

**ENVIRONMENTAL SANITATION MANAGEMENT IN THE
KUMASI METROPOLITAN AREA**

BY:

PHILIP TIEKU ACHEAMPONG

BA. Publishing Studies (Hons)

A Thesis Submitted to the Department of Planning
Kwame Nkrumah University of Science and
Technology, Kumasi, in Partial Fulfilment
of the Requirement for the Degree of

MASTER OF SCIENCE

Development Planning and Management
Faculty of Planning and Land Economy
College of Architecture and Planning

October, 2010

DECLARATION

I hereby declare that this submission is my own work towards the Master of Science in Development Planning and Management 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.

Philip Tiekue Acheampong (PG2237808)

Student Name and PG No.

Certified by:

Dr. Isaac Frimpong Mensa-Bonsu

Supervisor

Certified by:

Dr. Braimah Imoro

Head of Department

ACKNOWLEDGEMENTS

I profoundly thank Dr. Isaac Frimpong Mensa-Bonsu, my supervisor, for his guidance and useful contributions in accomplishing this work.

My sincere thanks go to Mr. Alex Acheampong for his motivation and inspiration throughout my study, and for sponsoring my studies in the Master of Science in Development Planning at KNUST.

Special appreciation and thanks go to Miss. Montiel Lopez and Miss. Nadege Angbo for being true and loving friends.

ABSTRACT

Sanitation and good hygiene are fundamental to health, survival, growth and development. The Millennium Development Goals (MDGs) have set us on a common course to push back poverty, inequality, hunger and illness. Having a healthy urban environment sets a city on track for development. Kumasi is currently experiencing poor environmental sanitation. Open spaces and many other private and public places are littered with garbage, which in most cases clogs drains thereby creating conditions for disease vectors and posing health risks to inhabitants. The main objective of the study is to examine the causes of the environmental sanitation conditions in the Kumasi Metropolitan Area and its effect on the health of the people.

The study adopted the case study method to understand the situation in six residential suburbs and the Central Business District (CBD) in Kumasi. Administration of questionnaires to households in these communities enabled the researcher to understand the people's assessment of the environmental sanitation conditions in these suburbs in particular and the Kumasi metropolis in general. In addition, the availability of environmental sanitation facilities and services and the awareness of individuals about environmental sanitation regulations in the metropolis were analysed. Furthermore, interviews were conducted in selected institutions and five private waste management companies involved in environmental sanitation in Kumasi. These include the Waste Management Department, the Metro Environmental Health Department and the Town and Country Planning Department. From the interviews, the challenges faced by these institutions and companies in managing environmental sanitation in Kumasi were revealed.

The study revealed differences in sanitation behaviour among residents from the various suburbs. However, the general environmental sanitation condition in Kumasi is not up to expectations. Individuals, households and businesses (commercial entities) do not tend to prioritize environmental sanitation. As such, people have poor attitude towards sanitation. Coupled with this are inefficiencies in service provision by the private waste management companies who are contracted to ensure good

sanitation in the city. The Departments within the Metropolitan Assembly responsible for managing the environment are also ill-resourced.

The poor environmental conditions challenge the Assembly's efforts at meeting the health and environment components of the Millennium Development Goals. The study revealed that, environmentally related diseases contribute to 80 per cent of hospital admissions in Kumasi.

Poor environmental sanitation cripples national development. People, households and communities lose time and money to illness, workers produce less, save and invest less and live shorter lives. It also imperils environmental sustainability, particularly, water quality and aquatic biodiversity. Some recommendations pointed to the need for intensive public education to promote a positive attitude for environmental sanitation in Kumasi. In addition, enforcement of the environmental sanitation bye-laws is also recommended to make every individual responsible for good environmental sanitation in the metropolis.

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LIST OF ACCRONYMS

AFD	-	Agence Francaise Developpement
AMA	-	Accra Metropolitan Assembly
BOT	-	Build Operate and Transfer
CBD	-	Central Business District
CWSA	-	Community Water and Sanitation Agency
DESF	-	District Environmental Sanitation Fund
DFID	-	Department For International Development
EMS	-	Environmental Management System
EPA	-	Environmental Protection Agency.
ESM	-	Environmental Sanitation Management
GDP	-	Gross Domestic Product
GHS	-	Ghana Health Service.
IRC	-	International Rescue Committee
KMA	-	Kumasi Metropolitan Assembly
KWMD	-	Kumasi Waste Management Department
MEST	-	Ministry of Environment Science and Technology.
MDG	-	Millennium Development Goals
MHD	-	Metro Health Directorate
MLGRD	-	Ministry of Local Government and Rural Development
MWRWH	-	Ministry of Water Resources, Works and Housing
NESPoCC	-	National Environmental Sanitation Policy Coordinating Council
NESP	-	National Environmental Sanitation Policy.
NGO	-	Non Governmental Organisations
PHAST	-	Participatory Hygiene and Sanitation Transformation
UNCED	-	United Nations Commission on Environment and Development.
UNICEF	-	United Nations Children's Fund.
UNEP	-	United Nations Environment Program
WHO	-	World Health Organisation.
UESP	-	Urban Environmental Sanitation Project.
UN-HABITAT-	-	United Nations Human Settlement Programme.
WC	-	Water Closet
WEDC	-	Water, Engineering and Development Centre.
WCED	-	World Commission on Environment and Development.

CHAPTER ONE

GENERAL INTRODUCTION

1.1 Background to the Study

As the global economy grows, developing countries all over the world are urbanizing at an alarming rate. Although urbanization is the driving force for modernization, economic growth and development, there is increasing concern about the effects of expanding cities, principally on human health, livelihoods and the environment. The implications of rapid urbanization and demographic trends for employment, food security, water supply, shelter and sanitation, especially the disposal of wastes (solid and liquid) that the cities produce are staggering (UNCED, 1992).

In Africa, the dramatic effects of rapid urbanization are very clear in the cities and peri-urban areas (Nsiah-Gyabaah, 2004). Although, cities serve as ‘engines’ of growth in most developing countries by providing opportunities for employment, education, knowledge and technology transfer and ready markets for crafts and agricultural products, high urban population place enormous stress on the environment. With this rapid population growth, its implication can be predicted in terms of the demand for food and raw materials or in ‘inputs’ and generation of waste and pollution, or output.

The population of Kumasi was estimated at 1,915,179 in 2009 based on a growth rate of 5.4 per cent annually (KMA, 2006). The high rate of population growth coupled with the high migrant numbers has outstripped the rate of infrastructure development and service provision, such that, the city authorities are struggling mightily to cope with the rapid urban growth. Most of the infrastructures such as, roads, markets, toilet facilities and housing have exceeded their carrying capacities. The high population with its accompanying waste generation and indiscriminate waste disposal practices have impacted negatively on the drainage system and have consequently brought all water bodies in Kumasi to the brink of extinction (KMA, 2006).

Urbanisation has its accompanying environmental degradation and urban poverty. Reducing poverty and achieving sustained development must be in a healthy environment. The MDGs recognise the fact that environmental sustainability is part of

global economic and social well-being. However, achieving the fourth goal (reducing child mortality); the fifth goal (improving maternal health) and part of the sixth goal (to halt and begin to reverse by 2015, the incidents of malaria and other major diseases), of the Millennium Development Goals (MDGs) largely depends on the country's efforts to ensure a clean and healthy environment. Unsafe water, poor sanitation and hygiene result in countless deaths among children and a huge burden of disease such as diarrhoea, dysentery, malaria, and other parasitic illnesses. Poor hygiene is a conduit for these diseases.

Achieving the MDGs and the eradication of poverty remain the highest priority of the government of Ghana. The impact of poor environmental sanitation in cities and communities like Kumasi threaten the achievement of the MDGs. MDG 7 (Ensuring Environmental Sustainability) is precisely about linking environmental protection to poverty reduction through sustainable development. Ghana's National Environmental Sanitation Policy (MLGRD, 1999) spells out the guidelines and gives power to District Assemblies to promulgate bye-laws to address environmental issues in their locality in an effort to reduce environmental pollution. It also gives power to the Judiciary to establish and empower Community Tribunals to prosecute offenders against sanitary bye-laws and regulations. Based on the guidelines, KMA has enacted Environmental Sanitation Bye-Laws, but the enforcement of these environmental by-laws to regulate the activities of the inhabitants have been largely unsuccessful. Hence, the Kumasi Metropolitan area still faces the challenges of poor environmental sanitation resulting from poor or unhygienic habits and practices. Thus, the deteriorating environmental quality in Kumasi calls for solutions in order to reduce its impact on the health of the people and the economy of Kumasi.

1.2 Problem Statement

Urban environmental management addresses environmental issues that exist in the urban area. Sanitation is one of the most basic services in human life. Improving environmental sanitation is known to have a significant beneficial impact on health both in households and across communities. Coupled with the high population growth is the lack of institutional capacity to formulate and adopt strategies to ensure proper environmental management in Kumasi.

The use of plastic bags as packages for drinking water and other wares and the proliferation of fast food joints which package cooked food in styrofoam, and the indiscriminate disposal of these materials in the environment is an eye sore in the Kumasi metropolis (KMA, 2006). Parts of the city are almost always dirty. Open spaces, market places, car parks and many other public and private places are littered with refuse. In most cases, drains are clogged or totally blocked and many compounds are hemmed in by solid waste, posing health threats to children who play and live around the area.

Several efforts have been made by the Kumasi Metropolitan Assembly to ensure that the city is always clean. It has engaged the services of private waste management companies to ensure that streets are always cleaned and also to ensure that communal dumpsters are emptied regularly. Coupled with these are the provision of new sanitation facilities and the maintenance of old ones.

However, the behaviour and attitude of the inhabitants towards sanitation do not augment this effort. People do not seem to care about good environmental sanitation practices and constantly litter indiscriminately without considering the future effects of these poor sanitation practices on their health. If appropriate efforts are not made to halt such practices, the city will continue to spend the greater part of her resources in an attempt to ensure good environmental sanitation without success.

Poor environmental sanitation is a serious health risk and an affront to human dignity. There are many threats of pollution where there are no sanitation systems or where they do not work properly. Plate 1.1 illustrates some unsightly scenes on the streets of Kumasi. Appendix 1 on page 83 illustrates sanitation conditions in Kumasi. The study sets out to examine the causes of the environmental sanitation condition in Kumasi, their effects on the health of the people and to offer interventions that could help ensure good environmental sanitation in Kumasi.

Plate 1.1 Open Drains in the City are Choked with Solid Waste



Source: Field Survey, March 2010

1.3 Research Questions

The study therefore sets out to find answers to the following relevant questions.

- What is the current environmental sanitation situation in the Kumasi Metropolitan Area?
- What factors account for the environmental sanitation situation in Kumasi?
- What interventions the Kumasi Metropolitan Assembly (KMA) have to ensure a clean and hygienic environment?
- What recommendations can be offered to ensure good environmental sanitation in the Kumasi Metropolitan Area?

1.4 Research Objectives

The research has the main objective of examining the causes of the environmental sanitation conditions in the Kumasi Metropolitan Area, its effects on the health of the people and to propose appropriate interventions for improved sanitation in the metropolis. Specifically, the study seeks to achieve the following objectives:

- To examine the current environmental sanitation situation in the Kumasi Metropolitan Area;
- To identify the factors that contribute to the current environmental sanitation situation;
- To examine the various interventions by the Assembly to ensure a clean and hygienic urban environment; and
- To identify policy interventions to address the environmental sanitation issues to ensure a clean and healthy urban environment in the Kumasi Metropolitan Area.

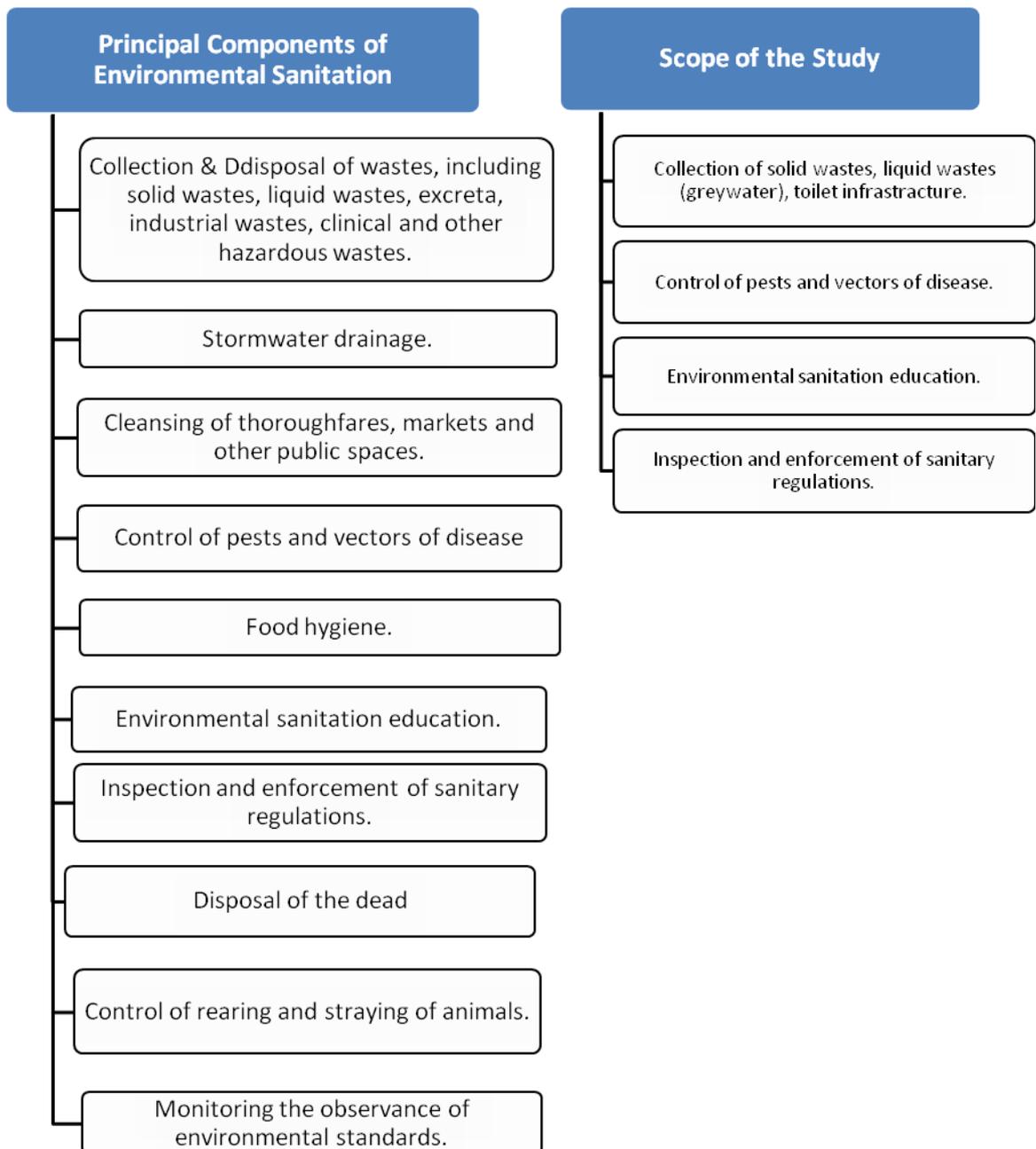
1.5 Scope of the Study

The scope of the study is defined by the spatial and conceptual dimensions. The spatial scope of the study is limited to the local level - the Kumasi Metropolitan Area in the Ashanti Region of Ghana. With the conceptual dimension, environmental sanitation management, according to the MLGRD (1999), comprises all activities aimed at developing and maintaining a clean, safe and pleasant physical environment in all human settlements, to promote the social, economic and physical well-being of all sections of the population. Figure 1.1 illustrates the components of environmental sanitation and the scope of the study with respect to the components of environmental sanitation.

For the purpose of this study, the research was focused on specifically selected components of environmental sanitation, the factors that contribute to the current condition and the extent to which the interventions such as institutional arrangements, legislations, programs or projects aimed at promoting good environmental sanitation condition are achieving their intended purpose of breaking the cycle of disease.

There are three actors in environmental sanitation management. These are generators which comprise: households, business and government institutions; service providers which comprise private waste management companies and; the managers which comprises KMA. The study focuses on households and commercial businesses from the CBD as generators, seven private waste management companies and KMA.

Figure 1.1: Components of Environmental Sanitation



Source: MLGRD (1999).

In studying environmental sanitation it is important to look at parameters, such as using Material Flow Analysis (MFA) and Quantitative Microbiological Risk Assessment (QMRA) to quantify waste flows and to estimate microbial infectious risks (pathogens) on human health in Kumasi. However, this would require a comprehensive laboratory work to enable the researcher to attribute changes in environment to a particular cause. This elaborate laboratory work was beyond the means of the researcher.

The study is not necessarily concerned with a detailed technical discussion of all the environmental themes such as air pollution, flora and fauna, human development and settlement, hazardous substances/chemical, noise control, solid waste management, water management and pollution. However, those aspects of the various themes that do relate to filth and poor urban sanitation/hygienic environment were discussed.

At the institutional level, the study focuses on the various departments within the Assembly responsible for ensuring a hygienic urban environment, their capacities, strengths and weaknesses (with respect to staffing, financing and logistics) in managing environmental sanitation in Kumasi.

1.6 Justification of the Study

The problem of environmental pollution today has assumed a serious and gigantic proportion and this threatens the very existence of human society. Environment is the basis of the existence of all the living beings; at the same time, the living beings, including human beings, themselves create environment. Thus, environment and the living world are mutually interdependent. Social and economic development is necessary for people, without which the human being can neither exist nor fulfil their basic needs like food, clothing, housing, etc.

But today, the problem is that, socio-economic development has reached a point that, its speed has so increased and its destructive power is so enhanced such that it is decimating the environment rapidly. Hence, it has become necessary to find out such new paths and methods of development which would not destroy ecology and produce pollution, but would ensure good environmental sanitation at the same time. In this

context, environmental sanitation management assumes great importance and includes the adoption of strategies in accordance with the sanitation problem, determination of priorities, their application and their proper direction and regulation.

Proper environmental sanitation management is vital. The ramifications of mismanagement or no management are severe. With increased habitat fragmentation comes the risk of loss of the benefits the natural environment provides such as the aesthetic value of being outdoors and being able to experience a hygienic urban environment with no sight of filth and squalor.

It is easy to take for granted the importance of good sanitation. However, its economic and intrinsic value cannot be overstated. Clean and healthy urban environment can effectively help to attract foreign investment and trade to Kumasi, and to better provide services critical in meeting the needs of its growing population.

The study would serve as a major input to the local government, departments and agencies concerned with managing environmental sanitation in Kumasi in designing interventions, programs or activities for the Kumasi metropolis. The study provides information which serves as a basis for further research into issues of managing local environmental sanitation as a means of improving health and reducing urban poverty.

1.7 Summary of Methodology

1.7.1 Research Approach and Design

A combination of qualitative and quantitative data were gathered for analysis. The Case Study approach was used in this study. This is because the case study method involves techniques of investigation which enabled the researcher to grasp and understand individuals, the community and the social issue to propose interventions that take into account the special and peculiar circumstances surrounding the case investigated. However, other research approaches and strategies were also employed to obtain relevant information which helped to provide answers to questions posed and assisted in drawing suitable conclusions after the data were analysed.

1.7.2 Units of Analysis

The units of analysis for the research were households from six suburbs in the metropolis, businesses at the Central Business District (CBD), and institutions such as the Waste Management Department, the Town and Country Planning Department, the Metro Environmental Health Unit, the Regional Environmental Health Directorate and five Private Waste Management Companies.

1.7.3 Sample Selection

The researcher used stratified sampling to group the suburbs in each of the ten sub-metros in Kumasi into three sectors namely; the high cost housing sector, the tenement sector and the indigenous sector based on the house characteristics, access to sewage, type of waste collection service and access to sanitation facilities (toilets). Using simple random sampling from Microsoft Excel, two suburbs were selected from each of the housing sectors. The six suburbs that were selected as study areas include: Ahodwo-Nhyiaeso and Atasomanso New Site for the high cost housing sector, Asokwa and Asafo for the tenement sector and; Asawase-Zongo and Kaase for the indigenous sector. Adum in the Central Business District (CBD) was added as the seventh study area to obtain data from business owners. A total of 156 respondents were selected for households and 26 respondents were selected from the CBD for businesses for the research. Data was also collected from principal sector institutions and departments. The detailed methodology for the study is presented in Chapter Three on page 27.

