Solid Waste Management Problems and the Role of Stakeholders: A Case Study on Household Solid Waste Management in Arada Sub-City, Addis Ababa

By

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SOLID WASTE MANAGEMENT PROBLEMS AND THE ROLE OF STAKEHOLDERS: A CASE STUDY ON HOUSEHOLD SOLID WASTE MANAGEMENT IN ARADA SUB-CITY, ADDIS ABABA

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Acronyms

AA	ADDIS ABABA
AACG	ADDIS ABABA CITY GOVERNMENT
AAWSA	ADDIS ABABAWATER AND SEWERAGE AUTHORITY
APWA	AMERICAN PUBLIC WORKS ASSOCIATION
CBO	COMMUNITY BASED ORGANIZATIONS
CES	CODE ENFORCEMENT SERVICE
CSA	CENTRAL STATISTICS AGENCY
ENDA	ENVIROMENTAL DEVELOPMENT ACTION
EPA	ENVIRONMENTAL PROTECTION AGENCY
HH	HOUSEHOLDS
ISWA	INTERNATIONAL SOLID WASTE ASSOCIATION
ISWM	INTEGRATED SUSTAINABLE WASTE MANAGEMENT
MSE	MICRO AND SMALL ENTERPRISES
MSWM	MUNICIPAL SOLID WASTE MANAGEMENT
NGO	NON GOVERNMENTAL ORGANIZATION
ORAAMP	OFFICE FOR REVISION OF ADDIS ABABA MASTER PLAN
SBPDA	SANITATION, BEAUTIFICATION AND PARKS DEVELOPMENT AGENCY
SHH	SAMPLE HOUSEHOLDS
SPSS	STATISTICAL PACKAGE FOR SOCIAL SCIENCES
SW	SOLID WASTE
SWM	SOLID WASTE MANAGEMENT
SWMT	SOLID WASTE MANAGEMENT TEAM
UNCHS	UNITED NATIONS CENTER HABITAT SETTLEMENT

Abstract

Population explosion and the associated anthropogenic activities generate huge amounts of different wastes that adversely affect the physical environment of Addis Ababa City.

This situation is not different for Arada Sub-city, which is one of the oldest and the central part of the city, where the concern of this study has focused. The current estimated population of the sub-city is 350,000 people. The sub-city has been established as part and parcel of the city in 2003 and has got a wide range of power and various urban service activities to be provided for the residents. Often a discrepancy exists between the growing population and the increasing demand for the urban services on one hand and the capacity of the local government to provide these services on the other hand.

This study has focused on, household solid waste management service delivery, one of the urban services provided by the sub-city and the role of the stakeholders in this particular activity. In this study, both quantitative and qualitative descriptions were used to show the performance of the sub-city in delivery of the household solid waste management service. The role and performance of the sub-city's agent was assessed in terms of the service it provides, institutional and resource capacity, working relations with stakeholders mainly with the MSEs, issues of awareness raising and user participation in the sub-city were attempted to be included.

The findings of the study revealed that household solid waste management service in the sub-city is provided below the required quality or has a poor status. According to the survey results, the inadequate organization, lack of material and human resources, unfair distribution of containers, lack of proper support for the private sector, lack of awareness raising and community participation are some of the factors that account for poor solid waste management service delivery in the sub-city.

Finally, results of the study indicate that there is so much to be done in order to improve the service provision. Thus, there is a need to create driving motives into the community to use integrated sustainable solid waste management strategies by promoting public- private-partnership in the area of solid waste management service delivery in the sub-city.

CHAPTER ONE

INTRODUCTION

1.1 Background Information

According to Madina (1999), Municipal Solid Waste (MSW) refers to the materials discarded in the urban areas for which municipalities are usually held responsible for collection, transport and final disposal. MSW encompasses household refuse, institutional wastes, street sweepings, commercial waste, as well as construction and demolition debris. The above cited author further explained that MSW in developing countries contains varying amounts of industrial waste from small industries, as well as dead animals and fecal matter.

In light of this, Municipal Solid waste Management (MSWM), as defined by Bernstein (2004), refers to the collection, transfer, treatment, recycling, resource recovery, and disposal of solid waste generated in urban areas. MSWM is a major responsibility of local governments and a complex service involving appropriate organizational, technical, and managerial capacity and cooperation from numerous stakeholders in both the private and public sectors.

On the other hand, the magnitude of solid waste collection and transportation services that will be available for residents of a city is mainly dependent upon the amount of budget allocation (financial capacity), institutional arrangements and increased participation of the stakeholders. Therefore, the conditions, issues and problems of urban waste management in the industrialized and developing worlds are different.

Similarly, Ogawa (1995) stated that SWM system in developing countries displays an array of problems; including low coverage and irregular collection services, crude open dumping, burning without control, poor handling and control of informal waste picking, or scavenging activities. These cause public health, environmental, and management problems, which in turn constrain the development of effective SWM systems.

Like other developing world cities, the above situations are demonstrated by the SWM service in Addis Ababa.

Addis Ababa which was founded in 1887 is the capital city of Ethiopia as well as the diplomatic capital of AU and home of regional headquarters like ECA, UNDP, UNICEF, UNHCR, FAO, ILO, ICO, and ITU. Addis Ababa is located in the central highland of the country, with an elevation of 2400 meters above sea level. This elevation makes Addis Ababa the highest capital in Africa. Due to the high elevation, the climate is comfortable; with an average air temperature between 20 and 25 degree Celsius during the day and between 7 and 11 Celsius during the night, throughout the year. Average rainfall is 1200 mm per year, with the major rainfall occurring between July and September (Girma Kebede, 2004). The city covers an area of 530.21 km2 (CSA, 1994), with a topography that slopes down from the Entoto Mountain in the north to the southern border of the city, cut by a number of steep-sided valleys with rivers and streams. For administration purpose, the city is divided into three tiers of government structures. Addis Ababa City Government is located at the top while the 10 Sub-cities fall in the middle level and the 99 Kebele are the smallest administrative units below the sub-cities. (It should be noted that Addis Ababa City Government and Addis Ababa City Administration can be used equally and interchangeably in this paper).

Being the nation's capital city, Addis Ababa has modern economic activities, social and infrastructural services in a better situation than other cities of Ethiopia. However, development is too slow to meet the demands of the increasing population due to both natural growth and rural-urban migration (ENDA, 1999). The city is characterized by rapid population growth and urbanization. Based on the CSA census (1994), the estimated population of the city by 2008 is 3,147,000 and is experiencing a fast growth rate (about five percent per annum) which increases the demand for the service by generating substantial amounts of solid waste.

The Charter of Addis Ababa City has set forth in its objective to make the city a naturally balanced, clean, green and favorable environment through the prevention of environmental pollution.

To be more specific, the City Government of Addis Ababa having a commitment to clean and green environment, established the Sanitation, Beautification and Parks Development Agency (SBPDA) in January 2003. It also endorsed comprehensive waste management (solid and liquid waste) regulations and SWM policy.

Furthermore, Code Enforcement Service (CES) was also established as a new institution to control illegal acts and to ensure that the sanitary service of the city is duly respected. This effort had been started even before the existence of a comprehensive national Solid Waste Management Law. (The national SWM law, Proclamation No.513/2007, was endorsed on 12th February 2007).

Although there is a shortage of resources to fulfill its duties, the city council budgets relatively enormous amount of funds on recurrent and development expenditures on solid waste management and has designed different strategies for waste management and improvement purposes.

In addition to government efforts, participation of different parts of the society and various actors in cleaning and beautifying Addis Ababa has greatly increased, particularly with the efforts made by Sileshi Demisie commonly known as Gashe Abera Molla and Clean and Green Addis Ababa Society.

Currently, most sub-cities of Addis Ababa have the sole responsibility for solid waste management of their own jurisdiction as per city's decentralization power delegation. All the 10 sub-cities have established their own Solid Waste Management Teams (SWMT). The prominent solid waste management services such as collection and transportation are executed by the sub-city administrations and small-scale enterprises, which are providing the solid waste collection activities in different places in the sub-cities. The solid waste disposal is a sole responsibility of the city Administration (SBPDA, 2004).

Despite all these endeavors of the city government and individuals, the problem of SWM still persists. The environmental pollution and health problem due to solid waste has continued to plague. Addis Ababa is getting polluted due to an increase of solid wastes; dwellers of Addis Ababa continue to dispose wastes along the roads, in ditches, rivers, open spaces, avenues, etc of the city. Burning of waste in the backyard and in open spaces, spontaneous combustion and haphazard incineration without proper treatment for gas emissions are also causing air pollution. The situation is exacerbated in slums where households cannot make use of garbage collection facilities. This situation is not different in Arada sub-city

Though research materials on the subject are scarce, the entire urban space confirms that managing solid waste is becoming a matter of great concern. (To cite recent evidence of concern,

some residents of the city, in a public meeting held on 22nd Dec. 2007, requested the premier, with great emphasis, to draw his particular attention to the issue of SWM). While walking in the city, most of the public places like roadsides and open spaces attest eye-catching piles of garbage; flying plastic bags (Known as 'Festal' in Amharic, which is increasingly used for packaging), rubbish, organic plants (residues from vegetables and Chatt), dead animals, construction demolitions and moved out materials from new construction sites are littering the urban space widely. Obnoxious odors emanating from decomposing solid wastes, semi-liquid and liquid wastes are sickening citizens.

