

UNIVERSITY OF CAPE COAST

CAUSES AND EFFECTS OF INDISCRIMINATE WASTE DISPOSAL: THE
CASE OF TEMA METROPOLIS

BY

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DECLARATION

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

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Supervisor's Declaration

I hereby declare that the preparation and presentation of this dissertation were supervised in accordance with the guidelines on supervision of dissertation laid down by the University of Cape Coast.

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ABSTRACT

Causes and effects of indiscriminate waste disposal within the Tema Metropolitan Assembly area is the topic of study. What prompted the study has been the realization of generally poor state of sanitation within the municipality. The objective of the study therefore was to examine the causes and effects of indiscriminate waste disposal in the Tema Metropolis.

The descriptive survey design was adopted for the study with its population being all residents of Tema aged 15 years and above including males and females. A sample of 403 subjects comprising 396 residents and seven (7) key informants were used for the study. The quota, systematic and convenience sampling techniques were employed in selecting the respondents. Data were analyzed using the Statistical Product and Service Solution (SPSS) version 16 and presented on Tables and Charts.

It became evident that the reasons for indiscriminate disposal of refuse in the study area include inadequate dumping sites or collection containers coupled with irregular removal of filled refuse containers by the Tema Municipal Assembly. It also became evident that the TMA is constrained by inadequate funds and equipment which further compound the problem. The study recommended that research to find efficient and affordable latrine technologies for adoption by all residents; reviewing of TMA bye-laws to make them more deterring; the institution of a sanitation fund into which all companies operating within the Metropolis should contribute; and the establishment of public education unit within the Assembly.

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DEDICATION

To my lovely, aged mother.

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LIST OF ACRONYMS

TMA	Tema Metropolitan Assembly
O.P.D.s	Out Patient Departments

CHAPTER ONE

INTRODUCTION

Background to the study

Waste, according to Hanley (2001), is almost anything that has served its original intended purpose and is being discarded or stored prior to being discarded. In effect, there is no human endeavour that does not result in waste creation. All survival and life improvement (development) activities go with the creation of one type of waste or the other. This fact is aptly captured by Cunningham and Cunningham (2002) that waste is everyone's business. We all produce unwanted by-products and residues in nearly everything we do. As man processes and prepares food, waste is generated from the non-edible parts (i.e. peels husk, fibres, entrails etc); upon eating food, waste in the form of excreta is the final outcome; in clothing the body, waste is generated from worn out fabrics; in meeting our desires to comfort ourselves by acquiring varied material belongings, waste is generated when these are worn out or become old; and in our technological advancement, waste, most of which is dangerous to life, is generated.

Events in the 20th century indicate that waste in whatever form of classification: solid, liquid or toxic, has become a major consequence of modernization and economic development. Although developed countries have

long been aware of waste problems, this has not prevented many industrialised European countries like Britain, France, Spain, Ireland and Italy to be branded as the “dirtiest countries in Europe,” “drowning in a sea of garbage,” and “with most of their metropolitan rubbish dumped in landfill sites” . It is well known that until recently most of the rivers in Germany and Britain had dangerous high levels of nitrate, coal and iron deposits as a result of chemical and toxic waste dumped into them from iron and steel industries. In most of these developed countries such as Britain, America, France and Ireland, there has been a tendency to rely on landfills to reduce waste accumulation, which compared to other means of waste disposal like incineration and composting, has the ability to contain and dispose greater proportions of waste produced and seemed to be relatively less costly (Chazan, 2002).

Kwawe (1995) reports that by 1995, half of the million tones of waste generated in Central London were being transported more than 64 kilometers to be dumped because all dumping sites in Central London were full. Botkin and Keller (2003) point to the same problem involving the cost of construction, transportation and managing landfill sites in America and warned that the country may be close to running out of landfill space because of the sheer amount of refuse produced on a daily basis. Nevertheless, there are a small group of countries namely Austria, the Netherlands and Denmark that have evolved necessary management processes to efficiently resolve the waste disposal problem. One of the mechanisms that has been fashioned by these countries to manage their waste is coaxing their citizens to separate their domestic solid waste

into glass, paper and plastic categories, thereby enabling easy collection and consequently reuse (Chazan, 2002).

Even though many factors influence metropolitan solid waste management, population size is an important factor. There is a positive correlation between city population size, the percentage of waste moved and the rate of households enjoying regular waste collection. This suggests that increasing city size poses a greater problem to the solid waste management in Africa. In the Yaounde city of Cameroon for example, statistics have shown that the population was estimated to have grown from 600, 000 thousand people in the 1960s to 1.2 million people in the 1990s. Not only have the quantities of the waste increased from about 300 tons to 1200 tons per day but also the variety (Vermande & Ngnikam, 1994).

Talking of metropolitan waste (a combination of household and commercial refuse), Cunningham and Cunningham (2002) report that the U.S produces about 180 million metric tons per year which approximates two-thirds of a ton for each person every year. This figure is said to be twice as much per capital as in Europe or Japan, and five to ten times as much as it is in most developing countries. However, Hall (2007) reports that from the start of 2006, there have been sixteen major mergers and acquisitions of waste management companies in Europe to manage waste. Private equity firms were involved in half of the deals either as buyers or sellers and were involved in all the largest deals. For instance, in France, two Dutch companies, AVR and Van Gansewinkel were bought and merged by KKR and CVC. Similarly, three Bulgarian companies were

bought by Equest , a private equity group specialising in Balkan investments in France.

One big problem with waste management is the pre-collection of large amounts of waste trapped in inaccessible residential quarters, prior to its transportation to the nearest official regular waste management facility. Such areas constitute more than 60 percent of the city area and are mostly inhabited by low-income members of the African urban communities. There is no house to house collection, so pre-collection from homes to the public or communal skips to be placed at strategic spots in the city, are organized by households or some informal private groups (Achankeng, 2003). Medina (2005) identifies the city of Cairo in Egypt, as an example of an African city that practices this form of waste management strategy. The author notes that the one and only organised scavenger cooperative called the Zebballen of Cairo, has entered into an agreement with the city government to collect and recycle waste within the city.

In 1998, solid waste generated in the capital city of Ghana, Accra, was estimated at 765,000m³ and that of liquid waste 75,000m³. The total quantity of solid waste collected in the same year in Accra was 669,000m³ , implying that around 96,000m³ of the waste was unaccounted for. As at December 2002, the total volume of solid waste generated in Accra was between 500 to 1800 tones per day out of which 1200 tones was disposed on the average. At present, the tonnage of waste collected is about 1000-1200 and up to 1300 depending on the season.

McMichael (2000); Ngnikam (2001) and Lambi (2001) assert that in Accra, only 11 percent of 1.4 million people benefit from home collection of their

solid waste. Here, as in many other cities in Ghana, the uncollected waste is illegally dumped in open spaces, water bodies, storm-drainage channels, buried, burnt or deposited along the streets or roadsides. Blocked drainage channels causes flooding in the cities, while the prevalence of parasites, tetanus, malaria, hookworm, cholera and diarrhea are as a result of unsanitary conditions caused by waste being simply strewn around.

The mere volumes and quantities of waste generated is not so much the problem, but the consequences thereafter. Contamination of surface and groundwater sources and the breeding of vectors and pests which spread diseases and other undesirable nuisances are some of the many consequences of improperly managed/disposed waste. It has been estimated that a significant proportion of health problems reported at Out Patient Departments (O.P.Ds) in developing countries, including Ghana, are sanitation or waste management related. Caincross and Feachem (1993) did not lose sight of this when they stated that a variety of environmental hazards are associated with the mishandling or mismanagement of refuse. Fly breeding will always be encouraged by uncovered piles of waste, mechanical transmission of faeco-oral diseases such as diarrhea, dysenteries, balantiasis, cholera, campylobacter enteritis, giardiasis, rotavirus diarrhea, hepatitis A and leptospirosis.

To say that waste management has been a serious problem in Ghana particularly in the towns and cities is an understatement of the reality. Sporadic outbreaks of cholera, typhoid and the endemic nature of malaria including the annual rituals of flooding in Accra and other cities all point to poor or inadequate

waste disposal. Tema, a fast growing urban community within the Greater Accra region of Ghana, has its fair share of poor waste management by residents. It has been this state of affairs pertaining in and around the Tema Metropolis, the study area, which is viewed with dissatisfaction and as such, warrants this study. Tema, as at now, is a multi-ethnic society even though its indigenous people are the Gas. The predominant population of the area is the Ga Adangbe people. However, in view of this strategic location close to Accra, the capital of the nation, significant and competing numbers of other ethnic populations are found in Tema.

For instance, there are huge numbers of people from the Akan and northern extractions as well as Ewes and other ethnic groups all mixed up in the town. The Ga Adangbe, however, is the recognized group that exercises authority of land ownership and important traditions. The people of Tema are engaged in a variety of occupations as means of livelihood. These range from fishing by the indigenes through petty trading to big time commercial and industrial activities. According to the 2002 population and housing census and projections there from, the Metropolis had a population of 506,400 at the close of 2007. This makes it so large for the traditional waste management methods to be sufficient in dealing with waste problems.

Statement of the problem

Indiscriminate disposal of waste as pertains in Tema is of much concern for several reasons. Refuse is found littered on streets, lorry parks and other open spaces in the community with the resultant stench and flies nuisance. Residents do

not take the pains to dump refuse into containers strategically placed by the Metropolitan Assembly. Some of those who take refuse to these containers simply discard the refuse on the ground rather than into the container. The same is true regarding human excreta. Human faeces are found on open spaces in-between houses, with some rapped in polythene bags behind buildings. Even where public toilets are provided, these unsanitary practices are still seen. It is worthy to disclose that the Metropolis has public toilets all manned by personnel of the Tema Metropolitan Assembly. With these, including individual household toilets, one wonders what the explanation can be regarding the insanitary situation of the environment. Close to two public toilets in particular (one water closet and the other aqua privy) is located in an open space where people openly defaecate instead of visiting the toilets.

In view of the poorly managed waste on human health and what really pertains in Tema Metropolis. The study was aimed primarily at unearthing the underlying factors accounting for the poor waste management situation within the Tema Metropolis as well as suggesting practical and reliable solutions, based on the outcome of the study regarding what was found to be most plausible factors contributing to the problem. The plates below show the indiscriminate waste disposal in the Tema Metropolis.



Plate 1: An open dumping site in the Tema Metropolis

Source: Field data, 2008



Plate 2: Cattle feeding on an open dump site

Source: Field data, 2008



Plate 3: Workers of Zoomlion Company Limited dumping refuse

Source: Field data, 2008

Objectives of the study

The general objective of the study was to ascertain what accounts for poor state of sanitation within the Tema Metropolis in order to suggest appropriate intervention strategies. The specific objectives of the study were to:

- Explain why residents of Tema Metropolis dispose of refuse indiscriminately.
- Ascertain why residents of Tema Metropolis defaecate in open spaces instead of in toilet facilities.
- Determine the extent to which residents of Tema Metropolitan know the link between poor waste disposal and health.

