to manage the public toilets. These private operators include Toll Collectors who sit at the entrance of toilets and collect tolls from users. They also see to the general cleanliness on the toilets – thus acting as direct supervisors of the sanitary labourers.

Other private operators include Conservancy labourers who clean the toilets. Considering the pressure on existing public toilet facilities and queues that develop at the peak times, the number of conservancy labourers working on most public toilets is not adequate. The absence of working gear, protective clothing and the abysmally low level of hygiene at some of the public toilets creates a situation of extreme danger in terms of exposure to diseases.

4.5.1.4 The Madina Urban Council (The Environmental Health Division)

This council falls and operates under the supervision of the Ga-East Municipal Assembly. Among the roles it plays include the following:

- Plans and implements measures for ensuring sustained management and financial viability of the toilets.
- Conducts Environmental sanitation education;
- Monitors and controls hygiene (including food hygiene) and sanitation practices among residents and the public.

- Conducts routine and incidental inspections to detect nuisances and call for its abatement.
- Issues notices to reinforce verbal warnings for abatement of nuisances. They prosecute recalcitrant residents, who infringe on public health laws.

4.5.1.5 Private Operators

- The private operators are involved in the construction of the toilets (household, institutional, public), collection/desludging of faecal sludge, operation of communal commercial latrines. This provision is in consonance with the Environmental Sanitation Policy of Ghana which stipulates that majority of the management activities be assigned to the private sector.

4.5.1.6 CWSA, NGOs and other support agencies

- CWSA at times facilitates the provision and delivery of safe institutional latrines
- NGOs and other donors support (in terms of financial resources) the provision of safe institutional and public toilets.

ORGANIZATIONAL CHART FOR THE WASTE MANAGEMENT DEPARTMENT –GA EAST MUNICIPALITY

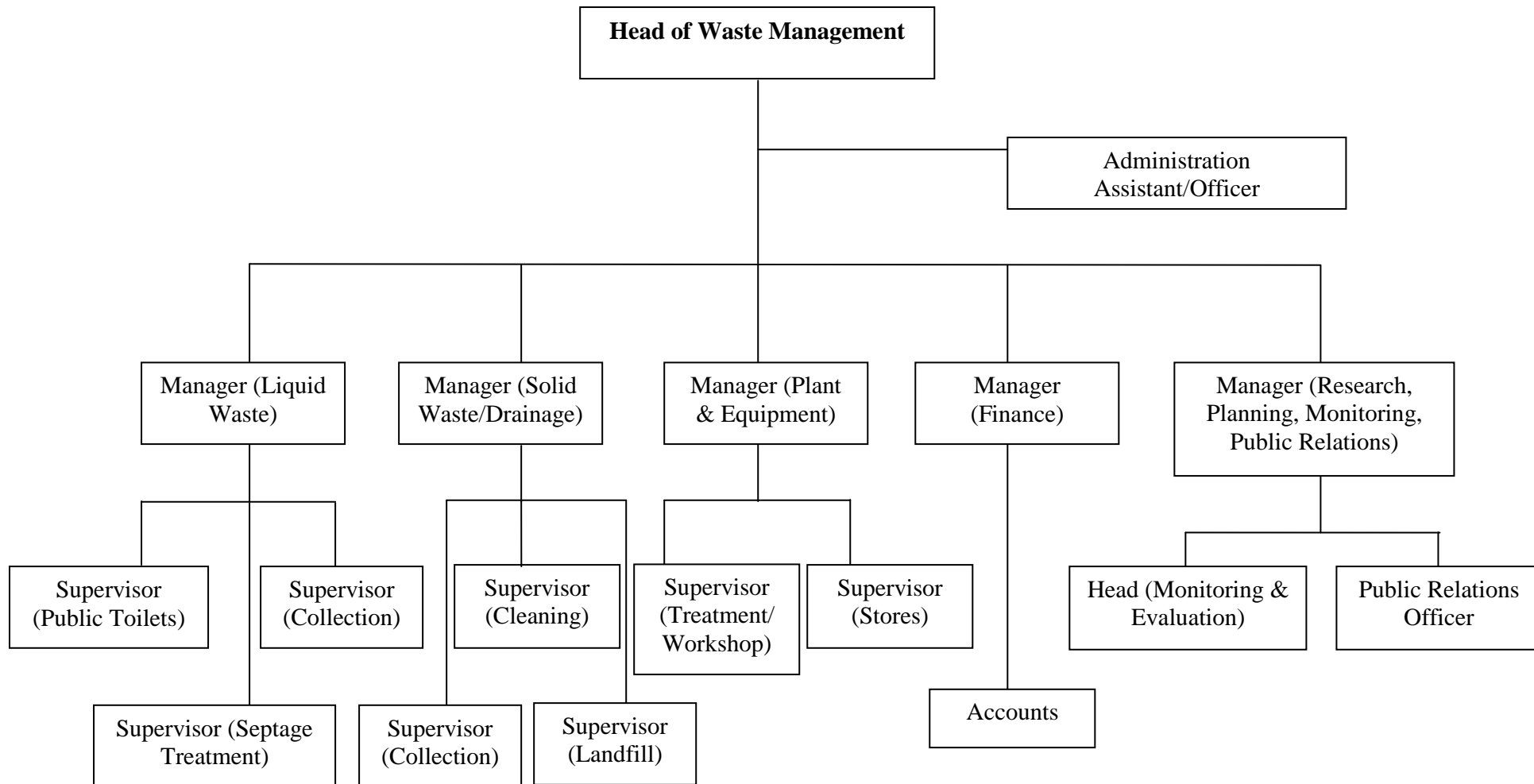


Figure 4.7: Organizational structure of Waste Management Department –Ga East Municipality

4.5.2 Private Operators in Faecal Sludge Management.

There were a number of private firms/contractors who were involved in the desludging of faecal sludge in Madina using cesspit emptiers (Plate 4.8, Appendix 3). Majority of these contractors operate from outside Madina. Two contractors were however stationed in the community – Gamadok Enterprise and Alenor Plumbing Engineering Company. The latter does not as of now undertake regular operations as it used to do. The University of Ghana also used to operate in Madina but has since stopped. A number of the public commercial toilets are also owned by private individuals in Madina (Table 4.4, Appendix 1).

4.5.3 Municipality's Management collaboration with Stakeholders

Community Water and Sanitation Agency (CWSA) was established to help provide for water and sanitation facilities and services for rural and small towns in Ghana. However there were times when funds were allocated to provide for these facilities in peri-urban areas and other urban towns including Madina. For toilet facilities CWSA had adopted the multiple compartments KVIP for educational institutions. Whenever such provisions are made the Assembly collaborates with CWSA and tops the budget to be able to construct Water Closet with septic tank since it considers the municipality more of an urban town than rural and therefore the need to upgrade from KVIP to WC.

4.5.3.1 Collaboration with Ghana Education Service (GES)

The Municipality also liaises with GES through its School Health Education Programme (SHEP) in the selection of schools to benefit from sanitation facilities in the Municipality.

The waste department with the help of the environmental health and sanitation unit at the town council is also taking inventory of all toilets in Madina and the list of all private firms involved in the collection apart from other host of activities. After this exercise a stakeholders meeting will be organised to brainstorm on all the problems being faced by each of the stakeholders and develop new strategies to mitigate the sanitation problem.

4.5.3.2 Contract Arrangements with Operators of Public/Private and Commercialized Toilets

All the public toilets in Madina were operated by private persons either on their own or under some sort of contract arrangement with the Municipal Assembly. According to the Environmental and Sanitation Unit of the Madina Urban Council, private operators managing toilets constructed by the Assembly pay a certain % to the Assembly at agreed times. Attendants and cleaners at some of the public toilets (e.g. at the market) were given daily wages. The Assembly collected sales made from these operators on a daily basis. Apart from this all other private operators including those who own their own toilet facilities paid an agreed amount to the Assembly monthly.

4.6 Challenges in Faecal Sludge Management

4.6.1 Specific Problems related to Management of Faecal Sludge at the Assembly's Level.

Management of faecal sludge had become difficult for the Ga-East Municipality because of a host of problems. The assembly had a medium-term strategic plan which has detailed some of the problems and strategies to adopt for the sanitation situation. The waste department had also strategised for the year to try and bring things to order

with regards to the sanitation situation and delivery. Some of the sanitation bottlenecks facing the Municipality were the following:

- Interference of some political figures (e.g. Member of Parliament, Assembly man) in the communities and also at the assembly. Some of these people take charge of managing some public toilets without the knowledge of the right people at the Assembly. At times contracts on sanitation were given to people without the knowledge of the right people at the Assembly. The same thing at times happened with contracting a private person to manage a public toilet. In the latter proceeds become difficult to share since the Municipality had limited control over the person. There were also times when certain decisions were also taken without the knowledge of the waste management department.
- There was little coordination among stakeholders in the provision of sanitation facilities. The Municipal Assembly is the entity representing all the communities in the Municipality and at such all sanitation infrastructure provisions must be known by them. There were times when certain agencies, NGOs and other institutions constructed toilet facilities without the knowledge of the Assembly. This more often than not leads to duplication of sanitation facilities at certain communities at the expense of communities which needed them most.
- The assembly had no alternative source of funds apart from the common fund given to the Municipal from the government. This amount which is not adequate must also be prioritised in terms of the projects delivery and implementation since it is the main source of revenue for district development. More often than not sanitation was less prioritised and only a small percentage (less than 10%) allocated to fund its delivery.

- The growth of the municipality was also tremendous and had now exceeded the national growth rate. This had come about as a result of the rural drift to urban centres in the Municipality to engage in several job opportunities and also to find a place of residence. The drift had also increased the floating population and had put pressure on the existing sanitation facilities. The provision of adequate sanitation facilities had therefore become a serious problem in terms of satisfying all communities in the Municipality especially Madina which has become a busy commercial centre.

4.6.2 Specific Problems associated with O & M of Public and Commercialized Toilets operated by Private Persons.

The commonest problem at almost all the toilet places was the soiling of the WC squatting bowls by the users. Other problems included the following:

- High cost of desludging the toilets
- High expenditure on water from the tanker services operators.
- Out of use WC bowls and cisterns (Plate 4.9a, Appendix 3)
- Unkempt walls of the latrine buildings and poor aesthetics (Plate 4.9b, Appendix 3)
- Anal cleansing materials left on the latrine floors in the privy rooms.

There were no cases of people not wanting to pay for services. According to one of the toilet attendants people complained for some time about the user charges but the complaints did not last long. There were also no cases of people defaecating outside the toilet premises.