1.7.4 Data Collection

➤ Secondary Data:

Secondary data were obtained from journals, books, articles, newsletters, magazines, the internet and published and unpublished materials. The secondary data research method was used to review existing documents of related institutions and departments, some national and international records. The internet also served as a good source of data.

➤ **Primary Data:**

Structured questionnaires were used to obtain data from households and businesses, on access to toilet facilities, means of solid waste and grey water disposal, knowledge about environmental sanitation regulations, assessment of environmental sanitation condition in suburbs and Kumasi in general among others. Institutional interviews were also conducted to gain first hand information on the interventions being carried out to improve the environmental sanitation in Kumasi, the progress made and the challenges KMA face in carrying out these interventions.

1.7.5 Data Analysis

The analysis of data gathered from the study was done using simple statistical tables and graphs. The presentation involved disaggregation of data into relevant themes. Figures, tables and diagrams such as bar charts and pie charts were used to graphically show the implications of the findings from the data.

1.8 Limitations of the Study

Although the objectives of the study were well explained and presumably understood by the respondents, certain sensitive questions such as age and means of disposing waste provoked hesitation in giving information by the respondents. Some respondents, especially, business owners were not willing to give answers to some questions since they feared the Metropolitan Assembly would find out about some practices and implicate them. The researcher took time to explain the purpose of the study and thus eventually convinced the respondents to answer these questions.

Given the low level of education among some of the respondents, the use of self administered questionnaires could not be employed outright. Thus, the study required additional man-hours to complete the questionnaires and thus compelled the researcher to employ the services of research assistants. However, the use of research assistants and the subsequent interpretations allowed for some misinterpretation and recording of inaccurate information in course of the study. There was also lack of cooperation from government agencies and departments as they refused to release some reports which were important for the study. Others also felt bothered and

complained of having too many students requesting for information and interviews which distorted their work schedule. They therefore resorted to giving only information they knew off-hand and were reluctant to put in extra effort to search for accurate data on record.

Furthermore, the study was not pre-financed by any resourceful organisation, but rather, self-sponsored and commissioned for academic purposes. Thus, there was inadequate resources to carryout an extensive and intensive study throughout the Kumasi metropolis; hence, limiting the survey to only six suburbs, Asawase-Zongo, Kaase, Asafo, Asokwa, Ahodwo-Nhyiaeso and Atasomanso New Site. Nevertheless, the findings from this study are sufficiently accurate and reliable to make informed generalisation about the extent of households waste disposal practices and knowledge about sanitation regulations.

1.9 Organisation of the Study

The thesis report has been divided into six chapters. Chapter one presents a general introduction and discussion of the background of environmental sanitation management in Kumasi, the problem statement, objectives, the scope and justification of the study. It also presents the limitations encountered during the study and a summary of the methodology adopted for the study.

Chapter two is devoted to the framework on which the study is conceptualised. Also key concepts employed in the study are defined to avoid ambiguities in the use of similar terms elsewhere for other purposes. This chapter also presents a review of the literature from which the findings were analysed in the context of the significance of each of the concepts that was employed. Chapter three presents the detailed research approach and the methods that were adopted for the data collection and analysis. Chapter four presents the profile of the Kumasi Metropolitan Area, population and other characteristics of the study area and its implications on environmental sanitation management in Kumasi. Chapter five is devoted to the analysis of field data and interpretation of results and Chapter six concludes the study with the summary of the findings and recommendations for policy frameworks as well as strategies for enhancing environmental sanitation in the Kumasi Metropolitan Area.

CHAPTER TWO

ENVIRONMENTAL SANITATION MANAGEMENT: CONCEPTS AND STRATEGIES

2.1 Introduction

This chapter examines and analyses environmental management issues to build a conceptual framework within which the study is undertaken. Basic concepts such as environment, sanitation, management, environmental management, sustainable development are defined. Their issues and relationships in providing a framework from which assumptions are derived for environmental sanitation management are elaborately discussed.

2.2 Definition of Terms

2.2.1 Environment

Environment (from the French word: to circle or surround) can be defined as (1) the circumstances and conditions that surround an organism or group of organisms, or (2) the social and cultural conditions that affect an individual or community (Cunningham, 2002 p.4). The concept of 'Environment' is an all-embracing term describing the terrestrial, aquatic and atmospheric systems of the world. In its widest use, it refers to all the biophysical features, organic and inorganic resources and all bio-diversity disposable to humankind.

Barrow (1995) defines environment as the sum total of conditions within which organisms live. It is the result of interaction between living (biotic) and nonliving (abiotic) parameters.

According to Schaefer in Stephens (2002), In relation to human health, the "environment" includes not only the physical and biological elements of nature, but also human-based systems – cultural, economic, political, technological, spiritual and relational – that make up the setting in which people live. (ReNED, 2006).

The concept of environment encompasses all the natural resources which interlink in a complex global ecosystem embodying many sub-systems. Disruption in such systems,

which is as a result of cumulative indiscriminate degradation which takes place in localised environments such as villages, towns and cities, distort the delicate ecological balance and have dire consequences for mankind, and thus provide a compelling justification for the preservation of the environment.

2.2.2 Sanitation

The concept of sanitation has been defined in a number of ways. Mensah (2002) define sanitation as the state of cleanliness of a place, community or people particularly relating to those aspects of human health including the quality of life determined by physical, biological, social and psychological factors in the environment.

Schertenleib et al (2002), define sanitation as interventions to reduce people's exposure to diseases by providing a clean environment in which to live and with measures to break the cycle of disease. This usually includes hygienic management of human and animal excreta, refuse and wastewater, the control of disease vectors and the provision of washing facilities for personal and domestic hygiene. It also involves both behaviours and facilities which work together to form a hygienic environment (World Bank, 2002).

Nyamwaya (1994) also defines sanitation as the proper disposal of human waste, i.e. faeces and urine. It includes keeping the human environment free of harmful substances which can cause diseases.

Wherever humans gather, their waste also accumulates. Progress in sanitation and improved hygiene has greatly improved health, but many people still have no adequate means of appropriately disposing of their waste. This is a growing nuisance for heavily populated areas, carrying the risk of infectious disease, particularly to vulnerable groups such as the very young, the elderly and people suffering from diseases that lower their resistance. Poorly controlled waste also means daily exposure to an unpleasant environment.

Sanitation is therefore a concept explaining activities to ensure safe disposal of excreta, solid waste and other liquid waste and the prevention of disease vectors to

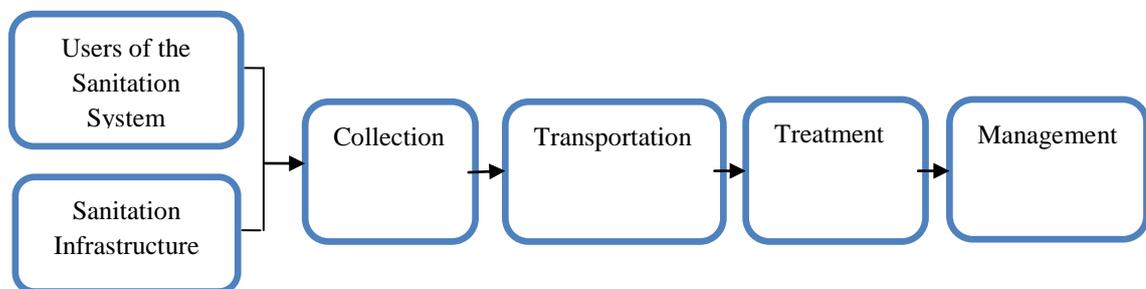
ensure a hygienic environment. Taking these factors into account, the following text is offered as the working definition of sanitation.

Sanitation refers to the proper disposal of human waste, i.e. urine and faeces. It also involves keeping the human environment free from disease causing vectors through the proper disposal of domestic, street wastes and litter as well as wastewater.

2.2.3 Sanitation System

Bracken, (2005) define a sanitation system as comprising the users of the system, the infrastructure, the collection, transportation, treatment, and management of end products (human excreta, solid waste, grey water, storm water and industrial wastewater). A sanitation system considers all components required for the adequate management of wastes produced by humans including the users of the system. Figure 2.1 is an illustration of environmental sanitation system.

Fig 2.1. Environmental Sanitation System



Source: Author's Construct, April, 2010

2.2.4 Environmental Sanitation

The concept of environmental sanitation refers to activities aimed at improving or maintaining the standard of basic environmental conditions affecting the well being of people. These conditions include (1) clean and safe water supply, (2) clean and safe ambient air, (3) efficient and safe animal, human, and industrial waste disposal, (4) protection of food from biological and chemical contaminants, and (5) adequate

housing in clean and safe surroundings. Sanitation is also referred to hygiene (Business Dictionary, 2010).

According to the Ministry of Local Government and Rural Development (MLGRD) (1999. p 1). Environmental sanitation refers to efforts or activities aimed at developing and maintaining a clean, safe and pleasant physical environment in all human settlements. It comprises a number of complementary activities, including the construction and maintenance of sanitary infrastructure, the provision of services, public education, community and individual action, regulation and legislation.

Environmental sanitation therefore involves controlling the aspects of waste that may lead to the transmission of diseases. Included in the term waste management are water, solid waste and industrial waste. According to the International Water and Sanitation Centre, the term 'environmental sanitation' is used to cover the wide concept of controlling all the factors in the physical environment which may have an impact on human health and well-being (IRC, 2006, p.7). In developing countries, environmental sanitation normally includes drains, solid waste management, and vector control, in addition to the activities covered by sanitation (DFID, 1998).

2.2.5 Environmental Management

Environmental Management has been described as the process of allocating natural and artificial resources in order to make optimum use of the environment in satisfying human needs at the minimum and if possible, for an indefinite future.

The United Nations Environmental Programme also defines environmental management as the control of all human activities which have a significant impact on the environment. (UNEP 2005)

Mitchel (2002) defines environmental management as the actual decisions and action concerning policy and practices regarding how resources and the environment are appraised, protected, allocated, developed, used, rehabilitated, remediated and restored, monitored and evaluated.

To be efficient in managing the environment, institutions have to have a good environmental management system to provide a framework for managing environmental responsibilities in a way that is integrated into overall operations. Environmental Management System (EMS) refers to the management of an organisation's environmental programs in a comprehensive, systematic, planned and documented manner. It includes the organisational structure, planning and resources for developing, implementing and maintaining policy for environmental protection.

2.2.6 Environmental Sanitation Management (ESM)

Considering all the components of environment, sanitation and management, one can deduce a definition of ESM as the process of allocating resources to ensure a hygienic environment through service and infrastructure provision and proper disposal of waste.

2.2.7 Sustainable Development

Sustainability has become a central theme of environmental studies and of human development and resource use. Although the idea of sustainability has many facets, the central idea is that we should use resources in ways that do not diminish them. Resource and natural amenities, including wildlife, natural beauty and open spaces, should be preserved so that future generations can have lifestyles at least as healthy and happy as ours – or perhaps better.

One of the most important questions in environmental studies is how we can continue improvements in human welfare within the limits of the earth's natural resources. A possible solution to this dilemma is sustainable development, a term popularised in a 1987 report of the World Commission on Environment and Development called *Our Common Future*. It defines sustainable development as development that meets the needs of present without compromising the ability of future generations to meet their own needs (Mitchel, 2002 .p74).

The concept of sustainable development does imply limits – not absolute limits but limitations imposed by the present state of social organisation on environmental resources and by the ability of the biosphere to absorb the effects of human activities.

2.3 The Need for Environmental Sanitation Management

Poor sanitation gives many infections the ideal opportunity to spread: plenty of waste and filth for the flies to breed on, and unsafe water to drink, wash with or swim in. Among human parasitic diseases, schistosomiasis (sometimes called bilharziasis) ranks second behind malaria in terms of socio-economic and public health importance in tropical and subtropical areas. The disease is endemic in 74 developing countries, infecting more than 200 million people. Of these, 20 million suffer severe consequences from the disease (WHO and UNICEF, 2008). Sound environmental sanitation management ensures that appropriate interventions are introduced and implemented to promote behaviour change.

Poor environmental sanitation or hygiene also has tremendous economic costs. The health impact of inadequate environmental sanitation leads to a number of financial and economic costs including direct medical costs associated with treating sanitation-related illnesses and lost income through reduced or lost productivity and the government costs of providing health services. Additionally, poor sanitation also leads to reduced income from tourism (due to high risk of contamination and disease) and clean up costs. A World Bank country environmental analysis conducted in Ghana has shown that health cost resulting from poor water, sanitation and hygiene is equivalent to 2.1% of Annual Gross Domestic Product (GDP). (UNICEF, 2008)

The significant economic benefits of good environmental sanitation are not well known; the media often emphasise on health benefits, but the time savings and opportunity cost are equally important stories. Environmental sanitation management ensures that there is prudent allocation of limited resources tailored to the needs of the people to ensure economic sustainability. On the one hand, a healthy people produce more and miss fewer days and on the other hand, a healthy community is often a more lucrative market for goods, services and investment.

Every dollar spent on improving sanitation generates economic benefits (about nine times) that far exceed the required sanitation investments. The cost of inaction is enormous. Achieving the MDG for sanitation would result in \$66 billion gained through time, productivity, averted illness and death. It is estimated that a 10 year

increase in average life expectancy at birth translates into a rise of 0.3-0.4 per cent in economic growth per year (WHO, 2008).

Poor environmental sanitation practices also affect the environment in diverse ways. In regions where a large proportion of the population are not served with adequate water supply and sanitation, sewage flows directly into streams, rivers, lakes and wetlands, affecting coastal and marine ecosystems, fouling the environment and exposing millions of children to disease. Particularly in the context of urbanization, indiscriminate littering, domestic wastewater, sewage and solid waste improperly discharged presents a variety of concerns as these promote the breeding of communicable disease vectors as a result of air, water and soil pollution.

Poor waste management also contribute to a loss of valuable biodiversity. In the case of coral reefs, urban and industrial waste and sewage dumped directly into the ocean or carried by river systems from sources upstream, increase the level of nitrogen in seawater. Increased nitrogen causes overgrowths of algae, which in turn, smother reefs by cutting off their sunlight.

Improved environmental sanitation management reduces environmental burdens, increases sustainability of environmental resources and allows for a healthier, more secure future for the population.

2.4 Environmental Sanitation Policy and Government Institutions

Environmental sanitation management necessarily requires the assignment of responsibilities to specialised institutions involved in overseeing the use of natural resources. As such, a number of institutions have been established to guide and coordinate all activities involving the appropriation of natural resources.

Benneh (2007) argues that, the successful management of environmental resources in any country depends to a large extent on the effectiveness of the institutional arrangements put in place by government for their management. These institutional arrangements refer to the types of organizational units involved, such as ministries, agencies, and committees, and to the responsibilities and authorities of these units, and the relationships between them.

2.4.1 Institutional Structure

At the national level, there are four ministries involved in environment and sanitation. The Ministry of Local Government and Rural Development (MLGRD), and the Ministry of Water Resources Works and Housing (MWRWH) have been the primary ministries involved in policy-making for sanitation and water, respectively. The other two ministries involved in environmental sanitation are the Ministry of Environment, Science and Technology and the Ministry of Health, which handles health data, contributes to policy-making, setting standards, and hygiene education.

2.4.2 Ministry of Local Government and Rural Development (MLGRD)

MLGRD is the lead agency in the sanitation sector. It is responsible for creating and coordinating sanitation policy, issuing guidelines on sanitation services and their management, and for supervising the National Environmental Sanitation Policy Coordinating Council (MLGRD, 1999). In theory, institutional responsibilities for sanitation are clear, with the Ministry of Local Government and Rural Development (MLGRD) having overall responsibility for formulating environmental sanitation policies.

2.4.3 Ministry of Environment, Science and Technology (MEST)

The Ministry of Environment, Science and Technology exist to establish a strong national scientific and technological base for accelerated sustainable development of the country to enhance the quality of life for all. The overall objective of MEST is to ensure accelerated socio-economic development of the nation through the formulation of sound policies and a regulatory framework to promote the use of appropriate environmentally friendly, scientific and technological practices and techniques and the intensification of the application of safe and sound environmental practices.

2.4.4 Environmental Protection Agency (EPA)

The Environmental Protection Agency is the leading public body responsible for protecting and improving the environment in Ghana. Its job is to make sure that air,

land and water are looked after by everyone in today's society, so that tomorrow's generations inherit a cleaner and healthier world.

The Environmental Protection Agency (EPA) seeks to ensure environmentally sound and efficient use of both renewable and non-renewable resources, to prevent, reduce, and as far as possible, eliminate pollution and actions that lower the quality of life; and to apply the legal processes in a fair, equitable manner to ensure responsible environmental behaviour in the country.

According to Vodounhessi (2006), the Environmental Protection Agency is very collaboration-oriented, which weakens its regulatory abilities. There is also, a need to update enforcement procedures for sanitation bye-laws. Some fines are “ridiculously low” and still listed in British currency (Amoaning, 2006).

2.5 National Environmental Sanitation Policy

Ghana's National Environmental Sanitation Policy (ESP) was developed in 1999 in consultation with a variety of stakeholders and covers the broad spectrum of environmental sanitation including solid and liquid waste, industrial and hazardous waste, storm water drainage, environmental and hygiene education, vectors of disease, and disposal of the dead (Republic of Ghana, 1999). The policy was developed by the Ministry of Local Government and Rural Development (MLGRD). It is a fairly concise document that sets out basic principles and objectives, identifies roles and responsibilities and also covers environmental management and protection, legislation and funding among others.

The Environmental Sanitation Policy is aimed at developing and maintaining a clean, safe and pleasant physical environment in all human settlements, to promote the social, economic and physical well-being of all sections of the population. It comprises a number of complementary activities, including the construction and maintenance of sanitary infrastructure, the provision of services, public education, community and individual action, regulation and legislation (MLGRD, 1999).

The policy identifies many of the major problems and constraints in environmental sanitation, including the lack of assigned roles for governmental bodies, the lack of

capacity and skilled professionals at all levels, and the problems associated with the transfer of responsibilities for environmental sanitation without the corresponding budget, personnel, and equipment transfers. The policy then lays out its strategy to deal with these problems. Key items in the strategy include:

- a) Defining the roles and responsibilities related to environmental sanitation of institutions from the national ministries down to unit committees, community organizations, and the individual;
- b) The privatization of environmental sanitation services;
- c) The creation of a National Environmental Sanitation Policy Coordinating Council (NESPoCC) and a District Environmental Sanitation Fund (DESF); and
- d) The phasing out of pan latrines (by 2010). Targets were set for 2020 (except for the phase-out of pan latrines, which was targeted for 2010).

This has allowed the government a lot of flexibility. Each of the above components is discussed below.

- (a) Roles and responsibilities. The policy clearly states the role of actors at a variety of levels of government. Evaluations of Ghanaian sanitation policy and governance conducted by Tayler & Salifu in 2005 identified loopholes in the activities and coordination between some ministries and institutions and thus recommended an update to include the roles of the MWRWH and Community Water and Sanitation Agency (CWSA), and to clarify the roles of some other institutions and ministries (e.g., Ministry of Health).
- (b) The Policy also outlines the roles and responsibilities of the Community and Individuals. Ensuring good environmental sanitation is the responsibility of all citizens, communities, private sector, enterprises, NGOs and government institutions. All these actors have an essential part to play in maintaining a high standard of environmental sanitation. The policy indicates that, every individual, establishment or institution shall be responsible for:
 - Cleansing within and in the immediate environs of the property they occupy, including access ways and the drains and roads abutting the property;
 - Temporary storage of wastes within the property and disposal thereof outside the property, as may be directed by the competent authority;

- Taking measures to prevent the breeding of disease vectors within and in the immediate environs of the property they occupy;
- Ensuring that the wider environment is not polluted or otherwise adversely affected by their activities;
- Hygienically disposing of all wastes they generate in public areas by use of an authorised public toilet or solid waste container as appropriate;
- Participating in all communal environmental sanitation exercises organised by the community or its representatives (MLGRD, 1999, p. 6).

The policy also entrusts in the Assemblies the power to promulgate bye-laws and regulations to help in their environmental sanitation management process. To complement these efforts, the Judiciary is expected to establish and empower Community Tribunals to prosecute offenders against environmental sanitation bye-laws and regulations (MLGRD, 1999, p19). This is a clear opportunity for KMA to enact strict environmental sanitation bye-laws to make the city inhabitants responsible for environmental sanitation in Kumasi to ensure good environmental sanitation practices.