- Ascertain what the Metropolitan Assembly think could be done to address waste disposal problems in the Metropolis
- Identify strategies that could be employed from the perspective of residents, to improve waste disposal practices in Tema Metropolis
- Suggest measures that could be employed to eliminate or reduce poor waste disposal practices in the Tema Metropolis

Research questions

The purpose of this study as stated above could be achieved by obtaining answers to the following questions:

- Why do residents of Tema dispose off refuse indiscriminately?
- Why do the people of Tema dispose of human excreta in the open instead of public or household toilets?
- What knowledge do the people of Tema have regarding the relationship between poorly disposed waste and disease causation?
- What measures has the Metropolis authority put in place to address
- waste disposal problems in the Metropolis
- What difficulties do the Metropolitan authorities face in addressing waste problems in the Tema Metropolis?

Significance of the study

This study would inform policy makers particularly in the Tema Metropolis as to the causes of indiscriminate disposal of waste and what could

possibly be the solution to the problem. The policy implication therefore is that, it could help in shaping waste management policies in Metropolitan/Metropolitan and District Assembly areas in the country.

It is also of significance to other student researchers who may find it useful for the purpose of replication and also as a document from which new problems could be generated for the study. It is also a contribution to existing knowledge regarding the problem of the study.

Delimitation

The study was limited geographically to only Tema Metropolitan Assembly and did not extend beyond these areas. In terms of respondents, the study was also limited to only permanent residents of the Tema Metropolis including, both males and females, aged fifteen (15) years and above. In terms of scope, concern was on factors that contributed to indiscriminate disposal of waste-human excreta and refuse – as well as knowledge between waste and disease and suggestions as to how this could be stopped. Any other aspects not specified here are outside the jurisdiction of the study.

Limitations

This study could not have been completed without some difficulties which might in one way or the other affect the reliability of the findings. Some of the limiting factors that readily come to mind are:

- Sampling procedure: Except for the systematic method used to sample households, the quota and convenience techniques are non-probability methods that lack strict reliability and could therefore affect the results of the study.
- Sample size: The sample size of 403 was only 0.133% of the target population and therefore not significant enough to allow for generalization of findings. In addition, the number of subjects representing the Environmental Health staff and Metropolitan Assembly staff (i.e. 7), was too small to articulate a fair opinion of the universal set that they belong.
- Administration of data collection instrument: Even though assistants are oriented to collect data, strict adherence to all the procedures could not be assured since they operated individually. Besides, the interpretation of question items to subjects could be a suspect.
- Time: Having to carry out the study while at the same time performing official administrative duties, there was long period of time between data collection and the time they were put together to come out with this report.
- Resources: The researcher was financially constrained to expand the scope of work to include in the study other types of waste other than solid waste.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

This chapter reviews related literature on the concepts and theories underpinning the study. The tragedy of the commons and sustainable development theories were adopted to account for the indiscriminate disposal of waste by the Tema residents and the need for them to be environmentally sensitive. The literature was further grouped into the following sub-headings: extent of indiscriminate disposal of wastes; factors contributing to indiscriminate disposal of wastes; consequences of indiscriminate disposal of wastes; and solutions to indiscriminate disposal of wastes.

Tragedy of the commons theory

The theory of the tragedy of the commons dates to an 1833 essay by William Forster Lloyd, who noticed that in a common pasture owned by all of the villagers, each villager overgrazed the pasture, running it for everyone. In 1968, Garret Hardin applied the theory to population growth (the idea that having children is beneficial to individuals, who will therefore have many kids, but will eventually culminate in overpopulation in society, which has numerous negative effects). Hardin (1968) argues that if the population gets out of control, many

scarce natural resources will be entirely consumed. Humanity will not have enough water, food, energy or room to support an increased population. To combat this problem, Hardin proposed an international agreement meant to restrict population growth (Hardin, 1968).

In concrete terms, the tragedy of the commons theory states that when a resource is collectively owned by a group of people, each person will exploit the resource, overusing it and thus ultimately destroy it. In other words, everyone acts as a free rider, ignoring the group's collective interests in favour of their own (Lloyd, 1833). Lack (1954) exemplifies the tragedy of the commons with a pasture. The author asserts

“Picture a pasture open to all. It is expected that each herdsman will try to keep as many cattle as possible on the commons. Such an arrangement may work reasonably satisfactorily for centuries because tribal wars, poaching and disease keep the numbers of both man and beast well below the carrying capacity of the land. Finally, however, comes the day of reckoning, that is, the day when the long-desired goal of social stability becomes a reality. At this point, the inherent logic of the commons remorselessly generates tragedy.”

Lack (1954) adds that as a rational being, each herdsman seeks to maximise his gain.

“Explicitly or implicitly, more or less consciously, he asks, What is the utility to me adding one more animal to my herd?”

This utility, the author states has one negative and positive component. The negative component is a function of the additional overgrazing created by one more animal. Since, however, the effects of overgrazing are shared by all the herdsmen, the negative utility for any particular decision-making herdsman is only a fraction of -1. The positive component is a function of the increment of one animal. Since the herdsman receives all the proceeds from the sale of the additional animal, the positive utility is nearly +1.

Extent of indiscriminate disposal of wastes

In respect of human excreta, according to Caincross and Feachem (1993), the World Health Organisation's (WHO) figures for 1988 shows that only 67% of the combined urban population of developing countries have adequate excreta disposal facilities. In yet another study, Author (undated) in an article states that available statistics indicates that as at 1994, 5 million people residing in urban areas do not have access to adequate sanitation facilities (toilets). The figure for rural population worldwide is 2,284 million. In Ghana, according to the report, the average in terms of access to sanitation facilities is 53% in the urban population and 36% for rural population. In view of the apparent lack or inadequacy of excreta disposal facilities according to these reports, therefore, places other than the approved sanitary facilities are used for the disposal of excreta.

Considering the issue of excreta disposal in Ghana in particular, Kendie (1990) in a study realized that 51% of the settlements disposed of human excreta indiscriminately, while 48% used pit and bucket latrines.

In respect of solid waste (refuse), Cunningham and Cunningham (2002) state that “open, unregulated dumps are still the predominant method of waste disposal in most developing countries”. Cunningham and Cunningham report that “the gaint third world megacities have enormous garbage problems”. The study area (Tema) similarly has characteristics of mega cities. Cunningham and Cunningham (2002) further report that Mexico City, the largest in the world, generates some 10,000 tons of trash each day. Most of these waste according to the report, was until recently, left in gaint piles, exposed to the wind and rain, as well as rats, flies and other vermin. It is also reported that, Manila, in the Philippines, has at least ten huge dumps, with the most notorious called “smoky Mountain” in view of its constant smoldering fires (Cunningham and Cunningham, 2002: 295). The authors further intimated that even in developed countries “you have undoubtedly seen trash accumulating along roadsides and in vacant, weedy lots in the poorer sections of cities”. These pictures of waste problem in even the developed countries are not different from what is observed in most cities in the third world countries. As far back as the 1960s waste disposal problems in Accra were noticed and complained of. For instance, the Friday, December 13, 1966 edition of the Daily Graphic in a caption “Poor Sanitation threatens lives in Accra” vividly painted a disturbing picture of waste disposal situation in the city. The opening paragraph of the article states that “Accra is rapidly becoming one big refuse dump. Refuse is thrown almost everywhere and it is left there to pile up into mounds”. The second paragraph continued that “the drains are not cleaned and some are so sand-logged that they overflow whenever

there is little rain” (Graphic communications Group Ltd, 2006:129). If in 1966 it was said that Accra was becoming a refuse dump, the city has indeed become so in the present time in view of the fact that nothing significant has since been done to correct the factors that led to the problem even then. Tema being part and parcel of the city can therefore not be expected to be different.

Factors contributing to indiscriminate disposal of wastes

As can be inferred from the foregoing, indiscriminate disposal of waste is not a new phenomenon the world over and Ghana in particular, which persist till date, despite the long realization of the consequences. Why the practice continues to persist is the question that is the concern of this study. Considering the human excreta aspect of waste Gosh (1935) observes that in most villages and non-metropolitan areas, there are no arrangements for latrines with the result that people use any open space for defaecation.

In apparent support of the above observation, Pickford (1991) indicates that where there are no latrines, people resort to relieving themselves in the open. They usually do this in the fields or bushes or any undeveloped land. The conclusion one can make here is that lack of places of convenience (latrines) is one of the reasons why people defaecate indiscriminately. This conclusion is, however, contestable in the case of Tema, the study area, because even in areas where latrines are available, people still defaecate indiscriminately.

Nabiochoge (1997), in a study to determine factors that contribute to indiscriminate defaecation in Bawku Township reported that 40% of the

households had toilets while 60% did not have. He further reported that not all lodgers of these households with toilets have access to the use of the facilities. This study therefore supports the findings cited earlier on and also suggests that even where toilets were in some houses, not all lodgers were allowed to use them.

Poor maintenance conditions of toilets are some of the reasons often cited by some people for not using toilets where they exist. For instance, Nyonator (1996) implied this notion when he opined that latrines already in existence needed continuous maintenance or users view them becoming hazardous facilities, thus encouraging the indiscriminate defaecation by people of the community. Collaborating the above, Caincross and Feachem (1993) cited Nicholas (1992: 30) as having reported that in Juba, Sudan, “smell” was their chief problem. These findings suggest that even where toilets exist, poor maintenance can make people avoid them. The conclusion is a plausible reason for the practice in the study area. The knowledge level of many people with regards to the relationship between exposed human excreta and health is another factor worth considering. According to Cotton et al (1995:28), low income urban people are seldom convinced by health promoting function.

In support of this notion, Caincross and Feachem (1995) contend that health improvement does not motivate many people to buy a latrine. This is because the connection between latrine usage and health is not clearly perceived. The authors say the desire for privacy, convenience or social status is usually more effective in generating demand for latrines. These findings clearly indicate

that some people do not perceive the health function of toilets, but would go in for toilets just for status and other reasons as stated above.

Socio-cultural factors also play significant role in explaining indiscriminate defaecation. In the words of Cotton et al (1995), the importance of cultural beliefs and perception in latrine use was amply demonstrated in Kumasi, Ghana, when it was agreed to provide pit latrines after several master plans for sewerage were abandoned. According to the report, the house holder of the first demonstration unit refused to use the latrine because he was a Muslim and the latrine faced the direction of Mecca. Belcher and Vazques-Calcerrada (1997) in their study in Uganda, in the late 1940s found out that people were afraid to use latrines because their fixed location would provide sorcerers with easy access to their excreta for devilish purposes. Another perception of the people, according to the study, was that faces of one's own in contact with another could bring about contamination; hence defecating at random in the bush and surroundings was considered the safer alternative to outwit the sorcerers.

According to the study, even though individuals recently had toilets brought to their houses, many did not use them. The men continued to use the fields. One man particularly, according to the study, said that he just does not feel comfortable responding to nature's call in the house because it was something that was rated as unclean and he felt compelled to get away from living quarters to carry out such functions. The foregoing cited studies suggest that there can be certain inherent customs and beliefs among people that can inhibit change towards healthy practices, including use of toilets.