This is a good example for the existence of a gap between the service and the demand that keeps on widening from time to time while the capacity of the municipality to render the required SWM service is remained the same, if not lagging behind. This, as the researcher believes, is the alarming signal for the existence of overall management problems of solid waste that need to be studied.

1.2 Statement of the Problem

Solid waste management is becoming a major public health and environmental concern in urban areas of many developing countries. The situation in Africa, particularly in the capital cities is severe (Birke, 1999). The public sector in many countries is unable to deliver services effectively, involvement of the private sector is limited and illegal dumping of domestic and industrial waste is a common practice. In general, SWM is given a very low priority in these countries. As a result, the levels of services required for protection of public health and the environment are not attained.

Population growth intensifies the pressure on urban infrastructure in many cities of the developing countries which already are overburdened with the provision of urban services. As Birke (1999:326) stated, the booming growth of cities of the developing world has outpaced the financial and manpower resources of municipalities to deal with provision and management of services, of which solid waste is the major one. Lack of these services greatly affects the urban poor, women and children who are vulnerable to health hazards. Twenty two human diseases are related to improper solid waste management (World Bank, 1999 in Birke, 1999). Moreover, its effects are also reflected in reduced productivity, low income and poor quality of life and deteriorated environment.

Nevertheless, solid waste management in developing countries has received less attention from policy makers and academics than paid to other urban environmental problems (Medina, 1999). Thus, improper handling and disposal of solid wastes constitutes a serious problem; it contributes to the high morbidity and mortality rates in many third world cities.

Similar to other developing countries, the collection, transportation and disposal of solid waste is a persistent problem to Addis Ababa. Of the daily solid waste generated in Addis Ababa, about 65 percent is collected and the remaining 35 percent is simply dumped into open sites, drainage channels, rivers and valleys as well as on the streets (SBPDA, 2004).

Very few studies and projects have been undertaken on the problem of solid waste management in Addis Ababa. These studies suggested various solutions for different aspects ranging from problem of collection to institutional management and assessment of community based projects.

Regardless of its sensitivity and the higher demand, the practical solutions for the causes of problems of solid waste management service seem not discovered yet and remained demanding for changes. The National Health Policy, for example, has given priority to the development of environmental health with no or very little consideration of the impacts of poor SWM on public health. This shows that SWM service has received scant attention from the police makers and community.

Though the practicality is under a question mark, the current Government of Ethiopia has issued Federal Solid Waste Management Law, Proclamation No. 513/2007, which states its objective as to enhance, at all levels, capacities to prevent the possible adverse impacts while creating economically and socially beneficial assets out of solid waste.

As a matter of fact, inadequate SWM service is assumed to be the result of weak management, insufficient finance, low level of stakeholders' involvement, etc. Weak management of solid waste eventually leads to environmental pollution, which means the contamination of air, water and soil by materials that interfere with human health, the quality of life and nature.

From the above perspectives and as Beyene (1999:323) explained, the enormous solid waste littering our city is one of the major areas of concern. Indeed, it is one of the major public nuisances and the causes of morbidity in the city. Therefore solid waste needs proper attention

Beyene (1999) further cited that the Addis Ababa City Council recognizes six major sources of solid waste: households, street, commercial institutes, industries, hotels and hospitals. Based on the data of the year 1993, Beyene, concluded that household takes the lion-share of solid waste generated in the city.

Like the sources for solid waste are many, the problems of SWM service in Addis Ababa city are also multi-dimensional and so serious that they deserve studies. Therefore, this study has tried to assess the performance of the SWM service delivery of Arada Sub-city and evaluate the related challenges and prospects from different perspectives. Particular emphasis has been given to the household SWM problems and the roles of stakeholders in the service.

In light of the above-mentioned points, an attempt is made to address and examine the overall management problems that are pertinent to the inadequacy of SWM service delivery and the role of stakeholders in SWM service within Arada Sub-city.

1.3 Objective of the Study

As population of urban areas grows and as activities are enhanced from time to time, the problems caused by solid waste are growing and becoming serious too. Thus solid waste requires studies and appropriate management systems.

With this in mind, the general objective of this study is to identify the main causes of the problems of SWM service and to propose possible policy recommendations to reduce and tackle shortcomings. This aims at assessing the role of various actors in the service and proposes viable alternative systems for the service improvements. The specific objectives of the study include:

1. To evaluate the current status of SWM service delivery to the residents of the sub-city
2. To evaluate the extent to which the stakeholders play a role to implement sustainable SWM strategies, their challenges and prospects in the sub-city
3. To propose and recommend possible solutions and better alternative ways of SWM for the residents of Arada sub-city

1.4 Research Questions

This section contains questions that guide the focus of the study in relation to what the objectives the study intends to attain. Therefore the study was guided by the following research questions to answer the research problem.

- Who are the main actors in the current SWM service delivery in Arada sub-city and what is their role?
- How is the current performance of the main stakeholders in household SWM service delivery in Arada sub-city?
- What are the causes of the current SWM problems in Arada Sub-city at the household level?
- What strategies are implemented to reduce major problems of the SWM service in Arada sub-city?

There were a number of changes and modifications of research questions and methods of approaching to the research problem as the study was progressing. In addition, several institutions and knowledgeable persons were visited in order to obtain relevant information from their experiences. Furthermore, Personal observations at different sites were carried out during the study period for better understanding.

1.5 Significance of the Study

Cities like Addis Ababa have serious health and environmental problems, especially inadequate handling and disposal of municipal solid waste is the most serious cause of environmental degradation (ORAAMP, 2002). So studying the extent of the problems of SWM and the level of stakeholders' participation will help to identify some of the key constraints for improvement and to create a better service delivery in the SWM service. Therefore, the finding of the research will have the following socio-economic significance:

- To help design more sustainable and effective methods of providing SWM service. It will help especially for SWM teams and policy making bodies in the area of SWM service

- To help the private sector institutions to be engaged in the SWM service to generate more income and employment opportunities
- To initiate and increase level of awareness of stakeholders to extend their effort in the area of SWM so as to achieve the common objectives of clean and healthy living environment and
- To initiate other researchers for further and/or an in-depth study on the SWM problems in order to improve and provide better service, in the future, in our city in general and in Arada Sub-city in particular.

1.6 Scope of the Study

To make the study more manageable, demarcations in terms of the geographical area, the type of subjects (respondents) to be studied, the issue to be analyzed and the breadth and depth with reference to the topical scope is made. Therefore, the study is delimited from the standpoint of manageability. Accordingly, data collection was made based on sample survey to cover more relevant information regarding solid waste generation, temporary storage, collection, transfer, and disposal as well as on the awareness of households and the role of stakeholders in the service. The survey included sample households, the SWMT and private MSEs, in Arada sub-city. Efforts were made to cover four selected Kebeles with systematic representation and with reference to the study topic.

1.7 Research Methodology

This study is a cross-sectional survey research. A combined strategy, between analytical and descriptive, is employed whereby details of the SWM problems and the role of stakeholders in Arada sub-city are analyzed. The researcher used both primary and secondary data in the study.

1.7.1 Sources of Data

The primary data were collected from the main stakeholders of the SWM service delivery in the sub-city. Data from households were collected by means of questionnaire and personal interview within ten days. The interview part was used to fill the information gaps from different categories of the sample. Thus, it is believed to help ensure the validity of the results. Where as, information

from the sub-city SWMT and MSEs were collected by means of personal interviews within the next week after household data were collected.

Other data were collected from the secondary sources including from various institutional documents, books, proclamations, reports, journals, project documents, published & unpublished materials and internet. Last but not least, purposely organized visits to the major areas of focus in the sub-city were carried out to make observations and gather information.

1.7. 2 Sampling Procedure

One of the main objectives of this study is to investigate the causes of SWM problems and to evaluate the role of stakeholders in the service. In a study like this, one obviously needs to collect primary data through field research from each stakeholder of the service and from authorized institutions. However, due to time and financial constraints, this research has focused on selected households only from four Kebeles based on the criteria set by the researcher.

The researcher had set up samples that were assumed to represent most of the different socio-economic groups of the households and the SWM service providers. The SWMT (government agent) and MSEs (private sector) of the study area were given particular emphasis in this study. In line with the above explanation, the researcher had introduced the following sampling technique to select the target population.

1.7.3 Sampling Technique and the Sample Size

The estimated population for this study is the total number of households of the study area at large. Arada sub-city has ten (10) Kebeles and the total sample size of this study was intended to be 200 households by taking 50 households from the selected four Kebeles. However, since seven households did not return the questionnaire, the actual sample size became 193 households. The study Kebeles were selected based on the following criteria set by the researcher.