4.6.3 Specific Problems at Disposal/Treatment Facility Site

The range of problems experienced at the site varied from environmental/health through social to human resource management. The specific problems included:

- Recalcitrant cesspit operators dumped the septage/Faecal sludge at inappropriate places including on the haulage route as well as in the bush all close to the dumping site (Plate 4.11a & b). This was normally done in the night. This practice led to the institution of the 24-hour service at the dumping site. The practice was also against the legal provisions of the Tema Metropolitan Assembly (owners of the treatment facility). Some of the operators also don't stand their vehicles in the discharging bay before discharging the waste and as such ended up spraying the whole compound with the waste.
- Emanation of a strong stench during discharging of the septage from the cesspit emptiers. This problem arose due to several factors including the direction of the wind and spilling over of the waste at the yard and outside the discharging chamber. The inhalation of the gases in the septage at times resulted in chronic coughing.
- Lack of provision for workers at the dumping site to go for medical check-ups. There used to be this provision (two times in a year) but had since been stopped. Workers could only go for medical check-ups depending on their ability to do so.
- The screens of the discharging bay connected to the ponds were also out of use. They were too small and the metallic material not strong enough to contain the pressure associated with the waste during discharging. The screens were often clogged or choked up and could at times result in the manholes spraying the waste over. This problem mainly arose due to the small size of the discharging bay inside which were the screens. The internal area of the bays had also been overgrown by weeds (probably because they were not being used anymore as of the time of the visit (Plate 4.12a & b, Appendix 3).
- The salary was not also very encouraging. As a motivation the Municipality at that time paid 20% (was formerly 15%) of a person's salary in addition to his monthly

salary at the end of every month. This provision did not cover the security workers at the site since they had overtime allowances.

4.6.4 Specific Problems relating to Management of toilet facilities at the Schools Level

- The interview with the MSHEP showed that most of the schools in Madina had one common characteristic; they all do not have adequate land available for the construction of adequate school latrines.
- The problem of security for school facilities especially the school toilet was also a problem in most of the schools. There had been instances where toilet facilities have been encroached upon by community members.

In cases like this the toilet facilities get vandalized by these encroachers and the sustainability of the facility is compromised.

- There was also lack of financial resources for effective O & M of the toilet facilities at these schools. This problem was common in schools owning WC toilet facilities. These facilities require the use of water for proper operation. Most of these schools, however, did not have water supply facilities on the school compound and as such had to depend on tanker services for their water requirements. The cost of this service was very expensive and difficult for the schools to continue operating the facilities considering the amount of the capitation grant given to them. Part of this amount was expected to be used for all sanitation related services. Because of this grant government also forbids any school from charging the pupils for any services including sanitation services in the schools. This condition has made some of the schools to reserve the WC facilities for use by the teachers since the students number is too big and puts pressure on the facilities.

- There was also problem with adequacy of toilet facilities regarding the number of users. Most of the schools in Madina were clusters and located on one compound. The interview and observations showed that there were always pressure on the few toilet facilities provided on the compound.

4.6.5 Specific Problems relating to Environmental Degradation and Health.

The private contractors used to have an association who sees to it that the welfare of the operators is fully ensured. However since the collapse, about 7 years ago the operators had to do everything by themselves. The operators must buy all the protective clothes including overall attire, hand gloves and other wears to help them desludge. Most of them have the gloves but use any attire during the desludging. There was also no timetable for them to go for medical check-ups. The decision to visit the health centres depended on the individual's financial ability.

4.7 Legal Issues and Requirements

All sanitation activities and issues were guided by some legal documents. The Assembly has its own bye-laws which it uses to prosecute recalcitrant offenders. The other legal policies are the ordinance law and the criminal code. As of the time of writing this report a very well renowned lawyer has been tasked to compile all the sanitation related laws and policies from the various legal documents into a single document.

4.8 Financial requirements for Faecal Sludge Management and Cost Recovery Mechanisms

4.8.1 Financial Sustainability issues of Public and Commercialized Toilets

In order to operate and maintain the toilet facilities in a sustainable manner the operators charge users for using the toilet facilities. It must be noted that the cost recovery in this section pertained to only operation and maintenance activities of the toilets since data was only available for that. On the average an adult paid a user charge of Fifteen Ghana Pesewas (15Gp). Some operators charged children below 12 years 10 Gp while others also used their own discretion on the charges and even the age limit for children. There was also a charge of 10Gp for urinating. Users who preferred to use toilet rolls had to pay 20Gp. This was the only cost recovery mechanism (restricted to only Operation and Maintenance) to sustain the facilities. The proceeds from the user charges were used to buy anal cleansing materials (papers and toilet rolls), soaps and disinfectants and water for hand washing, cleaning and flushing of toilet in the case of WCs. Other expenditure included payment of electricity bills, workers' salaries and wages as well as minor and major maintenance works (Fig.4.9, Appendix 2).

4.8.1.1 Proceeds from user charges for public toilet services

On the average the total number of visits to a typical 34-seater WC public toilet at the Central Market was 350 (2No. 34-seater WC were assessed). Using the user charge of 15Gp the total proceeds for a day will be GH¢ 52.50. This figure was translated to the corresponding monthly and annual proceeds (Table 4.6, Appendix 1). Inferring from Tables 4.6 & 4.7 (Appendix 1) it is clear that financial requirement for managing this toilet was sustainably viable. There was an excess surplus of about GH¢ 6336.00 (Fig.

4.8) after the annual O & M cost was deducted from the Annual financial proceeds. Similarly the annual proceeds and O & M expenditure for a 4 – Seater KVIP were compared (Tables 4.8 & 4.9, Appendix 1). There was also a financial surplus of GH¢ 6491.00 (Figure 4.10). It must however be noted that even though O & M financial sustainability seems viable, not all the commercial operators were operating under hygienic conditions as should have been the ideal case. There were also a lot of renovations yet to be done. This presupposes that in the ideal case, there would not have been any surpluses or if any, reduced drastically if all the renovations were tackled and the environment kept very clean.

Irrespective of the above figures, the Municipal Assembly asserted that managing faecal sludge in Madina was difficult because of political interference (the expected proceeds do not get to the assembly), inadequate funds (from the central government) and high rural-urban migration (high floating population).

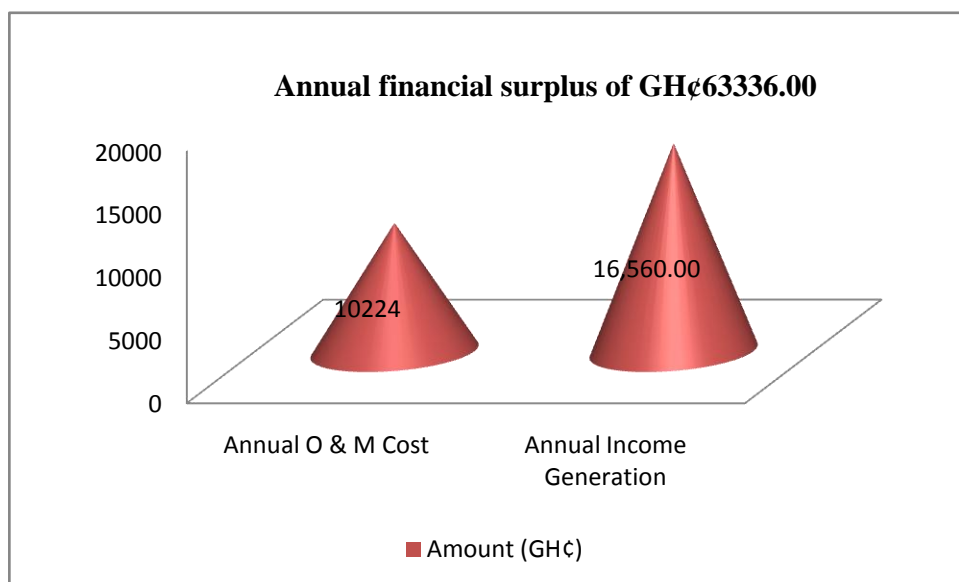


Fig. 4.8: Graph for comparative analysis of Annual cost of O&M activities and Annual Income Generation from a 34-Seater WC Public Toilet.

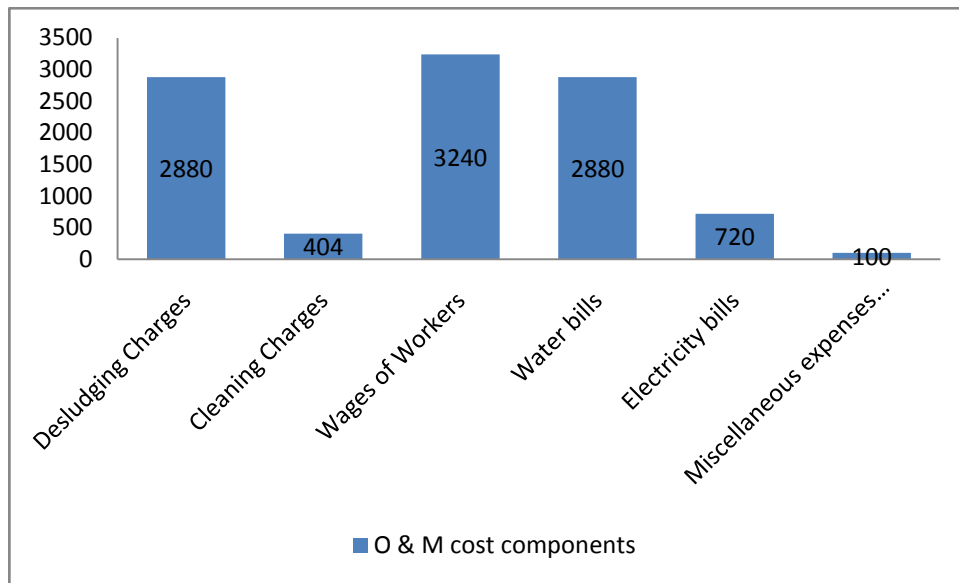


Fig. 4.9: Annual cost components of O & M activities of a 34-Seater WC Public Toilet.

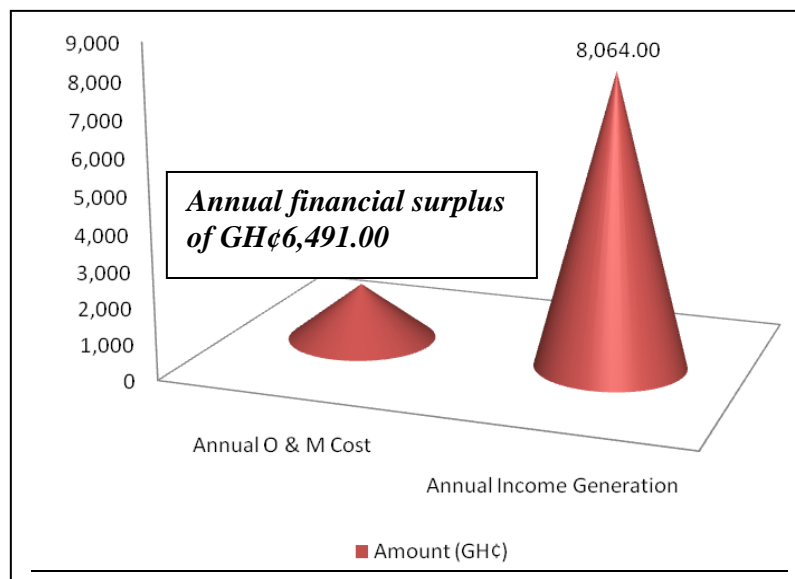


Fig. 4.10: Graph for comparative analysis of Annual cost of O&M activities and Annual Income Generation from a Private 4-Seater KVIP commercialised Public Toilet.