Poverty can also be cited as a factor militating against the acquisition (ownership) and use of latrines. Alluding to this, Cotton et al (1995: 42) make reference to income levels and existing levels of payments for sanitation services among other reasons. They report that a typical family in “Kumasi relying on public latrines in 1990 paid about the same monthly for rent (US\$1.51), water (US\$1.14) and electricity (US\$1.63)”. The situation for most families is not likely to be different in the case of the study area, and the figures may even be several times higher in the present due to obvious reasons. Brown (1995) also indicates that the high cost of Kumasi Ventilated Improved Pits (KVIP) in Ghana (where they were first introduced) has seriously impeded the implementation of urban sanitation programmes. This is an affirmation of the findings of Caincross and Feachem (1993) who state that the cost of a new toilet may compete as a priority with extra space of their home improvement.

Booth, Martin and Lankester (2001) explain that these solid waste substances result from human activities that are no longer wanted or needed by their users. The authors report that “piles of rotting food, plastic, bags, cans, bottles and other materials build up in the streets, sometimes making huge, dangerous and stinking piles. It is further said that even when household garbage reaches collection bins, problems still occur. It may overflow because the contents of the bins are not removed regularly.

In addition, scavengers may retrieve some components to resell and animals may rummage through garbage for food. One other major factor resulting in refuse accumulation in communities, according to Booth et al., (2001), is that,

in developing countries, the metropolitan government rarely provides garbage collection for communities. As a result, garbage clutters the area, blocks drains, and gathers in piles at any open area that is informally selected as a place for dumping. These reasons for refuse accumulation cannot be more plausible anywhere in the third world than they are in Ghana, and the study area in particular.

Consequences of indiscriminate disposal of waste

Considering human excreta (liquid waste) aspect of waste in general, review of a few works would suffice. Feachem (1993) says that diseases in the faeco-oral categories as well as most of the water-based diseases and several others not related to water are caused by pathogens transmitted in the human excreta. Surjardi (1994), in a research on household environmental problems in Jakarta, observes that while quality of and upkeep of lavatories is undoubtedly important, when some people do not use the lavatories, other faeco-oral routes can become crucial. By this the author was referring to diseases spread by faeces from one person to the other through the faeco-oral route.

In the view of Cotton et al. (1995), it is often difficult to prove that latrines are beneficial to health. This could be as a result of lack of understanding of the germ theory of disease to many people. Cotton et al., (1995) however, contend that positive evidence comes from a study of mortality among 2,500 infants in Bangladesh (Aman et al., 1985). According to the study referred, mortality amongst infants over four weeks old is 3.12 times higher in households not using

latrines compared with those which had latrines. The authors also refer to yet another study (Silva and Athukorla, 1991) which shows that in four similar low income communities in Sri Lanka, the only community in which people defaecated in the open corresponded with the communities with the highest incidence of diarrhea. These findings go a long way to confirm that people's health can be significantly affected by improper disposal of human excreta.

On the consequence of improper disposal of solid waste (refuse), Booth et al. (2001) reveal that people who live near solid waste have an increased risk of health problems. This, according to them, is especially the case of young children who play in areas where garbage is thrown, and scavengers who earn their living by sorting through rubbish. The authors listed dengue fever, malaria, filariasis, other mosquito-borne disease, rabies, plague and animal bites as some of the consequences. Other risks they listed include cuts, tetanus, hepatitis B and skin infections, diarrhea disease and chemical toxicity, all of which are associated with improper disposal of solid waste (refuse).

Lucas and Gilles (2003) express the same notion in a more succinct manner that, different types of waste pose different problems but in general, failure to manage and dispose waste properly exposes people to increased risk of infectious diseases.

Managing solid waste in developing countries

The responsibility of managing solid waste over the years has rested with local government. This service is non-exclusive, meaning that once it is provided

to some portion of a community it benefits the overall welfare of the community. Again the service is non-rivalled, meaning that any resident can enjoy the benefit of the service without diminishing the benefit to anyone else (Dillinger, 1988). These qualities of being non-exclusive and non-rivalled, essentially places the responsibility of managing solid waste within the public domain as a public good.

Because solid waste management is an urban issue, the level of government responsibility is typically local or metropolitan government. However, because the task of managing solid waste in recent times has become very difficult, the governments in developing countries have sought the support of the private sector to help deal with the problem. In Ghana the Local Government Act, 1993 (Act 462) gives local authorities the responsibility to see to the overall development their respective districts. These responsibilities include effective management of waste. However, local authorities have failed to address the management of waste their jurisdictions. Piles of refuse and choked drains and gutters as well as overflowing public septic tanks are evidences of environmental crisis.

Efforts at managing urban waste

According to Addae (1996), Ghana's attempt at managing urban waste dates back to the 1880s when the nation came into contact with the Europeans. The Europeans established sanitary departments to deal with sanitation in the colony. In 1910, the Secretary of State issued a memorandum which set out the

organizational structure of the new sanitary branch. The sanitary branch was charged with the following responsibilities:

- General sanitation of the urban centres
- Refuse disposal
- The construction and proper maintenance of drains
- Lagoon reclamation work and mosquito control
- Management of sewage and sewage disposal
- Managements of markets and slaughter houses
- The handling of epidemics
- Health education, and
- Overseeing towns and village planning along sanitary lines (Addae, 1996).

The sanitary branch established faced many challenges initially but chalked some progress in the 1920s. The then governor of the Gold Coast, Guggisberg was determined to reform and bring sanitation in the colony. In his address to the Legislative Council, Guggisberg pressed for clean, well drained towns, with broad streets, numerous open spaces and intervals between houses. According to the governor, these essentials help promote quality health and are the finest measures to prevent the spread of epidemics.

However, the problems associated with managing waste in the Gold Coast continued and when Ghana gained independence in the 1950s some dynamism was introduced in the waste management effort. In 1974, the Environmental Protection Council (EPC) was established by NRCD 239 and was amended by SMCD Decree 58 of 1976 to address development and environmental related

issues, and in the main to advise government on environmental matters. The SMC Degree gave the EPC the power to:

- Establish standards and guidelines for air, water, land and other forms of pollution, including the control and discharge of waste and solid substances;
- monitor, inspect and execute law enforcement functions; and
- introduce adequate penalties for offences against environmental legislation.

In spite of these efforts the nation was still faced with the problem of managing waste and this continued in the 1960s to the early 1990s until the Ministry of Local Government and Rural Development (MLGRD) Act (Act 462, Section 81) led to the publication of the National Environmental Sanitation Policy (NESP) in 1999. The NESP aims at developing and maintaining a clean, safe, and pleasant physical environment in all human settlements, and to promote the social, economic and physical well-being of all sections of the population. It comprised a number of complementary activities including the construction and maintenance of sanitary infrastructure, the provision of services, public education, community and individual action in managing waste, and regulation and legislation to deal with sanitation issues in the country (MLGRD, 1999). Currently, the private sector is involved in managing waste in Ghana.

Solutions to indiscriminate disposal of waste

Scattered in the existing literature are several prescriptions as to how to solve indiscriminate disposal of waste and the inherent/associated problems. For instance, writing on options for effective sanitation, Booth et al. (2001), among other things, are of the opinion that effective waste management requires a metropolitan authority that is open to new or bold ideas, relatively efficient and politically stable; and not overwhelmed by civil unrest, high levels of debt and rampant corruption. The authors added that it also requires an improvement that is based on low-cost, innovative and often unorthodox technology, that depends heavily on community input and suggestions; and is based on providing a toilet for each individual household. From the above, it would be purely speculative to say whether or not the metropolitan authorities in Ghana are open to new and bold ideas or whether they are corrupt, but with certainty, one can say that they are politically stable, at least, for the past couple of years. Commenting on improvement, it is common knowledge that most of the technologies operating in the country are highly orthodox, lacking innovativeness and usually above the means of the ordinary person. It is also clear that choice of technologies does not usually depend on community input and suggestions. It is in view of these observations that the suggestions are considered with much importance.

On their part, Lucas and Gilles (2003) opine that sufficient containers or bins are needed to cope with the volume of waste prior to collection whether or not this is the case in towns and cities is the big question. Lucas and Gilles further

direct that the waste storage containers must be convenient to access both for the user and the collector.

On collection, the authors suggest that where the collection of domestic waste is possible, collections should be at regular and consistent intervals. The frequency of collection will often depend on the capacity and quality of the storage containers used. What pertains in many metropolitan and metropolitan areas in Ghana is clearly the direct opposite of these suggestions. It is, however, understandable in some cases in view of huge financial requirements which can simply not be mobilized by some Metropolitan Assemblies.

The solutions to waste problems continue with the suggestion that there is the need to involve beneficiary communities in programme choice, design and implementation (Cotton & Saywell, 1998). Another suggestion is mandating sanitary disposal of human excreta (use of toilets) through legislation and intensification of health education (Lucas & Gilles, 2003). The adoption of appropriate technological design of toilet facilities is also suggested by Zajac et al. (1995) while Whittington et al. (1992) suggest the sharing of ownership of latrines by households to reduce cost of acquiring them. Recommended solutions to indiscriminate waste disposal pertaining to Tema, for the purpose of this study are based on what the study found as predisposing factors to the problem and what is practicable, reliable, acceptable and sustainable.

CHAPTER THREE

METHODOLOGY

Introduction

This chapter is concerned with the methodological aspects of the study. It consists of the description of the study area, the research design, population, sampling, sample size, data collection techniques, and data analysis.

Description of the study area

Tema, which serves as the administrative capital of Tema Metropolitan Assembly, is a coastal city situated 25km east of Accra, the national capital. The Greenwich Meridian passes through the city of Tema. The metropolis shares common boundaries with the Accra Metropolis on the west, the Ga East municipalities on the north-west and the Dangme West District on the northern and eastern borders. Tema is bordered to the south by the Gulf of Guinea. Until 1952, when the government of Ghana decided to develop a deep seaport, Tema was a small fishing village. The metropolis became an autonomous council in 1974 and was elevated to the status of a Metropolitan Assembly in December, 1990 (Tema Metropolitan Assembly-TMA, 2006).

There are 220 km of roads in the metropolis. Over 80% of the settlements in the metropolis enjoy electricity supply and a similar proportion has access to

potable water by means of pipe-borne water system. A few of the rural settlements, however, still depend on water from streams, rivers and other sources like boreholes. The Tema port, which opened to maritime traffic in 1962, is Ghana's largest and indeed one of the most important maritime on the west coast of Africa. It is a free port and efforts are being made to make it a hub port in the West African sub region. These include dredging to allow vessels with deeper draught into the port. Other works include reconstruction of access roads, extra pavement works and the establishment of a specialised modern container terminal. A shed was refurbished and dedicated for exclusive use by non-traditional exports since 1995. A fishing harbour also adjoins the main harbour (TMA, 2006).

Beside, the heavy industries, there are also numerous light industries, with over 250 factories in the metropolis engaged in eight major areas namely: chemicals, textiles, food processing, engineering, paint, fish cold stores, printing and wood working. Efficient and good economic and social infrastructural facilities are in place and are continuously being upgraded. Tema is less than 25 km away from Accra, which provides the largest and most affluent market for consumers and intermediate goods in the country (TMA, 2006).

Livestock production, especially cattle is a major activity in the rural areas of the metropolis, although the industry is still underdeveloped. Poultry is very popular with small, medium and large scale poultry enterprises available in the semi-urban areas. The predominant mining activity in the metropolis is gravel and

sand winning. This activity is however, strictly controlled in order not to degrade the land (TMA, 2006).