- Relatively higher and lower populated Kebeles were considered and selected. This is done to assess the status of solid waste management service provision in both areas and to identify the impacts of the variable upon the subject.

- The relative income and volume of solid waste generation i.e. Kebeles assumed to have better income and produce higher and lower volume of solid waste were included in the survey

The total number of residential housing units in the selected Kebeles was reported to be 14,734. Random sampling technique has been used to draw samples from each Kebele's population. Hence this study has been undertaken in Arada sub-city of which Kebele 01/02, 06, 10 and 11/12 were selected based on the above criteria.

1.7.4 Survey Instrument

As a matter of fact, household is one of the major stakeholders in the activities of MSWM and at the same time pays taxes, charges and fees and expects better services in return. Therefore a separate set of questionnaire had to be prepared to collect the opinion survey on SWM service and its related problems. Accordingly, one set of fully-structured questionnaire was prepared and used to gather the required information from the households.

To make the data collection easier and to increase the accuracy, the English version questionnaire has been translated into Amharic language before it was delivered. In addition to this, extensive training was given to data enumerators as to what sort of approach they should use towards respondents and how to fill the answers of the questionnaire.

In addition to the questionnaire, personal observations at different places in time were made. Furthermore, two sets of checklists to interview the remaining stakeholders (SWMT and MSEs) were prepared. The objective of the interview was to get the complete picture of the SWM service delivery, to assess their respective role and contribution, to investigate the challenges and prospects in carrying out their activities and to get their timely opinion to be incorporated in the recommendation for the betterment and improvement of the service.

1.7.5 Data Presentation and Analysis

Simple mathematical procedures like percentage, ratios, average, cross tabulations with the help of table is used for the presentation and analyses of the data generated by the survey and case interviews. Data organization and descriptions are undertaken by SPSS Version15. In addition to this, qualitative analyses are employed in the analysis part.

1.8 Limitation of the Study

The researcher believes this study has limitations, because the study is mainly based on survey method by which its limitations are inevitable. The following are additional factors for the limitation of this study:

- Absence of studies, recorded and documented data about SWM activities that has taken place in the Sub-city have limited the depth and scope of the study
- Some respondents were not able to tell the truth due to various reasons such as misunderstanding the purpose of the study, lack of knowledge and experience, and apathy
- Time and financial constrains precluded the possibility of a more rigorous approach for data collection.
- Since time and finance have forced the study to be limited in the major activities of household solid waste, the study did not include more stakeholders with the survey, which is unlikely to show their role and extent of involvement in the service.
- Since the study is conducted at selected Kebeles and at the sub-city level, the result may not be used to generalize for all parts of the sub-city.

1.9 Organization of the Study

The study is organized into five chapters. The first chapter presents information about the introductory part including statement of the problem, objective of the study and research questions, significance, scope, limitation and methodology of the study. The second chapter incorporates the literature review part. This chapter contains the information reviewed by giving more room to the management aspects of the service delivery. The third chapter deals with the situational analysis of the SWM service delivery in the study sub-city. The fourth chapter deals with data presentation and analysis of findings concerning the household SWM service delivery performance in the sub-city. Discussions, in this chapter, are made based on the survey results, interview responses and secondary data. The last chapter is devoted for the conclusion drawn and recommendations forwarded by the researcher.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 History of Solid Waste Management Problems

Since prehistoric times, human beings have been accustomed to follow certain sanitary practices. As many archaeological findings and evidences show the people who lived in caves used to clean their shelters and dispose of their wastes. This implies that the issue of solid waste management is not a problem of modern times only, but it is an old and aged problem of mankind that has not got a lasting solution so far. Therefore, problems of solid waste Management have existed ever since human beings made the transition from hunting and gathering activities to settled communities.

Solid waste production started when people begun to live together and started to process their food. This development of processing was nothing more than to bring fruits and meat to the caves. They started processing their food by peeling the fruits and vegetables and by boning the meat. Archaeological findings indicate that the people who lived in caves used to clean their shelters and pile their refuse outside the caves. Ever since, the production and dispose of solid waste has started.

The main problem of today's city poor waste management is that so many of us are living so close together in urban clusters where the great capacity of the natural environment to purify itself is submerged by the flood of filth we generate; which is aggravated by failure of managing wastes of all types. Many archaeologists have used to study post civilizations that have been extracted from old or ancient dumps. In the early days, the number of people who lived in an area were too small and the waste disposal methods that they used largely relied on the capacity of the environment to absorb and dilute pollutants.

The world population, in the developing and developed countries, is generating solid waste increasingly and disposal areas are getting scarcer every year. Furthermore, wastes are getting complex from time to time.

Nowadays, urban solid wastes are becoming rapidly growing problems of worldwide. Uncollected wastes, particularly in squatter communities and outlying urban areas are major

sources of disease and sickness. Lack of financial resources slows the creation of needed waste collection and disposal infrastructure, while population and industrial pressure on available land make it increasingly more difficult to find disposal sites for the collected trash.

Therefore, governments struggle to prevent their citizens from being buried under a mountain of trash and sewage. Environmentalists, scientists, and naturalists are also working very hard not only to minimize but also to revise and recycle the waste materials so that they could make money out of it and also conserve the natural resources.

Beginning in the early 1970s, a number of governments of developed countries and major corporations began concentrated efforts to find technological solutions for harvesting this portion of the urban waste stream and converting it into useful energy.

At the same time, urban wastes started to be seen as valuable resources: "urban gold" as urban wastes contain valuable materials such as aluminum and steel that can be recovered and sold to help defray the costs of waste collection and treatment. The vegetative portions of the waste stream can be broken down by microbial action, producing a medium bio-gas that can be used for household cooking, shaft-power production, or electricity generation. Combustible fractions of the urban waste stream: paper, cardboard, plastic, etc have a high energy content that can be mined to meet the growing urban energy needs (Urban waste management issues, unpublished source).

When we turn our attention to examining the waste streams found in the urban areas of the developing world, however, we find more questions than answers. Most developing countries are characterized by rapid and unprecedented urban growth. The rate of urbanization in these countries is high because of rural-urban migration and natural population increase. As a result, the process of urbanization becomes a mixed blessing to developing countries i.e. on its positive side; urbanization plays an important role on development by bringing changes in attitudes and practices. At the same time, on its negative side, urbanization creates numerous problems that are beyond the capabilities of the economic set of developing countries (Rakodi, 1997: 32).

2.2 Terminology, Characteristics and Categories of Municipal Solid Wastes

There are numerous definitions and categorizations of what exactly solid waste constitutes. According to the European Environmental Protection Act (1990), "waste is any substance, which constitutes scrap material or any effluent or other unwanted surplus substance arising from the application of a process, or any substance or article, which requires to be disposed of as of being broken, worn-out, contaminated or otherwise spoiled."

Similarly, different literatures defined the word 'solid waste' in different ways, based on the objectives of the literature that the term solid waste is wanted to be defined, but all have more or less similar meanings. However, the definition which the researcher preferred to go with this study is taken from the World Bank Waste Management Guidance.

Accordingly, the definition of MSW, given by World Bank (2005), includes refuses from households, non-hazardous solid waste from industrial, commercial and institutional establishments (including hospitals), market waste, yard waste, and street sweepings. Hence, SWM encompasses the functions of collection, transfer, treatment, recycling, resource recovery and disposal of municipal solid waste.

Solid waste management, according to Tchobanoglous (1997:19), is "that discipline associated with the control of generation, storage, collection, transfer and transport, processing and disposal of waste in a manner that is in accordance with the best principles of public health, economics and that is also responsive to public attitudes".

Similarly, the WB explained that MSWM is the responsibility of local government, and it is a complex task requiring organizational capacity and cooperation amongst various stakeholders, both private and public. If waste is not handled and treated, it will have a negative environmental impact that can have significant consequences for public health.

At the same time, the composition and quantities of solid wastes depends on the economic activities and lifestyle of the society producing it. Types of solid wastes in urban areas, for example, are different from the wastes generated in rural areas both in amount and composition. This shows that the contents and quantities of household or residential wastes change along with the change in the socio-economic situation of the society.

In addition to this, the proportion of different constituents of solid waste varies from season to season and place to place depending on lifestyle, food habits, standard of living, and the extent of industrial and commercial activities in an area. Similarly, the average income level of the society affects the composition (both physical and chemical) of solid waste generation.