4.8.1.2 Willingness and Ability to Pay for Public Toilets

The assessment showed that 86% and 77% out of the 100 respondents were willing and had the ability to pay for the use of public toilets in Madina respectively (Table 4.10, Appendix 1). Those who were willing to pay however would only do so upon

conditions that the toilet operators operate under hygienic conditions devoid of odour and also ensure that they desludge on time.

4.8.2 Cost of Managing Household Toilets

Out of the 100 respondents 32% had their monthly income more than GH¢200 with only 4% earning monthly income of less than GH¢10. Figure 4.11 shows the statistics for the income levels. Analysis of the results showed that the average monthly income was GH¢140. This figure was translated into an average annual income of GH¢1680.

Figure 4.12 also shows the annual O & M cost of managing household toilets in Madina. The average expenditure range was between GH¢50 and GH¢70.

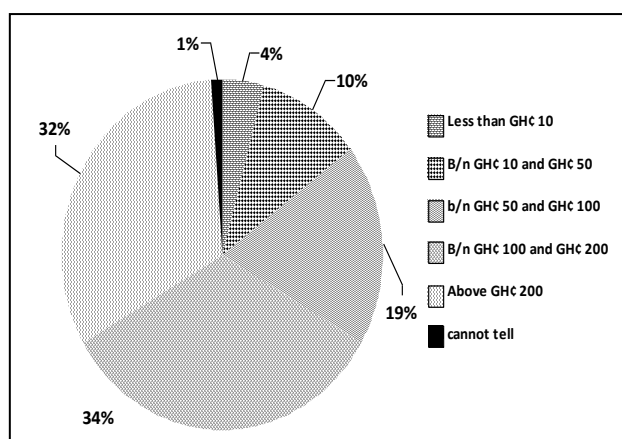


Fig. 4.11: Monthly Household Income Levels toilets

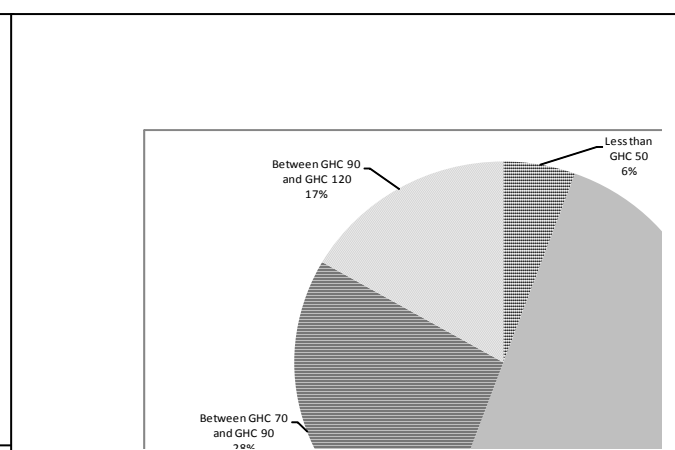


Fig. 4.12: Annual O & M cost of household toilets

Specifically the average household expenditure for managing toilet for a year was GH¢65. Comparing this amount to the average annual household income it supposes that on the average a householder spent 3.87% of his/her income on managing faecal sludge at the household level. Householders attributed the high cost of managing faecal sludge at the household level in part to the high cost of desludging the toilets (Fig. 4.13). The other O & M cost components for household toilets included water, disinfectants (dettol), soap and anal cleansing materials (toilet roll or newspapers). The rest were brooms and brush for sweeping and cleaning the toilet.

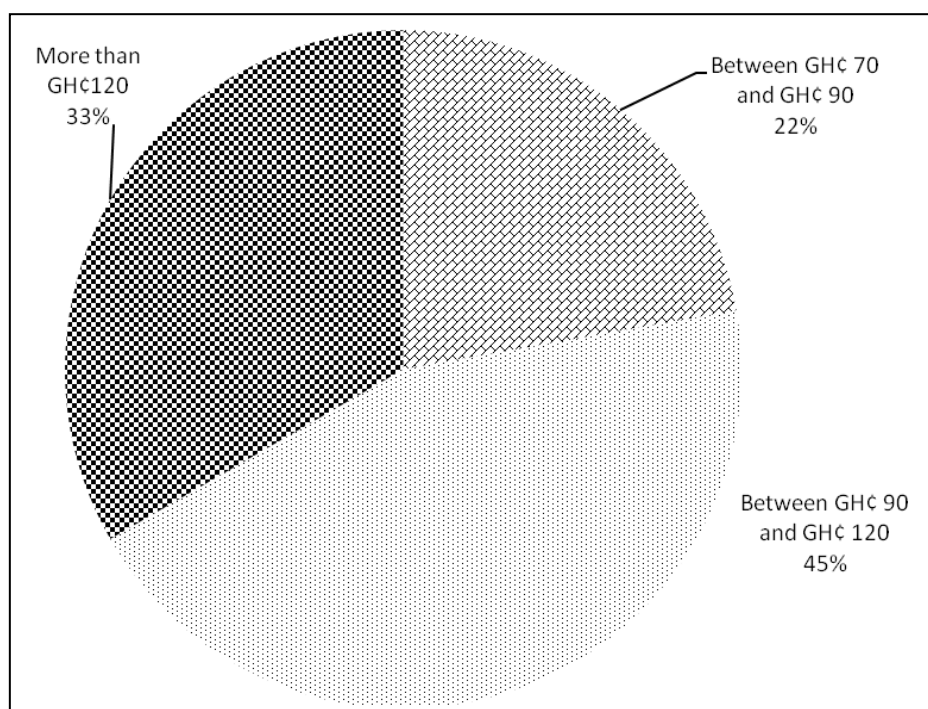


Fig. 4.13: Annual Desludging cost of household toilets

4.8.3 Financial Sustainability of Faecal Sludge Disposal Site

The Ga East Municipal Assembly does not have a disposal/treatment plant. Operators of cesspit emptiers in the district therefore discharge faecal sludge at other districts where these facilities are available. Interview with the Urban Council, the Municipality and a host of private operators revealed that most of the cesspit emptier operators in Madina discharge their waste at the treatment plant at Nungua Farms (Borteima) close to Ashare Botwe. This treatment/disposal plant is owned by the Tema Metropolitan Assembly. To be able to operate and maintain the disposal/treatment facility and the general site the Tema Metropolitan Assembly has instituted charges for dumping of waste at the site. For that purpose the cesspit emptiers have been categorised into two – those with capacities more than 4500 litres and those below it. A charge of GH¢8 is paid by those with capacities more than 4500 litres while those below pay GH¢6 per every emptying of waste. As of the time of the assessment this was the cost recovery

mechanism for operation and maintenance of the system. Apart from this money all other financial resources needed to manage the site come directly from the Tema Metropolitan Assembly. There were also plans of selling the treated and recycled waste (compost) to generate additional income to operate and maintain the facility and the site. This recycling of waste is yet to start since the site is fairly new. Even though the total annual O & M cost of managing the treatment plant was not available, the disposal facility supervisor acceded to it that current O & M activities are financially sustainable based on the total daily proceeds generated from user charges.

4.8.4 Funding for Sanitation in Schools

The main source of funding for investment cost of toilet facilities in Schools in Madina is through government institutions like the Community Water and Sanitation Agency (CWSA) and the Ga-East Municipality with major support from external donor agencies like DANIDA. The main toilet facilities provided in schools are the KVIP and the WC with septic tanks. CWSA was instituted to provide for water and sanitation services in rural communities and small towns in Ghana. The agency however at times implements projects in peri-urban towns and slums close to urban cities. For schools CWSA only provides the KVIP type of toilet which it deems fit for rural communities and small towns. Madina however does not fall under the rural and small towns category and is more often considered as an urban city. Comparatively the investment cost of the same number of seaters of WC is more expensive than that of the KVIP. The Ga-East Municipality at times agrees with CWSA and contributes some amount money to the estimated cost of the KVIP and instead provides WC for the schools.

For facilities provided by CWSA the schools are expected to pay 5% of the capital cost of the facility and the full cost of O&M, the municipality pays 5% whilst the

Community Water & Sanitation Agency pays the remaining 90% through the project. The school's contribution is purely a cash requirement. It is also expected that the schools' contribution to the investment cost and the cost of O&M would be taken out of the capitation grant provided to schools by the government. The interview revealed that the O & M cost especially has often been a burden to schools with toilet facilities since the capitation grant alone is not adequate to meet such costs. The schools are also forbidden to charge pupils for sanitation services.

As of 2006, the investment cost for constructing an 8-Seater WC toilet and the respective amounts contributed by CWSA and the Ga-East Municipality is presented in the table 4.12 at appendix 1.

4.9 Assessment of the Incidence of Excreta Related Diseases in Madina Sub-District.

As of September 2008 the top five (5) sanitation (Excreta) related diseases in the sub-district were Diarrhoea, Typhoid fever/enteric diseases and Intestinal worms/parasitic infections. The rest were schistosomiasis and cholera (Table 4.13). For the top 10 diseases in the sub-district diarrhoea was the fifth highest (Table 4.14). There were a number of Government and Private Health Institutions in Madina which served the community and the surrounding communities. These facilities dealt with the treatment, management and control of diseases and general health care. It must be noted that only data for the period of January to August in 2007 and 2008 were analysed as there were no data available for the previous years.

Table 4.13: TOP FIVE (5) EXCRETA RELATED DISEASES (Jan – Aug 2008)

No.	Diseases	Cases Seen	% Covered (Cases/total *100%)
1	Diarrhoea Diseases	2211	60.2
3	Intestinal worms/parasites	775	21.1
2	Typhoid/Enteric	514	14.0
4	Schistosomiasis	145	3.9
5	Cholera	26	0.7
	GRAND TOTAL	3671	100

Source: Ga-East Health Directorate, 2008

A comparative analysis of the incidence of the common excreta related diseases showed a reduction of about 571 for the same period (Jan. – Aug.) from 2007 to 2008. In the same period the trend was however not of the same pattern for the individual diseases which depicted fluctuations (Fig. 4.14). Diarrhoea which was the topmost excreta related disease however showed a decrease in trend.