The Tema metropolis is serviced by a total of 158 basic schools made up of 77 public and 81 private schools. The industrial sector represents the most important productive sector in terms of local revenue generation. Currently, there are three steel manufacturing companies in Tema, a large aluminum smelter and several major food and fish processing companies such as Nestle, Ghana Cocoa Processing Company, Pioneer Food Cannery and Ghana Agro Food Company. There are also two large textile manufacturing companies (TMA, 2006).

Research design

The design adopted for this study is the descriptive survey. Unlike experimental and correlational designs, this study did not intend to find cause and effect relationship between variables nor did it control any variables to find the effect on other variables. The design allows for mere observation of events and reporting them as they unfold. Being a social issue and sensitive as it is, coupled with the retrospective nature (i.e. the events have occurred much earlier before the study), this design is certainly the most appropriate hence, its choice.

Population

The study targeted the entire population of Tema (506,400) including males and females, adults and children since every one is a potential producer of waste. However, the population from which respondents were sampled includes

people aged 15 years and above both males and females, and who were permanent or semi-permanent residents of the eighteen Communities and Kpone area. This constitutes about 59% (298,775) of the total population.

Sample size

The number of respondents sampled for the study was 403, made up of 396 residents and 7 key informants. Two hundred and seventy (270) of the respondents were females, while 126 respondents were males. Four of the key informants came from the Metropolitan Assembly and three from the Environmental Health personnel of the Metropolitan Waste Management Department. However, this number was settled on for purposes of ease, time and other resource constraints. More females were also included in the sample in view of the unique role they play in waste management in the Ghanaian context/culture.

Sampling procedures

The techniques that were used to sample respondents were the quota, systematic and convenience sampling techniques. The quota technique was used to allot proportionate number of subjects (22) to each of the 18 communities within the Tema Metropolis, while the systematic technique was used to select housing units in each community from which subjects were sampled.

To do this, a sampling frame was constructed using the house numbers of each of the communities. Then, 22 housing units were selected in each of the

communities systematically. To select the individual respondents from the selected housing units, the convenience sampling technique was then employed. This was done by sampling any one female aged 15 years and above from the first two (2) housing units each, then a male is selected from the third housing unit. This was repeated until individuals were selected from all the 22 housing units in each of the 18 communities.

Data collection methods

The instrument used to collect data from the sampled subjects/respondents was a structured interview schedule. The choice of this instrument was in view of its inherent advantages over a questionnaire or other tools. In the first place, it allows for probing by either the interviewer or the respondent where a response or question was not clear enough. This is not possible using the questionnaire. The situation where questionnaire cannot be recovered due to failure of respondents to return or complete them is a problem that is not associated with interview. The complete sample size is covered by the end of the study using interviews. Whereas the questionnaire is not suitable for illiterate populations, the interview is quite suitable for that.

The instrument consisted of three (3) main parts. Part one concerns socio-demographic data of respondents, part two has question items that addressed the main research questions for respondents, while part three was meant for Metropolitan Assembly and Environmental Health personnel. There were both

open-ended and close-ended question items which totaled 29 in number. Spaces were provided on the instrument for recording of responses.

Data collection

The instrument was administered by the researcher with the assistance of five (5) Environmental Health personnel drawn from the Tema Metropolitan Assembly, particularly the Waste Management Department. The five (5) other people (i.e. Environmental Health Personnel) were first given an hour orientation regarding the understanding of the question items and how the interviews were to be conducted, including where and how to record responses. In all, two weeks were used to collect the data with each research assistant carrying copies of the instrument and going into the communities individually as assigned.

Data analysis

The data were collated and analyzed using the Statistical Product and Service Solutions (SPSS) version 12 and then presented in tables and graphs/charts. Both tables and graphs/charts provide for responses to question items, frequencies of different responses and percentage of response out of the total respondents. Brief comments are made under each Table or Graph/ Chart highlighting the unique observations such as those in conformity with the literature or in direct conflict or contradiction with aspects of the literature and /or any established fact.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

The findings of the study are presented on this chapter. The presentation is on two parts. Part one covers the socio-demographic data of respondents, while part two covers the main findings from respondents. All findings are presented on tables and graphs with a few presented as simple statements. There are brief summaries under each table or graph. Discussions on the basis of research questions are done under Tables/ Graphs that are related to the particular research question.

Socio-demographic characteristics of respondents

The socio-demographic data collected include sex, age, occupation, religion and the educational level of respondents. The details of the demographic data of respondents are presented in the discussions that follow:

Table 1: Sex distribution of respondents

Sex	Frequency	Percent
Male	124	30.8
Female	270	69.2
Total	398	100.0

Source: Field data, 2008

Table 1 shows the distribution of respondents by sex. From Table 1, females constitute 69.2% of the main study's respondents while 30.8% of the respondents were males. This implies that females are more reckless in disposing waste than their male counterparts.

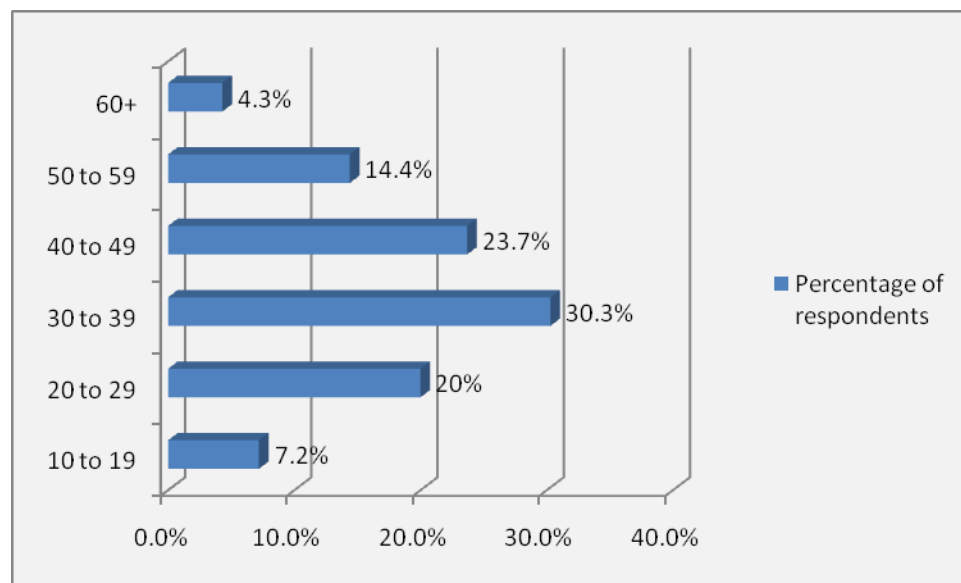


Figure 1: Age distribution of respondents

Source: Field data, 2008

About 30% of the respondents according to Figure 1 were aged between 30 and 39 years while the minority (4.3%) was aged 60+. Most of the

respondents, however, fell between 20 years and 49 years (i.e. about 70%). It can be observed from Figure 1 that the age of respondents was fairly distributed making it possible for diverse views from both the young and old respondents. Thus, the results revealed that the young respondents dispose more waste in the metropolis, than the respondents who are old.

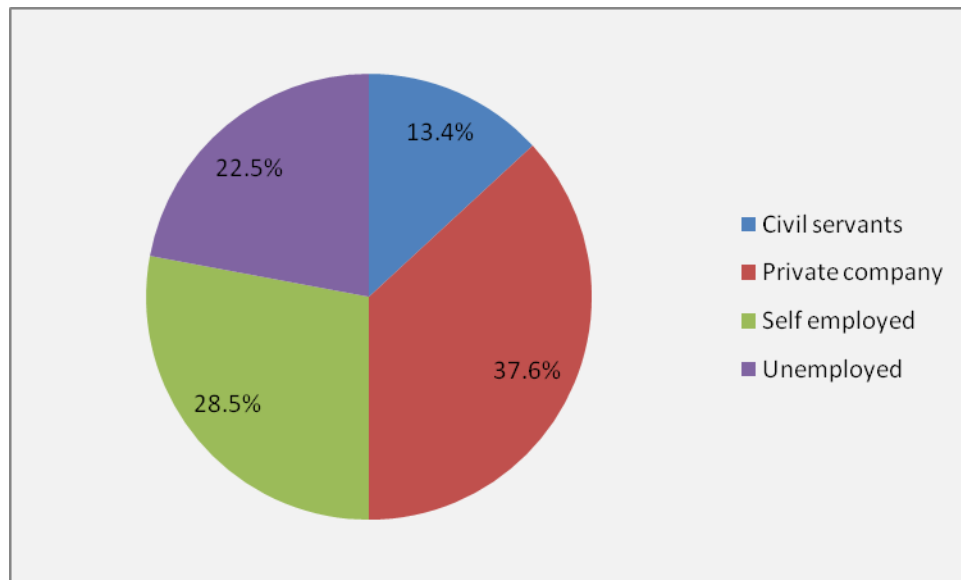


Figure 2: Occupational distribution of respondents

Source: Field data, 2008

From Figure 2, a significant number of respondents (22.5%) were unemployed while 13.4% were employed in the civil service. Put together, about 67% of respondents were either employed in private companies (37.6%) or in self employment (28.5%). This meant that among the respondents, those who work with private companies litter the environment the most.

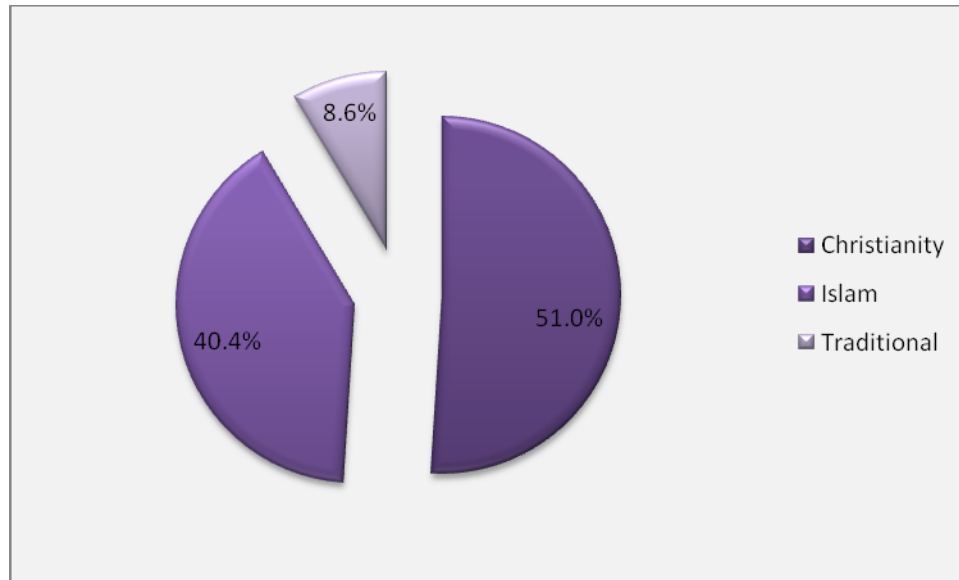


Figure 3: Distribution of respondents by religion

Source: Field data, 2008

Figure 3 shows the distribution of respondents by religion. About 51% of the respondents were Christians while 40.4% were Moslems. About 8.6% of the respondents were traditional believers. This is an indication that Christians are more reckless in disposing their refuse than their Muslim and traditional counterparts.