Furthermore, solid wastes can be classified into different classes based on different criteria. Among different scholars and experts of the field who classified solid waste into different categories based on various criteria, E. Korbitz (1976: 426), for example, has taken the following terms and definitions from a glossary published by United States Environmental Protection Agency (USEPA) to show the number of sub categories of solid wastes as shown below:

1. *Agricultural*: the solid waste that results from the rearing and slaughtering of animals and the processing of animal products and the orchard and field crops
2. *Commercial:* solid waste generated by stores, offices, and other activities that do not actually turn out a product
3. *Industrial*: solid waste that results from industrial processes and manufacturing
4. *Institutional:* solid wastes originating from educational, health care, and research facilities
5. *Residential*: all solid waste that normally originated in a residential environment, sometimes called domestic solid waste
6. *Municipal*: normally residential and commercial solid wastes generated within a community;
7. *Pesticide*: the residue resulting from the manufacture, handling, or use of chemicals for killing plant and animal pests

On the other hand, Rushbrook (1999:17) stated that traditionally, and, of course, more functionally, municipal solid waste can be classified into three main classes: residential/ household, commercial and industrial solid wastes.

Though many scholars and experts define and classify solid wastes in different ways, its basic and conceptual meaning is some how similar in a sense that the term usually relates to materials

produced by human activity, and is generally undertaken to reduce their effect on health, aesthetics or amenity.

Hence, for the purpose of this study the classification on the basis of sources (origin of generation) is taken. On the basis of their sources (origin), solid wastes are usually classified as household (domestic), commercial, industrial, institutional, street sweepings and construction and demolish wastes.

2.3 Goals and Principles of Municipal Solid Waste Management

Human activities create waste, and it is the way these wastes are handled, stored, collected and disposed of, which poses risks to the environment and to public health (Schübeler, 1996: 18).

According to this author, the *first* goal of MSWM is to protect the health of the urban population, particularly that of low-income groups who suffer most from poor waste management. *Secondly*, MSWM aims to promote environmental conditions by controlling pollution (including water, air and soil pollution) and ensuring the sustainability of ecosystems in the urban region. *Thirdly*, MSWM supports urban economic development by providing the demanded waste management services and ensuring the efficient use and conservation of valuable materials and resources. *Fourthly*, MSWM aims to generate employment and incomes in the sector itself.

To achieve the above goals, it is necessary to establish sustainable systems of SWM which meet the needs of the entire urban population. The essential condition of sustainability implies that waste management systems must be absorbed and carried out by the society and its local communities. These systems must, in other words, be appropriate to the particular circumstances and problems of the city and locality, employing and developing the capacities of all stakeholders, including the households and communities requiring the service, private sector enterprises and workers (both formal and informal), and government agencies at the local, regional and national levels.

The same author emphasized that solid waste management should be approached from the perspective of the entire cycle of material use, which includes production, distribution and consumption as well as waste collection and disposal. Whilst immediate priority must be given to effective collection and disposal, waste reduction and recycling should also be pursued as equally important as longer-term objectives.

The principles of sustainable waste management strategies are thus to:

- *Minimize waste generation*
- *Maximize waste recycling and reuse and*
- *Ensure the safe and environmentally sound disposal of waste.*

Keeping the solid waste management goals and the required strategies in mind, one cannot assume the goals be achieved through isolated or sectoral approaches. Similarly, Schübeler (1996:19) mentioned that sustainable waste management depends on the overall effectiveness and efficiency of urban management, and the capacity of responsible municipal authorities.

2.4 Integrated Sustainable Solid Waste Management System

According to Klundert (2000), the concept of Integrated Sustainable Waste Management (ISWM) is an approach to reach better, more sustainable solutions to solid waste problems, especially in cities of developing countries.

According to the author cited above, ISWM refers to a waste management system that best suits the society, economy and environment in a given location, a city in most cases. The concept of ISWM not only takes technical or financial or economic sustainability into account as in conventionally done, but it also includes socio-cultural, environmental, institutional and political aspects that influence overall sustainability of waste management. ISWM also stands for a strategic and long-term approach. Waste management is seen in the ISWM approach as an equity and public health issue, which means that everybody has a right to a regular waste collection and proper sanitation.

Klundert (2000) further explained that the concept of ISWM consists of three dimension of sustainability, which needs to be integrated namely stakeholders, system elements and aspects.

Similarly, ISWA (2002:19) states that a number of different factors such as environmental, cultural, social, economic, and technical aspects must be taken into consideration in the setting up of a sustainable waste management system. That is why waste management schemes vary substantially from one country to another. In the context of ISWM 'sustainable' can be described as a system appropriate to the local conditions from a technical, environmental, social, economic,

financial, institutional, and political perspective, and capable to maintain itself over time without exhausting the resources it needs.

In light of this, a MSWM system has to devise an ISWM consisting of the above three dimensions and sustainable waste management can only be realized by using the technical, organizational and financial resources available in a particular locality.

However the concept of integrated solid waste management has evolved in the last few years, it relies on a number of different means to manage solid waste. According to ISWA (2002:17), ISWM aims at a holistic approach to the chain of SWM from generation to disposal and all stages in between.

Likewise, the EPA (2003) defines integrated waste management as using a combination of five ways to reduce and reuse as much waste as possible. The important word in the definition is "combination". This implies that there is no single approach to manage solid waste that will solve the problem completely, but only by combining different methods. The EPA's five ways to manage solid waste are Source Reduction, Recycling, Composting, Waste-to-Energy Incineration, and Land filling.

In designing systems, EPA encourages communities to consider these components in a hierarchical sequence. The goal of EPA's approach is to use a combination of all these methods to safely and effectively manage municipal solid waste. EPA recommends that communities tailor their systems from the four components in the three tiers to meet their individual needs, looking *first* to *source reduction*, and *second* to *recycling* as preferences to *combustion* and/or *land filling*.

2.4.1 Source Reduction

Source reduction, also called waste prevention, is defined as the design, manufacture, and use of products in a way that reduces the quantity and toxicity of waste produced when the products reach the end of their useful lives. The ultimate goal of source reduction is to decrease the amount and the toxicity of waste generated. Businesses, households, and state and local governments can all play an active role in source reduction.

One way to manage solid waste is to reduce the waste we generate at the source. This is called "source reduction". For manufacturers, "source reduction" means producing less waste at a manufacturing facility itself. It also means designing products that have the least amount of packaging necessary to keep the products safe and of high quality so as to meet the needs of the consumer (EPA, 2003).

For individuals, "source reduction" means reducing how much you use of an item, or deciding whether to use it or not to use at all. Writing on both sides of a sheet of paper before throwing it away is an example of source reduction. Another example is using durable clothing, appliances, furniture, and recreational equipment carefully and responsibly so that these items do not wear out so quickly (EPA, 2003).

Therefore, rather than managing waste after it is generated, source reduction changes the way products are made and used in order to decrease waste generation.

2.4.2 Recycling

Municipal solid waste recycling refers to the separation and collection of wastes, their subsequent transformation or remanufacturing into usable or marketable products or materials, and the purchase of products made from recyclable materials. In other words, recycling is another important step in managing MSW by reclaiming the valuable materials, for example, glass, aluminum, steel, plastic, paper, etc. and turning them into something useful.

Advantages of solid waste recycling:

- Preserves raw materials and natural resources
- Reduces the amount of waste that requires disposal
- Reduces energy use and associated pollution
- Provides business and job opportunities
- Reduces greenhouse gas emissions and
- Reduces pollution associated with use of virgin materials.

Communities can offer a wide range of recycling programs to their residents, such as drop-off centers, curbside collection, and centralized composting of yard and food wastes

2.4.3 Composting

Some authors consider composting as part of the recycling process. However, composting processes are designed to optimize the natural decomposition or decay of organic matter (items that were once living matter) such as leaves, paper and food. Compost is humus like material that can be added to soils to increase soil fertility, aeration and nutrient retention. Composting can serve as a key component of municipal solid waste recycling activities.

For recycling to be successful, the recovered material must be reprocessed or remanufactured and the resulting products bought and used by consumers. Recycling programs will become more effective as markets increase for products made from recycled material.

2.4.4 Combustion (Incineration)

Confined and controlled burning, known as combustion (incineration), can not only decrease the volume of solid waste destined for landfills, but can also recover energy from the waste-burning process. Modern waste-to-energy facilities use energy recovered from combustion of solid waste to produce steam and electricity.

"Waste-to-energy-incineration" is a fourth part of the EPA's approach and is a method of reclaiming value from our trash in the form of energy. In simplest terms, "waste-to-energy incineration" according to EPA, means burning trash to produce electricity.

Today's waste-to-energy incinerators use high-technology scrubbers to remove potentially harmful gases and to collect ash that results from the burning of trash. Most importantly, these incinerators also produce energy. The heat produced by burning trash can be recovered through a steam turbine that produces electricity. In some instances, the steam itself is used to provide heat.

Though it remains controversial method of waste disposal, in many places due to issues such as emission of gaseous pollutants, incineration is also recognized as a practical method of disposing of certain hazardous waste materials such as biological and medical wastes.

2.4.5 Land Filling

A common confusion exists between the term 'dump' and 'sanitary landfill'. Community officials and others, for example, often refer to dumps when they mean sanitary landfill and vice versa (E. Korbitz, 1976:227). To make it more clear, the same author used the US EPA glossary to define the two different terms.