2.6 Environmental Sanitation Bye-Laws in the Kumasi Metropolitan Area

Sound environmental law and governance are essential for protecting the natural environment and the life and livelihoods that depend on it. Governance here refers to the Assembly's use of a range of legal tools to require or promote desired behaviour. These tools could be traditional regulations, environmental assessments, information disclosure requirements, market mechanisms, economic incentives, or public policies to promote voluntary action on a scale that will enhance urban environmental sanitation and environmental protection. Details of the sanitation Bye-laws are presented in Appendix 2 on page 84. The summary of the Bye-laws includes the following:

- Kumasi Metropolitan Assembly (House Owners and Occupier) Bye-Laws, 1995.
 - This bye-law defines the responsibilities of house owners, property owners, tenants or other occupants in keeping their immediate environment clean. It also

prescribes the punishment that should be meted out with offenders of the bye-laws.

- Kumasi Metropolitan Assembly (Sanitation) Bye-Laws, 1995. – This bye-law also covers general sanitation or hygiene. It describes what constitutes a sanitation offence and what should not be done by both property owners and pedestrians to cause pollution in the city.
- Kumasi Metropolitan Assembly (Cleansing) Bye-Laws, 1995 – The cleansing bye-law regulates activities that promote visual pollution and nuisances and prescribes penalties for such offences.

2.7 Significance of Community Participation in Environmental Sanitation Management

As part of the governance debate issues concerning participation, participatory governance and participatory approaches have been investigated. From a normative perspective, a core argument is that more inclusive forms of (local) government constitute approaches to ensure broader participation in urban environment initiatives which in turn will lead to better results in implementation (Menegat, 2002)

According to Hueting (1980) and Blaikie and Brookfield (1987), the issues related to environmental degradation is not only technical or engineering ones, but more socio-economic. Thus, the understanding of such factors affecting the community's collective action is crucial to any efforts aimed at championing people's participation of such resources.

The UNEP (2000) recommends community participation in environmental sanitation problem-solving using the Participatory Hygiene and Sanitation Transformation (PHAST) approach. The PHAST approach encourages local participation in defining problems and solutions related to water, sanitation and disease control. The community itself analyses its own beliefs and practices and then decides what needs to be changed. Outside experts, such as local health personnel, water and sanitation engineers and social scientists also participate and share information with the

community. This is based on the principles that; Communities can and should determine their own priorities for disease prevention. When people understand why improved sanitation is to their advantage, they will act. Also all people, regardless of their educational backgrounds, are capable of understanding that poor environmental sanitation promotes diseases and can be harmful, and can learn to trace and describe the faecal-oral route of disease transmission in their own environment. Communities can identify appropriate barriers to block disease transmission.

Commitment from the local government to improve environment performance and establish policies for the purpose is very important. A strong commitment from the local government to be inclusive, develop political support, or show leadership will necessitate the involvement of the community. A prudent local government will involve the community in order to ensure broad commitment from all residents of the city. This will also ensure acceptance and ownership of its policies and programmes with the community. The local government has to develop and implement the necessary measures to enable various urban stakeholders to perform their tasks and implement their programmes/projects on the environment (This is a departure from the usual position of a local government as a 'provider' of services to a 'facilitator' of action).

Community participation calls for people to participate in planning, implementing and managing their local environment. Community participation means a readiness on the part of both local governments and the citizens to accept equal responsibilities and activities in managing their surroundings (UNEP, 2005).

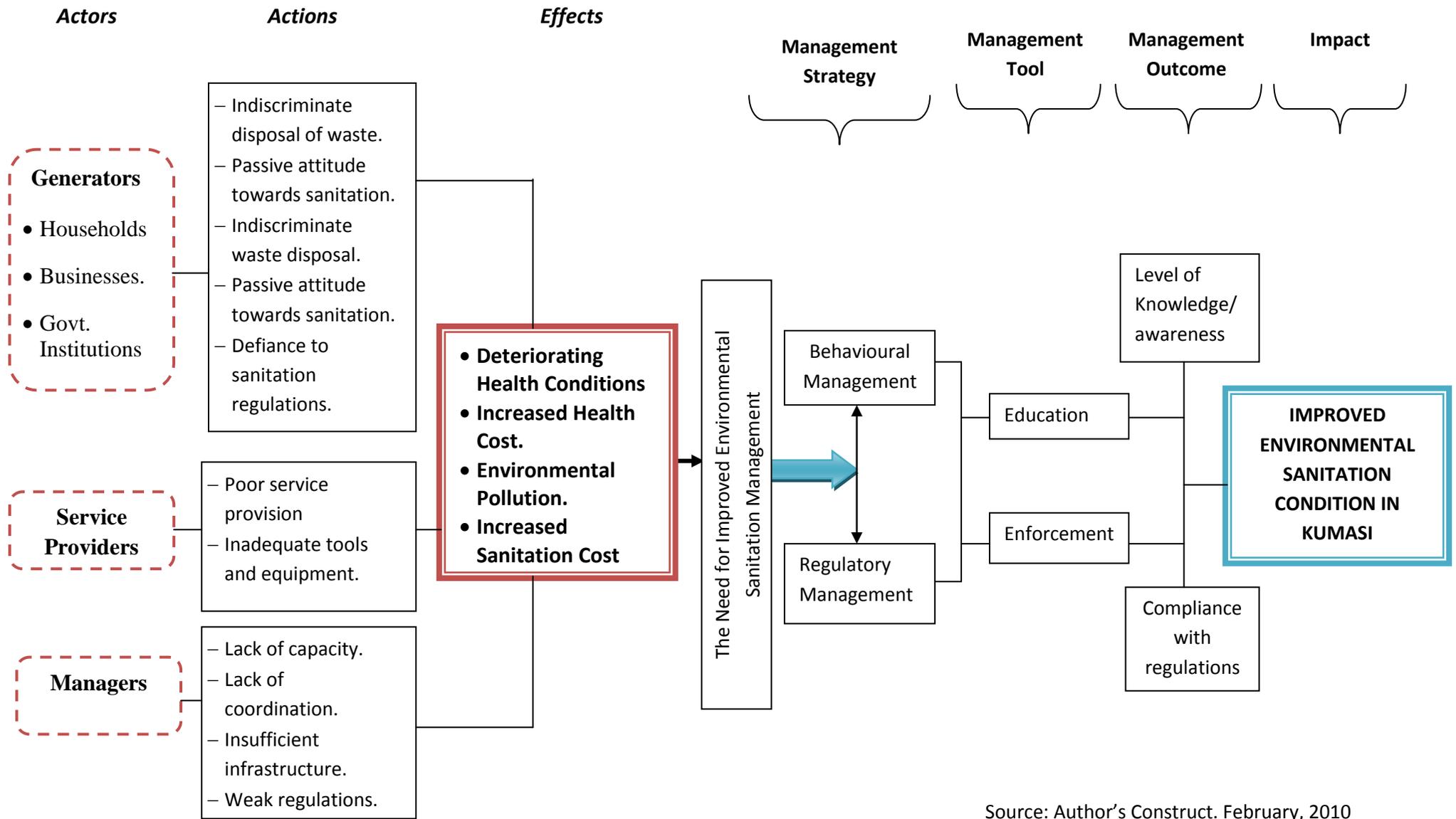
2.8 Conceptual Framework

Figure 2.2 presents the conceptual framework for improving environmental sanitation conditions in the Kumasi Metropolitan Area. There are three actors in environmental sanitation management. These include generators which comprise households, businesses and government institutions. They generate waste and use sanitation services. Service providers form the next group of actors and they include private companies contracted to provide sanitation services. The managers constitute the third group of actors and they include government agencies or departments in the

Metropolitan Assembly responsible for planning, organising, staffing, directing and controlling, activities to ensure good environmental sanitation in the metropolis. Managers and service providers are required to render satisfactory sanitation services. When these service providers fail to effectively carry out their responsibilities, it results in poor environmental sanitation condition. When the generators do not appropriately dispose of waste, they promote poor environmental sanitation condition in Kumasi. All these negative activities when left unchecked, lead to deteriorating health conditions of the people, increased health cost, environmental pollution and increased cost of providing sanitation services. These therefore call for a new management approach to improve sanitation.

The two management strategies that could be adopted to improve environmental sanitation are behavioural management and regulatory management. These management strategies involve activities that would ensure that people understand the consequences of poor environmental sanitation practices and the benefits that would accrue to everyone if people adopt good behaviour towards the sanitation. This could be done through education. The other complimentary management strategy is regulatory management. This involves activities that would ensure that people comply with good sanitation standards which can be done through enforcement of sanitation regulations. The tools for achieving these strategies are through education and enforcement. When people are well educated about environmental sanitation, they become proactive and can organise themselves to secure facilities that would ensure good sanitation condition in their locality, even when these are not provided by the local government. When these two management strategies are well implemented, they would lead to good environmental sanitation condition in Kumasi.

Figure 2.2 Conceptual Framework



Source: Author's Construct. February, 2010

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes and analyses specific research methods and techniques used for the study. It also looks at the appropriate data collection procedures and the tools used for the data analysis.

3.2 Research Approach

The case study design was adopted for this study. It is an empirical enquiry that allowed the researcher to investigate and understand the current environmental sanitation phenomenon in Kumasi. This approach was preferred because it provides a systematic way of looking at events, collecting data, analysing information and reporting results. It is used to narrow down a very broad field of research into one easily researchable topic.

The research study employed various methods and strategies to obtain relevant information to provide answers to questions posed and assisted in drawing suitable conclusions after the data had been analysed. A combination of qualitative and quantitative data were gathered for the data analysis. Those aspects that relate to human behaviour and therefore not easily measurable were investigated using qualitative methods.

3.3 Units of Analysis

The units of analysis for the research include the following:

1. Households.
2. Businesses (Commercial).
3. Metropolitan Environmental Health Unit.
4. Waste Management Department.
5. Sanitation Service Providers in the metropolis such as Zoom Lion, Mess World Ltd, Kumasi Waste Ltd, ABC Company Ltd and Waste Group Ltd.
6. Metropolitan Health Directorate of the Ghana Health Service (GHS).

7. Town and Country Planning Department.

3.4 Data Collection

3.4.1 Secondary Data

Secondary data were obtained from journals, books, articles, newsletters, magazines, the internet and published and unpublished materials. The researcher also obtained data from existing documents of related institutions and departments, some national and international records and experiences on environmental sanitation management to ensure that the research outcomes and experiences on environmental sanitation management are logically explained. Information was gathered from the records of the Planning Office of the Kumasi Metropolitan Assembly, The Metropolitan Health Department, The Waste Management Department, The Regional Health Directorate, the Komfo Anokye Teaching Hospital and the Environmental Sanitation Policy document from the Ministry of Local Government Rural Development (MLGRD).

3.4.2 Primary Data Collection

These are data observed or collected directly from first-hand experience. The primary data collection methods that were employed for the research include the following;

i. Rapid Appraisal Survey (Observation)

The Rapid Appraisal Method is suitable for situations that do not require elaborate statistical data to establish the nature of an event or situation before taking decision (Kumekpor, 2002 p.124). Considering the self evident nature of the environmental sanitation situation in the Kumasi metropolis, visits to suburbs and public places were undertaken to have an in-depth knowledge and understanding of the situation. Environmental sanitation issues are social issues, as such, in social policy issues, the Rapid Appraisal survey is used in urban renewal cases where visits to sites provide vivid and picturesque on-the-scene data on which to appraise issues involved (Kumekpor, 2002 p.125).

ii. Interviews

The researcher conducted interviews to obtain information from households about the subject matter. Personal interview questionnaires which involve the interviewer asking questions and recording the answers in the questionnaires was used to obtain information from 156 households. This method was adopted considering the literacy level of some of the respondents and also for the interviewer to create a rapport to make the respondents confident to provide answers to questions. The type of interviews that were conducted are listed below.

a) Household interviews

Considering the low literacy levels among some of the respondents, especially, in the traditional and some of tenement housing sectors, the use of self-administered questionnaires would have been limited to some extent. According to Bulmer & Warwick (1983), the checklist approach is preferred to self administered questionnaires when the literacy levels are not so high among the respondents. The questionnaires were designed in such a way that key questions concerning solid waste disposal, assessment of local environmental condition and knowledge about environmental sanitation regulations were easy to understand and were well answered. Variables such as availability of waste bins, closeness to waste bins, responsibility for cleaning the immediate surroundings, type of sanitary facilities (toilets and urinals) available, their conditions and closeness, personal measures to prevent filth and promote hygiene in the immediate surroundings among others were investigated.

b) Institutional Interviews

Formal interviews were also conducted in some selected institutions responsible for ensuring good environmental sanitation practices in Kumasi. This helped to assess their efforts and capacities in addressing environmental sanitation management concerns and the enforcement of environmental sanitation bye-laws in the Kumasi metropolis. The heads of institution that were interviewed include:

1. The Metropolitan Assembly Officials (Metro Environmental Health Director).
2. The Regional Health Directorate.

3. Waste Management Department.
4. The Town and Country Department.
5. Regional Environmental Health Directorate.

The interview with the KMA officials provided an overview of the current environmental sanitation situation in Kumasi, problems of enforcement of environmental regulations and bye-laws, policy interventions as well as strategies to manage environmental sanitation in the metropolis. More importantly, they helped explain the socio-cultural and political issues affecting their environmental sanitation management strategies.

3.5 Sampling

Kumasi is a metropolis with a population of 1,915,170 people (KMA, 2009). It encompasses about 90 suburbs. There are 10 Sub-Metropolitan Assemblies (Sub-Metros) in the metropolis. Each of the 90 suburbs falls under one of the 10 Sub-Metropolitan Assemblies. The 10 Sub-metros include: (1) Asokwa Sub Metro, (2) Bantama Sub Metro, (3) Kwadaso Sub Metro (4) Manhyia Sub Metro (5) Nhyiaeso Sub Metro (6) Oforikrom Sub Metro (7) Old Tafo Sub Metro (8) Suame Sub Metro (9) Subin Sub Metro and (10) Asawase Sub Metro.

A blend of sampling techniques were used to select the units of the population for the study in order to extend the knowledge gained about the unit selected to the whole population.

3.5.1 Sampling Method

The researcher used both probability and non probability sampling methods in selecting the samples for the study. Simple random sampling was used to select the sample suburbs to ensure that each suburb stood equal chance of being selected for the study.

3.5.2 Sampling Frame

The researcher took the time to visit most suburbs in all the ten Sub-Metros to identify the peculiar characteristics of each of the sub-metros. Stratified sampling method was

used to group all the suburbs in each Sub-metro into three classifications based on the common characteristics of the houses, that is, the type of house, access to sewage, type of waste collection service and access to sanitation facilities (toilets). These were:

- The high-cost sector,
- The tenement sector and
- The indigenous sector.

The high cost sector comprises single-family high income housing, blocks of flats, privately built estates and government-built high income estates. These suburbs are not served by public toilets and public or communal waste disposal sites.

The tenement sector includes the multi-storey compound houses and private middle income housing. This sector usually has toilet facilities in the house and is sometimes served by either house-to-house waste collection service or communal waste disposal sites. It has well laid out drains (gutters) on streets.

The indigenous sector includes the traditional houses such as compound houses. These are usually single storey with rectangular courtyard (Adarkwa and Post -Eds, 2001). These suburbs are usually served by communal waste disposal sites, public toilets and sometimes, the suburbs lack concrete drains or sewage.

After obtaining the three housing classifications, the researcher then used stratified sampling method to group the suburbs from each of the sub-metros under the high cost, the tenement and the traditional housing sectors based on their characteristics. Using simple random sampling from Microsoft Excel, two suburbs were randomly selected from each of the three housing sectors to obtain six suburbs as study areas. These six suburbs represented the high cost, the tenement and the indigenous housing sectors. Table 3.1 presents the list of the suburbs selected for the study and their respective housing sectors.

The selection of a household from a house for the study was also based on the availability and willingness of the person contacted to respond to the questionnaire.

However, using the purposive sampling method, more women were selected for the study than men. This was done because in the culture of the study population, women are responsible for managing sanitation in the home, and as such provided more and accurate information on a particular subject than men.

Some of the selected suburbs had more housing stocks than other suburbs such that, using the formula for the allocation of the respondents, some suburbs would have had few number of respondents such that, their responses would not be enough to represent the whole suburb. To avoid biased representation, the researcher used the quota sampling method to allocate equal number of respondents from each unit, that is, 26 respondents for each of the six suburbs selected for the study.

Table 3.1: Housing Classification for Units of Analysis

First Housing Classification	Second Housing Classification	Third Housing Classification
Ahodwo-Nhyiaeso	Asokwa	Kaase
Atasomanso New Site	Asafo	Asawase-Zongo

Source: Author's Construct, April 2010.

In selecting the businesses for the study, the researcher used respondents from the Central Business District (CBD) of Kumasi. This was done because the CBD is the hub of the city where all roads in the metropolis merge. It has sanitation problems and almost everyone who visits the city comes into contact with the CBD. Again, the CBD has a special characteristic of having business owners from all the sub-metros in Kumasi and diverse types of businesses. Selecting them allowed a fair representation from all the sub-metros. The same number of respondents (26 respondents) from the suburbs was used to collect information from business owners in the CBD.

3.5.3 Sample Size

It was necessary to take a part of the population from which information was drawn from to represent the entire population in the selected suburbs. A sample size of 152

was drawn from the sample frame at a confidence level of 92 per cent. The estimation of the total sample size was derived from the formula below:

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

Where;

n is the sample size

N is the total number of houses.

α is the margin of error

Table 3.2: Calculation of Total Number of Houses (N) of the Study Areas

Suburb	No. Houses
Asafo	587
Asokwa	1102
Asawase Zongo	2525
Kaase	547
Ahodwo Nhyiaeso	270
Atasomanso New Site	796
N	5827

Source: KMA 2010

N= 5827 houses

$\alpha = 0.8\%$

n. = 156 houses.

Based on the formula, the total number of houses that were selected for the study was 152 houses.

CHAPTER FOUR

PROFILE OF THE KUMASI METROPOLITAN AREA

4.1 Introduction

This chapter presents the profile of the Kumasi Metropolitan Area. The profile explains the economic, social and environmental characteristics of Kumasi. It further explains the implications of these characteristics on the management of environmental sanitation in the metropolis. Figure 4.2 is the map of Kumasi with divisions into the ten sub-metros.

4.2 Historical Background

The city of Kumasi was founded in the 1680's by King Osei Tutu I to serve as the capital of the Asante State. Given its strategic location and political dominance, Kumasi developed into a major commercial centre with most major trade routes in Ghana converging on it. However, it came under the influence of the British rule in 1890. With time, the city began to expand and grow thereby making it second only to Accra in terms of land area, population size, social life and economic activity.