Table 4.14: TOP TEN (10) DISEASES SEEN (Jan – Aug 2008)

No.	Diseases	Cases Seen	% Covered (Cases/total *100%)
1	Malaria	41838	62.5
2	Other ARI (Acute)	8187	12.2
3	Hypertension	5277	7.9
4	Skin Infestation & Ulcer	4026	6.0
5	Diarrhoea	2211	3.3
6	Gynaecological	1429	2.1
7	Diabetes Mellitus	1133	1.7
8	Anaemia	997	1.5
9	Chicken Pox	995	1.5
10	Pregnancy & Related complications.	841	1.3
GRAND TOTAL		66934	100

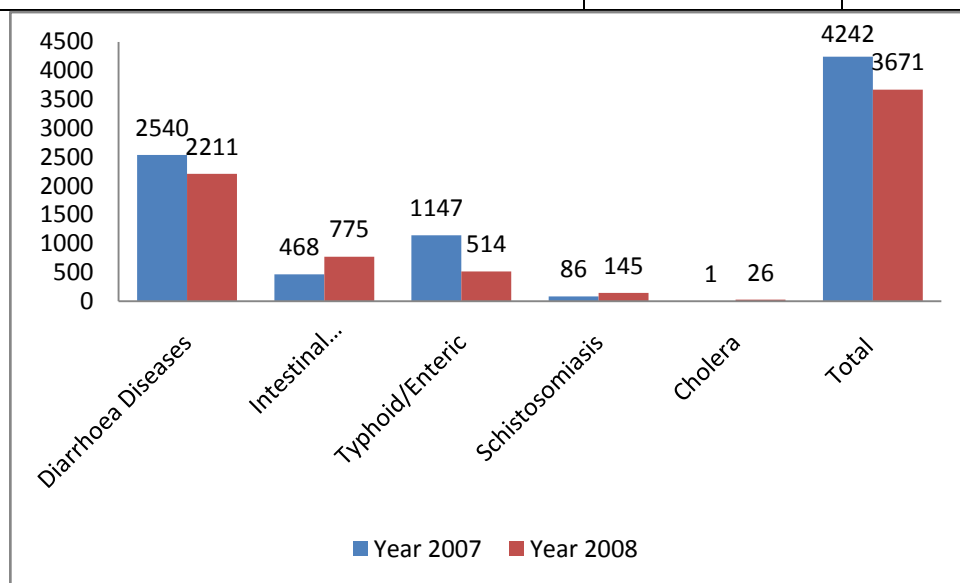


Fig. 4.14: Graph for comparative analysis of top five (5) Excreta (Sanitation) Related Diseases (Jan – Aug. 2007 and 2008) - Source: Ga-East Health Directorate, 2008

An assessment of the monthly incidences of the five common excreta related diseases showed that there was no particular trend for any of the diseases (Table 4.15).

Table 4.15: Monthly incidences of excreta related diseases (Jan – Aug 2007 & 2008).

Disease	Jan.	Feb.	Mar.	April	May	Jun	Jul	Aug	Total
Diarrhoea	326	644	308	218	236	147	205	127	2211
Instestinal worms/parasites	6	35	90	137	176	180	56	95	775
Typhoid/Enteric	92	61	56	70	66	61	55	53	514
Schistosomiasis	17	14	60	11	19	8	11	5	145
Cholera	0	0	0	0	0	0	25	1	26

Source: Ga-East Health Directorate, 2008

4.10. Public Perception of Current Faecal Sludge Management Practices

4.10.1 Assessment of Excreta Management Practices by the Municipality/Madina Urban Council

The Household questionnaire administration showed that 65% of the people interviewed were not happy while 32% were satisfied about the way faecal sludge was managed in Madina. 3% did not comment (Fig. 4.15).

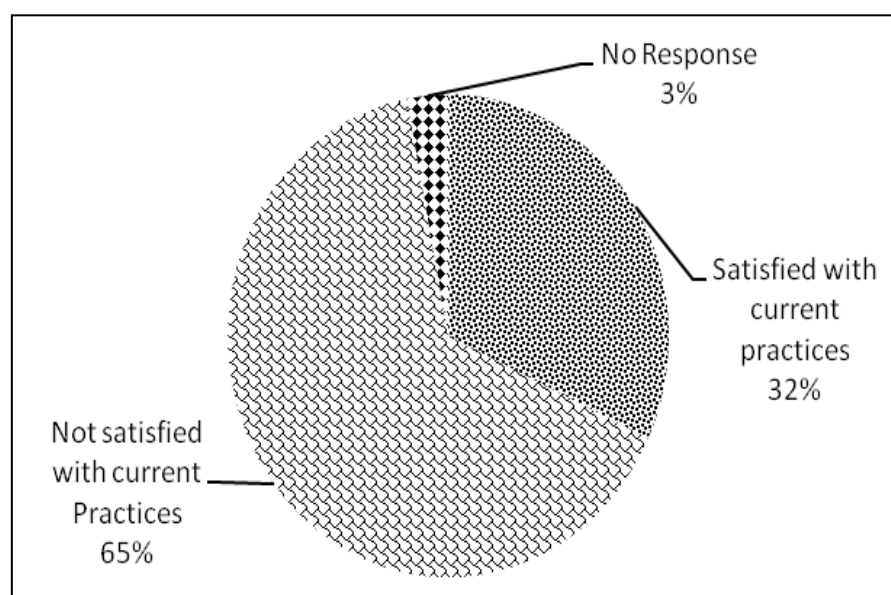


Fig.4.15: Chart Showing Household Satisfaction of Sanitation management practices by the Municipality/Urban council

A host of problems were cited by those who were not satisfied with the management practices. Among these included the following:

- Government failure to provide subsidies for household latrine construction (4%)
- Government lack of sponsorship for latrine project construction especially public toilets (6%)
- Failure to educate people on the importance of having household latrines and general awareness creation on proper and good sanitation practices (24%)

- Corrupt urban council workers who always take bribes from people instead of prosecuting them for sanitation offences (12%).
- Lack of trained sanitary inspectors for effective inspection and monitoring of sanitation conditions of houses and their immediate surroundings (4%).
- Improper disposal of excreta (12%)
- Failure to implement sanitation legal rules and regulations (bye-laws, etc.) - (28%)
- Erratic water supply (10%)

Out of the 100 respondents the major problem to most of them (28%) was the Assembly/Urban council's failure to implement the sanitation rules and regulations effectively. In tandem with this the Revised Environmental Sanitation Policy of Ghana recommended that one of the key outputs to a sustainable environmental sanitation development of a community should be that Environmental standards and sanitary regulations are strictly observed and enforced.

To this end majority (91%) of the respondents were of the opinion that the Assembly prosecutes all people who engages in open defaecation or dump excreta at inappropriate places (Table 4.16, Appendix 1).

4.10.2 Householders Motivation to Own a Household Latrine.

The interview showed that 97% preferred household toilets to public toilets (2%). There was only 1% non-respondent (A). The reasons given for this preference included the following (Fig. 4.16) :

- To avoid early morning queue at public toilets and go to work/farm early (16%) - B
- To be able to use the toilet facility privately (26%) - C
- It is convenient to use especially at night (18%) - D
- It saves a person from the embarrassment of soiling himself (12%) - E

- It helps avoid using the bush and the hazards associated with it (snake bites, cuts/bruises) (4%) - F
- It is hygienic (2%) - G
- I will not be embarrassed when I have visitors (18%) - H
- It saves one from the disgust and smelly conditions of the public toilets (3%) - I

The major problems faced by users of public toilets have also been depicted by the figure below (Fig. 4.17).

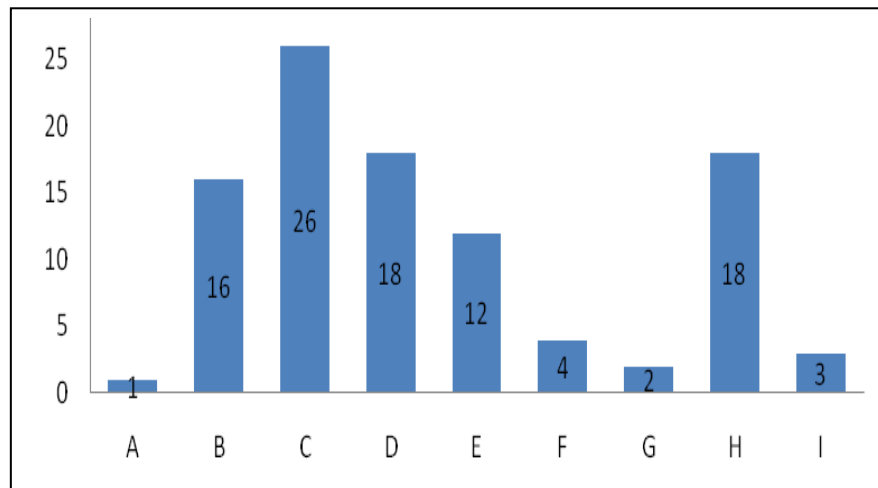


Fig. 4.16: Householders Motivation to own Household toilets and preferring that to a public toilet (Numbers are in percentages)

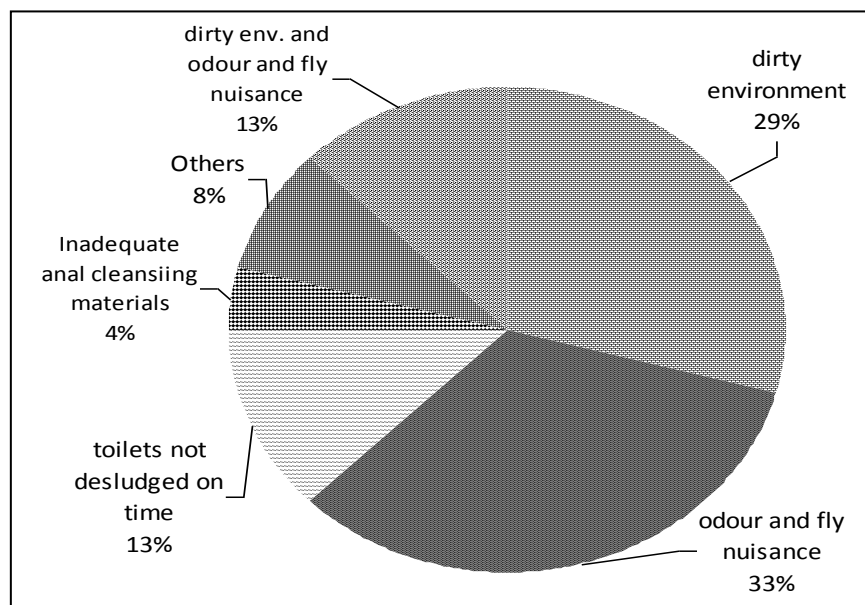


Fig. 4.17: Major problems faced by users of public toilets

4.10.3 Householders Proposal to Better Sanitation Management

When asked what could be done to improve the excreta management practices in Madina, the householders had these to say:

- All sanitation related offenders should be prosecuted (13%).
- Rent control laws should be enforced (prosecute people who refuse to construct a toilet facility when building their house) - (2%).
- Assembly should embark on intensive education and awareness creation on good sanitation practices and its benefits - (27%).
- Rehabilitation of existing and construction of more public toilets at vantage points (16%).
- Government should provide subsidies for the construction of household latrines (6%).
- Government to seek for sponsorship for latrine construction (4%).
- Communal cleaning of the environment by the general public (4%).
- Education on the need to have household latrines (4%).
- Financial and logistical support to Assembly workers to undertake effective supervision, inspection and monitoring of sanitation facilities and services (5%).
- Introduction of Town council Inspectors ("Tankers") - (2%).
- Implementation and enforcement of sanitation bye-laws and regulations - (17%).

From the above percentage figures it was evident that education and awareness creation on the benefits of good sanitation practices as well as enforcement of sanitation bye-laws were highly ranked as probable solutions to the faecal sludge management problems in Madina.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The key infrastructure components and practices that were looked at included latrine technologies and defaecation practices, excreta management in terms of collection and desludging, transportation and disposal and recycling and reuse. The other study components included O & M activities, financing and cost recovery mechanisms, incidences of excreta related diseases and beneficiary perception of faecal sludge management practices.