Accordingly, a 'dump' is defined as a land site where a solid waste is disposed of in a manner that does not protect the environment while a 'sanitary landfill' is a site where solid waste is disposed using sanitary land filling techniques. The techniques mentioned in sanitary land filling consist, basically, spreading waste in layers, compacting of the waste as much as possible and covering it with soil at the end of the day work.

For many communities, the landfill is the last resort for trash. For these communities, the landfill is the place where MSW goes after steps have been taken to reduce trash through source reduction, recycling and composting, and waste-to-energy incineration. For other communities, landfills will play a more important role because other MSWM methods are more expensive or less practical.

Generally, the EPA recommends that all communities should attempt to reduce, as much as possible, the amount of MSW that goes to landfills. In this way we can lighten the burden caused by the trash we throw away. Landfills should be the way we dispose of our trash, after as many valuable materials as possible have been reclaimed or reused. Other steps should also be considered first, rather than looking at landfills, as the primary way of taking care of our trash.

2.5 The Scope of Municipal Solid Waste Management Activities

As defined by Bernstein (2004), MSWM refers to the collection, transfer, treatment, recycling, resource recovery, and disposal of solid waste generated in urban areas. The above mentioned author further explained that MSWM also involves vehicle maintenance (repair), financial management, and administrative activities such as routing, scheduling, record keeping, staff management and development and strategic MSWM planning.

Generally, SWM encompasses all the activities ranging from the point of generation to disposal. To be more specific, SWM activity includes waste generation, waste storage, collection,

transportation, processing (waste treatment), recycling and finally disposal. This implies that MSWM is a complex service that demands the involvement of appropriate organizational, technical, and managerial capacity and cooperation among numerous stakeholders.

Therefore, within the overall framework of urban management, the scope of MSWM encompasses the function and concern of planning and management, waste generation and waste handling processes.

2.5.1 Planning and Waste Management

Management, as Schübeler (1996:18) has stated, is a "cyclical process of setting objectives, establishing long term plans, programming, budgeting, implementation, operation and maintenance, monitoring and evaluation, cost control, revision of objectives and plans, and so forth". Thus, planning and management of MSWM, according to Schübeler's explanation include:

- Strategic planning
- Legal and regulatory framework
- Public participation
- Financial management (cost recovery, budgeting, accounting, etc.)
- Institutional arrangements (including private sector participation)
- Disposal facility and siting

Historically, health and safety have been the major concerns in waste management. These two still apply that waste must be managed in a way that minimizes risk to human health. However, today's society demands more than this; apart from being safe, waste management must also be sustainable. At the simplest level, sustainable waste management must therefore be efficient in terms of environmental protection, socially acceptable and efficient in terms of economic viability (ISWA, 2002:31).

With the view of this, sustainable strategies of MSWM require that specific objectives be formulated and appropriate measures taken with regard to the political, institutional, social, financial, economic, and technical aspects of waste management.

2.5.2 Solid Waste Generation

Solid Waste generation, according to the World Bank (2004), is the process of creating heterogeneous mixtures which are considered to be of no further use. However, solid waste generation for the purpose of this study is considered as characterization (source, composition, quantity, etc) and the application of different strategies of solid waste minimization.

The waste generated by a population is primarily a function of the people's consumption patterns and, thus, of their socio-economic characteristics. At the same time, waste generation is conditioned to an important degree by people's *attitudes* towards waste; their patterns of material use and waste handling, their interest in waste reduction and minimization, the degree to which they separate wastes and the extent to which they refrain from indiscriminate dumping and littering (Schübeler, 1996:34).

Hence, estimating waste quantities and composition, based on the above factors, is typically the first task in any local waste management study. Because, understanding of the rate of generation would help those who administer waste management to identify the type and number of containers, collection methods and frequency of disposal of waste.

In addition to this, generation is used to evaluate reuse and recycling feasibility and processing and disposal requirements. It also helps to identify the sources and types of solid wastes and the factors that influence them.

At the same time, solid waste reduction can also be accomplished by changing behavior (consumption patterns) so that new habits or practices are developed that generate less waste. Reusing a grocery bag, buying materials in bulk to reduce packaging waste, and reselling or giving away unwanted items instead of discarding them, are typical examples of solid waste reduction practices.

One way to manage solid waste, according to various studies, is to reduce the waste we generate at the source. The processing of solid wastes specifically at their sources may also involve reducing the volume of the solid waste that is ready for collection and disposal, altering physical form of solid wastes to reduce the size of the individual items and /or recovering usable materials from solid wastes.

2.5.3 Solid Waste Collection (Handling)

Solid wastes are originated from wide range of sources; it also poses highly complex and heterogeneous environmental problems. As the World Bank (2005) states, if solid waste is not handled and treated, it will have a negative environmental impact that can have significant consequences for the public health. Therefore, a hygienic and efficient management system for collection and disposal of solid waste is paramount in any urban center.

In other words, majority of human activities result in the generation of solid wastes. As a result, it might be almost normal to come across some forms of wastes from almost all types of human activities. It might also be difficult and futile to attempt to completely avoid the creation of wastes. This implies that the creation of wastes is inevitable and its disposal is necessary. Therefore, it is unlikely to secure clean and healthy living conditions in cities and villages without reliable and regular waste collection and disposal services.

2.6 Modalities of Solid Waste Collection Service

Municipal solid waste collection, as defined by EPA (2003), is the act of removing solid waste from the central storage point of primary source. Similarly, Schübeler (1996:46) stated that collection systems comprise household and neighborhood (primary) waste containers, primary and secondary collections vehicles and equipment, and the organization and equipping of collection workers, including the provision of protective clothing.

Municipal Solid Waste collection service in a city can be provided by different alternative systems and using different agents. The organizational modalities of solid waste collection system can be open (private) collection, municipal (government) collection, contract collection and/or hauler licensing system.

2.6.1 Open (Private) Collection System

Private collection basically involves situations where private collectors are paid directly for the services rendered to individuals or firms by those individuals and /or firms, singly or in groups. According to American Public Works Association (APWA) in Korbitz (1976: 429), collection

service of solid wastes is made by individuals or private companies, the arrangements for which they are made directly between the occupier of the premises and the collector. Often such collections are as regular and as systematic as municipal and contract operations, but in some cases the private collector conducts his business on the basis of individual orders.

Most residential and commercial solid waste is collected by private haulers who contract directly with the individual homeowner, apartment complex, commercial establishment, industry, or institution. Individual clients are billed for services by the private hauler on a monthly or quarterly basis based on the arrangements made between the contracting parties. All haulers operating in local government must secure a license to operate under the requirements of the solid waste ordinance.

However, the individual or commercial establishment is free to deal with the hauler of his/her choice. The lack of involvement of the municipality may be more difficult to implement modifications to collection practices that may be desirable to meet the goals and objectives of the locality's solid waste management plan.

2.6.2 The Municipal (Government) Collection System

Municipal solid waste collection system is "a collection of solid wastes directly by a public agency, using public employees and equipment, under direction of municipal official in the same manner as for other public functions such as street cleaning, sewer maintenance and pavement repair" (The institute for solid wastes of APWA in Korbitz, 1976: 427).

Under this option, collection and hauling services would be provided by local government employees using equipment owned by the local government. Collection could also be made either on voluntary or mandatory basis throughout the locality while financing of the system could either be through the tax system or by direct billing the true cost of maintaining the program.

This alternative provides the most controlling power for the local government; this could be important for implementation of source reduction and recycling programs as well as providing a uniform quality of service. Theoretically, economies of scale could be realized by such a large operation in the procurement of equipment and supplies. In addition, the absences of the need to make profit or payment of taxes, the ability to buy trucks, etc are some of the advantages of using this system.

However, APWA points out the disadvantages also as severe lowering of efficiency and standards when political influences (particularly patronage appointments) prevail: insistence by councils and officials on a short term cheapness (inadequate salaries, failure to replace ailing equipment) rather than long term economy, excessive costs of extra service to complainants, problem of removal of inefficient employees in making use of the labor force and inability to embark on perhaps risky salvaging operations.

2.6.3 Contract Collection System

Contract collection is the collection of solid wastes by individuals or companies under formal agreements with the responsible governmental agency. The agency pays the contractor from the general public revenues or from service fees collected by the agency. Contractors are usually awarded on a competitive basis to the lowest responsible bidder who must furnish a performance bond (APWA in Korbitz, 1976: 429).

The essential characteristic of contract collection procedure is that a public agency pays contractors to collect the solid waste. Under contract collection, the local government would be divided into collection districts with approximately equal residential populations. Municipalities could either comprise a separate collection district, or could be included within an adjacent unincorporated area. One hauler is generally awarded the collection contract for each district based on competitive bidding. Each hauler could be responsible for billing each customer for collection and disposal services according to the rate established in the competitive bidding process.

Alternatively, the local government would pay each hauler based on their bids. This cost could be reflected on the tax rate or through a waste generation fee. The local government would be responsible for determining the number and geographic location of collection districts and establishing uniform performance requirements and standards for the franchisee.