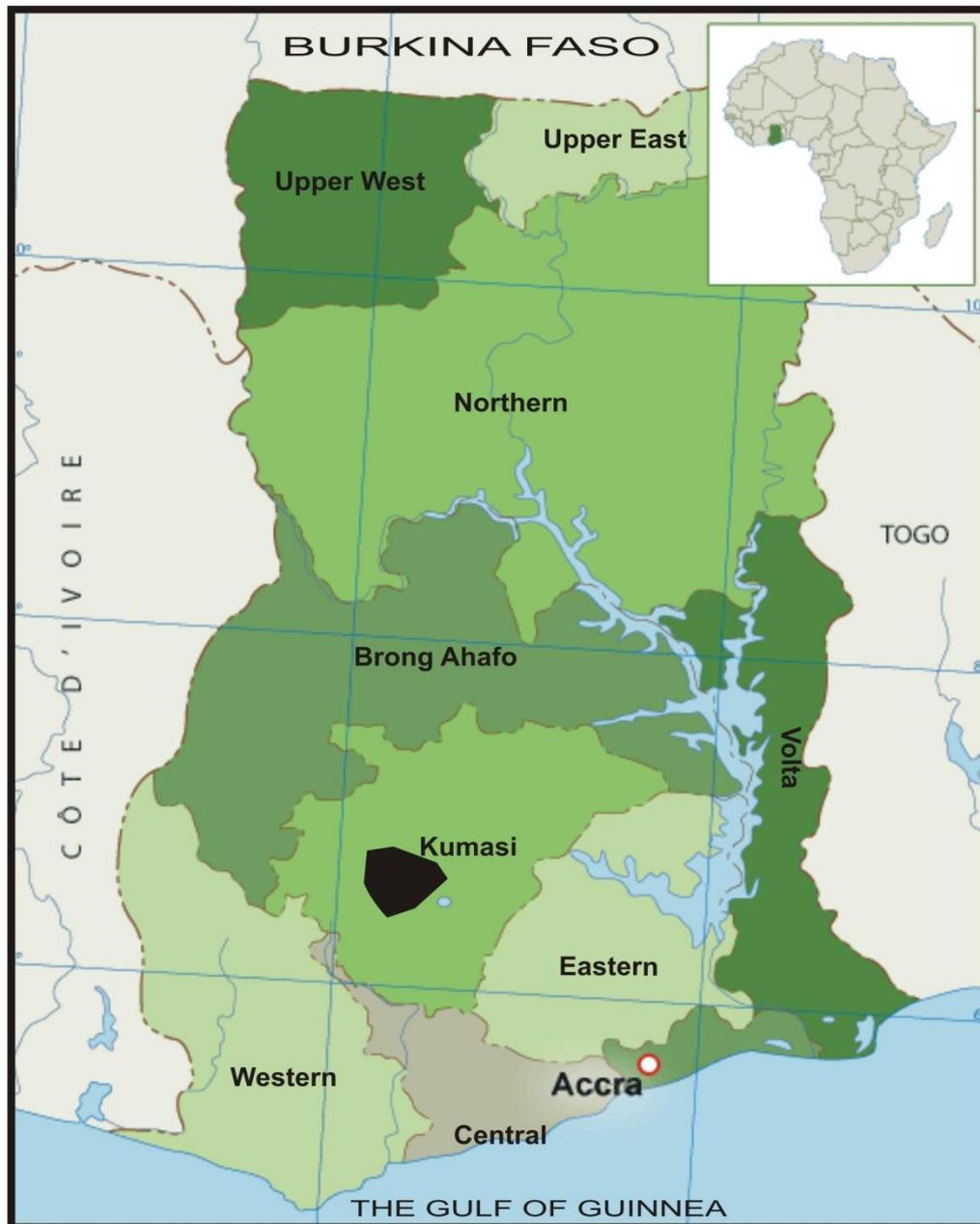
Its beautiful layout and greenery accorded it the accolade of being the "Garden City of West Africa". From the three communities of Adum, Krobo and Bompata, it has grown in a concentric form to cover an area of approximately ten (10) kilometers in radius. The direction of growth was originally along the arterial roads due to the accessibility they offered resulting in a radial pattern of development. It encompasses about 90 suburbs, many of which were absorbed into it as a result of the process of growth and physical expansion. The metropolis has further been sub divided into ten sub-metros for administrative purposes.

4.1.1 Location and Size

Kumasi is located in the transitional forest zone and is about 270km north of the national capital, Accra. It is between latitude 6.35° – 6.40° and longitude 1.30° – 1.35° , an elevation which ranges between 250 – 300 metres above sea level with an area of about 254 square kilometres. The unique centrality of the city as a traversing

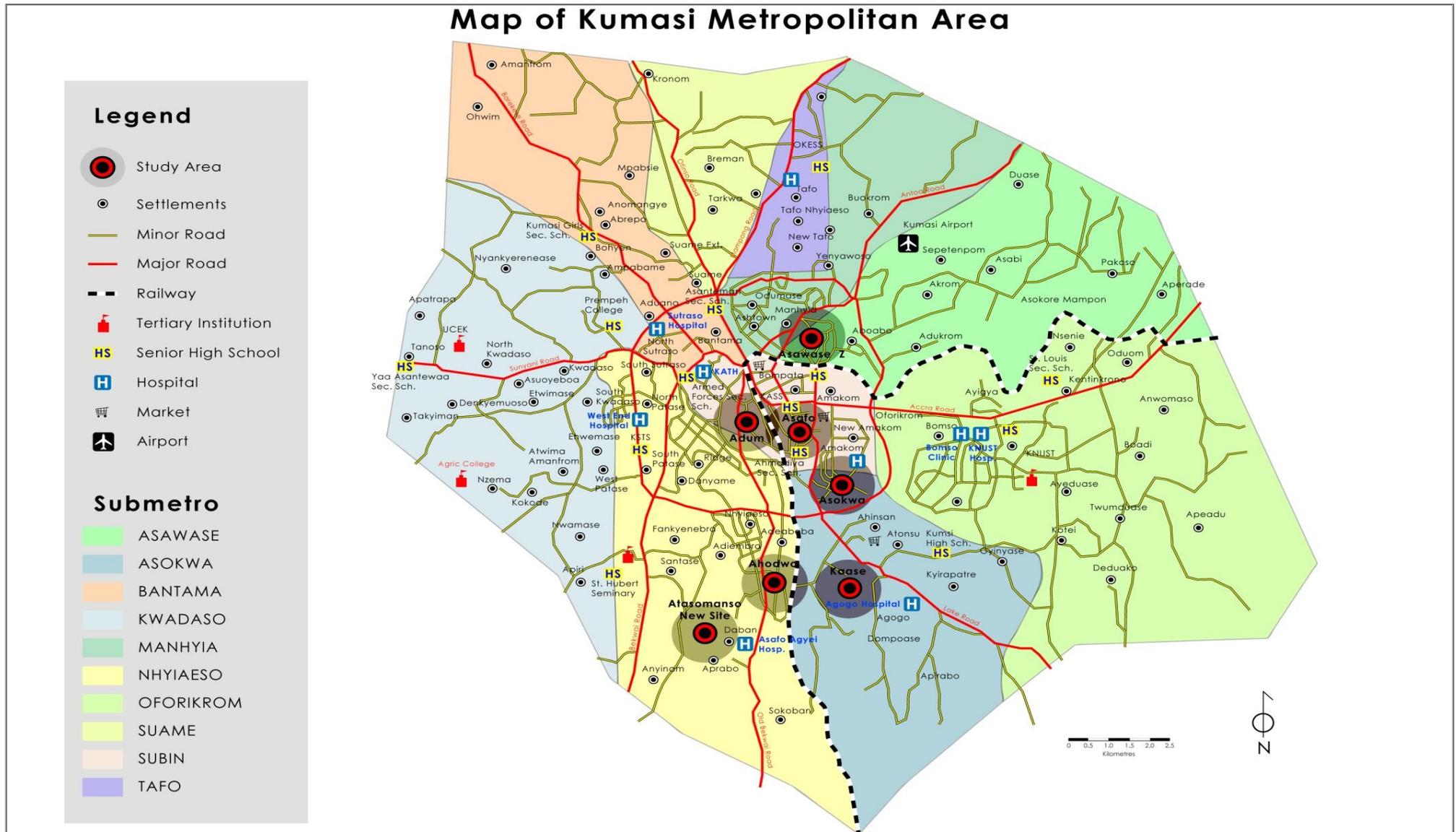
point from all parts of the country makes it a special place for many to migrate to. Figure 4.1 is the administrative map of Ghana showing Kumasi in the Ashanti region.

Figure 4.1. Regional Map of Ghana.



Source: www.googlemaps.com, 2010.

Figure 4.2: The Map of Kumasi Showing the Locations of the Study Areas



4.1.2 Population Size and Growth Rates

Kumasi is the second populous district in Ghana after the capital, Accra. It recorded a figure of 1,170,270 during the 2000 Population Census. It has been projected to have a population of 2,022,919, by the end of 2010, based on a growth rate of 5.47 per cent per annum. Kumasi has attracted such a large population partly because it is the regional capital, and also the most commercialised centre in the region. Other reasons include the centrality of Kumasi as a nodal city with major arterial routes linking it to other parts of the country and also the fact that it is an educational centre with two state universities, private universities, a polytechnic, two teacher training colleges, senior high schools and a host of basic schools.

A high population growth has serious environmental consequences if it is not accompanied by good and technology oriented infrastructure and service provision. Rapid population growth means high rate of waste generation, overcrowding and pressure on existing environmental sanitation infrastructure and sanitation service. When such a high population is anticipated there is the need for planning for new infrastructure and maintenance of existing ones to prevent them from running down as a result of excessive pressure.

4.1.3 Ethnicity

Although the metropolis is Asante dominated, almost all the other ethnic groups in Ghana are represented. Ethnic and cultural diversity abounds tremendously, but they are closely knit together in a harmonious relationship. (KMA 2006)

The diverse ethnic groups in the area can be attributed to the following factors;

- The rate of in-migration into the metropolis as a result of its strategic location and also rapid urbanization.
- The ability of these diverse ethnic groups to co-exist with each other and share cultural values.
- Presence of a strong traditional administrative set-up that galvanises cohesion among the diverse ethnic groups.

Diverse ethnic group means different beliefs and practices as well as attitudes towards environmental sanitation. This is evident in the sanitation conditions in some neighborhoods in the metropolis. Many of these beliefs may be obstacles but some may be supportive of the construction or provision of environmental sanitation services. Health and hygiene promotion must be adapted to the local culture.

4.3 Physical Characteristics

4.3.1 Housing

Houses in the metropolis can be classified into about five types. These include: single storey traditional compound houses, multi-storey compound houses, government – built detached or semi-detached for low-income households, large single household houses built on relatively large plots and block of flats.

The housing environment in some parts of Kumasi especially Oforikrom, Moshie Zongo, Sawaba, Ayigya Zongo and Aboabo are unsightly and characterized by poor drainage and sanitation.

The 2000 population census kept the housing stock at 67,434 and the regional housing stock at 328,751. Kumasi has 20.5 per cent of the regional housing stock. The city keeps expanding with new housing infrastructure. Old houses in the city centre are currently being pulled down to make way for new and ultra-modern structures. Most of these buildings, especially those built in the city centre do not have adequate sanitation facilities as every little space is sold or rented out to people. In some cases, house owners turn toilets into rooms and rent them out to people. This is an indication of weakness in enforcing housing regulations in Kumasi, and consequently, defeats the Metropolitan Assembly's long term goal of reducing dependence on public toilet in favour of household facility usage.

4.3.2 Access to Roads

Road transportation has been dominant in Kumasi, since air and rail transports just account for less than one per cent of the daily movements of goods and persons within the metropolis. The road network is radial with Kejetia and Adum being the hub of the network. All major roads converge at Kejetia. All the major arterials such as the

Accra Road, Mampong Road, Sunyani Road and Offinso Road radiate from the Kejetia/Adum area, which forms the core of the central business district (CBD).

The current state of the road network is as follows;

Inventoried Road Length 846km

Unpaved Road Length 575km

Paved Road Length 271km

Out of this, the city has 100km asphalted surface and 171km bitumen road. (KMA 2010)

The predominant means of travel within the city is by use of the road. The city has been planned with Arterial Roads, Collector Roads, the roads that link the arterial road network and local roads, as the name suggests are roads that link residences to the collectors and within local communities. Construction of new roads serves as an opportunity for the Assembly to improve the drains in the city and to improve sanitation.

4.3.3 Water Supply

Water is essential for the survival of humanity. The provision of treated water to the inhabitants of the city is a civic responsibility of the city administration. The presence of good treated water is essential for good health and the elimination of some water borne diseases. The supply of water to the Kumasi metropolis is from two surface water treatment plants; Owabi and Barekese headworks located 10km and 16km respectively from Kumasi. The supplies of water from these headworks serve the city as well as surrounding communities outside the metropolis. The Owabi headwork is operating at full capacity whereas the Barekese headworks have a potential for further expansion to increase production.

4.4 Economic Characteristics

Kumasi serves as entrepreneurial and cultural hub of Ghana. There is high migration and a day time population of 2,300,000 people (KMA 2010). The major economic activity is centred on wholesaling and retailing. Trade/service/commerce constitutes

71 per cent of economic activities; industry is 24 per cent and agriculture is 5 per cent.

The major economic activity points are:

- Central Market (The largest open air market in the ECOWAS Sub-region).
- Adum Shopping Centre (Described as the Heart Beat of Commerce).
- Suame and Asafo Magazines.
- Kaase/Asokwa Industrial Area and Sokoban Timber Products Market.

The Kumasi Central Market is the single largest traditional market in West Africa. It has over 10,000 stores. There are also about thirty-three (33) satellite or neighbourhood markets in the metropolis. This explains the surge in day-time population. People travel from all over the country to trade in Kumasi. The result of this is huge waste generation in the city. The high number of traders is also accompanied by high demand for sanitation infrastructure and services.

4.4.1 Tourism

It is estimated that 50 per cent of tourists who visit the country visit Kumasi (KMA 2010). The city has an outstanding rich cultural heritage, which is depicted in festivals like Akwasidae, funerals etc. There are also many recreational or tourist centres accessible from Kumasi. Aesthetic considerations, cleanliness, comfort, health and safety are preconditions for a thriving tourism industry, a large and growing area of economic opportunity. These, nonetheless, requires a good environmental sanitation in the metropolis.

4.5 Environmental Characteristics

4.5.1 Conditions of the Natural Environment

Kumasi falls within the moist semi-deciduous section of the South East Ecological Zone. It is drained by a number of rivers and streams. However, as a result of the effects of the urban sprawl and population growth, the natural environment has been altered. Estate developers have encroached upon the green reserves. In addition to this, the water bodies have been greatly polluted from human activity to the extent that some are near extinction (KMA, 2006). Even the few patches of greens along the

waterways have been cleared for agricultural purposes leading to siltation. Some developers have also built along and across watercourses resulting in occasional flooding in some areas in Kumasi. Industrial and vehicular emissions have also affected the quality of air in the city.

4.5.2 Vegetation and Drainage

Predominant species of trees found in Kumasi are ceiba, triplochlon, celtis with exotic species. The rich soil has promoted agriculture in the periphery. A patch of vegetation reserve within the city has led to the development of the Kumasi Zoological Gardens. Apart from the zoological gardens, there are other patches of vegetation cover scattered over the peri-urban areas of the metropolis. However, the rapid spate of urbanization has caused the depletion of most of these nature reserves. The city is traversed by major rivers and streams, which include the Subin, Wiwi, Sisai, Owabi, Aboabo, Nsuben among others. However, biotic activity in terms of estate development, encroachment and indiscriminate waste disposal practices have impacted negatively on the drainage system and have consequently brought these water bodies to the brink of extinction (KMA, 2006).

4.5.3 Conditions of the Built Environment

The passage of the Town and Country Planning Ordinance, Cap 84, marked the genesis of organized development of Kumasi in 1945. The Plan designated Kumasi as the “Garden City of West Africa” and declared the city among other regional capitals as a statutory planning area. This and other planning schemes (the Kumasi Outline Planning Scheme implemented from 1963 to 1988) sought in broad terms to provide the framework for social, economic, physical, infrastructure and environmental growth of the city.

It is estimated that 48 per cent, 46 per cent and 6 per cent of the metropolis are urban, peri-urban and rural respectively (KMA Development Plan, 2006), confirming the fast rate of urbanization. In terms of housing types the city has been categorized into high-income area, government area, indigenous areas and tenement area (Adarkwa and Post -Eds, 2001).

The high rate of population growth coupled with the high migrant numbers has outstripped the rate of infrastructure development and service provision. Most of the facilities have exceeded their carrying capacities. Lands in the newly developing suburbs have not been serviced, hence, estate development precedes the provision of water, telephone facilities and electricity. It is estimated that about 24% of all residential structures are uncompleted (KMA Development Plan, 2006).

The Kumasi metropolis has in recent times been experiencing both human and vehicular traffic congestion, particularly in the Central Business District (CBD). As a result of the dominance of the distributive trade in the city's economy the CBD and all the principal streets have been taken over by hawkers. The erection of wooden structures including kiosks and metal containers along the streets and on any available space is a common sight and these have greatly blighted the beauty of the city. The problem of waste management in the metropolis has been nagging. The city's authorities have therefore been groping for solutions to contain the waste management problems. Flooding is a common phenomenon in some parts of the city especially during the rainy season with occasional cholera outbreak.

4.5.4 Solid and Liquid Waste Management

The city is estimated to generate about 500,000kg of solid waste daily since 2006 and based on the 2006 projected population of 1,610,867 (2006). The Waste Management Department of KMA appears to be overwhelmed by the task of hauling all the solid waste produced in the city. The use of plastic bags as packages for drinking water and other wares and the proliferation of fast food joints which package cooked food in styrofoam, and the indiscriminate disposal of these materials in the environment constitute a major challenge for waste management in the metropolis.

4.5.5 Land Degradation

The major land degradation issues are the encroachment of forest reserves, green belts, wetlands and open areas. Some of the people involved have legal documents covering these parcels of encroached lands thereby making it difficult to assess the source of the problems. The areas of grave concerns are the Owabi and Offin

watersheds, which are the sources of water for the city and surrounding towns. Sacred groves continue to suffer from encroachment. Areas reserved as greenbelts have been taken over by shops of all sorts and small scale industries e.g. garages, soap and palm kernel oil extraction. Part of the land for the Kwame Nkrumah University of Science and Technology, which used to be a virgin forest has been rapidly degraded into farmlands. Wetlands in the area have all been degraded for farming activities. Farmers operating in the vicinity have diverted the course of the Wiwi stream, which flows through the University.

4.5.6 Water Pollution

The extent of water pollution in city is worrying and the situation continues to exacerbate. This is as a result of the flouting of fundamental hygienic practices in the metropolis. Effluent is discharged into the Nsuben River from the Septic treatment plant at Kaase. At Anloga, toilets have been built on the Sisai stream.

CHAPTER FIVE
ENVIRONMENTAL SANITATION CONDITION IN THE KUMASI
METROPOLIS: ANALYSIS AND INTERPRETATION

5.1 Introduction

This chapter presents the findings and discussion of results of field data obtained from the survey conducted in six suburbs from the various sub-metros and businesses at the Central Business District (CBD) of Kumasi. The survey was intended to ascertain the knowledge, factors that influence the attitudes and practices of waste generators and service providers and their contribution to the environmental sanitation situation in the city of Kumasi. The data to establish the above variables were generated from interviews of 156 households and 26 business owners from the CBD of Kumasi. Supplementary data were also obtained from governmental institutions and departments engaged in the management of environmental sanitation.

5.2 Generators

These are households or private individuals, businesses and institutions that generate waste in the course of their daily activities. The following data were obtained during the study about households and businesses.

5.2.1 Households

Households generate both solid and liquid waste in the course of their daily activities. They are both waste generators and consumers of sanitation services. Their desire is to have a good environmental sanitation. The following present the characteristics and waste generation behaviour of respondents from the study areas:

i. Sex and Age Distribution of Respondents

In collecting data for the study, 156 households were selected for the interview. Out of this, 113 respondents, representing 72.4 per cent were women while the remaining 43 respondents (27.6 per cent) were men. This is an indication of the role women play in sanitation management in the various households in the study area.

At Kaase, Asafo and Asawase Zongo, where much detail was required for garbage disposal, men indicated that they knew little and thus either failed to respond to some of the questions or called a woman to ask for specific answers. In charting an educational programme with the Environmental Sanitation Education component of environmental sanitation, much emphasis can be placed on women since they are actively involved in managing sanitation and hygiene in households and teach children how to handle waste.

The ages of the respondents from both households and businesses were grouped into three cohorts. This is presented in Table 5.1.

Table 5.1. Distribution of Age of Respondents

Age Group	Frequency	Percentage (%)
18 – 30	33	18.1
31 – 40	58	31.9
>40	91	50

Source: Field Survey, March, 2010.

The results in table 5.1 show that, people above age 40 constitute majority of the respondents at 50 per cent followed by those with ages between 30 and 41 at 31.9 per cent. The least cohort comprises those from age 18 to 30 constituting 18.1 per cent.

Out of the total household respondents, 50.64 per cent were landlords or landladies, 44.87 per cent were tenants and the remaining 3.8 per cent were caretakers. However, the caretakers were all from the two high cost housing sectors. The high percentage for landlords and landladies present an opportunity for identifying which type of solid waste collection service to subscribe to in the various households, since they control how household waste should be gathered and disposed of. This is because landlords and landladies wield power in the various households and they can determine how the whole household should dispose of their refuse. They can therefore be seen as key partners determining the method of solid waste disposal. That is, house-to-house or communal.

ii. Educational Level of Respondents

The educational level of people determines to a large extent the nature of their responses and their understanding of the issues at stake. From the survey, 37.18 per cent of the respondents had attended High School before, 27.56 per cent of the respondents had attended a tertiary institution, 15.38 per cent of the respondents had either attended vocational or commercial school, and 14.1 per cent attended primary school. The study showed that, 5.77 per cent of the respondents had never been to school before or attended any non-formal class. This is a positive indicator for environmental sanitation education and enforcement of sanitary regulations components as majority of the people can comprehend any effort to promote hygienic urban environment both through public education and enforcement of sanitation laws.

iii. Access to Water and Toilet Facilities

Table 5.2 presents the access to water in the houses of the various households interviewed.