From the analysis of the results and discussion the following are concluded:

Out of all the on-site latrine technologies identified in Madina there were 63.05% improved latrines, 13.95% unimproved latrines and 23% shared latrine facilities.

The percentage (65%) of people owning and using household toilets in Madina was low compared to the recommended 90%. More people (23%) than recommended (10%) in the environmental sanitation policy of Ghana were depending on public toilets with their associated unhygienic environmental conditions.

Only excreta from KVIP and WC with septic tank were collected and transported using cesspit emptiers. Excreta from these toilets were also disposed and treated using a waste stabilisation pond. Excreta from bucket/pan latrines, pit latrines and VIPs were collected and transported manually and discharged untreated into open drains, in the bush or in rivers. No major recycling of the excreta had been performed since the start of operations at the treatment site.

Even though there were clear definitions of roles and responsibilities, stakeholders failed to implement these roles fully. There was collaboration between the Municipality and CWSA and also with GES/SHEP in the provision of institutional toilets. However collaboration between the Municipality and NGOs and some funding agencies was comparatively weak.

Majority of the sanitation services was provided by the private sector in line with the environmental sanitation policy of Ghana.

The cost of managing faecal sludge in schools and at the households was expensive due to the high cost of desludging. Even though the Municipality asserted that inadequate funds from the central government was the main problem they faced in managing faecal sludge , the results showed that other factors contributed to the poor management. Faecal sludge management was not of much priority to the assembly. Interference of some political figures at the assembly was also an inhibiting factor to the effective management of faecal sludge. Rural-urban migration had increased the floating population and had put a lot of pressure on the existing sanitation facilities. Security was a threat to the sustainability of the institutional toilet facilities as most of the institutional toilet facilities are encroached upon by the public.

Cost recovery mechanisms (for only operation and maintenance activities) adopted by the Assembly were user charges from public commercial toilets and charges from private individual toilet operators and cesspit emptier operators.

Excreta related diseases were among the highest category of diseases in the Madina sub-district for 2007 and 2008. The top 5 excreta related diseases for these years were Diarrhoea, Typhoid fever/enteric diseases, Intestinal worms/parasitic infections, schistosomiasis and cholera. For the same period (Jan. - Aug) there was a reduction in the total number of the top 5 excreta related diseases in 2008 as compared to the reported cases in 2007. This reduction could however not be attributed to improvements in faecal sludge management.

More people were not satisfied with the current excreta management practices by the Municipality. The main inhibiting factor to the effective management was the Assembly's failure to implement the sanitation legal rules and regulations. Almost all the population preferred household toilets to public toilets and attributed their topmost motivation as the ability to use the toilets privately. The major problem people attributed to public toilets was the incidence of fly and odour nuisance.

5.2 Recommendations

Based on the above conclusion the following recommendations are given:

The use of household latrines should be promoted and encouraged by the Municipal Assembly.

Sanitation bye-laws and building code regulations should be enforced by both the Madina Urban Council and the Municipal Assembly.

There should be an integrated approach (bottom-up approach and involving all beneficiaries) of stakeholders' participation in from the planning to the implementation

phases of faecal sludge management services. This can be achieved by the formation of a Learning Alliance for environmental sanitation in for Madina town.

The Assembly should give much priority and also increase the percentage of funds allocated to faecal sludge management.

The Municipal Assembly should try and secure at least a cesspit emptier to be used in Madina. This will relatively cut down the current cost of desludging as charged by private operators. Again it will serve as a source of revenue generation to augment the meagre funds normally allocated to excreta management services.

All providers of institutional latrines should seek the preference of the beneficiary schools so as not to overburden the schools with high O & M cost. Any stakeholder especially supporting agencies should collaborate with the Municipal Assembly in the provision of toilet facilities.

All public toilets operators should be trained for effective operation and maintenance of the toilets. They should also be certified to operate. The Assembly should also undertake regular monitoring and inspection of the facilities and their operations and those with unhygienic conditions and structural deformities prevented from operating.

The performance of the treatment plant should be evaluated by the Tema Metropolitan Assembly for possible reuse and recycling of accumulated sludge.

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APPENDICES

APPENDIX 1
(TABLES)

Table 1.1: Sanitation Coverage (%) in Ghana.

	1990	2006
Total Population (thousands)	15,579.	23,008
URBAN	36	49
Open Defaecation	11	8
Unimproved	31	8
Shared	47	69
Improved	11	15
RURAL		
Open Defaecation	31	32
Unimproved	47	28
Shared	19	34
Improved	3	6
TOTAL		
Open Defaecation	24	20
Unimproved	41	19
Shared	29	51
Improved	6	10
% of population that gained coverage (1990-2006) with respect to median population (Year 1998)	8	

Source: WHO/UNICEF, 2008.

Table 3.2: Sampled Locations in Madina for Questionnaire Administration

No.	Sectional Area	No. of Respondents	No.	Sectional Area	No. of Respondents
1	Action	5	11	Baba Yara	5
2	Rawlings Park	5	12	Samanpon	5
3	IPS	5	13	Point 5	5
4	Asanka Locals	5	14	Zongo Junction	5
5	Riss Hotel	5	15	Atomic Junction	5
6	Redco	5	16	North Legon	5
7	Nkwatanang	5	17	Doku	5
8	Central Market	5	18	Local government Area	5
9	Domeabra	5	19	Estate	5
10	Social Welfare	5	20	Presec	5
Total Sample Size		100			

Table 4.1: List of Private Toilets and their locations

No.	Type of Facility	No. of seaters	Location
1	KVIP	20	Zongo/Redco
2	KVIP	5	Zongo
3	KVIP	2	Zongo
4	KVIP	3	Zongo
5	WC	20	Taxi Station, Libya Quarters
6	WC	10	Zongo Junction
7	KVIP	3	Yellow Signboard
8	KVIP	4	Atima
9	KVIP	6	Atima
10	KVIP	8	Atima
11	KVIP	10	Taxi Rank
12	WC	10	Market
13	WC	30	Cemetery
14	KVIP	4	Atima
15	KVIP	2	Doku
16	KVIP	2	Behind Post Office
17	WC	2 No. 34	Market

Source: Health and Environmental Unit - Madina Urban Council, 2008

Table 4.2: Institutional (Schools) toilets in Madina.

No.	Institution (School/Health centre)	Type of Facility	Number and Seater
1	Madina DA 2 & 3	KVIP	1No. – 4Seater
2	Immaculate Heart of Mary	WC	1No. – 8Seater
3	Nkwantanang	KVIP	1No. – 8Seater
4	Redco DA	WC	1No. – 8Seater
5	Babayara DA	WC	1No. – 8Seater

Source: Community Water and Sanitation Agency – Greater Accra Regional Office

Table 4.4: List of some Private Toilet Operators in Madina

No.	Name	Location	No. of seaters	Type of Facility
1	Bawa Yusif	Zongo/Redco	20	KVIP
2	Hajia Amina Ibrahim	Zongo	5	KVIP
3	Alimatu Yakubu	Zongo	2	KVIP
4	Mohammed Inuwa	Zongo	3	KVIP
5	Oheneba Boakye	Zongo Junction	10	WC
6	A.S. Salifu	Yellow Signboard	3	KVIP
7	Andrews Mensah	Atima	4	KVIP
8	Kenneth Annang	Atima	6	KVIP
9	Nikoi Kotei	Atima	8	KVIP
10	Sule/Ray Damton	Taxi Rank	10	KVIP
11	Nikoi Koteyfio	Atima	4	KVIP
12	Ismail & Abdul	Doku	2	KVIP

Source: Health and Environmental Unit - Madina Urban Council, 2008

Table 4.5: POCC Analysis of the Waste Management Department

Major Problems in Waste Management	Potentials	Opportunities	Constraints	Challenges
Lack of acquired sanitary site for waste disposal	Vast undeveloped land in the district	Planning schemes are yet to be prepared for most areas of the district	Funds	Rapid population growth/large volume of refuse
Indiscriminate dumping of solid waste	Large labour force available in the district	Form of large pool for employment for the youth	Fund and logistic for waste management	Sprawl of the district
Choked public drains		“	“	Attitude of the public
Inadequate household latrines in homes in the district	Sufficient number of staff (Env.) and available law court/Bye-laws		Staff lack logistic to carry out duties	Land lords turning household latrines into shops.

Source: Waste Management Department, Ga-East Municipal Assembly – Abokobi (2008)

Table 4.6 Average Annual Expected Proceeds from Operating a 2No. 34-Seater Water Closet Toilets with Septic Tank.

Day/Period	Unit User Charge (Gp)	Number of Visits	Daily Total (GH¢)	Monthly Total (for 28 days/4 weeks)/ (GH¢)	Annual Total (12 months)/ (GH¢)
Monday-Saturday.	15.00	350	52.50	1260.00	
Sunday	15.00	200	30.00	120.00	
Sub-Total				1380.00	16,560.00
Grand Total					16,560.00

Table 4.7 Average Annual O & M Costs and Costs components of a 2No. 34 - Seater Water Closet Toilets with Septic Tank.

Item	Description	Unit	Qty/yr	Unit rate (GH¢)	Annual Cost (GH¢)
1	Desludging Charges	Month	12	240	2880
	Sub-Total				2880
2	Cleaning Charges				
	Disinfectants/ soap	Gals/Number	36	4	144
	Brooms	No.	12	0.5	6
	Mop & Buckets	No.	12	5	60
	Toilet Rolls/Papers	No/bundle	10	10	100
	Nose masks	No.	24	2	48
	Hand gloves	Pairs	12	3	36
	Shovels	No.	2	5	10
	Sub – Total				404
3	Wages of Workers				
	Attendant (2No.)	month	24	75	1800
	Cleaners (2No.)	month	24	60	1440
4	Water bills	month	12	240	2880
5	Electricity bills	month	12	60	720
6	Miscellaneous expenses (Repairs & Renovations)	Lumpsum	1	100	100
	Sub - Total				6940
	TOTAL				10224

Table 4.8 Annual Expected Proceeds from Operating a 2No. 4-Seater KVIP in Madina

Day/Period	Unit User Charge (Gp)	Average Number of Visits	Daily Total (GH¢)	Monthly Total (for 28 days/4 weeks)/ (GH¢)	Annual Total (12 months)/ (GH¢)
Monday-Saturday.	15.00	100	15.00	420.00	
Sunday	15.00	60	9.00	252.00	
Sub-Total				672.00	8064.00
Grand Total					8,064.00

Table 4.9 Annual O & M Costs and Costs components of a Public 2No. 4 - Seater KVIP.