Under this system, additional government agency staff members might be required to conduct the franchise award process and administer the contracts. Considerations such as length of the contract, provider of the containers, collection of recyclables, collection days and hours, performance standard, billing and bill collection procedures, performance bond, etc must be addressed when establishing a contract system.

2.6.4 Hauler Licensing System

A licensing system provides a compromise between the completely open (private) collection system and a contract system. The licensing system allows existing private haulers to remain in business; however, these haulers are then required to meet requirements imposed by the local government i.e. vehicle and/or container standards or reporting requirements. The haulers are responsible for billing each customer and for disposal services. Under this system, the local government is responsible for establishing uniform performance standards for the haulers. Additionally, the local government must also establish procedures and policies for licensing haulers. The following considerations must be addressed in establishing a licensing system: the length of license, the mandatory or voluntary collection, collection of recyclables and the hauler of his/her choice.

The system should allow for the customer to select and change haulers at his/her option. In addition to customer choice, the licensing system should give the local government the opportunity to control flow and facilitate the implementation of new management policies through the requirements of the license such as provision of containers for refuse and recyclables, collection frequency and performance standards.

2.6.5 Community Provision System

In situations where public sector service coverage is limited, the role of community participation is significant in the delivery of service. In countries where public systems are in decline, with the increasing impoverishment of governments, the need for self- provision becomes even more prevalent (Devas and Rakodi, 1996).

However each of these agencies has certain pros and cons, the waste collection service in a given city could be performed either by the three agencies simultaneously, or by two of them or by one agency only depending on suitability.

Generally, there are so many variables present in considering which system is the best solid waste collection system for any particular jurisdiction. This means that the system of collection varies from country to country or even from community to community. Therefore, waste managers have to recognize the best way of collection method by considering the existing equipment and general conditions.

2.7 Solid Waste Transfer System

Transfer station is a facility at which municipal solid waste from collection vehicles is consolidated into loads that are transported by larger trucks or other means to more distant landfill sites (World Bank, 2004).

Solid waste transfer system includes temporary waste storage and transfer points, vehicles and equipment for waste transfer, and the procedures for operating and maintaining these facilities and equipment.

The goal and objective of a transfer system is to be operated as cost-effectively as possible, to meet current regulatory requirements and provide a minimum level of services to support the proper solid waste management system.

Transfer station is an important element of the solid waste management system, especially in developing countries. A transfer station is a facility that accepts many smaller loads of solid waste from a variety of customers and consolidates those into a few large loads. The disposal and other services provided by transfer stations are critical components affecting efficiency and cost-effectiveness of SWM system.

Therefore, the design and expansion possibilities of transfer facilities and equipment must match with the characteristics of local collection systems and the available capacity of environmentally safe disposal facilities. The size, number and distribution of transfer stations must be carefully designed to facilitate local collection while achieving efficient transfer operations and minimum transport distances and costs.

On the other hand, selection of vehicles must be based on careful cost-analysis which considers transfer ease, haul volume, operation costs and maintenance requirements. Practical techniques are available for the specification of vehicle requirements.

In general, the technical characteristics and design of transfer points and vehicles must consider the characteristics of local collection systems (hand cart dumping requirements, etc). Careful attention must be given to the objectives of reducing local pollution and limiting, as much as possible, the access of rats and insects.

2.8 Solid Waste Disposal

Even if a resource recovery system is in full operation, some residual elements will still have to be disposed by one method or another after the collection and the processing operations (Korbitz, 1976:447).

Similarly, as ISWA (2002:18) cited Rushbrook (1999), apart from those controlled treatment methods what one cannot ignore is the fact that a considerable amount of waste is still done away with an unacceptable way.

This implies that each day solid wastes are generated from a range of different sources. At the same time, these wastes are assumed to be processed using some different kinds of technologies. For example, some part of waste may be recycled and another part may be composted. After that, remaining part of the waste may go to the landfill. And there may also be some part that is not collected and is instead dumped in an open area in an uncontrolled manner.

Urban authorities should ensure that appropriate sites for solid waste disposal are made available, and these sites will become accessible for the timely execution of MSWM improvements. However, evidences show that selecting a site for a new sanitary landfill is a constant headache to local governments and politicians alike as the general public is often most negative towards the neighborhood site of landfill.

2.9 The Role of Stakeholders in Solid Waste Management

The stakeholders include various social, business, and environmental groups, as well as formal and informal agencies in both the public and private sectors, including non-governmental organizations (NGOs) that can affect as well as be affected by the solid waste (Schübeler 1996:20)

These wide ranges of individuals, groups and organizations are concerned with MSWM as service users, service providers, intermediaries and/or regulators. The roles, interests and agenda of these actors are briefly described as follows:

2.9.1 National Government

National governments are responsible for establishing the institutional and legal framework for MSWM and ensuring that local governments have the necessary authority, powers and capacities for effective solid waste management.

To assist local governments execute their MSWM duties, national governments need to provide them with guidelines and/or capacity-building measures in the fields of administration, financial management, technical systems and environmental protection.

In addition, the national government intervention is often required to solve cross-jurisdictional issues between local government bodies, and to establish appropriate forms of association when, as in most metropolitan areas, effective waste management calls for the collaboration of several local bodies.

2.9.2 Local Government

Local government authorities are generally responsible for the provision of solid waste collection and disposal services. They become the legal owner of solid waste once it is collected or put out for collection. Responsibility for solid waste management is usually specified in bylaws and regulations and may be derived, more generally, from policy goals regarding environmental health and protection.

Besides their legal obligations, local governments are normally motivated by political interests, user satisfaction with provided services, approval of higher government authorities and financial viability of the operation are important criteria of successful solid waste management from the local government perspective.

The authority to enforce bylaws and regulations and to mobilize the resources required for solid waste management is, in principle, conferred upon local governments by higher government authorities. Problems often arise when local government's authority to raise revenues is not commensurate with their responsibility for service provision.

Besides solid waste management, municipal governments are also responsible for the provision of the entire range of infrastructure and social services. Needs and demands for MSWM must

therefore be weighed and addressed in the context of the needs and relative priorities in all sectors and services.

To fulfill their solid waste management responsibilities, municipal governments normally establish special purpose technical agencies, and are also authorized to contract private enterprises to provide waste management services. In this case, local authorities remain responsible for regulating and controlling the activities and performance of these enterprises.

Effective solid waste management depends upon the cooperation between the population and the local governments. Hence, to bring the required cooperation, Local governments should take measures to enhance public awareness of the importance of MSWM, generate a constituency for environmental protection and promote active participation of users and community groups in local waste management.

2.9.3 Households, Communities and Other Service Users

Residential households are mainly interested in receiving effective and dependable waste collection service at a reasonably low price. Disposal is not normally a priority demand of service users so long as the quality of their own living environment is not affected by dump sites. Only informed and aware citizens do become concerned with the broader objective of environmentally sound waste disposal.

Schübeler (1996:20) discusses that in low-income residential areas, where most services are unsatisfactory, residents normally give priority to water supply, electricity, roads, drains and sanitary services. Solid waste is commonly dumped onto nearby open sites, along main roads or railroad tracks, or into drains and waterways. And pressure to improve solid waste collection arises as other services become available and awareness mounts regarding the environmental and health impacts of poor waste collection service

The same author further explained that poorly served residents often form community-based organizations (CBOs) to upgrade local environmental conditions, improve services and/or petition the government for service improvements. Hence, CBOs which may arise in middle and upper income neighborhoods as well as in low-income areas may become valuable partners of the government in local waste management. Other service users including small and large scale industrial and commercial establishments and institutions are similarly interested in reliable and

affordable waste collection service. Commercial establishments are particularly concerned in avoiding waste related pollution, which would cause inconvenience to their customers.

This indicates that community groups have considerable potential for managing, financing local collection services and operating waste recovery and composting activities.

2.9.4 Non-Governmental /Community Based Organizations

NGOs operate between the private and governmental realms. NGOs may help increase the capacity of people or community groups to play an active role in local solid waste management by contributing to:

- People's awareness of waste management problems
- Organizational capacity and the formation of CBOs
- Channels of communication between CBOs and government authorities
- CBOs voice in municipal planning and implementation processes and
- Technical know-how of locally active CBO and access to credit facilities.

NGOs may also provide important support to informal sector waste workers and enterprises, assisting them to organize themselves, to improve their working conditions and facilities, increase their earnings and extend their access to essential social services such as health care and schooling for children.

2.9.5 Private Sector Enterprises

The formal private sector includes a wide range of enterprise types, varying from informal micro-enterprises to large business establishments. As potential service suppliers, private enterprises are primarily interested in earning a return on their investment by selling waste collection, transfer, treatment, recycling and/or disposal services. Operating in various forms of partnership with the public sector, they may provide capital, management and organizational capacity, labor and/or technical skills.

Private sector solid waste service providers may be contracted directly by individual households, neighborhood associations or business establishments. More often, they operate under contractual agreement with municipal authorities.