Table 2: Educational attainments of respondents

Levels of education	Frequency	Percent
None	136	34.4
Basic	85	24.5
Secondary	125	38.3
Tertiary	23	5.8
Total	396	100.0

Source: Field data, 2008

Table 2 shows the distribution of respondents by occupation. About 38.3% of the respondents had formal education up to secondary level, while a significant 34.4% had no formal educational background. This implies that even though a greater number of respondents were literates which would inform their understanding of health issues, quite a significant proportion (34.4%) were illiterates whose understanding of health issues could be a suspect, thereby likely to result in unhealthy behaviours. This confirms Cunningham and Cunningham (2002) that most people are able to demonstrate adequate knowledge as what waste is.

Table 3: Explanation of waste

Response	Frequency	Percent
Hous sweeping, paper and plastics.	88	22.2
What people throw away.	67	16.9
What people discard (animal and human faeces)	103	26.3
Household, market, commercial and industrial sweepings, including human and animal faces.	74	18.4
All dirty things in the human environment.	64	16.2
Total	396	100.0

Source: Field data, 2008

From Table 3, 18.4% of the respondents indicated all the key ingredients that constitute waste. On the contrary, however, a significant number (22.2%) of respondents saw waste to be only house sweepings, paper and plastics.

A combined 61.6% gave various but quite appropriate definition of waste. These findings confirm Hanley's (2001) definition of waste as anything that has served its original intended purpose and been discarded or stored prior to being discarded.

Regarding a description of waste situation in respondents' area of residence (from Figure 4), 45.7% indicated that their areas of residence were dirty while 54.3% of the respondents indicated that their area of residence were either clean (30.8%) or partially clean (23.5%). However, an observation of the environment by the researcher suggested that most parts of the communities were relatively clean. Respondents were asked to indicate the causes of bad sanitation in their area of residence and the responses gathered are presented in Figure 4.

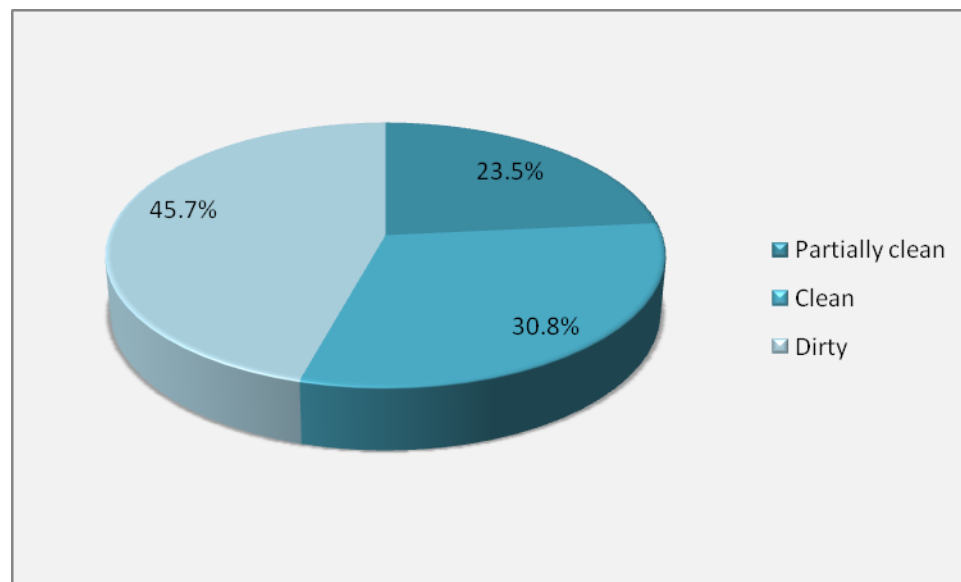


Figure 4: Description of waste situation in respondents' areas of residence

Source: Field data, 2008

From Table 4, 7.1% of the respondents cited lack of waste disposal bins in the community as accounting for the bad sanitation situation while 28.5% cited irregular collection of waste bins by the TMA as the attributing factors. Factors such as heavy usage of plastic products by residents, lack of sanitary facilities and deliberate dumping of waste indiscriminately, were cited by large percentages of respondents. These findings are similar to Pickford (1991) that where there are no latrines and other waste disposal facilities, people resort to relieving themselves in the open.

Table 4: Causes of bad sanitation situation

Response	Frequency	Percent
Lack of waste bin in community	28	7.1
Dumping indiscriminately by residents	81	20.5
Heavy usage of polythene products	86	21.7
Lack of toilets in households, and industrial entities	88	22.2
Irregular collection by TMA	113	28.5
Total	396	100.0

Source: Field data, 2008

From Table 5, 46.6% of the respondents disposed daily refuse in containers while 11.6% disposed their refuse on open dump sites. Those who disposed refuse on open dump sites indicated that they do not have the money to pay for door to

door refuse collection and also did not have access to public refuse containers. Another 26.8% disposed daily refuse through the door-to-door service operated by the TMA, while 13.9% said they paid individuals to collect their refuse.

Table 5: Access to containers

Response	Frequency	Percent
On an open dump	42	11.6
In a refuse container	184	45.5
Door-to-door collection		
TMA	102	26.8
Taken by paid individual		
collectors	59	13.9
Others	9	2.3
Total	396	100.0

Source: Field data, 2008

Details from Figure 5 show that 15% of the respondents who agreed that the sanitation situation in the metropolis affects them indicated outbreak of diseases as specific effects. This is similar to Lucas and Gilles (2003) that different types of waste pose different problems but in general, failure to manage and dispose of waste properly exposes people to increased risk of infectious diseases. The majority (51.1%) of the respondents, however, cite specific effects of the situation, illustrating an overall satisfactory knowledge regarding effects of bad disposal situation.

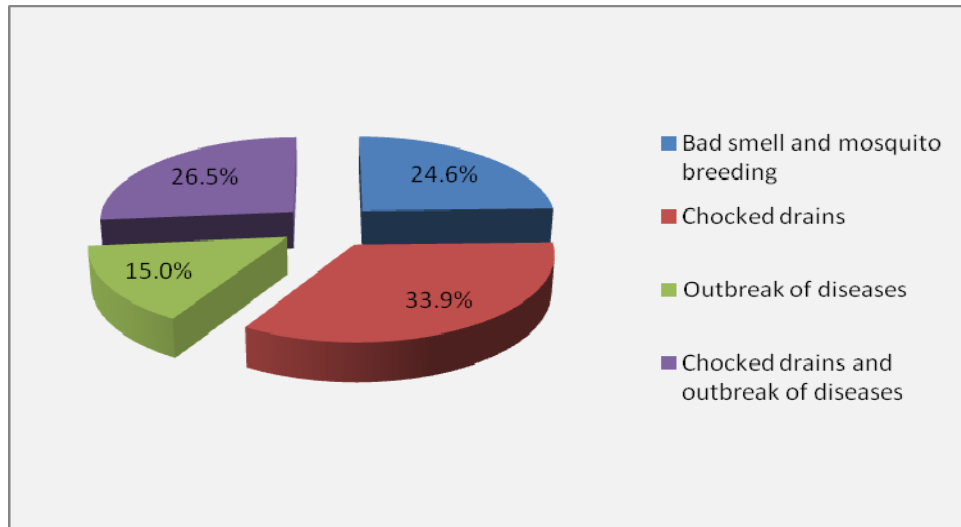


Figure 5: Effects of bad sanitation situation

Source: Field data, 2008

As to how far refuse disposal sites are from the residence of respondents, Figure 6 indicates that 48.2 % of respondents stayed more than 200 meters away from dump sites while 12.1 % said they were less than 50 meters away from the nearest refuse dump.

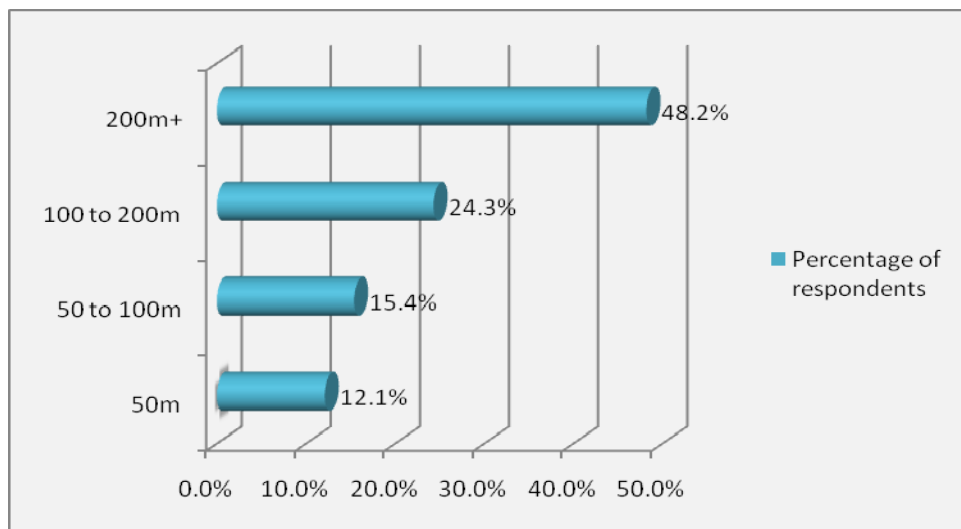


Figure 6: Distance of refuse dump from respondents

Source: Field data, 2008

Table 6: Reasons for poor refuse disposal

Response	Frequency	Percent
Due to inadequate refuse bins	85	21.5
People are not punished when they dump indiscriminately	40	10.1
Due to ignorance of residence	76	19.2
Irregular collection by TMA	99	25.0
Inability to pay for refuse collection	96	24.2
Total	396	100.0

Source: Field data, 2008

Regarding why people dispose of refuse in places other than authorized sites, Table 6 indicates that 25% of respondents cited irregular removal of accumulated refuse by TMA as a reason, while 10.1% indicated that offenders are not punished to deter other. Other reasons cited include inadequate public refuse bins (21.5%), ignorance about the effects of the practice (19.2%) and inability to pay for refuse collection (24.2%) on the part of some residents.

From Figure 7, the majority of the respondents reported that it cost them less than one Ghana cedi to dispose of daily refuse while 19.7% indicated that daily refuse disposal costs them nothing. About 11.6% of the respondents, however, indicated that they pay as much as one Ghana cedi to dispose of refuse daily.