Table 5.2. Community Access to Water Facilities

Suburb	Access	%	No Access	%	Total
Kaase	14	53.85	12	46.15	26
Asawase Zongo	26	100.00	0	0.00	26
Asokwa	21	80.77	5	19.23	26
Asafo	25	96.15	1	3.85	26
Ahodwo	26	100.00	0	0.00	26
Atasomanso New Site	24	92.31	2	7.69	26
Total	136	87.18	20	12.82	156

Source: Field Survey, March, 2010.

Two suburbs, Ahodwo and Asawase zongo recorded 100 per cent access to water facilities in the various houses. Three suburbs, Asokwa, Asafo and Atasomanso New Site recorded an average of 89.6 per cent access to water facilities, with the remaining 10.4 per cent with their water system disconnected due to non payment of water bills.

Kaase recorded 53 per cent access with almost half of the respondents without access to water facility at home and therefore have to resort to buying water from vendors.

The respondents from this suburb explained that, it is impossible for them to construct water closet toilets due to the unavailability of water facilities in their homes.

Respondents from the high cost housing sector had 100 per cent access to toilet facilities with average household toilet seats of four per house and an average five people per house. At Asafo and Asokwa which fall under the tenement housing sector, 77 per cent of the respondents in Asokwa had toilet facilities in the house with an average of 3 water closet toilet seats per house with an average of six people to a toilet. However at Asafo, 73 per cent of the houses had toilet facilities with an average of 3 toilet seats per house and an average of thirty-six people per house. Even though there are toilets facilities in most of the houses at Asafo, most of the households still patronise public toilets as the total number of toilet seats per house are not enough and the few ones are sometimes only used by the landlords and landladies and their families.

At Kaase, only three houses had toilet facilities but these were exclusively used by the landladies and their families. In this community, 80.8 per cent of the respondents patronise public toilets.

iv. Access to Drains

Most of the housing environments in the study areas have access to concrete drains while other parts are characterised by poor drainage. Data on drainage from the study areas are presented in table 5.3.

The study revealed that, all the households interviewed at Asawase zongo, Asafo and Ahodwo had access to concrete drains. At Atasomanso New Site, even though 38.5 per cent of the respondents did not have access to concrete drains, the respondents had septic tanks in which waste water from kitchen and bathrooms are kept.

Table 5.3. Access to Concrete Drains in the Study Areas

Suburb	Access	%	No access	%	Total
Kaase	16	61.54	10	38.46	26
Asawase Zongo	26	100.00		0.00	26
Asokwa	24	92.31	2	7.69	26
Asafo	26	100.00		0.00	26
Ahodwo	26	100.00		0.00	26
Atasomanso New Site	16	61.54	10	38.46	26
Total	134	85.90	22	14.10	156

Source: Field Survey, March, 2010.

At Kaase, some of the houses lack access to concrete drains. The survey revealed that, 21 (80.7 per cent) of the 26 respondents did not have access to concrete drains from their homes. They resort to carrying grey water from home to an open drain or let it drain on the ground. This leaves algae and stagnant water which breeds mosquitoes and flies. Plates 5.1 and 5.2 illustrate the current condition at Kaase.

Plate 5.1. Pictures Depicting Lack of Concrete Drains At Kaase



Plate 5.2. Open Drains at Kaase Causes Erosion and Expose Buildings' Foundation



Source: Field Survey, March, 2010.

Though KMA is making efforts to provide more concrete drains through the Department of Urban Roads, these are only done when there is a road construction within communities. Inadequate drains poses serious environmental sanitation threats as wastewater is not able to flow freely and causes disease vectors and stench which are detrimental to the health of inhabitants.

v. Community Environmental Sanitation

The findings about the respondents' assessment of the condition of the environmental sanitation in their neighbourhood are presented in table 5.4.

Table 5.4. Assessment of Environmental Sanitation Condition in the Various Suburbs

Suburb	Bad	%	Good	%	Total
Kaase	18	69.2	8	30.8	26
Asawase Zongo	13	50.0	13	50.0	26
Asokwa	6	23.1	20	76.9	26
Asafo	6	23.1	20	76.9	26
Ahodwo	0	0.0	26	100.0	26
Atasomanso New Site	1	3.8	25	96.2	26
Total	44	28.2	112	71.8	156

Source: Field Survey, March, 2010.

The study revealed differences in behaviour among the various housing sectors with regard to environmental sanitation. At the high cost housing sector, 100 per cent of the respondents described the environmental sanitation condition in their suburb as “good”, while 69.2 per cent and 50 per cent from Kaase and Asawase zongo respectively, both from the traditional housing sector described the sanitation condition in their suburb as bad. However, 76.9 per cent of the respondents from the tenement sector described the sanitation condition in these suburbs as good. This implies that sanitation projects or activities can be targeted at traditional housing sector and part of the tenement sector.

In the overall assessment of the environmental sanitation condition in Kumasi, 126 respondents, representing 80.8 per cent said that the environmental sanitation condition was bad while the remaining 19.2 per cent said that the environmental sanitation condition in Kumasi was good.

vi. Waste Collection and Disposal

The means of waste disposal for households are presented in table 5.5. The survey revealed that, 100 per cent of the respondents from the traditional housing sector and one suburb, Asafo, from the tenement sector patronised communal waste collection. At Ahodwo and Atasomanso New Site where 88.5 and 53.8 per cent of the

households respectively had access to the house-to-house waste collection, some households indiscriminately dispose of their refuse. For example, at Atasomanso New Site, 23.1 per cent of the respondents burn the waste they generate at home.

Table 5.5. Waste Disposal Methods in the Study Areas

Suburb	House-to-House	%	Burnt	%	Pit	%	Public sites	%	Total
Kaase		0.0		0.0		0.0	26	100.0	26
Asawase Zongo		0.0		0.0		0.0	26	100.0	26
Asokwa	18	69.2	1	3.8		0.0	7	26.9	26
Asafo		0.0		0.0		0.0	26	100.0	26
Ahodwo	23	88.5	3	11.5		0.0	0	0.0	26
Atasomanso New Site	14	53.8	6	23.1	6	23.1	0	0.0	26
Total	55	35.26	10	6.4	6	3.8	85	54.5	156

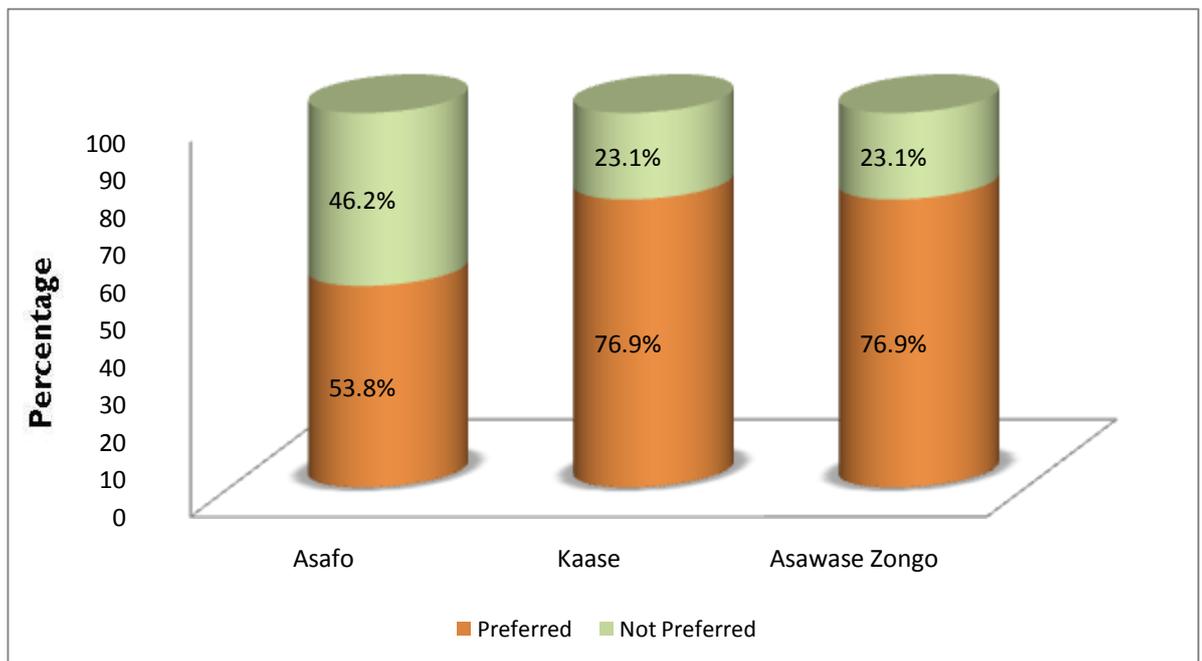
Source: Field Survey, March, 2010.

The study also tried to find out about the preferences of the respondents for waste disposal services from the suburbs in the traditional housing sector and Asafo, from the tenement sector where respondents patronise communal waste collection. The result is presented in figure 5.1 on page 51. It can be observed from figure 5.1 that, almost half of the respondents from Asafo, (46.2 per cent) indicated that they do not want to have the house-to-house waste collection service. The respondents attributed their reluctance to patronise the house-to-house waste collection to the fact that, the waste management companies sometimes fail to pick up the garbage for days and the garbage starts emitting foul smell. Plate 5.3 is an example of waste left uncollected for days.

vii. Awareness of Sanitation Laws

KMA has sanitation bye-laws that define the responsibilities of households and individuals for environmental sanitation and the punishments for flouting such laws. During the survey, 123 respondents (79.8 per cent) indicated that they were aware of the existence of the environmental sanitation bye-laws, but did not specifically know what it entailed. The remaining 31 respondents (20.13 per cent) indicated that they were not aware of any environmental sanitation bye-laws in the metropolis.

Figure 5.1: Household Preference for house-to-house waste collection service



Source: Field Survey, March, 2010.

Plate 5.3: Household Waste Left Uncollected for Days by the Service



Source: Field Survey, March, 2010.

Majority of the respondents, 153, representing 98.2 per cent indicated that, they considered it an offence to leave waste or litter in front of or on their property or business premises, with two respondents indicating that they did not know it was an offence.

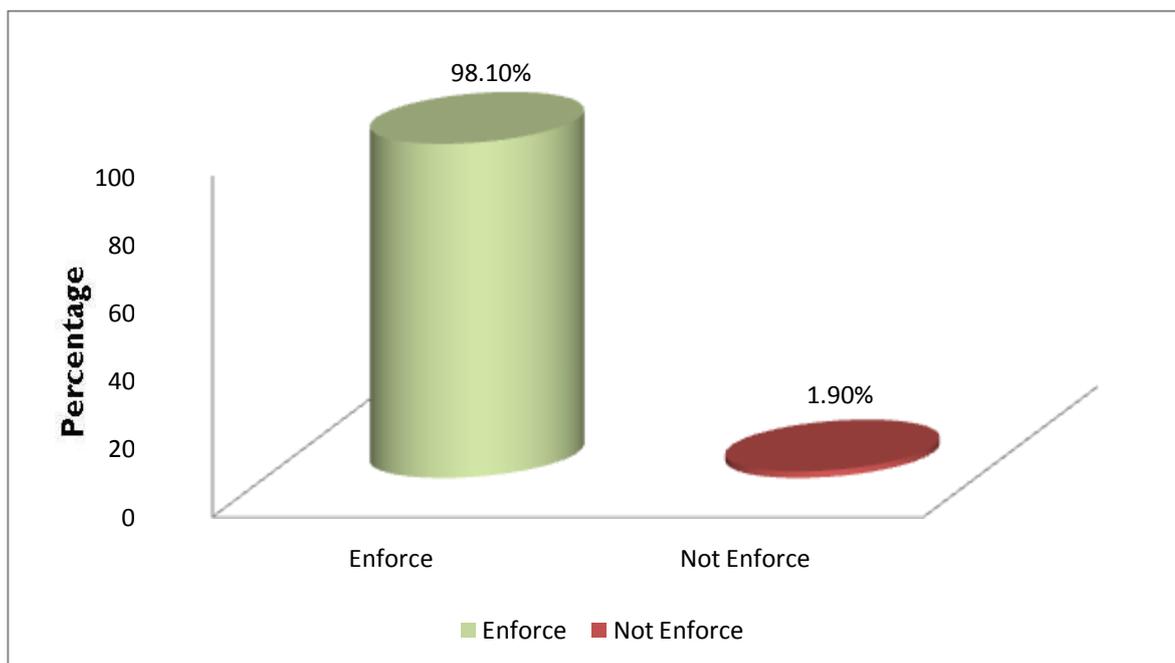
What this implies is that, the Metro Environmental Health Unit needs to step up the environmental sanitation education, to let the inhabitants know the effects of poor environmental sanitation on their health.

viii. Enforcement of Sanitation Bye-Laws

One cannot only rely on people's personal judgement in ensuring good environmental sanitation. There could be as much public education on the effects of poor environmental sanitation and about the need to ensure good environmental sanitation as possible, but if efforts are not made to ensure that people comply with regulations and apply their knowledge gained through public education, all the efforts would be in vain. As can be seen from Figure 5.2, majority of the respondents from households indicated that the Metropolitan Assembly should enforce the Sanitation Bye-laws in addition to the public education.

The respondents suggested stiffer punishment to deter people from engaging in bad sanitation practices. On the various forms of punishment, 66.7 per cent suggested that offenders be made to pay heavy fine, while 20.5 per cent of the respondents suggested that offenders be made to do community service such as sweeping public places for certain number of hours as a punishment, 9.6 per cent suggested imprisonment as a punishment for people who flout environmental sanitation regulations and 0.64 per cent of the respondents did not respond to this question.

Figure 5.2: Enforcement of Sanitation Bye-Laws



5.2.2 Businesses

Commercial and service businesses also generate waste in the course of their operations. The types of businesses operating in the CBD are predominantly merchandise with few offices. The type of goods sold at the CBD ranges from clothes, toiletries, home appliances, to hardware such as roofing sheets, paint and other construction materials. Most of the items sold at the CBD are wrapped in cartons or paper boxes. The survey conducted at the CBD was meant to find out access to urinals and toilet facilities, availability of public waste bins on streets, waste disposal and other sanitation issues.

i. Access to Urinals and Toilet Facilities

At the CBD, 53.4 per cent of the respondents did not have toilet facilities in the building and had to resort to public toilets which they sometimes have to queue to access it. The remaining 46.6 per cent had a shared toilet of one seat for all shop owners. About 53 per cent of the respondents urinate in the open drains or in the case of women, in a can and pour the urine into the open drain. This causes streets to smell the stench of urine at all times. Respondents attributed this to unavailability of urinals

and the long distance one has to walk to access one. This has the tendency of breeding disease vectors and can easily promote disease transmission if it continues.

ii. Waste Disposal

Out of the 26 businesses interviewed at Adum in the CBD, only six respondents (23 per cent) had subscribed to waste collection service from Zoomlion, the waste management company operating in the area. The remaining 77 per cent of the respondents keep their waste bins in their shops and throw the garbage on the pavement in the evening after the close of business, hoping for it to be swept by KMA the following morning. Plate 5.4 shows garbage left on pavement by businesses operating at the CBD. Sometimes, the wind blow the garbage into nearby drains and streets and these are washed away by wastewater or rain water. Eventually, the solid waste clogs major drains, and causes serious environmental sanitation hazards in the metropolis. Plate 5.7 illustrates drains clogged with solid waste from Adum after they it was left on pavements by business owners.

Pedestrians who cannot access waste bins on streets are tempted to throw any litter in their hands on gathered garbage left in front of shops. The garbage keeps compounding and within a short period, it turns into heaps of garbage in the middle of the city.

iii. Responsibility for Cleaning Pavements

The results of the survey showed that, 17 of the respondents, representing 65.4 per cent believed it was the responsibility of KMA to clean pavements and gutters in front of businesses and shops. The remaining 34.6 percent of the respondents admitted they knew they were responsible, but they do not clean because KMA cleans it everyday.

Plate 5.4. Shop Owners Leave Garbage on Pavements



Plate 5.5. Shop Owners Who do Not Have Waste Bins Throw Garbage at the Edge of Drains



Plate 5.6. Garbage Left Between Cars Parked on Streets

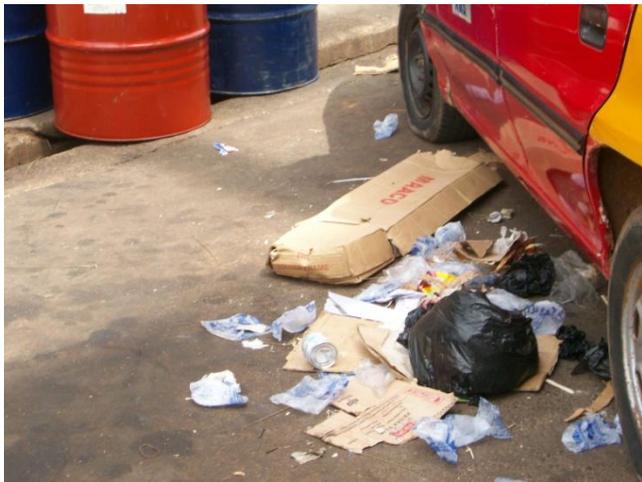


Plate 5.7. Garbage are Left on Pavements by Shop Owners



Source: Field Survey, March 2010.

iv. Awareness of Sanitation Bye-laws

Awareness of sanitation bye-laws at the CBD is worth discussing. Figure 5.3 presents the survey findings. Though majority of the respondents, 84.6 per cent indicated that they were not aware of the sanitation bye-laws, 73.1 percent said they knew it was an offence to leave waste in front of, or around their business premises. They indicated

that they had no choice but to leave the garbage on the pavement because there were no waste bins on the streets.

Figure 5.3: Awareness of Sanitation Bye-laws

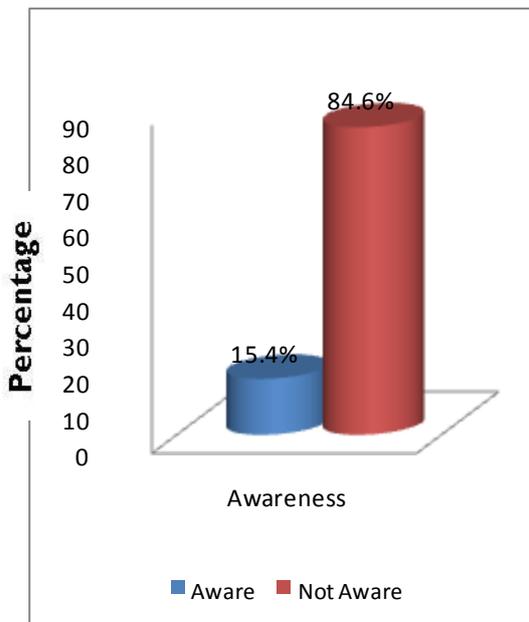
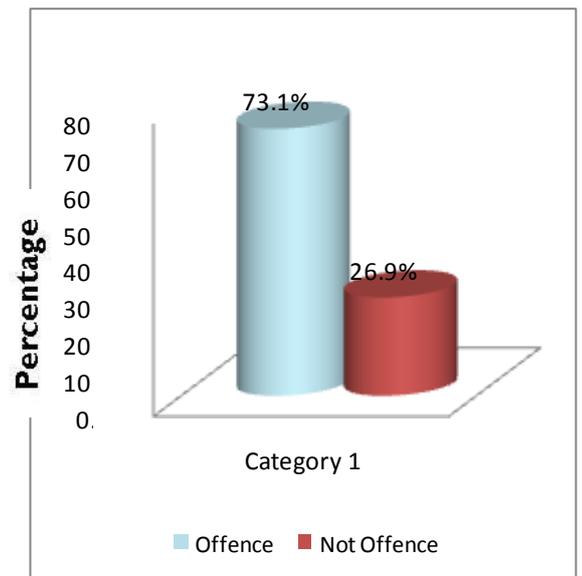


Figure 5.4: Offense to Leave Garbage in Front of Businesses



Source: Field Survey, March 2010

In the overall assessment of the environmental sanitation condition in Kumasi, 15 respondents from the CBD, representing 57.7 per cent said that the environmental sanitation condition was very bad while the remaining 42.3 per cent said that the environmental sanitation condition in Kumasi was good.

5.2.3 Issues Identified

The issues that were raised through the research findings which require interventions include the following:

- Developers do not make adequate provision for toilet facilities in new buildings being put up at the CBD and this causes pressure on the few public toilet facilities and long queues which reduces productivity.

- Staff of businesses and business owners pass urine in cans and pour it in open drains which could cause foul smell on the streets of the CBD.
- There are inadequate public waste bins on streets, especially the CBD and this causes pedestrians to throw litter anywhere.
- Business owners do not safely dispose of their garbage and leave them on streets and pavements after close of business.