In this case, the authorities commonly retain responsibility for user fee collection. This arrangement ensures more equitable service access; when private enterprises depend on the direct collection of user charges they have little incentive to provide services in low-income areas where revenue potentials are weak (Schübeler, 1996:23).

2.9.6 Informal Private Sector

As the above cited author discussed, the informal private sector comprises unregistered, unregulated activities carried out by individuals, families, groups or small enterprises. The basic motivation is self-organized revenue generation; informal waste workers are often driven to work as waste collectors or scavengers due to poverty and the absence of more attractive employment possibilities.

2.9.7 Other Stakeholders in MSWM

The following list, as discussed by the above cited author, presents stakeholder groups that are likely to be relevant to MSWM in any country.

- *Waste workers*: employees of municipal solid waste service, waste pickers, municipal sweepers, private sweepers, domestic workers, janitors, etc
- *Vulnerable Groups:* residents living near transfer stations or final disposal sites, women or children who are responsible for disposing of household waste and waste pickers
- *Waste Recycling Industry:* regional industries, city level main dealers, neighborhood dealers, and waste hawkers
- *Media, educational institutions, interest group*, etc

2.10 The Contexts of Municipal Solid Waste Management

As stated previously, MSWM is a complex task which depends upon organization and cooperation between households, communities, private enterprises and municipal authorities as it does upon the selection and application of appropriate technical solutions for waste handling: collection, transfer, recycling and disposal. Furthermore, waste management is an essential task which has important consequences for public health and social well-being, the quality and sustainability of the urban environment and the efficiency and productivity of the urban economy. As a result, solid waste management, today, is one of the most important urban services provided under the municipal responsibilities nearly in all countries. Municipal solid waste management is a major responsibility of local governments, typically consuming between 20% and 50% of municipal budgets in developing countries (Schübeler, 1996:15).

Like other urban services, the effectiveness and sustainability of MSWM systems depend upon their adaptation to the prevailing context of the city and/or country in which they operate. The most important aspects in this respect are the political, socio-cultural, economic and environmental conditions.

2.10.1 The Political Context

MSWM is influenced in numerous ways by the political context: the existing relationship between local and central governments (the degree of decentralization, for example), the form and extent of citizens' participation in the process of public policy making and the role of party politics in local government administration. All these and other similar factors affect the character of management, governance and the type of MSWM system.

2.10.2 The Socio-Cultural Context

The functioning of MSWM systems is influenced by the waste handling patterns and underlying attitudes of the urban population, and these factors are, themselves, conditioned by the people's social and cultural context. Programmes to disseminate knowledge and skills, or to improve behavior patterns and attitudes regarding waste management, must be based on sound understanding of the social and cultural characteristics.

As discussed by Schübeler (1996:15), a community may comprise a considerable diversity of social and ethnic groups, and this social diversity strongly influences the capacity of communities to organize local waste management. At the same time, urban communities often preserve rural traditions of mutual self-help and cooperation, which significantly enhance the potential for community-based waste management.

Similarly, Bernstein (2004:1) has pointed out that planning effective and sustainable investments in MSWM systems requires an understanding of the needs and preferences of a wide range of stakeholders in the service delivery, costs, and corresponding environmental and social impacts.

Generally, the effectiveness and sustainability of MSWM systems depends on the degree to which the served population is involved in strategic decision making and ownership of the systems and facilities.

2.10.3 The Economic Context

The level of economic development is an important determinant of the volume and composition of wastes generated by residential and other users. At the same time, the effective demand for waste management services, the willingness and ability to pay for a particular level of service is also influenced by the economic context of a particular city or area.

Similarly, the character of waste management tasks and the technical and organizational nature of appropriate solutions depend, by far and large, on the economic context of the country and/or city in question and, in fact, on the economic situation in the particular area of a city. This implies that the economic development of a country influences the level, type and effectiveness of SWM service provision.

2.10.4 The Environmental Context

The design of MSWM systems must consider the physical characteristics of such factors as density of population, conditions of roads, topography, etc of the given area.

In addition to the above factors, waste handling procedures and public health conditions may be influenced by climatic conditions and characteristics of local natural and ecological systems. This means that the degree to which uncontrolled waste dump sites become breeding ground for insects, rodents and other disease vectors and a gathering place for dogs, wild animals and

poisonous reptiles depends largely on prevailing climatic and natural conditions (Schübeler 1996:26)

In practical terms, climate determines the frequency with which waste collection points must be serviced in order to limit negative environmental consequences. According to Schübeler (1996:26), environment health conditions may also be indirectly affected through the pollution of ground and surface water by leachates from disposal sites. The above cited author further discussed that air pollution is often caused by open burning at dumps, and foul odors and wind blown that litter the surrounding. He also mentioned that methane, an important greenhouse gas, is a by-product of the anaerobic decomposition of organic wastes in landfill sites.

2.11 Overview of Solid Water Management in Developing Countries

Though the waste produced by human settlements and the resulting problems are mainly the same, there are differences between regions and locations due to variables such as climatic, cultural, industrial, geological, legal and environmental factors.

Hence, the current status of solid waste management is by no means uniform in different parts of the world. For the purpose of showing these differences, ISWA (2002:25) has viewed the globe by dividing into the following four geo-political areas: the European Union, the United States, other high and medium income countries and economically developing countries.

According to the above classifications, the member states of the European Union are viewed as having reached the most advanced state in waste management in the world while the economically developing countries generally lack policies that aimed at the management of solid wastes. In addition, most developing countries do not have modern regulations; existing regulations are antiquated and rarely enforced.

The waste management systems in different developing countries vary substantially and are in some cases virtually non-existent (ISWA, 2002: 26). In the mean time, SWM has become an issue of concern for public health and environmental protection agencies in many of these countries.

Most developing countries do not have the technical and financial resources to manage solid wastes safely. This means that storage at the point of waste generation is often inadequate and

collection services are inefficient and insufficient. Final disposal in those countries is usually a matter of transporting the collected wastes to the nearest available open space and then discharging them. In some cases, the waste is set on fire in order to reduce its volume and to minimize the attraction of animals and vermin (ISWA 2002:26).

Similarly, the UNCHS (1994) has indicated that rapid population growth and uncontrolled industrial development are seriously degrading the urban environment in many countries in the south. For example, the process of urbanization is one of the most serious environmental consequences of which causes the ever growing amount of solid and liquid wastes generated by cities in the developing countries.

Furthermore, developing countries in the process of industrialization are often hosting industries which are hazardous and waste intensive such as oil-refining, petrochemicals, pharmaceuticals manufacture and metal production. But the method they employ for waste disposal remains the same as mentioned earlier i.e. uncontrolled dumping. In this regard, as indicated by ISWA (2002), in many developing countries, the rapid population growth and the increasing economic activity combined with lack of training in modern solid waste management practices complicate the effort to improve the solid waste service.

Similarly, Ogawa (1995) stated that, solid waste management system in a developing country displays arrays of problems, including low collection coverage, irregular collection services, crude open dumping, burning without air and water pollution control, the breeding of flies and vermin, and the absence of handling and control of informal waste picking or scavenging activities which affects the public health and the environment in general. These public health, environmental and management problems are caused by various factors which constrain the development of effective SWM systems. The constraints can be categorized into technical, financial, institutional, economic, and social; each of these constraints need specialized attention.

This means that often a discrepancy exists between the growing population and the increasing demand for sanitation and solid waste collection services on one hand, and the capacity of the local government to provide these services on the other hand. Hence, SWM in the developing countries is inadequate and poor, leaving waste uncollected in streets; dumped in vacant lands, drains and surfaces of water, and burnt in the open air is becoming a major public health and environmental concern in urban areas of many developing countries.

Regardless of the need for sustainable and integrated system of management, the effort made by the municipalities in African Countries is to solve solid waste problems mainly by focusing on expensive 'end of pipe' solutions, involving the collection and disposal of solid waste.

CHAPTER THREE

SITUATION ANALYSIS OF SOLID WASTE MANAGEMENT SERVICE DELIVERY IN ADDIS ABABA: THE CASE OF ARADA SUB-CITY

3.1 History of Solid Waste Management Problems in Addis Ababa

The city of Addis Ababa is over hundred years old. It was established in the late 19th century by Emperor Menelik II as the permanent capital of the then emerging modern Ethiopian state. Over the years, the city has grown into an important urban center following the process of modernization and economic development which Emperor Haile Selassie-I zealously pursued in the aftermath of World War II.

When the city was built as an administrative center in 1880s, there was no any thought of waste as a potential threat. By then, neither the settlement pattern nor the mind set up of residents was in conformity with waste management issues. Haphazard physical development without regard for sanitary and utility facilities characterized the development pattern of the city. Rural tradition of disposing waste in the open air was instantly transferred to the emerging city to perpetuate to these days.