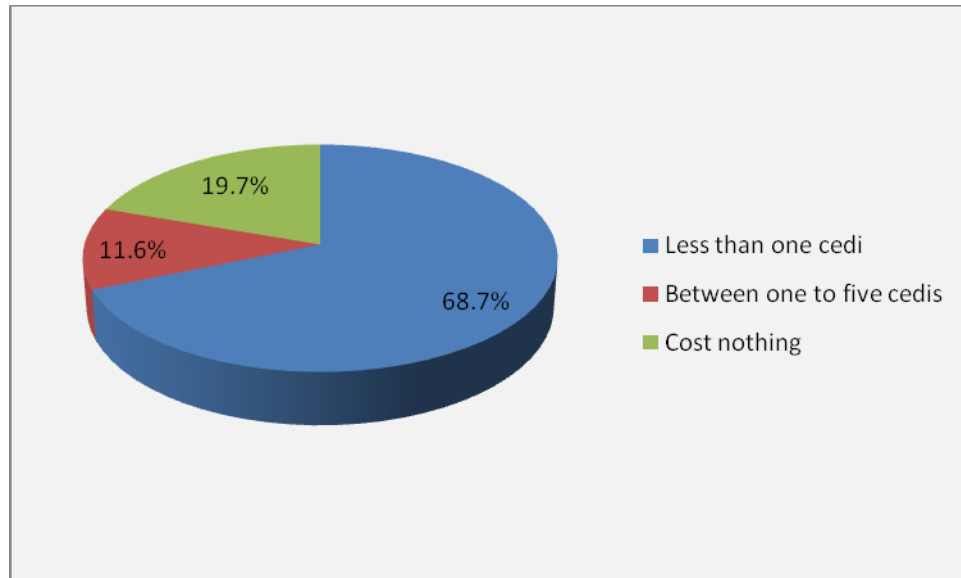


Figure 7: Cost of daily refuse disposal

Source: Field data, 2008

Data on Tables 4, 6, Figure 6, and Figure 7 offer some explanations as to why residents of Tema dispose of refuse indiscriminately. For instance, for the situation in Tema, 28.5% of the respondents cited irregular refuse collection by the TMA as accounting for the problem of waste management while 7.1% of the respondents mentioned lack of public waste bins in some communities.

These two findings seem to corroborate the assertion by Booth, Martin and Lankester (2001) that in developing countries, the metropolitan government rarely provides garbage collection for communities. Distance of refuse dumping sites could also be an important factor accounting for the practice. From Figure 6, 48.2% of respondents indicated that the nearest refuse dumps are more than 200 meters away from their places of residence. The metropolitan authorities and environmental health personnel supported the generally held view that facilities

are either lacking or inadequate when 71.4% of them rated waste management infrastructural facilities as not adequate (Table 10).

Cost of refuse disposal, however, appeared not to be a major factor contributing to indiscriminate disposal of refuse. From Figure 7, 68.7% of respondents reported that it cost them less than one Ghana cedi to dispose of refuse daily while 19.7% of them reported that, it costs them nothing to dispose of refuse daily. Invariably, these may be those engaged in disposing refuse at unauthorized places.

Expressing their opinions as to why people dispose of refuse in unauthorized places within the metropolis, 24.2% of respondents cited inability to pay for refuse collection as a reason (Table 6). This group of respondents might have been referring to the door-to-door refuse collection service. Anything short of this would point to a direct contradiction with the data on Figure 7 where the majority of respondents indicated they spent less than GH1.00 or nothing to dispose of refuse daily. Other reasons provided for indiscriminate disposal of refuse in the metropolis, from Table 6, include irregular collection by TMA (2.5%), inadequate refuse collection bins (21.5%), inadequate refuse collection bins (21.5%), ignorance of some residents (19.2%), and lack of appropriate punishment for offenders (10.1%).

In sum, it would be concluded from the above that, inadequate refuse dumping sites or collection of filled refuse containers are major contributing factors accounting for indiscriminate refuse disposal in the Metropolis. Ignorance about the consequences of the practice and lack or inadequate deterring

punishment were also some of the minor factors that could contribute to the practices.

Table 7: Suggestions as to how to solve indiscriminate refuse disposal

Response	Frequency	Percent
Education on effects of indiscriminate disposal	75	18.9
Strict enforcement of sanitation laws	91	23.0
Enactment of stiffer sanitation laws	67	17.9
Provision of approved dumping sites close to households and workplaces	163	40.2
Total	396	100.0

Source: Field data, 2008

From Table 7, 40.2% of respondents suggested the provision of approved dumping sites close to residents and work places as a solution to the practice while 17.9% suggested the enactment of stiffer sanitary laws to deal with offenders. Strict enforcement of existing sanitary laws (23%) and education on the effect of indiscriminate refuse disposal (18.9%) were other suggestions.

Table 8: Access to toilet facilities

Response	Frequency	Percent
WC	197	67.9
Pit latrine	102	32.1
Total	299	100.0

Field data, 2008

From Table 8, out of 299 respondents who indicated that there was toilet in their homes, 67.9% of them indicated the type of toilet as water closet (WC) while 32.1% named KVIP as the type of toilet in their places of residence.

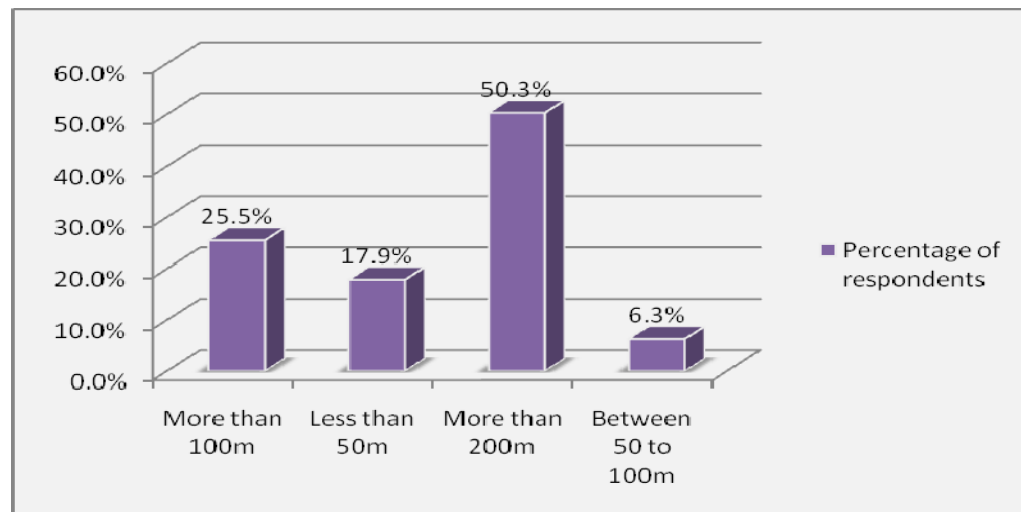


Figure 8: Distance of respondents' residence from the nearest public toilet

Source: Field data, 2008

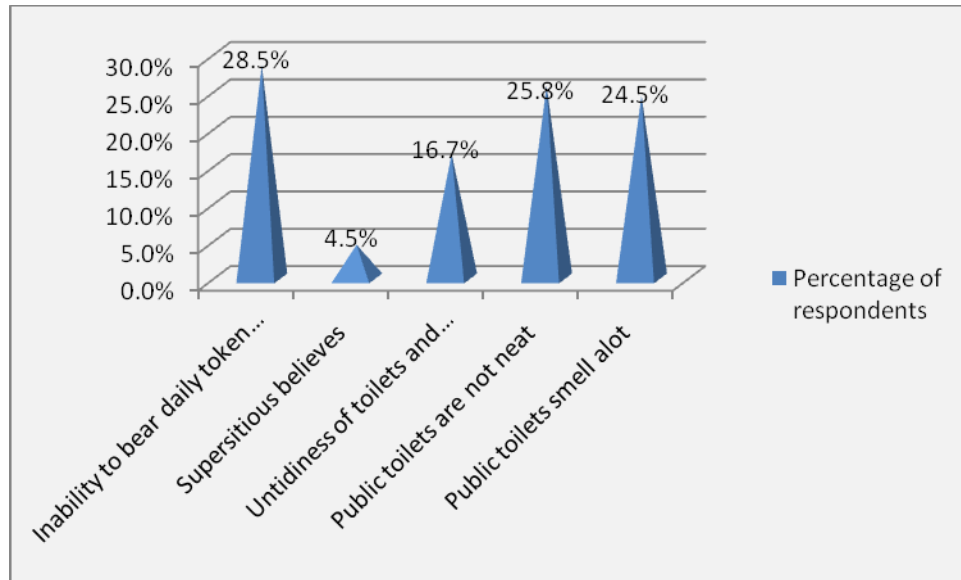


Figure 9: Opinions as to why some residents prefer to ease themselves in the open when toilets are close by

Source: Field data, 2008

As reasons for which some residents of the study area prefer open defaecation, 28.5% of respondents were of the opinion that some people were unable to afford the daily token fees for use of public toilets while 4.5% said this was due to superstitious beliefs. Other reasons cited were that public toilets are not neat (25.8%), public toilets smell a lot (24.5%) and that public toilets were untidy in addition to the need to pay for toilet use (16.7%).

The reasons for which indiscriminate defaecation is practiced by residents of Tema can be adduced from Table 8, Figures 8, & 9. A significant, 24.5% of respondents reported that there were no toilets in their houses, which means they ease themselves in public toilets (if close by) or they do it in the open if they are at home and where no public toilet is nearby.

Of respondents who have toilets in their houses, the majority of them (65.9%), from Table 8, reported that the type of toilet they use was water closet (WC) (Table 8). Though this is an ideal type of toilet in terms of hygiene, the maintenance of W.C largely depends on water, the inadequacy of which would make maintenance poor, and thereby make most people avoid using it. However, the precarious water situation in our cities including Tema is well known and one therefore wonders whether these WCs are well maintained to encourage their use.

This relates to the concerns expressed by Nyonator (1996) and Caincross and Feachem (1995) in the literature regarding the role poorly maintained toilets play in encouraging open defecation. Considering distance of public toilets from residence of respondents as a possible contributing factor, data from Fig. 8 portray that the majority of respondents (50.3%) live a distance more than 200 meters from the nearest public toilet. Yet still, 25.5% of respondents reported they live a distance more than 100 meters from the nearest public toilet. This can contribute to open defaecation of defecating into polythene bags during the night and particularly for those residents without toilet facilities in their houses.

The maintenance state of public toilets as a contributing factor to open defaecation has also been illustrated by data from Figure 9. Expressing their opinions as to why residents ease themselves in the open even where toilets were not far off a total 67% of respondents stated that public toilets were not neat (25.8%), public toilets were untidy coupled with the need to pay for toilet use (16.7%). These finding again clearly corroborates ascertains of Nyonator (1996) and Caincross and Feachem (1995) in the literature, to the effect that poorly

maintained latrines encourages people to ease themselves in other place then the toilets.

From the foregoing analysis, it would be clear to conclude that, to a large extent, lack of toilet facilities in some houses coupled with poor maintenance state of house hold toilets is a significant contributory factor. Another important contributory factor is the distance relatively long of public toilets form most residents, possibly as a result of inadequate number of toilet facilities in general which affected the distribution. Yet another important factor contributing to open defecation is the poor state of maintenance of public toilets which discourage people from using them. Inability to pay for the use of public toilets has been implicated to a significant extent as a contributory factor.

From Figure 10, 51.3% of the respondents suggested that keeping public toilets neat will encourage people use them instead of easing themselves in the open, while 5.3% were of the opinion that enactment of stiffer sanitary laws would help solve the problem. Other useful suggestions as per Figure 10 were also provided. On the question as to whether or not there was any link between poor waste disposal and health, all the 396 respondents agreed that there was a link.