5.3 Service Providers

These are companies which have been contracted by the metropolitan assembly to provide sanitation services in the metropolis. These services include cleansing of designated areas and facilities (streets, drains, markets, lorry parks, etc), collection and transportation of solid and liquid waste to the final disposal site. Other services include operation or management of public toilet and urinal facilities in the metropolis. With solid waste management, these companies provide house-to-house waste collection services and communal waste collection services in Kumasi. Households which patronise the communal waste service pay for garbage disposal according to the size of their waste container. It usually ranges from 10 pesewas to 50 pesewas.

Children are mostly responsible for dumping waste for households. Its implication is that, if the collection sites are not well maintained, children could contract hazardous contaminants when they go to dispose of garbage. The next type of service is the house-to-house waste collection, where household wastes are collected by a private company which goes from house to house within a particular suburb to collect garbage within certain days of the week. The fee for this service is paid either annually or monthly to the private company and ranges from GhC 3.0 to GhC 10 per month. The fee is determined by the suburb and according to the size of the waste bins. Usually, waste bins for such services are provided by KMA through the service providers. The size of the waste bins ranges from 125 litres to 250 litres.

Good service provision by these companies presents enormous health and economic benefits to inhabitants and the local government, by helping them achieve their

objective of developing and maintaining a clean, safe and pleasant physical environment in all settlements, to promote the social, economic and physical well-being of all sections of the population. With good service provision, “collection and disposal of wastes, including solid wastes, liquid wastes, excreta and other hazardous waste”, component of environmental sanitation management could be achieved. The study revealed lapses in the services provided by these companies that do not promote good environmental sanitation. Plate 5.8 is an example of communal waste container left to overflow by a private waste management company.

Plate 5.8: Central Waste Containers are Sometimes Left to Overflow



Source: Field Survey, March, 2010.

There are seven private waste management companies currently operating in Kumasi. Four of these companies and their capacity to provide the needed environmental sanitation services in the metropolis are presented next.

5.3.1 Zoomlion Ghana Limited

Zoomlion is a partner company for waste management in Kumasi. It operates in the Asawase, Subin and Tafo Sub-metros. Their main activities in Kumasi include house-to-house waste collection services, communal waste container lifting and street cleaning. It also offers private sanitation services such as cesspit emptying to individuals and institutions. The company has the staff and equipment capacity to undertake its activities in Kumasi. According to the company, it requires about 500

staff (Sweepers) for cleaning these sub-metros, but it currently has about 1500 sweepers, who were engaged through the National Youth Employment Programme (NYEP). This means that they are underutilised, and the company has the capacity to extend services to other sub-metros. In terms of equipment, it has exactly the required number of six roll on roll off trucks, seven skip loaders and three compactors. However it has no standby for such trucks which implies that, if any of these equipment and trucks breaks down for a long period, it could seriously affect their operations.

The company requires 100 central containers for communal garbage collection, but it currently has only 85. This causes pressure on some of the containers in parts of the city and this usually results in overflow of containers. It, however, has more than the required number of drivers and genitors who operate both administrative vehicles and garbage trucks.

5.3.2 Sak-M Company Ltd.

Sak-M Company Limited operates in all the communities in the Asokwa Sub Metro. Its major activity is to collect refuse and dispose it at a landfill site. It operates house-to-house waste collection at Asokwa, Gyinyase, Ahinsan Estate, Chirapatere and Atonsu Agogo Monaco. It operates communal garbage collection in the rest of the communities in the sub-metro. Its major objective is to ensure that the Asokwa sub-metro becomes the cleanest sub-metro in Kumasi. Even though in their own assessment, sanitation has improved in the sub-metro, it is still not the best as some parts of the sub-metro are still dirty. The company requires 50 staff to effectively carry out its activities, it has only 39. It has all the five trucks required to undertake their activities. It has one roll on roll off truck, two compactor trucks and two skip loaders. The company does not have any standby truck. Therefore, if any of the trucks breaks down, the garbage would have to sit until the time the truck is fixed and this could lead to over spilling of central containers.

The company requires 2500 waste bins to effectively service the suburbs where they operate house-to-house waste collection, it currently has 1250 waste bins.

Clearly the company has limited resources compared to the required capacity to effectively carry out its activities.

5.3.3 Waste Group Ghana Ltd.

The Waste Group Ghana limited operates in the Kwadaso sub-metro. It operates in all the communities in the sub-metro. Its major activities are to collect garbage, transport and dispose it of at sanitary sites. The company charges GHC 4.00 per month for the 125 liter waste bin for the house-to-house waste collection and from 10 pesewas to 50 pesewas for the communal waste collection. The company currently collects 630 tons of solid waste each week.

According to the company, it requires 35 staff to undertake its activities and it has exactly 35 staff both administrative and genitors. It requires seven compactor trucks, four skip loaders, but it currently has two compactors and two skip loaders. In addition to this, the company also has six tipper trucks and one pay loader to complement the existing trucks and equipment. It requires 15 central containers for the communal waste collection and 7000 waste bins for the house-to-house waste collection, but it currently has only 10 central containers and 2000 waste bins. Their activities are drastically hampered due to the shortfall of five central containers and about 5000 waste bins for house-to-house waste collection.

5.3.4 Challenges Faced by Private Waste Management Companies in Kumasi

All these private waste management companies share common challenges in providing environmental sanitation services in Kumasi. These problems include the following:

a) Socio-cultural

The study revealed that, one major problem waste management companies face is the poor attitude of the people towards sanitation. People seem not to bother living with litter all around them. They believe if they litter the streets, gutters or public places, it would be swept in the evening by the waste companies. They therefore do not make the least effort to put litter in a waste bin even when the bins are close by, but rather

dump it wherever they stand. This makes the city always dirty because, a few hours after streets have been swept, people start throwing litter around. In places such as Allah bar, the situation is an eyesore as the people who stay and work there start throwing litter even when sanitation workers are still sweeping. This usually causes confrontation between their staff and the public. Sometimes when it rains in the afternoon, all the litter are washed away into sewers which clogs gutters and sometimes causes flooding.

Usually, in communities where they have communal containers, some people do not like to pay as little as 20 pesewas for dumping and sometimes causes confrontation between clients and their staff over such amounts. Some wait until midnight to throw garbage in an attempt to avoid paying the 10 pesewas or 20 pesewas fee. This results in revenue loss to the companies. Others dump their garbage in storm water when it rains and this goes to clog gutters and causes streets to be filled with of rubbish after raining.

Sanitation workers are sometimes stigmatized and not treated with respect in society. This sometimes undermines the morale of the workers and has serious negative effects on their work.

b) Political

Governments do not seem to prioritize environmental sanitation and thus do not commit enough funds to provide facilities to ensure good environmental sanitation. They usually believe in outcome instead of impact. They would rather spend huge sums of money on subsidizing the cost of mosquito nets and anti-malarial drugs and other health costs instead of investing in sanitation to prevent disease vectors and to break the cycle of disease. Usually when there is a change of government, the new administration asks for some time to review old contracts before paying for environmental sanitation services that have been rendered. This leads to delays in payments for sometimes more than eight months. When this happens, the waste management companies are unable to pay their workers and this affects service delivery.

Agitation by youth from some political parties sometimes causes distractions in the activities of waste management companies. Some youth have the notion that there is so much profit in waste or garbage collection and sanitation business. They sometimes try to take over outsourced toilet facilities. Some demand for communal central containers in order to collect the fee for garbage collection at locations which are not feasible for garbage collection.

c) Poor Handling of Waste Bins

Most households mishandle refuse bins provided by city authorities and Zoomlion. Some pour ash residue with some fire from coal pots after cooking into waste bins which eventually melt the waste bins. Currently, Zoomlion and the Waste Management Department have stopped providing waste bins to households for free with the hope that, households would bear the cost of waste bins themselves. This is to ensure the sense of ownership for waste bins by households so that they would handle the waste bins with care.

5.4 Managers - KMA

The Kumasi Metropolitan Assembly has the responsibility of ensuring good environmental sanitation by providing the needed infrastructure and services to meet the components of environmental sanitation. The assembly undertakes these activities through its departments and other allied institutions.

5.4.1 Metro Environmental Health Unit

The Unit is responsible for carrying out all environmental sanitation tasks that relate to health, by ensuring that the environment is kept clean at all times. It is also responsible for ensuring:

- (a) Collection and sanitary disposal of wastes, including solid wastes, liquid wastes, excreta, industrial wastes, clinical and other hazardous wastes;
- (b) Stormwater drainage;
- (c) Cleansing of thoroughfares, markets and other public spaces;
- (d) Control of pests and vectors of disease;
- (e) Food hygiene;
- (f) Environmental sanitation education;

- (g) Inspection and enforcement of sanitary regulations;
- (h) Disposal of the dead;
- (i) Control of rearing and straying of animals;
- (j) Monitoring the observance of environmental standards.

It ensures that the Waste Management Department provides the necessary services and applies appropriate technology in managing waste in Kumasi. With enforcement of sanitation regulations, staff from this Department goes round the city to ensure that the public does not engage in unsanitary practices or nuisances that could be injurious to health. It has staff in every sub-metro who undertake these activities.

On the food hygiene component of sanitation, the department screens food vendors and restaurant operators every year in every sub-metro to ensure that, food sellers do not transmit communicable diseases, such as tuberculosis, typhoid fever and hepatitis to the public. This is the only opportunity it gets to educate people on sanitation, food hygiene and proper handling of food. What this implies is that, since this is targeted at food sellers, households do not get the opportunity to also learn from this. To ensure compliance, the sanitation task force visits food sellers and inspects their certificates which are given to the food sellers annually.

The study revealed that, although the department has adequate technical staff such as Environmental Health Officers, Environmental Health Technologists, Environmental Health Assistants, Health Overseers and 80 Sanitation Guards; a total of 203 officers since 2004. The department is beset with many challenges that affect their performance. Some of these challenges include:

- (a) Political interferences – People have aligned themselves to some political parties and when such people engage in poor environmental sanitation practices and they are apprehended, politicians who are in power threaten the staff of the department of their jobs. They are sometimes threatened to be beaten by youth from some political parties, and their leaders (politicians) do not do anything about it.
- (b) Apathetic attitude of inhabitants – Most people in the metropolis do not engage in good sanitation practices, not because they do not know, but because they see

cleaning as the responsibility of the city authorities. These attitudes serve as a setback to their operations.

- (c) Logistical problems – The department does not have adequate logistics such as vehicles, computers for data processing and protective clothing for staff due to the hazardous nature of sanitation work.

The study also revealed that the department lacks proper record keeping – The Department does not have adequate database of activities to enable them to assess progress on environmental sanitation activities.

5.4.2 The Kumasi Waste Management Department (KWMD)

The KWMD has the major objective of keeping the metropolis clean and healthy by ensuring the efficient and effective removal and safe disposal of solid and liquid waste from all premises and public spaces, and to create an enabling environment for development and recreation. Some of the functions of the department include the following:

1. Outsourcing of Sanitation Work to Private Companies

In an effort to improve the city's sanitation and solid waste services, the city authorities outsourced most of its operations or activities to private waste management companies. This shift creates a completely new set of roles and responsibilities for the various actors involved in solid waste management with KWMD playing a supervisory role. These companies work in all the ten sub-metros in Kumasi. However, the department is still insufficiently equipped to adequately manage the process.

The Assembly has 155 transfer stations for communal waste collection which are operated by the private waste management companies. The Department, however, has no plans of increasing the number of transfer stations but it intends to expand the coverage for the house-to-house waste collection. The Department spends about GHC 300 million on solid waste management each month.

KWMD has about 357 toilet facilities in the whole of the metropolis. Out of this 86 were constructed between 2001 and 2009. However, seven of the toilet facilities are under repairs, but the remaining are in use. It has 18 20 seater water closets (WCs) and most of these are in the Central Business District. The Department also has urinals in the city, but has no data on the number and location. Most of these facilities have been handed to private individuals to operate and manage the facilities. The Department has contract with private investors to build Aqua Privy toilet facilities in some suburbs on the basis of Build Operate and Transfer (BOT). These are all efforts to provide good sanitation facilities to the public.

2. Urban Environmental Sanitation Project II (UESP II)

The KWMD has donor agencies that support its operations in an effort to provide good environmental sanitation for its urban residents. These include the World Bank through its Urban Environmental Sanitation Projects (UESP I & II) and the Agence Francaise Developpement (AFD) from France. The UESPI involved Construction of four new secondary drains, widening the existing primary channel from the Zoo through Kejetia to Asafo Market, and reconstruction of a 4 km stretch of the Nsuben primary channel.

In the UESP II, the project constructed 3,613 drop holes household toilet facilities. The project financed 50 per cent of the project cost and the beneficiary households provided 50 per cent of the total cost. The type of domestic toilets provided under the scheme were the WC with attached septic tank and soak away system. Under the programme, 10 school toilet facilities were constructed and 7 public toilets were also constructed. (World Bank, 2004)

The AFD co-financed the World Bank UESP projects on environmental sanitation. It also provide capacity building for staff of the Waste management Department and the Waste management companies.

3. Sanitation Police

This was a sanitation task force unit that was set up to arrest people who commit environmental sanitation offences. They were to ensure that people did not litter indiscriminately or wash cars on roads. They arrested offenders and prosecuted them in court for sanitation offences, but the Department does not have data on the number of people who were arrested within a specific period of time, the kind of offence they committed and the punishment that was meted out on the offenders. The unit was understaffed and under resourced. Currently, the sanitation police is not functioning due to lack of funds.

5.4.3 Town and Country Planning Department (TCPD)

The TCPD is responsible for preparing local plans, advising District Assemblies, government and other quasi government departments on the location of their development. The Department is also responsible for conducting research into anything connected to development, but this, according to the department, is not done due to lack of funding. It is also responsible for development controls which exist only on paper (are not implemented).

According to the Department, chiefs, who are custodians of lands contract private surveyors to measure plots and sell to private developers without making provision for social facilities such as schools, lorry stations, hospitals and refuse collection sites.

The Environmental Health Department has to inspect the plans of all new buildings to ensure that they conform to sanitary regulations, and upon approval, issue Certificate of Habitation when the buildings are completed, but this is not done (MLGRD, 1999. p 7).

One major finding of the study was the lack of coordination between other allied agencies, such as the Waste Management Department, Town and Country Planning Department, the Regional Health Directorate and Ghana Water Company Ltd. These departments and agencies do not see themselves as working together towards a common goal, that is, improving public health, but rather see their activities as independent of the other. For example, the Ghana Health Service sees itself as health

service provider and has nothing to do with the Waste Management Department. It rather spends huge sums of money annually on curative measures rather than partnering with the WMD to provide preventive measures to break the cycle of disease, which could eventually reduce environmentally or sanitation related disease and also to reduce the workload of the GHS staff in the long run.

It is believed that that meeting the sanitation target and sustaining its progress require an increase in the capacity and accountability of the public sector to promote, and coordinate sanitation provision.

5.4.4 Metropolitan Environmental Health Directorate of Ghana Health Service

The Environmental health directorate is responsible for public health management in Ashanti Region. Some of its functions include the following:

- (a) Provision of guidance to MLGRD on environmental sanitation sector planning, policy and legislation;
- (b) Provision of technical assistance and training to District Assemblies and service providers;
- (c) Planning and assisting human resources development for the sector;
- (d) Co-ordinating and disseminating the results of research in the environmental sanitation field.

Good sanitation is vital for human health. Poor environmental sanitation has dire consequences on the health of the people. Data gathered from the Metropolitan Health Directorate revealed that, in 2005, 86.93 per cent of the top ten causes of admissions to hospitals in the Kumasi metropolis were environmentally related or sanitation induced diseases, with malaria topping the list. The remaining 13.7 per cent of admissions were caused by all other diseases and complications combined. The situation was no different in the year 2006 and 2007 with each year recording 82.9 per cent and 82.9 per cent respectively. The table in Appendix 3 is an indication of how poor environmental sanitation contributes to the ill health of the population.

Government continues to spend huge sums of money in an attempt to provide good health service to the people. More attention should be paid to adopting preventive measures such as ensuring good environmental sanitation and helping households gain access to good toilet facilities in order to eliminate or reduce disease vectors and also to break the cycle of diseases. This would reduce infant mortality. Figure 5.5 illustrates the top ten causes of admission to hospitals in the Kumasi Metropolitan Area. Details of the top ten causes of admission to hospitals in Kumasi are presented in Appendix 4 on page 88.

Children are the most vulnerable to environmentally related diseases as they easily get infected with malaria and trachoma, which is contracted when children swim, bath or walk in a contaminated water body or are exposed to poor environment. Plates in Appendix 5 at page 89 illustrate children exposed to poor environment and conditions that serves as a catalyst for disease vectors to breed and its effects on the health of children.

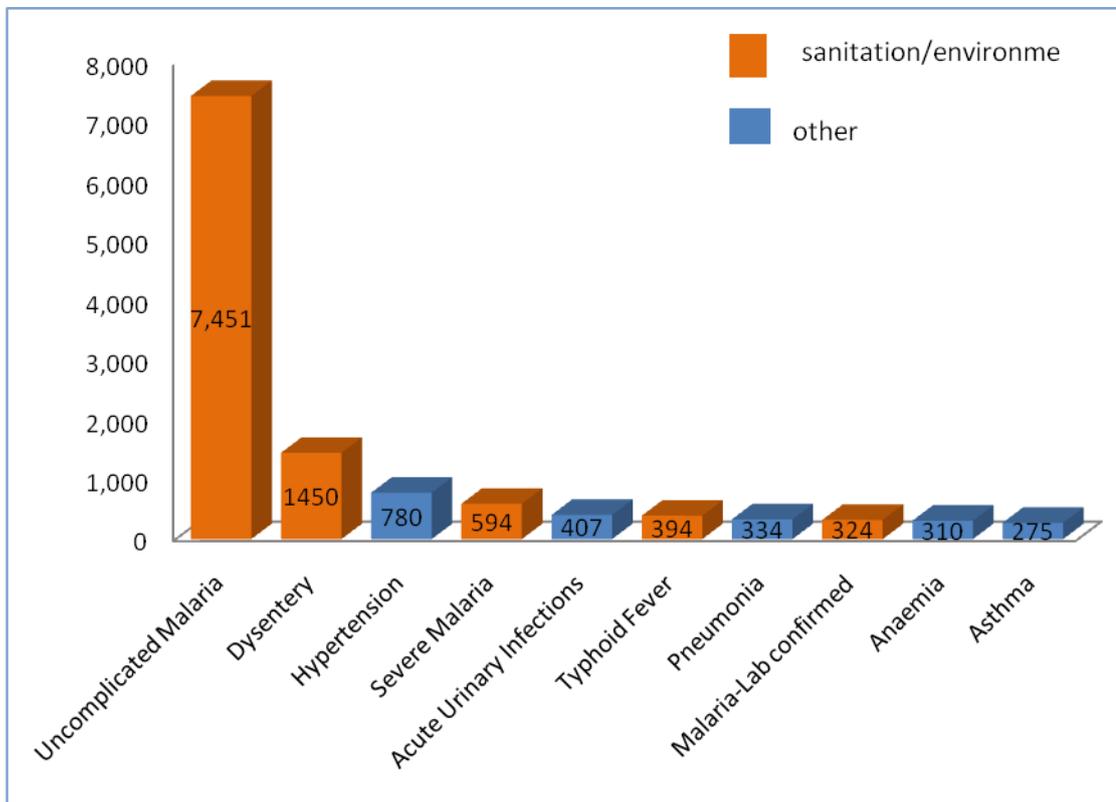
Table 5.6. Incidence of Malaria and Mortalities in Children Under Age 5

Year	2006	2007	2008	2009
Incidence of Malaria	61,874	73,140	71,859	84,913
Mortalities	31	20	19	32

Source: Field Survey, March, 2010.

The figures in Table 5.6 indicate a high incidence of malaria in children under the age of 5 years in Kumasi. (These figures are exclusive of case reported at the Komfo Anokye Teaching Hospital). This resulted in 102 mortalities in children under age five (5) from 2006 to 2009. If the city wants to make meaningful strides in achieving the fourth and fifth goals of reducing child mortality and improving maternal health, of the Millennium Development Goals, then much effort is required to ensure that people engage in responsible and healthy environmental sanitation practices.

Figure 5.5: Top Ten Causes of Admissions in Hospitals in Kumasi.



Source: Metro Health Directorate Annual Reports 2009.