Item	Description	Unit	Qty/yr	Unit rate (GH¢)	Annual Cost (GH¢)
1	Desludging Charges	Month	12	53	636
	Sub-Total				636
2	Cleaning Charges				
	Disinfectants/ soap	Lumpsum/month	12	40	480
	Brooms	No.	12	0.5	6
	Mop & Buckets	No.	12	5	60
	Papers (different sizes)	Lumpsum/month	12	19	228
	Nose masks	No.	8	2	16
	Hand gloves	Pairs	8	3	24
	Shovels	No.	1	5	5
	Sub – Total				819
3	Water bills	month	12	6	72
4	Electricity bills	month	12	3	36
5	Miscellaneous expenses (Repairs & Renovations)	Lumpsum	1	10	10
	Sub - Total				118
GRAND TOTAL					1,573

Table 4.10: Householders Willingness and Ability to Pay for Sanitation Services

	Yes	No
Willingness to Pay	86%	14%
Ability to Pay for public toilet use	77%	23%

Table 4.11: O & M cost components at the Household level in Madina

Number	Activities, Materials/Tools
1	Desludging charges
2	Disinfectants/ soap
3	Brooms
4	Mop & Buckets
5	Anal Cleansing materials (Toilet Rolls/Papers)
6	Nose masks
7	Hand gloves
8	Shovels
9	Miscellaneous expenses (Repairs & Renovations)

Table 4.12: Capital Cost Contribution for Institutional Latrine construction

FACILITY	CONTRACT SUM (GH¢)		
	CWSA	GEDA	Total Investment Cost
1 No. 8 Seater WC Toilet with 2-Unit Urinal at Redco D/A Basic School	9,500	15,708.7990	25,208.7990
1 No. 8 Seater WC Toilet with 2-Unit Urinal at Immaculate Heart of Mary Primary	9,500	14,966.831620	24,466.831620
1 No. 8 Seater WC Toilet with 2-Unit Urinal at Baba Yara Community School	9,500	15,708.7990	25,208.7990

Source: CWSA, 2006.

Table 4.16: Household Opinion on prosecution of excreta related offences

Yes to Prosecution	91%
No to Prosecution	8%
Non Respondents	1%

APPENDIX 2
(FIGURES)

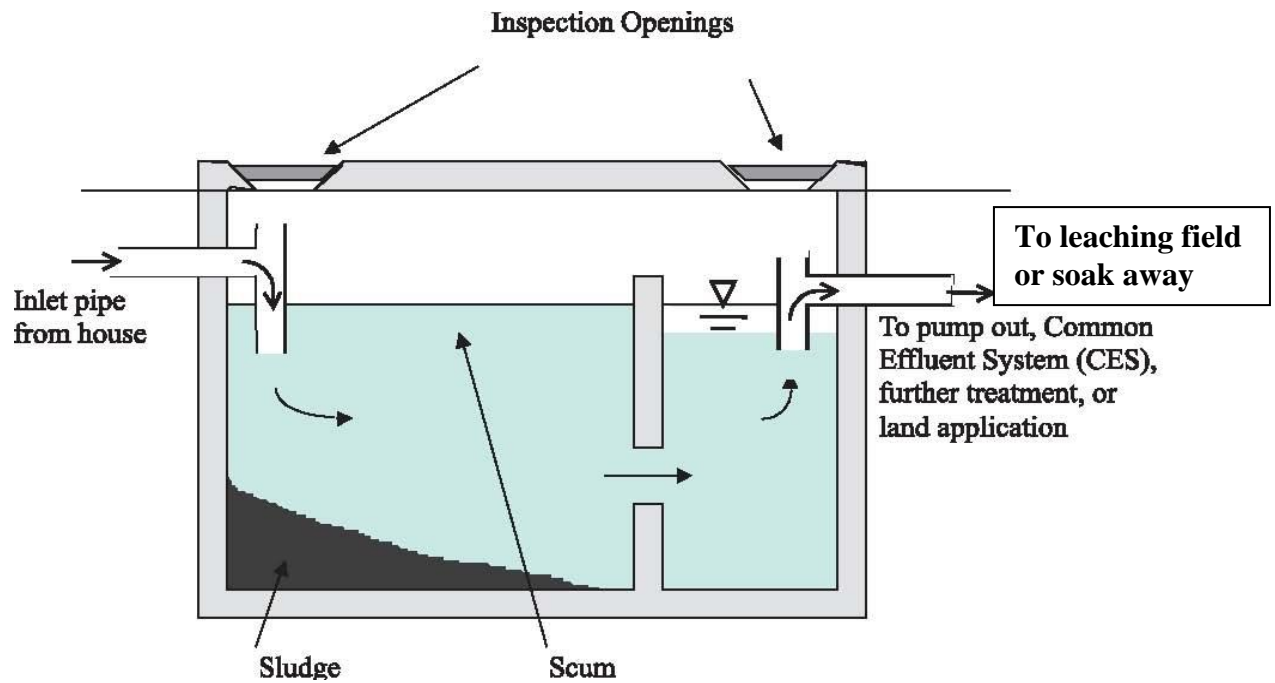


Fig.2.2: Cross section view of a Septic Tank

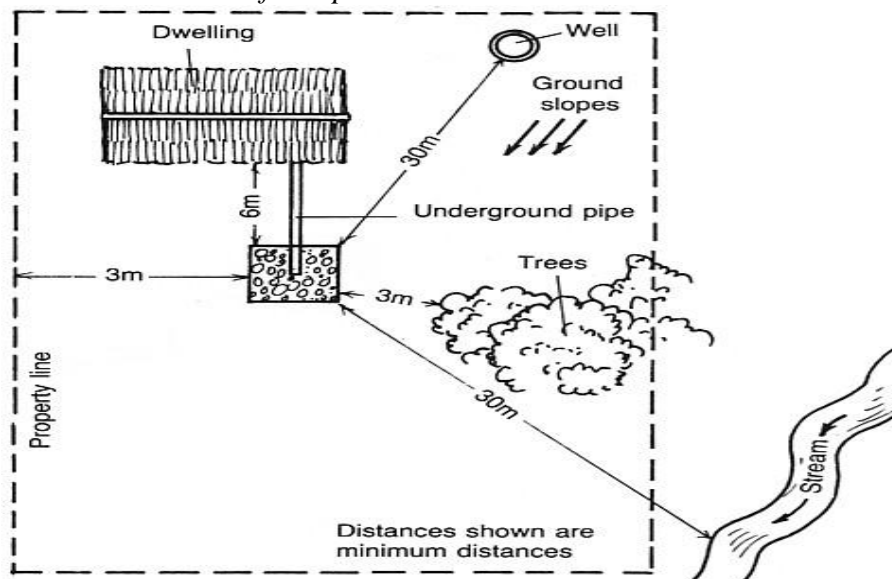


Fig.2.3: Siting criteria for a soakaway from different facilities.

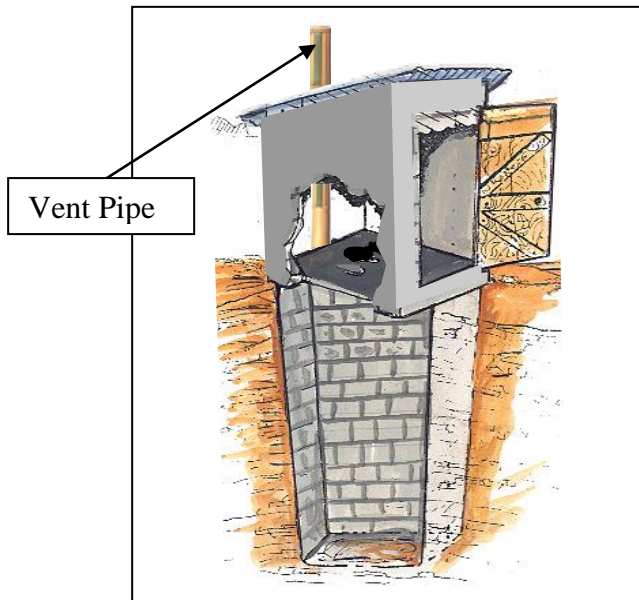


Fig.2.4a: Ventilated Improved Pit Latrine

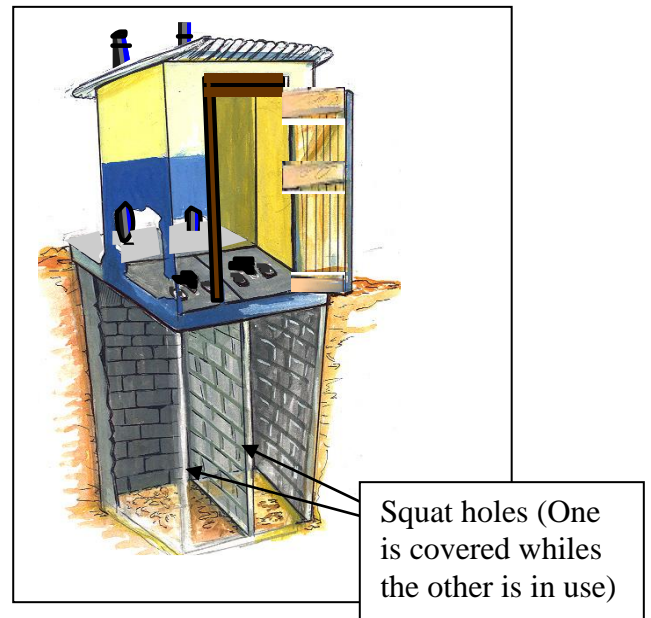


Fig.2.4b: Kumasi Ventilated Improved Pit Latrine

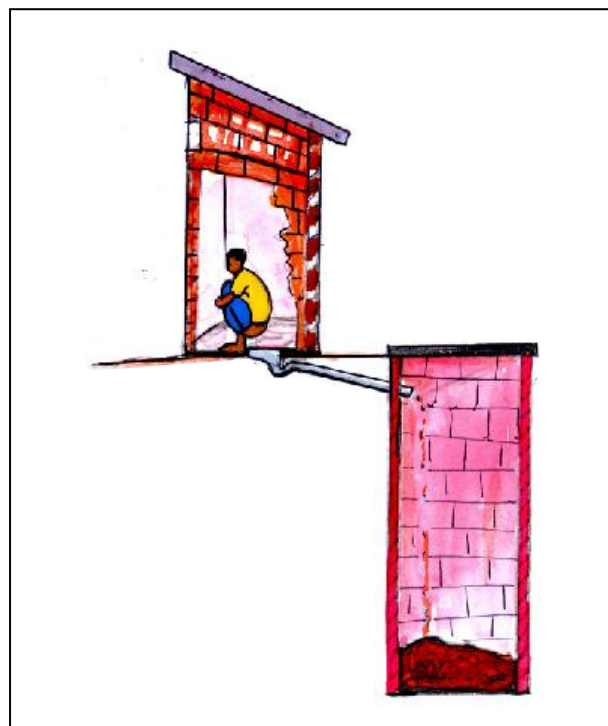


Fig.2.5: Pour-Flush toilet (Single Pit Off-set type)

APPENDIX 3

(PLATES)



Plate.2.1: Aqua-Privy Public Toilet (‘Bomber Latrine’) Plate 3.1a: A Residential Polytank