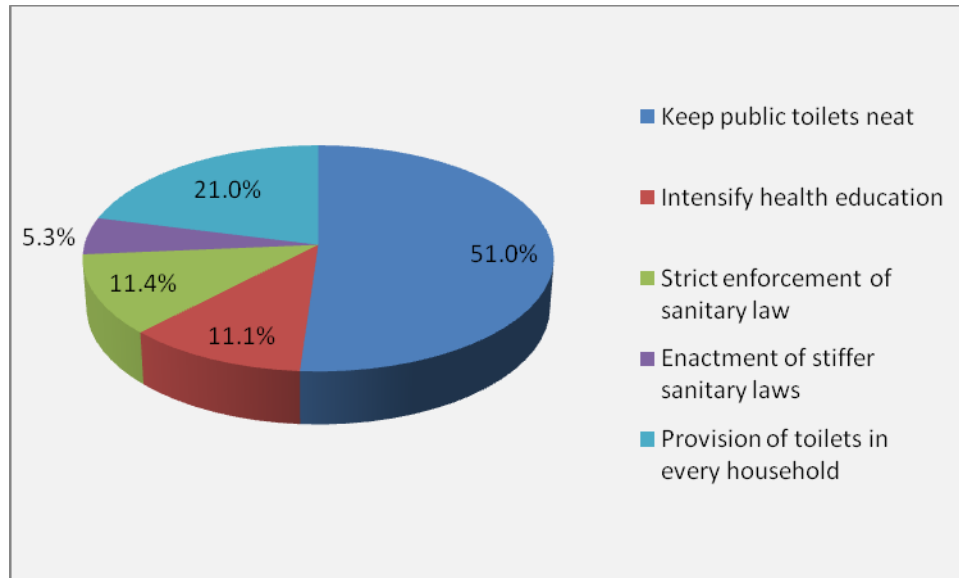


Figure 10: Suggested measures to solve indiscriminate defecation within the TMA area

Source: Field data, 2008

Explaining the links, 32.1% of respondents said poorly disposed waste promotes the breeding of disease causing germs which could impede health. Contamination of food and water (29.8%) and production of smell and contamination of the environment (29.5%) were other ways by which respondents think poorly disposed waste can promote the spread of diseases

Citing examples of specific diseases spread as a result of poorly disposed waste, Table 9 indicates that 23.7% of respondents stated cholera and malaria while 2.8% stated malaria and diarrhea. Cholera alone was cited by 19.2%, diarrhea alone cited by 10.9%, malaria alone cited alone by 16.2%, cholera and diarrhea cited by 18.2% and cholera, malaria and diarrhea cited by 9.1% of respondents.

Table 9: Perceived diseases as a result of poor waste disposal

Disease	Percent
Cholera only	19.2
Diarrhea only	10.9
Malaria only	16.1
Both cholera and diarrhea	18.2
Both cholera and malaria	23.7
Both malaria and diarrhea	2.8
Cholera, diarrhea and malaria	9.1
Total	100.0

Source: Field data, 2008

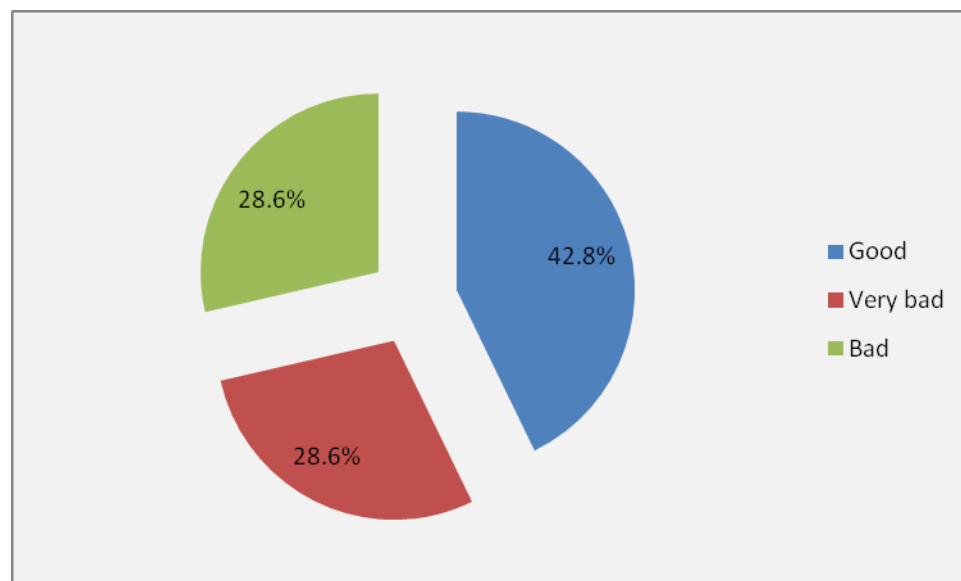


Figure 11: Assessment of waste disposal situation in TMA by Metropolitan authorities and the environmental health staff

Source: Field data, 2008

Answering a question to that effect, all seven (7) metropolitan authorities and environmental health staff agreed that the waste disposal practices within the Metropolis constitute a public health problem. From Figure 11, 42.8% of respondents judged the waste disposal situation as good while 28.6% each judged it as bad and very bad, respectively. It is unfortunate that no personnel judged the waste disposal situation as excellent or very good as some of the response categories.

The knowledge level of the residents of Tema with respect to poor disposal of waste and disease causation has been determined by using data presented on Figures 5, 11 and 12. Respondents demonstrated a high degree of knowledge regarding what waste is. All the definitions are quite acceptable from the perspective of a lay man as many of them really were. A total of 68.9% of the respondents agreed that the bad sanitation situation (referring to poor waste disposal) affected them and whole community. This is a further demonstration of their awareness level regarding waste and diseases. In confirmation of this, of those who agreed that the bad sanitation situation affected them and their community, 15% of them cited outbreak of diseases as the specific effect while 27.5% cited choked drains and outbreak of diseases as the effects. Other respondents indirectly alluded to the link between poor waste disposal and disease by starting bad smell and mosquito breeding (25.6%) on one side and choked drains (31.9%) on the other side as effects of the bad sanitation situation (Figure. 5).

Respondents also demonstrated acceptable understanding of how poorly disposed waste can promote the spread of diseases. A total 32.1% of respondents stated that poorly disposed waste promotes breeding of disease causing organisms while 29.8 (cited contamination of food and water as a way by which waste promotes the spread of diseases).

Knowledge of specific diseases spread as a result of poor waste disposal is shown in Table 9. About 9.1% of the respondents named three (3) diseases combined while a total of 44.7% name at least two (2) diseases (in different permutations) as examples of diseases spread as a result of poor waste disposal. Much of the knowledge demonstrated by respondents above are in consonance with consequences of poor waste disposal outlined in the literature by Caincross and Feachem (1993), Surjadi (1994), Cotton et al (1995) and Booth, Martin and Lankester (2001), among others.

The question as to what measures had been put in place by metropolitan authorities to address waste disposal problem was posed to the seven metropolitan and environmental health staff. As per Figure 10, about 28.6% each of respondents cited the provision of refuse containers at vantage points, regular emptying of refuse containers, and recruitment and motivation of sanitary personnel, respectively as the measures put in place. While it is surprising that nobody mentioned investment in modern waste management technologies, it is also contradictory to their own assessment of sanitary facilities as inadequate vis-à-vis the assertion that refuse containers are provided at vantage points.

Another contrary observation was that while respondents (in Table 6) held that refuse bins were inadequate (21.5%) and that there was irregular collection of refuse by the TMA (25%), the metropolitan authorities were here citing provision of refuse containers at vantage points and regular emptying of refuse containers as measures they have put in place to address the waste problem.

From the foregoing discussions one can observe that even though the metropolitan authorities were doing something to address the waste problem, for some reasons, these measures cannot be considered the best.

Table 10: Specific public health problems associated with waste disposal situation in TMA

Response	Frequency	Percent
Degradation of the environment	1	14.3
Chokage of drains leading to flooding	1	14.3
Breeding of vectors such as flies and mosquitoes	2	28.6
All the above	3	42.8
Total	7	100.0

Source: Field data, 2008

From Table 10 above, 42.8% of the key informants cited some health problems outlined above as being associated with the waste disposal situation in the TMA area while 14.3% each cited degradation of the environment on one hand and choking of drains leading to flooding on the other hand as health

problems associated with the waste disposal situation in the area. Breeding of vectors such as flies and mosquitoes was cited by 28.6% of the respondents.

However, the key informants were asked to indicate the adequacy of the resources needed to manage the waste problem. Responses from Table 11, show that 42.8% of key informants rated the equipment and logistics situation of the TMA as adequate while 28.6% each rated it as fairly adequate and not adequate respectively. On infrastructural facilities, 71.4% of the key informants rated this as not adequate while 28.6% rate the same as adequate. Rating technical personnel, none of the other resources was rated as very adequate.

Table 11: Assessment of adequacy of waste management resources in TMA

Response	Type of resource			
	Equipment & Logistics (%)	Infrastructural Facilities (%)	Technical personnel (%)	Legal provisions (%)
Very adequate	-	-	28.6	-
Fairly adequate	28.6	-	42.8	28.6
Adequate	42.8	28.6	14.3	42.8
Not adequate	28.6	71.4	14.3	28.6
Total	100.0	100.0	100.0	100.0

Source: Field data, 2008

On the issue of legal provision, 42.8% of respondents rated it as adequate while 28.6% each rated the same as fairly adequate and not adequate respectively.

From Table 11, except for technical personnel, none of the other resources was rated very adequate.

As to measures put in place by the metropolitan authorities to ensure sanitary disposal of waste, about 28.6% each of the key informants stated provision of refuse containers at vantage points, regular emptying of refuse containers, and recruitment and motivation of sanitary personnel, respectively as the measures put in place. Also, about 14.3% of the respondents indicated prosecution of sanitary offenders as measures put in place to remedy the situation.

Table 12: Measures put in place by the Tema Metropolitan Assembly to ensure sanitary disposal of waste

Response	Frequency	Percent
Prosecution of offenders	1	14.29
Provision of refuse containers at vantage points	2	28.57
Regular emptying of refuse containers	2	28.57
Recruitment and motivation of sanitary personnel	2	28.57
Total	7	100.0
Source:	Field data,	2008

The key informants were asked to indicate the major difficulties their office face in dealing with the waste problem and their responses are presented in Table 13. From Table 13, 28.57% each of respondents cited inadequate finance and non-adherence to building laws respectively as major difficulties they

encounter to ensure appropriate waste disposal practices. Lack of adequate technical personnel (14.29%), unauthorized erected structures (14.29%) and lack of adequate political support (14.29%) were other difficulties cited by respondents.

Regarding suggestions as to how to improve sanitation, about 28.6% each of respondents suggested recruitment and motivation of sanitary personnel on one hand, and allocation of separate budget for sanitation in the TMA respectively, as ways of improving waste disposal situation within the metropolis. On the other hand, some respondents suggested the commitment of government to sanitation issues (14.29%), establishment of sanitary courts (14.29%) and strict adherence to infrastructural development plans (24.29%) as other ways in improving the sanitation situation in the TMA area.