5.4.5 Issues identified

- (a) The study revealed that, environmentally induced diseases are the number one cause of illness in Kumasi and constitutes 82 per cent of hospital admissions.
- (b) The Ghana Health Service does not have any serious collaborative activities with the Metropolitan Environmental Health Unit or the Waste Management Department to break the cycle of disease.

CHAPTER SIX

SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

6.1 Introduction

This chapter discusses the summary of findings, implications, recommendations and conclusions drawn from the findings. It highlights issues that were revealed during the research with regard to the capacity of the institutions engaged in environmental related activities in the metropolis, communities' awareness of environmental sanitation regulations and their participation in the environmental sanitation management process as well as enforcement of environmental sanitation laws in the metropolis. The findings are based on a survey of 156 households, 26 businesses in the CBD as well as institutions.

6.2 Summary of Findings

6.2.1.1 Generators

a. Households: the following data were collected on households:

i Sex and Age Composition of Respondents

Out of the 156 respondents for households interviewed for the study, women constitute 72.4 per cent while men constitute 27.6 per cent. The study revealed that, women play a very important role in sanitation in the home, and as such, must be considered major stakeholders in charting sanitation programmes and strategies. Landlords in the traditional housing sector and the tenement sector also wield power and thus decide the type of sanitation services to opt for by all the households in a particular house.

ii Educational Level

The findings showed that the level of education varied from primary to tertiary education. Most of the respondents, 52.67 per cent had attained Senior Secondary School or Vocational/Commercial education. Those who had attained tertiary education constituted 27.6 per cent while 14.1 per cent had attained at least primary

education. This is a positive indicator for environmental sanitation education and enforcement of environmental regulations as people would comprehend the consequences of poor attitude towards environmental sanitation through intensive public education and awareness.

iii Type of Toilet facilities for households

Out of the 156 respondents, 77.6 per cent had access to toilet facilities in their house while 22.4 per cent had no toilet facilities in their house and thus resorted to public toilets. The respondents from the traditional housing sector and the tenement sector were not satisfied with the conditions of the public toilets. This calls for proper monitoring of how these public toilets are operated or cleaned to ensure that they do not promote disease transmission.

iv Waste Water Disposal

Out of the 156 households interviewed, 85.9 per cent had access to good drainage (concrete drains) for wastewater disposal while 14.1 per cent did not have access to good drains. Kaase and some part of Asokwa recorded low access to concrete drains for wastewater disposal. All the 10 respondents from Atasomanso New Site who did not have drains had septic tanks in their homes for safe wastewater disposal. If measures are not taken to provide concrete drains for such communities, the inhabitants stand the risk of being infected if there is an epidemic.

v Community Environmental Sanitation

The study revealed differences in sanitation behaviour among the various housing sectors or suburbs. Residents from the traditional housing sector (69.2 per cent from Kaase and 46.1 per cent from Asawase-Zongo) described the environmental sanitation condition in their suburb as bad. This implies that, more attention must be given to suburbs in the traditional housing sector in any sanitation improvement projects, since they have poor environmental sanitation condition.

Even though the Metropolitan Assembly has made great effort in improving the environmental sanitation in Kumasi over the years, the sanitation conditions is still not up to expectations. In the overall assessment of the environmental sanitation

condition in Kumasi, 80.8 per cent of the respondents described the environmental sanitation condition in Kumasi as bad.

vi Solid Waste Disposal

The revealed that, some households from the high cost housing sector dispose of their waste using unapproved means such as burning of garbage. Respondents from the traditional housing sector (76.9 per cent) expressed desire for the house-to-house waste collection. However, 46.2 per cent of the respondents from the tenement sector who have had the house-to-house waste collection service before and are now using the communal waste disposal indicated that they do not want the house-to-house service because the service providers fail to empty the waste bins on time, which causes the waste bins to overflow. If these inefficiencies in service provision remains unchecked, it will negatively impact efforts to promote the house-to-house waste collection.

vii Awareness of Environmental Sanitation Offence

The study revealed that majority of the respondents from the various suburbs were aware of what constitute environmental sanitation offence, although efforts to engage in good sanitation practices are almost non-existent. Out of the 156 respondents from households, 79.5 per cent indicated that, they were aware that it is an offence to leave waste or litter in front of and or around one's property or business premises. This implies that people know what is right and wrong sanitation practices. It is important to chart strategies that would cause inhabitants to conform to acceptable sanitation behaviour and practices at both the household level and public places.

viii Enforcement of Environmental Sanitation Bye-laws

Poor environmental sanitation practices have largely been attributed to poor attitude of the people towards sanitation. To ensure good environmental sanitation practices in the Kumasi metropolis, a greater majority of the respondents, 98.1 per cent proposed that the Kumasi Metropolitan Assembly enforce the existing Environmental Sanitation Bye-laws to make the inhabitants responsible and accountable for environmental sanitation in their immediate environment.

ix Punishment for Breaking Sanitation Bye-laws

In order to ensure enforcement of the sanitation bye-laws, stiff punishment should be employed to serve as a deterrent to others from engaging in bad environmental sanitation practices. It is, however, important to choose a cost effective but efficient punishment that would help balance punishment and cooperation. Cooperative methods alone will not ensure voluntary compliance. Punishment should be structured so that penalties increase in severity for repeat violators. From those interviewed, 66.7 per cent suggested that, environmental sanitation offenders be made to pay a heavy fine after they have been apprehended. Also, 20.5 per cent suggested that, offenders be made to do community service such as sweeping public places or dredging gutters for specific number of hours for certain number of days. This would allow for spectators to see people who break the environmental sanitation laws work in public and they would eventually learn a lesson from that. The remaining 12.8 per cent of the respondents suggested that, offenders be prosecuted and put in prison for specific number of days. A classical example of a country that has transformed its urban environment with strict sanitation regulations to turned its cities into economic fortunes is Singapore during the reign of its first Prime Minister Lee Kwan Yew. The Accra Metropolitan Assembly (AMA) has also established sanitation court to prosecute sanitation offenders in its effort to improve sanitation in Accra.

a) Businesses

The study focused on commercial businesses since they constitute 71 per cent of economic activities in Kumasi. The study revealed inappropriate means through which business owners at the CBD dispose of waste. Businesses leave the waste they generate on the pavement after close of business hoping for it to be swept away the next morning by sanitation workers. Due to the unavailability of adequate urinals at the CBD, shop owners and staff working at the CBD, particularly women, urinate in cans or containers and pour the urine in the open drain.

Pedestrians also throw litter on the streets and pavements because public waste bins are unavailable on streets at the CBD.

6.2.2 Service Providers

The study revealed inefficiencies in the service provision by the private waste management companies contracted by the Metropolitan Assembly to provide sanitation service. Communal waste containers are sometimes left to overflow which causes serious health threats to children who go to dispose of garbage. After streets are swept by some of these service providers, they are not collected and are left to compound into heaps of garbage on streets and pavements.

6.2.3 Managers - KMA

Departments in the Assembly, such as The Environmental Health Department lack the necessary logistics such as tools, vehicles and vehicles to enable them to monitor environmental sanitation activities in the metropolis. It also lacks adequate data to help them to identify priority areas and to plan for such areas.

There is also lack of coordination between the WMD, Environmental Health Department, the Town and Country Planning Department and the Building Inspectorate. For instance, developers get the permit to construct stores and offices without making adequate provision for sanitation, which invariably puts pressure on public facilities and compound the sanitation problems in the city.

6.3 Recommendations

Good environmental sanitation is a precondition for good health and for success in the fight against poverty, hunger, child deaths and gender inequality. It is also central to the human rights and personal dignity of every human being. The effective management of environmental sanitation requires strategies that bring about fundamental change in how people perceive environmental sanitation in the city and service delivery. The three actors identified, that is; Generators, Service Providers and Managers all have a part to play to ensure good environmental sanitation in Kumasi. The following recommendations are offered based on the issues identified during the analysis of the data collected.

6.3.1 Generators

- Enforcement of Environmental Sanitation Regulations and Bye-Laws

The study revealed that the principal cause of the poor sanitation conditions in Kumasi can be attributed to the poor attitude of the people towards sanitation. Voluntary compliance cannot be relied on to ensure that waste generators engage in good environmental sanitation behaviour in Kumasi. People know what constitutes good sanitation practices but they would just not engage in good sanitation practices. KMA has to make conscious effort to implement and enforce the environmental sanitation regulations and bye-laws in Kumasi.

The Sanitation Police should be reinstated and empowered to arrest sanitation offenders. They can effectively do their work with collaboration from the Ghana Police Service. The Assembly also has to collaborate with the Judiciary to establish Sanitation Tribunals. Enforcing the bye-laws would result in compliance and cost savings for the Assembly and they can then invest more in the provision of waste bins and other sanitation facilities.

- Provision of Sanitation Facilities in the City

The study revealed that pedestrians litter anywhere due to the unavailability of waste bins on streets and public places. Adequate investment should be made in the provision of waste bins on all streets and public places. Business owners should be encouraged to place waste bins in front of their business, and the KWMD must ensure that the waste management company responsible for such areas empties the waste bins regularly. This would reduce the amount of waste disposed of on streets and walkways.

The WMD alone cannot provide the needed sanitation infrastructure such as clean toilet facilities, urinals, waste bins etc. The private sector should be encouraged through incentives to provide such infrastructure, especially toilet facilities and urinals on Build Operate and Transfer (BOT) basis in public places. However, the KWMD has to set good hygiene standards for such facility owners or operators to ensure that these facilities are clean at all times, and also to ensure that they have facility for hand washing. It is only when these facilities are clean that people feel that they are having value for their money. This would eliminate excreta-related diseases bacteria, thereby breaking the faeco-oral transmission.

- Hygiene Behaviour and Health and Hygiene Promotion

Adequate hygiene behaviour is crucial in preventing disease. Improving infrastructure without improving behaviour will rarely result in effective disease control and good environmental sanitation practices. The largest improvements in environmental sanitation and health have occurred where hygiene improved because of a change in behaviour. Hygiene education is integral to environmental sanitation. Health improvements arising from improved environmental sanitation and water services are greatly enhanced – and in some cases only achieved – with the support of change in people’s behaviour (*Cairncross and Kolsky, 2003*). Hygiene education seeks to support sustainable behaviour improvements through increased awareness and knowledge. It greatly influences the extent of people’s adaptation to environmental sanitation regulations, policy issues, new technologies and participation and environmental awareness. Hygiene education should therefore be integrated into

environmental sanitation planning to maximise benefits. Successful approaches include Participatory Hygiene and Sanitation Transformation (PHAST), School Sanitation and Hygiene Education (SSHE).

The media operating in the metropolis must also be involved in campaigning for good environmental sanitation. Environmental sanitation education should be emphasised in the basic schools curriculum. This would ensure that school children understand the concept of sanitation and consequences of indiscriminate waste disposal, the health and economic benefit that can be accrued from engaging in good environmental sanitation practices. They can then become ambassadors for environmental sanitation in their homes and on the street. Changing people's behaviour is difficult and often requires prolonged education.

6.3.2 Service Providers

- Institutional Capacity for Improved Service Delivery

The private waste management companies have an important role to play in improving sanitation in the city. These companies may need assistance in acquiring the needed equipment to provide effective sanitation services to households. The banking sector could also play an important role in providing low cost loans for sanitation improvements to these companies to help them secure the necessary tools, adequate staff and equipment to be effective in their activities.

- Monitoring of Activities of Service Providers

The study revealed lapses in the service provision of the private waste management companies. This has resulted in reluctance by households and businesses to subscribe to the house-to-house waste collection service, even in suburbs where this service is rendered. The Assembly has to institute effective monitoring of environmental sanitation activities of the private waste management companies, and sanction companies that do not meet quality service standards. This can be done through regular visits to sites where the service providers operate, by the KWMD staff to assess work done. This would ensure that households and businesses get value for their money.

6.3.3 Managers – KMA

- The Need for Adequate Urban Planning and Management

It is clear that urban planning has an important role to play in assisting governments to meet the challenges of the twenty-first century, such as rapid population growth, slum development, deteriorating environment etc. There is now a realisation that, in many parts of the world, urban planning systems have changed very little and are often contributors to urban problems rather than functioning as tools for human and environmental improvement (UN-HABITAT, 2009). Against this background, the Global Report's central argument is that, in most part of the world, current approaches to planning must change and that a new role for sustainable urban development has to be found. It is important to have an effective development control in the Kumasi Metropolitan Area. This would ensure that developers and house owners make adequate provision for toilet facilities. This would reduce the pressure on public sanitation facilities. There is also the need for collaboration between The Town and Country Planning Department, The Environmental Health Directorate, Ghana Health Service and the Waste Management to ensure development control, and also to ensure that developers comply with environment and sanitation requirements.

- Capacity for WMD and the Environmental Health Department

Sanitation programmes need planners, decision-makers, and sector professionals who are trained in evaluating different approaches to providing, operating and maintaining good environmental sanitation. One of the challenges of the KWMD pointed to a severe shortage of field workers and engineers to provide the needed technical and skills to develop sanitation programmes. The KMA needs to pay particular attention to the Environmental Health Department by equipping it with the needed logistics such as vehicles, public address systems and computers to ensure efficient operations and good record keeping in the Department.

6.4 Conclusions

The study concludes that, sanitation regulations and law enforcement plays crucial role in ensuring good environmental sanitation condition. The study revealed that, the main driving force for the poor environmental sanitation conditions experienced in the metropolis is attitudinal. Whatever efforts made so far failed to bring about significant attitudinal change and awareness creation on environmental sanitation in the city. The attitude of the people towards cleanliness and environmental sanitation is so bad that, voluntary compliance cannot be relied on to ensure good sanitation behaviour in Kumasi. The city needs radical change in the attitude of people towards environmental sanitation. It is, however, recommended that the Assembly engages in vigorous environmental sanitation education and enforcement of the sanitation bye-laws to make the populace responsive to the city environment.

The effectiveness of the various institutions and departments engaged in the management of environmental sanitation in Kumasi has also been undermined by various factors such as shortage of professional manpower, political interferences, inadequate logistics and insufficient funding to successfully ensure good environmental sanitation in the metropolis. Coupled with this is the lack of coordination between the various institutions and departments in undertaking their activities.

The study further emphasised on the need for institutional capacity building and proper coordination between institutions and departments within the Assembly responsible for ensuring good environmental sanitation. The enforcement of sanitation regulations and bye-laws, intensive public education and the provision of facilities such as waste bins on streets would go a long way to help the city authorities achieve good environmental sanitation in Kumasi.

REFERENCES

- Adarkwa, K. Post, J - Editors (2001). The Fate of the Tree. Planning and Managing the Development of Kumasi, Accra. Woeli Publishing Service.
- Ali, S. M. (2000). Down to Earth: Waste Disposal Practices in Developing Countries. UK, Loughborough University.
- Amoaning, R. (2006). Sanitation - Our Collective Responsibility. Presentation at CONIWAS-DANIDA. Workshop November 16, 2006. Kumasi, Ghana.
- Asiedu, K. M. (2009). Environmental Sanitation Policy Revised. Article posted on Kwame Asiedu Marfo's Stories. Ghana
- Barker, L (2009). What is Primary Data? (Article). National Observation Service on Primary Data. [<http://www.ehow.com>]. (accessed 2010 March 2).
- Barrow, C. J. (1995). Developing the Environment: Problems and Management. Swansea: University of Wales.
- Blaikie, P. and H, Brookfield (1987). Land Degradation and Society. New York: Methuen.
- Bracken, L. (2005). Sustainable Sanitation. [<http://www.NETSSAF.net>]. (accessed 2010 March 11).
- Bulmer, M. and D. Warwick (1983). Social Research in Developing Countries: Survey and Census in the Third World. New York. John Wiley and Sons Ltd Pp: 91-124.
- Cunningham, W.P, Saigo, B.W. (1999). Environmental Science. A Global Concern. 5th Edition. McGraw-Hill. USA
- Daft, R.L. (2005). Organisation Theory and Design. International Edition. Thomson/South Western.
- DFID (1998). DFID Guidance Manual on Water Supply and Sanitation Programmes. London, UK.
- Dinesen, C. R. (2010). The Importance of Environmental Management. [<http://www.ehow.com>]. (accessed 2010 January 28).
- Engel, D. et al (1996). Towards a National Environmental Policy. Washington, D.C. Office of Policy Development and Research.

- Fink, M. (2002). Waste Management in Peri-urban Settlements: Case Study in Kwabre District. Thesis MSc. KNUST Kumasi, Ghana.
- Godmodder, M. (2009). Need for Environmental Management. [<http://www.associatedcontent.com>]. (accessed 2010 March 2).
- Huetting, R (1980). New Scarcity and Economic Growth. Amsterdam. North Holland Publishers.
- IRC (2006). The Value of Environmental Sanitation – Case Studies. International Water and Sanitation Centre. Delft, The Netherlands.
- Jeppesen, S. Andersen, J.E. Madsen P.V. (2006) Urban Environmental Management in Developing Countries – Land Use, Environmental Health and Pollution Management – A Review. Copenhagen, Denmark. Research Network on Environment and Development –ReNED.
- Krishna, K. (1993). Rapid Appraisal Methods. Washington DC: World Bank, pp. 177-211.
- Kumasi Metropolitan Assembly (2006). District Medium Term Development Plan. Kumasi. Ghana.
- Kumekpor, Tom K.B. (2002) Research Methods and Techniques of Social Research. Accra, Ghana. Sonlife Printing and Press Services.
- Menegat, R. (2002) Public Environmental Management. Porto Alegre
- Mensah, M. (2002). The State of Environmental Sanitation in the Accra Metropolitan Area. Pentecost Press. Accra, Ghana.
- Ministry of Local Government and Rural Development. (1999). Ghana Environmental Sanitation Policy. Accra. Ghana.
- Mitchell, B. (2002). Resource and Environment Management. Singapore. 2nd Edition. Pearson Education Publishers. Edinburgh, UK
- Nsiah-Gyabaah, K (2004). Urbanization Processes – Environmental and Health Effects in Africa. PERN, Sunyani, Ghana.
- Nyang'echi, G. N. (1992). Management of Solid and Liquid Waste – A Manual for Environmental Health Workers. African Medical and Research Foundation. Nairobi, Kenya
- Nyamwaya, D. (1994). A Guide to Health Promotion through Water and Sanitation. African Medical and Research Foundation. Nairobi, Kenya.
- Rahman, M.A. (1990). Qualitative Dimensions of Social Development Evaluation: Thematic Paper in Evaluating Social Development Projects. Oxfam. London Development Guidelines No. 5.pp: 45-49.

- Salifu, L., A. Nashiru, & K. Tayler. (2005). Sanitation Policy in Ghana – Assessing key elements and Policy measures. Maximizing the Benefits from Water and Environmental Sanitation. Proceedings of the 31st WEDC International Conference, Kampala, Uganda.
- Schertenleib, R, Dionys F, (2002). An Integrated Approach to Environmental Sanitation and Urban Agriculture. Deubendorf, Switzerland.
- Thrift, Charles (2007). Sanitation Policy in Ghana: Key Factors and the Potential for Ecological Sanitation Solutions. Stockholm. EcoSanRes Programme and the Stockholm Environment Institute.
- UN-HABITAT (2009). Global Report on Human Settlement. 2009: Planning Sustainable Cities. UK Earthscan Publisher.
- UNEP. (2004-5). Environmental Management and Community Participation - Enhancing Local Programmes. Nairobi, Kenya.
- UNEP (2000). Global Water Supply and Sanitation Assessment 2000 Report.
- UNCED (1992) Agenda 21, Rio de Janeiro
- UNICEF (2008). Celebrating World Water Day – 2008. Resources/advocacy-material.
- UNICEF (2008) Sanitation and Water for All: A Global Framework for Action WASH Ghana.
- Vodounhessi, A. (2006). Financial and institutional challenges to make faecal sludge management Integrated part of ecosan approach in West Africa. Case study of Kumasi, Ghana. MSc Thesis WM 2006.05, UNESCO-IHE Institute for Water Education, Delft, The Netherlands.
- Water and Sanitation Program (2009). Urban Sanitation in Indonesia. Planning for Progress. Indonesia.
- WHO (2006). Guidelines for the Safe Use of Wastewater, Excreta and Grey Water. P. xxiii. France.
- WHO (2005). Water & Sanitation Guide.
- WHO (2005). Water Supply and Sanitation Collaborative Council and. Sanitation and Hygiene Promotion Guide. Switzerland.
- WHO and UNICEF (2008). An Advocacy Guide - 5 Steps for Planning and Evaluating World Water Day Activities
- WHO and UNICEF (2008). Global Water Supply and Sanitation Assessment 2000 Report. World Health Organisation, Geneva.