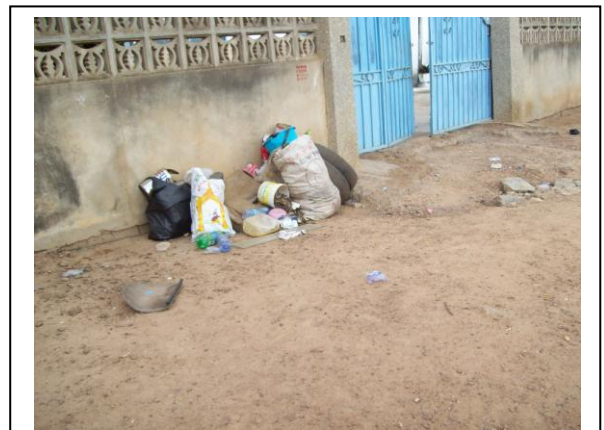


Plate 3.1b: A Polytank at a public toilet

Plate 3.2a: Refuse to be picked by private contractor



Plate 3.2b: An individual private contractor with refuse on truck

Plate 3.3a: Refuse burnt behind a residential house

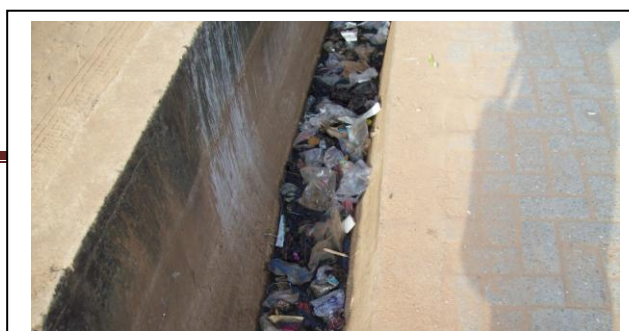


Plate 3.3b: A secondary drain choked with refuse



Plate 3.4a: Household wastewater facility with no soakaway



Plate 3.4b: Household wastewater facility (bucket is picked and the water poured away)



Plate 4.1: Household toilet facility (VIP latrine)



Plate 4.2a: Public WC toilet facility



Plate 4.2b: Private commercial toilet



Plate 4.3a: Institutional Latrine (WC) at Nkwantanang School



Plate 4.3b: Institutional Latrine (KVIP) at Redco School



Plate 4.6a: Cesspit Emptier discharging faecal sludge



Plate 4.6b: Inlet PVC pipe to pond for faecal sludge



Plate 4.7a: One of the treatment ponds for faecal sludge



Plate 4.7b: Discharging chamber through which faecal sludge is discharged.



Plate 4.4a: Sinks (right side corner) not being used because of operational abuse



Plate 4.4b: Non-functional WC flushing bowls/units



Plate 4.5: Drying Bed for drying faecal sludge for composting



Plate. 4.8: Some of the Cesspit Emptiers used by Private Operators



Plate. 4.9a: WC with non-functional flushing unit



Plate. 4.9b: Dilapidated Public toilet



Plate. 4.10: Clothes that could be used by people who soiled themselves with faeces



Prince Antwi-Agyei.



MSc. Thesis (2009).

Plate. 4.11b: Faeces sprayed at improper place and therefore causing environmental nuisance

Plate. 4.11a: A cesspit emptier spraying faeces at inappropriate place due to bad operation (pipe hose is not tightened properly)



Plate. 4.12a: Discharge chamber and bay overgrown by weeds

Plate. 4.12b: Discharge bay outlet being blocked by weeds and other

APPENDIX 4:
(INTERVIEWS WITH STAKEHOLDERS)

APPENDIX 4A: CHECKLIST FOR GA-EAST MUNICIPAL ASSEMBLY

1. Background data on Madina – Demographics, socio-economic, district and study area maps.
2. Area demarcations (e.g. low-income, middle and high income groups) and criteria for demarcation (e.g. housing patterns, population density, infrastructure etc.)
3. Sanitation situation in Madina
4. Types of latrine technologies existing (Household, communal/public & institutional, others and their numbers – those available, etc.) and their investment cost for construction.
5. Percentages of population using a particular latrine technology (both household and public)
6. Assembly's assessment of the way people construct their latrines in Madina.
7. How is quality assurance of latrine construction supervision done?
8. The investment and annual Operation and Maintenance Cost of the different technology options.
9. What goes into the Operation and Maintenance of public toilets
10. The cost recovery mechanism(s) in place and its performance (problems or successes)
11. Financial Arrangements in place: Who finances the sanitation (faecal sludge) services delivery (construction, O & M, etc.)
12. Annual budget for sanitation services delivery (construction, education, O & M cost etc.)
13. Financial constraints in managing faecal sludge in Madina
14. The management (Institutional) arrangements in the assembly with regards to Faecal Sludge.
15. The key stakeholders and their roles and responsibilities in the faecal sludge management issues.
16. List of all private firms involved in managing faecal sludge in Madina
17. Partnerships and type(s) of contract arrangements are in place between the Assembly and the private sector in faecal sludge services delivery (contributing to coverage, management, commercial use and re-use).
18. Policy and Legal framework covering the sanitation service delivery. Is the enforcement of the sanitation bye- laws effective?
19. The specific (financial and institutional) constraints being faced by the assembly in its sanitation services delivery (at all levels – households, communal/public and institutional categories)
20. Specific suggestions to improve service delivery
21. The general SWOT analysis of the Assembly.
22. Capacity (Staffing and training requirements) of Municipality in managing faecal sludge in the Municipality
23. The organisational structure of the Waste Management Division of the Assembly
24. How is the following taken care of?
 - Hygiene practices in Madina (environmental hygiene, food hygiene, vector control)
 - Groundwater pollution from leachates
 - Instances of offensive odour
 - Land degradation from uncontrolled dumping, erosion, bad agricultural practices etc.

**APPENDIX 4B: CHECKLIST FOR ENVIRONMENTAL HEALTH UNIT
(MADINA URBAN COUNCIL)**

1. Roles and responsibilities of the unit
2. The organisational structure
3. Sanitation Services delivery arrangement with private contractors
4. Kind of works the private sector is involved in
5. List of all private operators managing faecal sludge in Madina.
6. How is the unit involved in household sanitation services delivery (e.g siting, supervision, monitoring etc.)
7. How does the unit ensure that households toilets are desludged when they become full so that there will not be any environmental and health related hazards
8. Do you have records of % of households using a particular type of toilet
9. How do you ensure that there are no environmental and health related problems in the community.
10. Do you have any legal documents for sanctioning sanitation related offences
11. What arrangements are in place to make the sanitation services financially sustainable
12. Quantity of faecal sludge generated and desludged per month
13. Where do the private operators dump the waste and do you pay any fees to the management of those sites.
14. Major problems being faced in the delivery of sanitation services
15. Any strategies to adopt so that delivery of sanitation services will be sustainable and independent of donors' financial support.
16. General suggestions to improve delivery of sanitation services
17. Do you have any re-use of the faecal sludge to generate additional revenue for services
If no what are the possibilities of re-using the faecal sludge to generate revenue

**APPENDIX 4C: CHECKLIST FOR GES/MUNICIPAL SHEP
COORDINATOR – GA-EAST MA**

- School Information
 - Number of Public and Private schools in Madina
 - Enrolment/Population
 - Location under the sections of Madina
 - Existence of security to protect school facilities (fencing, availability of a security man etc.)
- Existing Toilet facility (where present)
 - Type, number of privy rooms (e.g 6-seater KVIP)
 - Operation and Maintenance regime (How is the O & M of the latrines done)
 - The General sanitation condition
 - Are toilet structures old or recently constructed and by whom
 - The investment cost of the toilet facilities
 - Do some schools commercialise (open to the public) their toilet facilities
 - Main problems faced with regards to sanitation
- School Health Committee
 - Existence of school health coordinators
 - Composition of committee

- Activeness of committee (functional or non functional)
- Funds
 - Who finances the construction of the sanitation facilities
 - Availability of funds for Operation and Maintenance
 - Who does the desludging and who pays (how much)
- Utility services
 - Availability of Water and electricity
- Handwashing Practices
 - Do schools have handwashing facilities
 - Do they practice handwashing with soap
- Solid waste Disposal
 - Do schools have solid waste disposal sites or practice the crude dumping
- Health
 - Common diseases pupils normally get
 - Does the existence of water and sanitation facilities affect attendance and performance of pupils

APPENDIX 4D: CHECKLIST FOR TOILET ATTENDANTS

1. Locality/Suburb.....
2. Age..... sex
3. Religion a. Christian b. Moslem. C. Traditional. D. Others. specify
4. Sex: M F
5. Marital Status.... Married ☐ Separated ☐ Divorced ☐ Living in ☐
6. Educational Background... none ☐ Basic ☐ Secondary/
Technical/Vocational ☐ Tertiary ☐
7. Type and number of seaters of toilet facility
8. Number of privy rooms for males and females
9. About how many years has the toilet been in existence and its current condition
10. How long have you been working on this toilet
11. Daily working hours (start and closing times)
12. Average number of users per day
13. How did you get to know this number everyday (some record keeping? Etc)
14. What are the anal cleansing materials given to the users (graphics, toilet rolls etc.)
15. How do you dispose off the anal cleansing materials
16. If WC toilet, where do you get the water for flushing and handwashing
17. Do you have handwashing facilities. If yes what type and do people practice handwashing with soap.
18. How much do you pay for water use in a month
19. User charges for children and adults (specify age limits, what about students)
20. Who cleans the toilet and with what cleansing materials and how often
21. How often does the toilet become full
22. How much do the charge for desludging the toilet (also state the approximate capacity of the cesspit emptier)
23. When (morning, afternoon, evening or any other time) and Who desludges the toilet and how do they do it
24. Do people use the toilet when it is being deslugged

25. What major problems do you face with people using the toilet (e.g behaviour, soiling the toilet seats or squat holes, people don't want to pay for using the toilet etc.)
26. What major problems do you face in managing the toilet
27. Do people at times defaecate in the environment close to the toilet or make the place dirty and dumping refuse around
28. How do you render accounts and to whom
29. How (is it % of daily revenues or fixed monthly wage etc) and who pays you
30. Who supervises your work and that of the cleaner (if you are not the same person)
31. Any health problems associated with your work
32. How often do you go to the hospital/clinic

APPENDIX 4F: CHECKLIST FOR CESSPIT EMPTIERS OPERATORS

General Data on Company

1. Name of company and location
2. Has company been in existence for long
3. Activities undertaken by company
4. Areas/towns where company works

Collection and Treatment

1. Type of facilities for the collection and treatment
2. Frequency of collection (desludging) per year.
3. Quantity of sludge deslugged (based on the capacity of the vehicle)
4. % of septage collected from specific latrine types (KVIPs, Septic tanks etc.)
5. Fees/charges for the collection and treatment per trip/total cost per year of different types of latrines (WC+septic tank, KVIP etc.)
6. Any re-use of the treated waste
7. How the collection is done or the methods of collection
8. Where do you dump the collected faecal sludge
9. Average distance from Madina to disposal sites
10. Do they treat the waste

Faecal Sludge Collection/Treatment Facilities

1. Type of vehicles used for the collection
2. Availability of vehicles
3. Working hours of vehicles per use (start and close times) – who monitors this
4. How often are the vehicles maintained
5. Do you have a central workshop for vehicles maintenance and repairs
6. General problems encountered (vehicle breakdowns etc.)
7. Any records on movement of desludging vehicles (who does the recording and the format of recording).
8. Type of treatment facilities available
9. How the treatment facilities are maintained

Faecal Sludge Collection/Treatment Facilities operators

1. How many people are involved in during desludging of faecal sludge
2. How is the desludging done

3. What protective clothes and gears are in place for the operators (for hands, body, eyes and head etc)
4. How often do the operators go for medical check-ups
5. What common diseases do operators normally get (sanitation related)
6. What general problems do you normally face
7. What do you think if done will improve upon your work

APPENDIX 4G: CHECKLIST FOR ATTENDANT AT DISPOSAL/TREATMENT SITE

1. How long has the disposal site been in existence
2. How long have you working at the disposal site
3. How is the dumping of human excreta done at the site
4. What are the charges for the different capacities of cesspit emptiers per dump
5. What are some of the O & M activities at the site
6. Are the charges able to take care of all O & M activities at the treatment plant
7. Who supervises the activities at the site and whom do you report to
8. What environmental effects have you experience so far
9. Have you had any peculiar disease probably because of the activities at the site
10. How often do you go for medical check ups
11. Do you have some safety or protective clothing for your work
12. Do you do any treatment at the site
13. Any recycling and re-use of the waste
14. Where does the final effluent end up from the dumping site
15. What level of motivation do you get from the employers
16. What are some major problems you face at the site
17. What recommendations do you have to make activities at the site better.