Data as presented in Table 13 throw light on the difficulties the Tema Metropolitan Assembly face in their attempt to address waste problems in the metropolis. As per Table 13, 28.57% of respondents, in answer to the question as to what constitute their difficulties, cited inadequate finance while another 28.57% cited non-adherence to building laws other the residents as some difficulties. Lack of adequate political support was also one of the difficulties, reflecting the assertion by Booth, Martin and Lankester (2001) in the literature that metropolitan governments rarely provides garbage collection for communities. Even though lack or inadequate technical staff was also cited, this could not be considered a very strong difficulty since apart from providing

technical advice (which the few are equally doing), they are not directly involved in waste handling.

Table 13: Major difficulties encountered in attempt to ensure appropriate waste disposal practices

Response	Frequency	Percent
Inadequate finance	2	28.57%
Lack of adequate technical personnel	1	14.29
Unauthorized erected structures	1	14.29
Lack of adequate political support	1	14.29
Non-adherence to building laws	2	28.57
Total	7	100.0

Source: Field data, 2008

It can also be inferred from Table 11 where 71.4% of respondents rated infrastructural facilities as not adequate to affirm the assertion that refuse dump sites (containers) and toilet facilities are inadequate in number and distribution. Equipment and logistics situation as well as that of legal provisions we also rated anything but very adequate. These are all difficulties that confront the Metropolitan Assembly in their attempt to provide efficient waste management services.

Summary

It is deducible from the foregoing that the apparent major difficulties faced by the Tema Metropolitan Assembly include: Lack of adequate sanitary infrastructure; non-adherence to building laws leading to unauthorized developments that impedes waste management services planning; inadequate political support; and budgetary constrains which probably explains the lack of adequate sanitary infrastructure (latrines and dump sites).

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter summaries the study and draws conclusions in respect of what has been achieved regarding the purpose of the study. Recommendations as to how to address the problem of poor waste management in Tema Metropolis are also outlined in this chapter.

In broad terms, the study sought to ascertain the factors contributing to indiscriminate waste disposal within the Tema Metropolis area and the possible effects with specific objectives being to: find out why residents of Tema Metropolis area dispose of refuse indiscriminately; ascertain why residents of Tema defecate in open spaces instead of in toilets; determine the extent to which residents know the link between poor waste disposal and health; ascertain what strategies to be employed to improve upon waste disposal practices in Tema; ascertain what the Metropolitan Assembly think could be done to address waste disposal problems in the area; and suggest measures that could be employed to eliminate or reduce poor waste disposal practices in the Tema Metropolis. The design adopted for the study was the descriptive survey type with the study population being all residents of Tema, males and females aged 15 years and above. The sample for the study was 403 comprising 396 residents and 7

Environmental health staff and Metropolitan Assembly. The subjects were sampled using the quota, systematic and convenience techniques.

The tool for the data collection was a structured interview schedule with 29 question items. Administration of the instrument was carried out by the researcher with the assistance of five (5) Environmental Health personnel drawn from the Tema Metropolitan Assembly. Analysis of data was done using the SPSS with presentations done on Table and Graphs/charts.

Summary

From the findings as stated in chapter four (4), it has been deduced that the reasons for indiscriminate disposal of refuse in Tema include inadequate refuse dumping sites or collection containers coupled with irregular removal of filled refuse containers by the TMA. Other reasons include ignorance on the consequences of the practice and inadequate deterring punishment for offenders. Regarding reasons for indiscriminate defecation, it has been deduced from the findings that lack of toilet facilities in some houses in addition to poor maintenance state is one major factor. Distance of public toilets from residents as a result of their (toilets) inadequacy has been found to be another important contributing factor. Other contributing factors for indiscriminate defecation were poor maintenance state of public toilets as well as the need to pay for the use of public toilets which some residents indicated was beyond their means.

Other findings of the study are that residents of Tema possess adequate knowledge regarding the link between poor waste disposal and diseases, and that

the difficulties faced by the Tema Metropolitan Assembly include lack of adequate sanitary infrastructure; non-adherence to building laws leading to unauthorized developments that impede waste management services planning; inadequate political support; and budgetary constrains. Suggestions regarding solutions to indiscriminate waste disposal included the provision of approved dumping sites close to households and work places and provision of toilets in every household. Other suggestions include health education, enactment of stiffer sanitary laws and keeping public toilets clean.

Conclusions

The conclusion arrived at from the findings of the study has been that inadequate waste disposal facilities coupled with poor maintenance state of toilet facilities and irregular services rendered by the TMA, stemming from the inadequate sanitary infrastructure are the major causes of indiscriminate waste disposal in the Metropolis. Lack of knowledge on the part of residents regarding link between poor waste disposal and diseases has been ruled out as a contributing factor, while some constraints faced by the TMA further compounds the problem. The measures in place by the TMA to address the problem for the time being have been found not to be the best.

Recommendations

From the findings of the study, the following are recommended as strategies to improve upon waste disposal practices among residents of the Tema Metropolitan Assembly:

- Communal refuse containers should be provided at approved sites within every 100 meter radius to be manned by employees of the TMA.
- The “pay as you dump” system should be introduced and the moneys collected by those who would man the dump sites. This will provide the Assemble with the needed funds to ensure regular removal of the refuse as well as remunerate those who would man the dumps.
- The assembly should research and come out with a latrine technology that would be efficient, affordable, and acceptable and environmentally friendly, which every household should be mandated to own in order to ease pressure on the public toilets.
- The Assembly’s sanitary bye-laws should be reviewed, making them more deterring, and recruit more Environmental Health Personnel who would be made to enforce these laws.
- Adequate state-of- the-art technological infrastructure and logistics should be acquired by the TMA to enable it equal the task of managing waste.
- A sanitation fund should be established by the Assembly, into which all companies operating within the jurisdiction of the Assembly would be mandated to contribute at a fixed time frame intervals. This is to resource

the Assembly to enable it meet some of the huge financial demands in achieving its responsibilities.

- A public education unit of the Assembly (if already not in existence) should be established and adequately resourced to embark on regular public sensitization regarding waste management.
- The government through the Ministry of Local Government should attach practical importance to sanitation issues throughout the country and for the TMA in particular, rather than the verbal rhetoric's that have become the order of the day.

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APPENDICES

APPENDIX A

INTERVIEW GUIDE

SECTION A: Socio-demographic data of respondents

1. Sex

Male

Female

2. Age

3. Religion

Islam

Christianity

Traditional

Other, specify

4 Level of education

Primary

J.S.S

S.S.S

Tertiary/Post Sec.

None

SECTION B: Question items that address main research questions:

- 5. Why indiscriminate disposal of refuse?
- 6. How do you or your family/business dispose of daily generated refuse?

- (a) On an open dump
- (b) In a refuse container
- (c) Door-to-door collection by TMA
- (d) Taken by paid individual collectors
- (e) Others, specify

.....

7. If your method of refuse disposal is (a) or (b) above, how far is this to your house or work (business point).

- a. Less than 50 meters
- b. Between 50-100 meters
- c. More than 100 meters
- d. Over 200 meters

8. How much does it cost you to dispose of refuse by your method of choice?.....

9. Why, in your opinion, do people dispose of refuse in unauthorized places within the TMA area?

- a. Lack of approved dumping sites

- b. Long distance between residents and dumping sites
- c. Inability to pay for refuse collection
- d. Ignorance about the effects of indiscriminate disposal
- e. Others, specify

10. What, in your opinion, should be done to solve the problem of indiscriminate disposal of refuse within the TMA area?

- a. More education on the effects of indiscriminate refuse disposal
- b. Strict enforcement of existing sanitary laws
- c. Enactment of stiffer sanitary laws
- d. Provision of approved dumping sites close to all households/business areas
- e. Others

11. Is there a toilet in your house?

- Yes
- No

12. If 'No' to (10) above where do you ease yourself when you are at home?

- a. Public toilet
- b. Toilet in neighbour's house
- c. By the sea shore

d. Any open/bushy area

e. Others, Specify

13. If answer to (12) above is 'yes', do you have access to use the toilet?

Yes

No

14. If answer to (12) is 'No', why?

a. Landlord/Lady does not allow

b. It is usually not neat

c. I don't feel comfortable using it

15. If you ease yourself in a public toilet as answer to question (7), how far is it from your house/business area?

a. Less than 50 meters away

b. Between 50 and 100 meters away

c. More than 100 meters away

d. Over 200 meters away

Others specify

16. Why do some residents prefer to ease themselves in open places, sometimes close to public toilets, instead of in the toilets?

a. To avoid paying for toilets fees

- b. Because the public toilets are in a state of mess, resulting from
smell, flies and spillage
- c. Because of religious practice
- Others, specify

17. What measures, in your opinion, should be adopted to solve the
problem of indiscriminate defecation within the TMA area?

- a. Intensify education on the effects of the practice
- b. Strict enforcement of existing sanitary laws
- c. Enactment of stiffer sanitary bye-laws to deal with
offenders
- d. Provision of toilets in every household
- Others, specify

**SECTION C: Knowledge of the People Regarding Waste Disposal and
Disease Causation**

18. Is there any link between Poor waste disposal and health?

- Yes
- No.

19. If 'yes' to (13) above, explain

- a. Poor waste disposal promotes the spread of diseases
- b. Poor waste disposal spoils the beauty of the environment

c. Poor waste disposal create discomfort for residents

d. Poor waste disposal pollutes water sources and degrade the
environment

Others, specify

20. How can poorly disposed waste promote the spread of diseases?

a. Flies visit exposed faeces or decomposing garbage and pick germs
onto our food

b. Wind blows dust with germs from refuse onto our food.

c. Rainwater washes germs from waste into water sources to pollute
them

d. Others, specify

21. Name any disease that is spread as a result of poor waste disposal.

.....

22. Children's faeces are not as a dangerous as that of adults.

True

False

Don't know

23. Children's faeces should not come into contact with adults faeces.

a. True

b. False

APPENDIX B

INTERVIEW GUIDE FOR KEY INFORMANTS

(Metropolitan Authorities and Environmental Health staff)

1. How will you assess waste disposal situation within the Tema Metropolis?
 - a. Excellent
 - b. Very good
 - c. Good
 - d. Bad
 - e. Very bad
 - f. Other, specify

2. Do you consider waste disposal practices within the Metropolis as constituting a public health problem?
 - a. Yes
 - b. No

3. If 'yes' to (2) above, what exactly is the problem?
.....
.....

4. How would you assess the adequacy of the following waste management resources in the Metropolis?
 - i. Equipments**
 - a. Very adequate
 - b. Fairly adequate

- c. Adequate
- d. Not adequate

ii. Infrastructural facilities (e.g. latrines and refuse disposal sites)

- a. Very adequate
- b. Fairly adequate
- c. Adequate
- d. Not adequate

iii. Technical personnel

- a. Very adequate
- b. Fairly adequate
- c. Adequate
- d. Not adequate

iv. Legal (statutory) provisions

- a. Very adequate
- b. Fairly adequate
- c. Adequate
- d. Not adequate

5. What measures have the Metropolitan authorities put in place to ensure sanitary disposal of waste within the Metropolis?

.....
.....

6. What are the major difficulties you encounter in your effort to ensure appropriate waste disposal practices in the Metropolis?

.....
.....

7. What suggestion do you have as a way of improving waste disposal practices within the Metropolis?

.....
.....