World Bank (2004). World Bank Implementation Completion Report. UESP I&II. Accra, Ghana.

World Bank, (2002). Sustainable Sanitation. [<http://www.NETSSAF.net>], (accessed 2010 March 11).

APPENDIX 1: UNSIGHTLY SCENES ON THE STREETS OF KUMASI

Plate A.1.1. Open Drains in Kumasi Filled with Solid Waste.

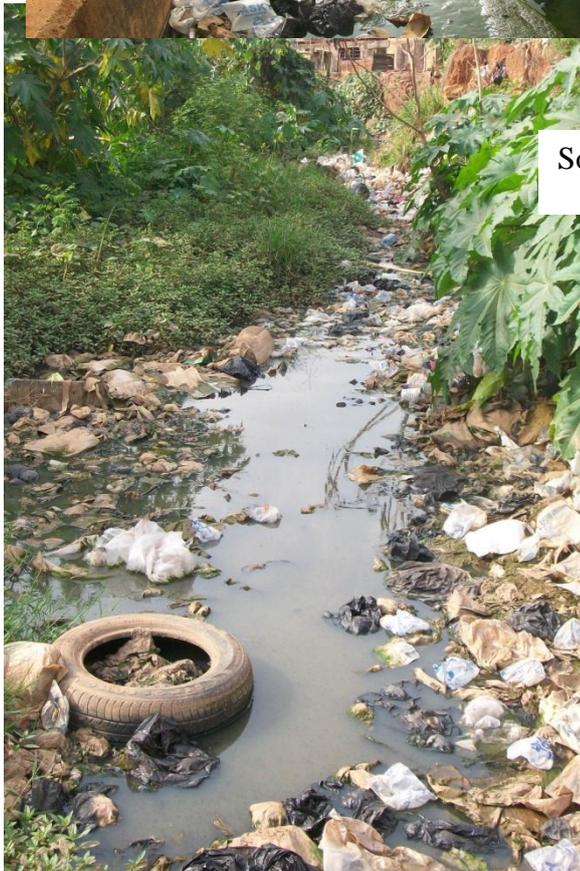


Plate A.1.2. Covered Drains Clogged with Solid Waste Spew Foul Smell to Pedestrians



**Plate A.1.3. Poor Sanitation in the City
Serve as Breeding Grounds for Disease**

Source: Field Survey, April 2010 East Engaged in Ghana



APPENDIX 2: ENVIRONMENTAL SANITATION BYE-LAWS IN KUMASI

1. Kumasi Metropolitan Assembly (House Owners and Occupier) Bye-Laws, 1995.

In the exercise of the powers conferred on the Kumasi Metropolitan Assembly by section 79 of the Local Government Act, 1993 (Act 462) these bye-laws are hereby made:

1. It shall be the responsibility of every house owner/occupier to clear and keep clean all gutters public or private in or around his premises.
3. All house owners/occupiers shall cause all premises to be painted between reasonable intervals.
4. All undeveloped plots shall be kept clear and clean or weed at all times.
5. (1) No house owners/occupiers shall create refuse dump in or immediately outside his premises.
6. Any person who contravenes any of these bye-laws shall be guilty of an offence and shall be liable on conviction by a court or Public Tribunal to a fine not exceeding 100,000.00 or in default, to a term of imprisonment not exceeding six months or both.

2. Kumasi Metropolitan Assembly (Sanitation) Bye-Laws, 1995.

In the exercise of the powers conferred on the Kumasi Metropolitan Assembly by section 79 of the Local Government Act, 1993 (Act 462) these bye-laws are hereby made:

4. (1) Where the KMA has set aside a place for the disposal of refuse, no person shall place, cause or permit to be placed any carrion, filth, refuse or rubbish or any offensive or unwholesome matter, on any street, yard, premises, enclosure or open space within the metropolis.
(2) if any offender under sub-paragraph (1) of this paragraph has not been identified or discovered, the existence of any carrion or other substance mentioned

in the said section found close to any building shall be presumed to have been placed by the owner or occupier thereof.

2. That occupier of a place shall clear and keep from all dirt, underbush, under-wood, weeds, high grass, rubbish, rags, broken bottles and all offensive matter (filling up holes with stones gravel, or other like materials) the streets or roads at the front, back sides, thereof with the drains, gutters and channels thereon.
6. No person shall deposit litter, refuse or other matter which may cause nuisance or block the passage provided for gutter or drains.
7. Any person who contravenes any of these Bye-Laws commits an offence and shall be liable on conviction of a Court or Community Tribunal to a fine not exceeding 50,000.00 or to a term of imprisonment not exceeding 3 months.

3. Kumasi Metropolitan Assembly (Cleansing) Bye-Laws, 1995

In the exercise of the powers conferred on the Kumasi Metropolitan Assembly by section 79 of the Local Government Act, 1993 (Act 462) these bye-laws are hereby made:

5. Any person who---
 - (b) Parks boxes or their things in any public pathway or pavement shall be guilty of an offence.
3. No posters, bills, placards, paper sheets or other materials used for advertisement shall be pasted, stuck on any wall, tree or fixture other than---
 - a) Space specifically provided or approved by the KMA for such purposes; or
 - b) Property owned or otherwise possessed by the advertiser.
6. Any person who throws, litter, refuse or other matter which may cause nuisance or block the water passage provided by gutter or drain, shall be guilty of an offence.

- 8 (1) The frontage of every commercial or industrial building shall be concreted, cemented or otherwise solidly paved, slabbed, tiled or culverted by the owner or occupier to the satisfaction of the KMA Engineer.
- (2) Where the owner or occupier of a commercial or industrial building does not comply with the provision of sub-section (1) of these bye-law the KMA Engineer or the Town Planning Officer shall do so and recover the cost from the owner or occupier of the building concerned.
- (3) Owners, occupiers of stores, shops, stalls and market spaces shall keep their doors and frontage clean and clear of litters, rubbish, filth or pool.
9. Any person who for the purpose of his trade, vocation or other business causes smell or other nuisance to the detriment of his neighbour or the public shall be guilty of an offense.
11. Except where penalty is expressly provided, any infringement or breach of any of these Bye-Laws may be met the abatement by the Assembly with or without notice or be punishable fine not exceeding 100,000.00 or in default to a term or imprisonment not exceeding three months. (Local Government Bulletin. 1998)

APPENDIX 3: TOP 10 INCIDENTS OF DISEASE IN KUMASI

2005		2006		2007		2008	
Disease	Cases	Disease	Cases	Disease	Cases	Disease	Cases
Uncomplicated Malaria	333,307	Uncomplicated Malaria	242773	Uncomplicated Malaria	316721	Simple Malaria Female	304668
Malaria Lab confirmed	66,066	Cough or cold	59442	Cough or cold	73229	Hypertension	38388
Cough or cold	55,583	Skin diseases and ulcers	31434	Skin diseases and ulcers	40417	Diarrhoea Diseases	15011
Severe Malaria	47,268	Diarrhoea with no dehydration	29340	Hypertension	33050	Severe Malaria	12186
Skin diseases and ulcers	39,746	Home/ Occupational injuries	22286	Home/ Occupational injuries	29757	Chicken pox	10640
Diarrhoea with no dehydration	30,432	Malaria Lab confirmed	22145	Diarrhoea with no dehydration	20667	Rheumatism & Joint	8549
Hypertension	27,394	Hypertension	17698	Malaria Lab confirmed	17934	Diabetes Mellitus	6118
Home/ Occupational injuries	24202	Acute Urinary Tract Infections	10125	Acute Urinary Tract Infections	11411	Malaria in Pregnancy	4843
Rheumatic & other joint conditions	11735	Severe Malaria	7666	Rheumatic & other joint conditions	9394	Intestinal worms	4206
Diarrhoea with some Dehydration	9,339	Rheumatic & other joint conditions	6653	Severe Malaria	6122	Typhoid Fever	3048

Source: Kumasi Metro Health Directorate, 2010

**APPENDIX 4: TOP 10 CAUSES OF ADMISSIONS TO HOSPITALS IN
KUMASI**

Annual 2005		Annual 2006		Annual 2007	
Disease	No. of cases	Disease	No. of cases	Disease	No. of cases
Uncomplicated Malaria	2,373	Uncomplicated Malaria	6175	Uncomplicated Malaria	7,451
Cholera	650	Diarrhea with no dehydration	1758	Diarrhea with Blood (Dysentery)	1450
Severe Malaria	540	Severe Malaria	715	Hypertension	780
Diarrhea with no dehydration	453	Hypertension	607	Severe Malaria	594
Uncomplicated malaria-Lab confirmed	272	Anaemia	400	Acute Urinary Infections	407
Diarrhea with some dehydration	267	Diarrhea with some dehydration	333	Typhoid Fever	394
Malnutrition	202	Uncomplicated malaria-Lab confirmed	328	Pneumonia	334
Hypertension	179	Typhoid Fever	324	Malaria-Lab confirmed	324
Typhoid Fever	168	Pneumonia	304	Anaemia	310
Pneumonia	165	Acute Urinary Tract Infections	281	Asthma	275

Source: Kumasi Metro Health Directorate, 2010

APPENDIX 5: CHILDREN EXPOSED TO POOR ENVIRONMENTAL SANITATION

Plate B.1.1: Improper Handling of Waste Exposes Children to Hazards and Diseases



Plate B.1.2: Women Spend Productive Hours in Hospitals as a Result of Poor



Plate B. 1.3: Most Children Loose their Lives to Environmentally Related Diseases



APPENDIX 6: INSTITUTIONAL INTERVIEW GUIDE

No. _____

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF PLANNING AND LAND ECONOMY

DEPARTMENT OF PLANNING

INSTITUTIONAL SURVEY QUESTIONNAIRE FOR ASSESSING ENVIRONMENTAL SANITATION
MANAGEMENT IN THE KUMASI METROPOLITAN AREA.

A. Institutional Interview Guide

Date: _____

Basic information:

- 1) Name of Respondent _____
- 2) Position _____
- 3) Department _____

WASTE MANAGEMENT DEPARTMENT

1. What is the scope of the activities of your Department?
2. How many toilet facilities do you have in Kumasi and how many were built since 2000?
3. How many toilet and urinals do you have in the CBD?
4. What percentage of the population have access to toilet facilities in their homes?
5. Which specific interventions have been implemented by your Department since year 2000 to improve the environmental sanitation in the metropolis?
6. Which donor agencies support environmental sanitation in Kumasi?
7. What are the interventions by these donor agencies since year 2000?
8. What are the specific duties of the SANITATION POLICE?
9. Do you have any plans with regards to wastes from sachet water?

10. Why is the Department still cleaning areas that have been demarcated for property owners by the Sanitation Bye-laws?
11. Which suburbs in Kumasi would you consider to have poor environmental sanitation and why?
12. What are the private waste management companies and their area of operation?
13. How many communal waste collection sites do you have in Kumasi and do you have plans to increase them?
14. Which obstacles do you face in promoting environmental sanitation in Kumasi?
15. What is your general assessment of the environmental sanitation condition in Kumasi?

APPENDIX 7 : INSTITUTIONAL INTERVIEW GUIDE

No. _____

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF PLANNING AND LAND ECONOMY

DEPARTMENT OF PLANNING

INSTITUTIONAL SURVEY QUESTIONNAIRE FOR ASSESSING ENVIRONMENTAL SANITATION
MANAGEMENT IN THE KUMASI METROPOLITAN AREA.

B. Institutional Interview Guide

Date: _____

Basic information:

- 4) Name of Respondent _____
- 5) Position _____
- 6) Department _____
- 7) Number of staff in the department _____
- 8) Office Location _____

Environmental Health Department

- 1) What is the scope duties and responsibilities of this department?
- 2) How would you describe the conditions of the built environment?
- 3) Does the city have official environmental sanitation plan for the metropolis?
- 4) Does the department have any collaboration with the town and country department to ensure that proposed developments have adequate sanitation, and also meets environmental regulations in order to protect the environment?
- 5) Are there adequate public toilet and urinal facilities in the metropolis and how are they managed?
- 6) What account for the non enforcement of these environmental sanitation bye-laws?
- 7) Are there plans to review the environmental sanitation bye-laws to make it more responsive to the ever changing society?

- 8) What measures are the department taking to address the issue of plastic waste in the city?
- 9) What is the nature of the natural environment surrounding the built environment?
- 10) The environmental sanitation bye-laws is clear about the responsibility of property owners and business owners for cleaning certain part of the urban environment, why are they being cleaned by the authorities instead of households and property owners?
- 11) What are the specific problems facing the built environment with regards to sanitation?
- 12) What measures is the department taking to address these problems?

Town and Country Department

- 1) What are the scope duties and responsibilities of this department?
- 2) How would you describe the conditions of the built environment?
- 3) Does the city have any official layout for settlements, concrete drains and waste collection sites?
- 4) Do you ensure that building plans have adequate sanitation (toilet) facilities and drains before granting building permits to developers?
- 5) How do you regulate or guide settlement development in the metropolis?
- 6) What is the nature of the natural environment surrounding the settlements?
- 7) What are the specific problems facing the city with regards to environmental sanitation?
- 8) What measures is the department taking to address these problems?
- 9) Did you involve the community in finding the proposed solutions and how if yes?

APPENDIX 8: INSTITUTIONAL INTERVIEW QUESTIONNAIRE

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
 FACULTY OF PLANNING AND LAND ECONOMY
 M.SC. DEVELOPMENT PLANNING AND MANAGEMENT

INSTITUTIONAL SURVEY QUESTIONNAIRE FOR ASSESSING ENVIRONMENTAL SANITATION
 MANAGEMENT IN THE KUMASI METROPOLITAN AREA.

C. Institutional Questionnaire

Date: _____

Basic information:

- 9) Name of Respondent _____
- 10) Position: _____
- 11) Name of Company: _____

1. Which sub-metro do you operate in? _____

2. Which suburbs in the sub-metro do you operate?

3. Which activities do you undertake in these suburbs?

4. What are your major challenges in providing services to these communities?

Political	Socio-cultural

5. Do you offer door-to-door waste collection services? a. Yes b. No
6. If yes, how much do you charge each month? _____
7. Who provides the waste bins for the door-to-door waste collection services?

8. How many tonnes of waste do you collect each week? _____
9. What equipment, staff and logistics capacity do you required to successfully carryout your activity? Please fill the columns below:

Item	Required Number or Capacity	Current Number/Capacity
Staff		
1.Trucks/vehicles		
2. Equipment(1)e.g. Public Waste bins (big size)		
3.		
4.		
5.		
6.		
7		
Other logistics		

10. Which incentives are available for you staff?

11. Do you have plans of extending your services to other communities and if yes where?

12. What is your assessment of environmental sanitation in Kumasi in general?

13. What are your contributions to environmental sanitation in Kumasi?

14. What do you think can be done by the following to ensure good environmental sanitation?

a) KMA:

b) Households

c) Traditional Authorities

**APPENDIX 9: HOUSEHOLD INTERVIEW QUESTIONNAIRE FOR
BUSINESSES**

No. _____

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF PLANNING AND LAND ECONOMY
DEPARTMENT OF PLANNING

HOUSEHOLD SURVEY QUESTIONNAIRE FOR ASSESSING ENVIRONMENTAL SANITATION
MANAGEMENT IN THE KUMASI METROPOLITAN AREA.

D. BUSINESSES

Date: _____

Basic information:

- 1 Status of the respondent: _____ Sex: M F
- 2 Age _____
- 3 Name of Street _____
- 4 No. of workers _____
- 5 Which type of wares do you sell? _____
- 6 What is your level of education?
 - a. Primary complete incomplete
 - b. Secondary complete incomplete
 - c. Vocational complete incomplete
 - d. Tertiary complete incomplete

Toilet facilities

- 7 How many shops are in the building?
Less than 10 Between 10 and 20 More than 20
- 8 Do you have access to toilet facility? Yes No
- 9 How many toilet seats do you have _____
- 10 Where is the toilet?
In the shop General toilet in the building
Public toilet Other (please specify) _____
- 11 Do you have urinal in the building? Yes No
- 12) If no, where do you pass urine?
Public urinal The drain Other (please specify) _____

13) What is the distance from your shop to the nearest public toilet?

Less than 100 meters between 100 & 250 meters
between 250 & 400 meters more than 400 meters

14) Which type of toilet is it?

WC KVIP other (please specify) _____

15) What is your assessment of the condition of the facility?

Very clean Clean Dirty Very dirty
Other _____

Refuse/solid waste

16) Who is responsible for cleaning the pavement in front of your shop and the drains?

KMA Zoom Lion myself Other (please specify)

17) How often do you see it cleaned?

everyday every three days once per week other (please specify)

18) Do you have a waste bin? Yes No

19) Where have you placed the waste bin? In the shop On the pavement

20) Who provided the waste bin?

Bought it myself Zoomlion KMA Other _____

21) If no, why don't you have a waste bin?

22) If no where do you and your customers dispose your litter?

In front of the shop On the street/pavement Other _____

23) How much do you pay for waste disposal/collection? _____

24) How often do you pay for the waste collection?

weekly monthly yearly other (please specify) _____

25) Whom do you pay to? KMA Zoomlion other (please specify) _____

26) What is your assessment of the environmental sanitation condition on your street?

Very clean Clean Dirty Very dirty

27) Do you have public waste bins on your street? Yes No

28) Are you aware that according to the KMA bye-laws, every individual is responsible for cleaning the pavement around his/her house or business premises and the immediate surroundings including the drains?

Yes No

29) What is your general assessment of the environmental sanitation in Kumasi?

Very clean Clean Dirty Very dirty

30) What can the city do to ensure that people engage in good environmental sanitation practices?

APPENDIX 10: HOUSEHOLD INTERVIEW QUESTIONNAIRE

No. _____

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF PLANNING AND LAND ECONOMY
DEPARTMENT OF PLANNING

HOUSEHOLD SURVEY QUESTIONNAIRE FOR ASSESSING ENVIRONMENTAL SANITATION
MANAGEMENT IN THE KUMASI METROPOLITAN AREA.

12 HOUSEHOLDS

Date: _____

Basic information:

1. Name of Community _____ Sex: M
F
2. Age _____ Status of
respondent: _____
3. Household size : _____
4. What is your level of education?
 - e. Primary complete incomplete
 - f. Secondary complete incomplete
 - g. Vocational complete incomplete
 - h. Tertiary complete incomplete

Toilet facilities

5. Do you have access to water?
Yes No
6. Do you have toilet facility in your house?
Yes No
7. If yes, how many toilets do you have in the house? _____
8. Which type of toilet is it? WC KVIP other (please
specify) _____
9. If no, where do you go to toilet?
Public toilet in the bush in the gutter
other _____
10. What is the distance from your house to the nearest toilet facility?
Less than 100 meters between 100 & 250 meters
between 250 & 400 meters more than 400 meters

11. Do you pay for the service? Yes No
12. If yes, how much do you pay for each visit? _____
13. What is your assessment of the condition of the facility?
 Very clean Clean Dirty Very Dirty

Wastewater

14. Do you have gutters from your house? Yes No
15. If no, how do you dispose off waste water from your kitchen and bathroom?
 In the open space in a pit other (please specify) _____

Refuse/solid waste

16. What is your assessment of the environmental sanitation condition in your neighbourhood?
 very good good bad very bad
17. Who is responsible for cleaning the pavement in front of your house and the gutter?
 KMA Zoom Lion myself
18. How often do you see it cleaned?
 everyday every three days once per week
 other (please specify) _____
19. How do you dispose off your waste/refuse?
 house-to-house burnt in a pit in an open space
 communal waste disposal site other (please specify) _____
20. How much do you pay for waste disposal/collection? _____
21. How often do you pay for the waste collection?
 weekly monthly yearly other (please specify) _____
22. Are you willing to pay for house-to-house waste collection if you do not have one? Yes No
23. Are you aware that according to the KMA bye-laws, every individual is responsible for cleaning the pavement around his/her house or business premises and the immediate surroundings including the gutter?
 Yes No

24. Are you aware that it is an offence to leave waste or litter in front of, and or around your house or business premises?

Yes No

25. Do you think that KMA should strictly enforce the bye-laws to make every individual responsible for the environmental sanitation?

Yes No

26. In your opinion, what should be the punishment if city authorities find filth in and around people's businesses and houses?

Community Service Fine imprisonment other _____

27. What is your general opinion about environmental sanitation in Kumasi?

Very clean Clean Dirty Very dirty

28. What can the city do to ensure that people engage in good environmental sanitation practices?