APPENDIX 4H: STRUCTURED HOUSEHOLD INTERVIEW QUESTIONNAIRE

1. Detailed household information

- 1.1 Name of area/suburb.....
- 1.2 Date.....Time.....of the observation/interview
- 1.3 Age.....sex.....
- 1.4 Marital status: 1= Married. 2= Separated. 3= Divorced 4= Living in 5= Not married
- 1.5 Is the head of household a man or a woman: 1=Male 2= Female
- 1.6 Size of household.....
- 1.7 Type of house: 1= compound. 2=single 3= semi detach/flat
- 1.8 Religion: 1= Christian 2= Moslem. 3= Traditional. 4= Others (Specify)
- 1.9 Ethnicity
- _____ Akan (1)
- _____ Krobos (2)
- _____ Ewe (3)
- _____ Northern (4)
- _____ Ga (5)
- _____ Other (6)
- _____ Refused to say (7)
- 1.10 Occupation of household head(s): 1= Unemployed 2= Trading. 3= Farming
4= Government employee. 5=.self- employed. 6=retired.
- 1.11 Do you own or rent your house?
- a _____ Occupy family house (1)
- b _____ Own (2)
- c _____ Rent (3)
- d _____ Take care of house for someone else(4)

2.0 Sanitation Practices

- 2.1 Is there a latrine in your house? 1= Yes 2= No. (If No, go to 2.3).
- 2.2 If yes
- i) Which type?
- 1= KVIP 2= VIP 3= Pit Latrine 4= Bucket Latrine 5= WC
- ii) What is the condition? 1= Poor 2= Very Good 3= Good
- iii) How many are the squat holes? 1=1, 2= 2, 3= 3
- iv) How many people use the toilet facility? 1=less than 5, 2= b/n 5 and 10,
3= b/n 10 and 15, 4= b/n 15 and 20 5= more than 20
- v). How often do you desludge it? 1= Daily, 2= monthly, 3= every two months,
4= every 6 months, 5= yearly 6 = more than a year
- vi) Is the latrine sited appropriately? 1= yes, 2= no (if no state the reasons)
- vii) What construction material was used to construct the toilet? 1= cement blocks, 2= local material, 3= others (specify)
- 2.3 If No.
- i) Where do you defecate? 1= in a Chamber pot, 2= open defaecation,
3= in a polythene bag 4= Public toilet 5= other (specify)

- ii) If public toilet how far is it from the house? 1= less than 100m, 2= b/n 100m and 200m, 3=b/n 200m and 300m, 4= b/n 300m and 500m, 5= more than 500m
- iii) Are you willing to pay for use of public toilets? 1= Yes. 2= No.
- iv) Do you find it difficult paying for the toilet use? 1= Yes. 2= No.
- v) How much do you pay for using the public toilet? 1= 50Gp, 2= 100Gp, 3= 150Gp, 4= 200Gp
- vi) For public toilets, what are the major problems you face in using it **(check all applicable answers)**. 1= dirty environment, 2= odour and flies nuisance, 3= poor customer care and service, 4= toilets not desludged on time, 5= others (please specify)
- 2.4 What type of anal cleansing materials is/are used? 1= newspapers, 2= toilet roll 3= rag, 4= water, 5= other (specify)_____
- 2.5 How do you dispose off the anal cleansing materials? 1= burning, 2= burying in the ground, 3= disposing on a refuse dump 4= other (specify)
- 2.6 i) How do you clean the toilet? **(check all applicable answers)** 1= sweeping 2= cleaning with water, 3= cleaning with disinfectants
 ii). How often do you clean the toilet? **(Check all applicable answers)**, 1= Daily, 2= every two days, 3= weekly, 4= every two weeks, 5= monthly

3.0 Intention to install a toilet

- 3.1 Does your household have plans to construct a sanitation facility?
 _____ Yes (1) _____ No (0)
- 3.2 If No, give main reason?
 _____ Never considered it (1),
 _____ High cost of toilet (2),
 _____ Satisfied with existing facility (3)
 _____ Other (specify) _____
- 3.3 If yes, who is in charge of the plan to build the sanitation facility?
 i) _____ Head of Household (1)
 ii) _____ spouse of head household (2)
 iii) _____ Tenant (3)
 iii) _____ Other (4) (specify) _____
- 3.4 How long has this plan been going on?
 _____ Within the last month (1)
 _____ 3 Months ago (2)
 _____ 6 Months ago (3)
 _____ 1 Year (4)
- 3.5 What made you to start this plan? **Check all that apply (1 if checked, 0 otherwise)**
 _____ Safe from soiling myself while queuing at the public toilet
 _____ To have a place for visitors
 _____ Because of relatives overseas/big cities
 _____ Any other (state) _____
- 3.6 Who will provide money for the construction of the toilet? 1= landlord, 2= head of household, 3= tenants, 4= others (please specify)

- 3.7 What types of toilet do you know of? ____ VIP (1) ____ Pit latrine (2),
____ Bucket (3), ____ WC (4) ____ Other specify, _____ (5)
- 3.8 Where did you learn about these toilets?
____ Neighbours (1)
____ Assembly Officers (2)
____ Latrine artisans (3)
____ Visiting friends and relatives (4)
____ Radio/television (5)
____ School (6)
____ Other (Specify) _____ (7)
- 3.9 Have you decided on the latrine type you want to construct?
____ Yes (1) ____ No (0)
- 3.10 What type have you chosen to build?
____ VIP (1) ____ KVIP (2) ____ Pit Latrine (3) ____ Bucket (4)
____ WC (5), ____ others (specify) _____ (6)
- 3.11 Do you know how much it will cost you to build this toilet? ____ Yes (1) ____ No (0)
- 3.12 If yes, how much? _____

4.0 Motivations/constraints to sanitation

- 4.1 Would you prefer a household toilet to a public toilet? ____ Yes (1) ____ No (0)
- 4.2 If yes what are your main reasons?
____ Avoid early morning queue at public toilets and go to work/farm early (1)
____ Able to use the toilet facility privately (2)
____ Convenient especially at night (3)
____ Safe from embarrassment of soiling yourself (4)
____ Avoiding using the bush and hazards associated with it (snake bites, cuts/bruises) (5)
____ Other, Specify _____ (6)
- 4.3 If you were to build a toilet, what will be the most important benefit/improvement it will bring to you/your family?
____ Avoid early morning queue at PL and go to work/farm early (1)
____ Able to use the toilet facility privately (2)
____ Convenient especially at night (3)
____ Safe from embarrassment of soiling yourself (4)
____ Avoiding using the bush and hazards associated with it (snake bites, cuts/bruises)(5)
____ Other, Specify _____ (6)
- 4.4 Here are five reasons people give for acquiring a house toilet, please rank them in order of importance to you, beginning with **1 most important to 5 least important**
a ____ I will not be embarrassed when I have visitors
b ____ I will be able to relax in the privacy of my home when using the toilet
c ____ Avoid long queues at the public toilet in the morning
d ____ Avoid embarrassing situation of defecating on my self
e ____ Safe from the disgust and smelly conditions of the public toilet

- 4.5 How likely is that by this time next year, your family will start building a toilet?
____ Very likely (1)
____ Likely (2)
____ Unlikely (3)
____ Highly unlikely (4)
____ Don't know (5)
- 4.6 If it is unlikely or unsure that you may start building a toilet in the next one year, why? ____ Do not have space (1) ____ Do not have money (2) ____ don't know how to construct a latrine (3), ____ Other (specify) _____ (3)

5.0 Hand Washing, Health and Hygiene

- 5.1 Can you mention some good hygiene practices you know of? (write them down)

- 5.2 Does your household practice hand washing after defecation?
____ Yes (1) ____ No (0)
- 5.3 If yes, what do you use to wash your hands?
____ Hand washing with soap (1)
____ Hand washing with clean water (2)
____ Hand washing with used/waste water (3)
____ Hand washing with sand/ash (4)
- 5.4 Do people involved in food preparation in your household wash their hands before preparing food? ____ Yes (1) ____ No (0)
- 5.5 What do you wash your hands with before eating?
____ Hand washing with soap (1)
____ Clean water (2)
____ Used/waste water (3)
____ Other (please specify : _____) (4)
- 5.6 Where do you throw your waste water (from bathroom, kitchen, laundry, washing of plates)? 1= soakaway, 2= open drains (gutter), 3= on the ground, 4= others (specify)
- 5.7 Where do you throw off your refuse? 1= public refuse dump, 2= in the bush, 3= burn, 4= bury in the ground
- 5.8 Do you know of a disease that can be caused by improper disposal of excreta (toilet)?
1= no, 2= Diarrhoea, 3= worm infections, 4= others (specify) _____
- 5.9 What are the common diseases that you or those in your house normally get? (indicate 1, 2, 3 etc. in order of most common to the least common)
____ Malaria, (), ____ cholera (), ____ diarrhoea (), intestinal worms (), others (please specify) _____

6.0 Income and Financial Expenditure on Sanitation

- 6.1 What is the size of your monthly household income?.....
1= Less than GH¢10 2= Between GH¢10 – GH¢50 3= GH¢50 – GH¢100
4= Between GH¢100 – GH¢200 5= Above GH¢200
- 6.2 What are your monthly expenses on: 1= food..... 2= clothing.....
3= rent..... 4= transport..... 5= electricity.....
6= water..... 7= sanitation (Latrine use)..... 8= health.....
9= education..... 10= others.....

7.0 Level of Service

- 7.1 Do you think the Municipality/Urban council is doing well in managing sanitation in Madina? 1= yes, 2= no
- 7.2 If no what do you think they are not doing well (write down the reasons)

- 7.3 Do you think the government should provide subsidies (support with money/materials) to those who want to construct their own toilet? 1= yes, 2= no
- 7.4 If yes what would you expect as subsidy from the government? 1= cement, 2= roofing sheets, 3= vent pipe, 4= others (please specify)_____
- 7.5 Do you think the government should prosecute (punish) those who practice open defaecation or dump faeces at inappropriate places? 1= yes, 2= no
- 7.6 What do you think can be done to improve the current sanitation practices/conditions in Madina? (Write down all points)