Though there is no written evidence about the history of solid waste management in Ethiopia, there is a legend about the practice and the reason for traditional solid waste management in Ethiopia. It is said that problems of solid waste had been understood by Emperor Menelik, due to the emergence of epidemics, and the subsequent announcement to the people to collect and burn solid wastes so as to control the disease had created the tradition of burning of solid waste on every 21st of November (Translated from Arada quarterly magazine, vol.1 No.1, Hidar, 2000, Amharic version).

The burning tradition has contributed little awareness to the people in some areas. However, the sort of misunderstanding by the people about the existence and emergence of epidemics after the collection and burning of solid waste on 21st November seems to continue until today.

The tradition of burning solid waste contributed for the present solid waste management practices in the city. This implies that burning should have been a foothold for improved SWM system especially in Addis Ababa.

Having reviewed the history and development of the urban services, particularly of the SWM Addis Ababa, some experts and scholars pointed out the current status, the causes and the impacts of the problems with their recommendations for improved and better services. Mehret (1999), for example, has explained the recent state of refuse collection and SWM in the city as the most deplorable. As Mehret discussed, an estimated 35-40 per cent of the solid waste generated is left uncollected and dumped on any available waste ground and hence, it is not uncommon to see mountains of garbage and solid waste blocking sidewalks and streets in many parts of the city. Apart from being eyesores to the residents and visitors of the city, the health hazards of such unsanitary conditions can indeed be incalculable' (AAPPO, 1994 in Mehret, 1999).

Similarly, SBPDA (2004) mentioned that the collection and disposal of solid waste is still a persistent problem to the city. Currently, solid waste generated per day in the city is estimated to 851 tones or 2,297 m^3. Out of which, about 65% is being collected, consequently a large proportion of the solid waste is left uncollected or disposed of in open spaces, in ditches and rivers. The above studies indicate that SWM problem is one of the key urban challenges currently prevailing in Addis Ababa.

Realizing the problems, the Charter of Addis Ababa City Government has set forth in its objective to make the city a naturally balanced, clean and green and favorable environment through the prevention of environmental pollution and hence established SBPDA in 2003. And has endorsed comprehensive waste management collection and disposal (solid and liquid waste) regulation No 13/2004 followed by SWM Policy.

The ten sub-cities under the city government are held responsible to undertake SWM affairs in their respective jurisdictions. All garbage vehicles, equipment and materials are distributed to all sub-cities with established criteria. With this decentralization process, full support and appropriate capacity building interventions have been undertaken.

3.2 Background of Urban Services in Arada Sub-City

Addis Ababa has an estimated population number of 3,147,000 people. The city has been organized under three tiers of government structures since 2003. According to the current city government hierarchy, the sub-cities are at the middle, while the Addis Ababa city government and the Kebeles represent the top and third administration strata respectively. There are 10 sub-cities and 99 Kebele administrations within the city of Addis Ababa. Among these, Arada sub-city is one of the oldest and is found in the central part of the city with the current estimated population size of 350,000 residents. Arada sub-city is bordered by Yeka in the East, by Gulele in the North, by Addis Ketema in the West and by Kirkos and Lideta sub-cities in the South. The total land area of Arada sub-city is 994.7 hactare (ha). (Please note these figures were obtained from Arada sub-city information bureau as of May 2008).

Arada was founded together with the establishment of Addis Ababa during the reign of emperor Menilik II when the Arada St. George church was built and the Menilik monument was erected. Therefore, it is one of the oldest and historical parts of the city where people first started to settle before a century.

Studies indicate that during the establishment of Addis Ababa, many foreign merchants like the Armens, Turks, etc settled in Arada and started business activities. Arada has been the nucleus of the city since the establishment of Addis Ababa and hence became the heart of the city where most of its frontal land is used for business activities and is now becoming a central business district area, which is a feature of urbanization (Arada sub-city information bureau, April 2006). This shows that service and commercial trade are dominant activities in Arada Sub-city.

According to the present system of decentralization of power, Arada sub-city was established as part and parcel of the organizational entity in 2003 and has been operating urban related services and development activities under the auspicious of the city government up to now. The sub city is undertaking various programs and activities by addressing different socio-economic problems of the community of which SWM is one of the serious problems in the view of its impact on the public health and environment.

Nowadays, sub-cities are responsible for the urban service provision for their residents. The powers and functions vested to Arada sub-city administration, similar to other sub-cities, emanate

from legislations endorsed to establish the Sub-Cities and Kebeles, Proclamation No. 1/2003 and 18/2004 (amendment for 1/2003).

The sub-cities and Kebeles establishment proclamation lists out the powers and functions of the sub-cities and Kebeles separately. The same proclamation elaborates the organization of Kebeles including the establishment, accountability, powers and functions and organs. Accordingly, the sub-city has got a wide range of powers, duties and responsibilities of providing various urban services including land management, road construction and maintenance, housing, education and health and sanitation services of which SWM is one of the most important.

3.3 Solid Waste Management Service Delivery in Arada Sub-City

Before the establishment of SBPDA, the provision of SWM service was under the sub-city's Health and Sanitation Department.

However, since February 2003, SWM service, collection and transportation, has been provided by the newly established SWMT in each sub-city. This means that the SWMT in Arada, like in other sub cities, has taken over responsibilities and operational activities of SWM service within the jurisdictions of the sub-city.

The Arada sub-city SWMT has also strengthened its ties with the voluntarily established MSEs. And hence, currently, SWM service is provided by a collaborative effort between the SWMT and the MSEs.

The SWMT is organized by the sub-city and has 226 permanent employees 63 standard 8 m^3 and 80 with 1.1m^3 containers, 9 vehicles, 350 waste bins attached to poles along main roads to serve the pedestrians as collecting baskets. However, the containers are not fairly distributed in all Kebeles. In the interview held with the head of the SWMT, he said that the reason for the uneven distribution is shortage of containers, unavailability of space for containers and size of the population. The head of the team further mentioned that 54 MSEs started to provide the solid waste collection service in 2003/4, and now only 40 are operational. He also indicated that there are also 4 NGOs who are supporting the MSEs.

Though solid waste management service in Arada sub-city is performed by many formal and informal stakeholders, the SWMT, the formally established part of the SBPDA at the sub-city

level, is the primary responsible for the collection, transportation and disposal of solid wastes. And the MSEs are the second most active stakeholders participating in the provision of SWM service. In general, the above two were the two major household solid waste collection service providers in the sub-city. However, this situation has been changed since 2006 and the SWMT of Arada sub-city has limited the range of its service to the provision of containers and solid waste transportation service to dump site. This shows that primary collection service is completely transferred to be shouldered by MSEs only.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF FINDINGS

This chapter has two parts. The first part deals with the presentation of findings. The second part analyzes the main findings of the field survey and the major factors determining the performance of SWM in Arada sub-city. To this end, findings from households, focus group discussions, observations and interviews held with different stakeholders are discussed and analyzed.

4.1 PRESENTATION OF FINDINGS

This section of the study attempts to illustrate the description of responses of households. Under this section, the major variables considered as helpful to explain performance of the household SWM service delivery are portrayed in frequency distribution tables and cross tabulation list.

4.1.1 Characteristics of Sample Households

In this study, from a total of 193 household respondents, 69.9 percent (135 HHs) were male-headed and the remaining 30.1 (58 HHs) percent were female-headed. On the other hand, the survey on the occupation of sample households shows that 74.1 percent (143 HHs) of the respondents were employed while 24.9 percent (48 HHs) were unemployed and the remaining 1 percent (2 HHs) did not want to disclose their employment status.

Table 1: Employment status of respondents

Sector of employment	Distribution of employed Respondents	
Government sector employee	Count	25
	% of Total	17.5%
Private sector employee	Count	27
	% of Total	18.9%
Self –employed	Count	74
	% of Total	51.7%
NGO/ CBO sector	Count	8
	% of Total	5.6%
Other	Count	9
	% of Total	6.3%
Total	Count	143
	% of Total	100.0%

Source: Computed from survey data, 2008

The result of the sample survey shows that, from the total employed respondents, 17.5 percent were government sector employees; 70.6 percent were engaged in private sector enterprises (51.7 % self-employed and 18.9% were employed by others); 5.6 percent work in NGOs/CBOs and the remaining 6.3 percent were not willing to disclose the sector of their employment.

Table 2a: Respondent households' educational level

Education and Gender of HHs			What is your gender?		
			Male	Female	Total
What is your educational level?	No education	Count	3	0	3
		% of Total	1.6%	.0%	1.6%
	Read and Write only	Count	1	1	2
		% of Total	.5%	.5%	1.0%
	Grade 1- 8	Count	20	10	30
		% of Total	10.4%	5.1%	15.5%
	Grade 9- 12	Count	70	26	96
		% of Total	36.3%	13.4%	49.7%
	Diploma and above	Count	34	20	54
		% of Total	17.6%	10.4%	28.0%
	Other	Count	2	0	2
		% of Total	1.0%	.0%	1.0%
	No Response	Count	4	2	6
		% of Total	2.0%	1.1%	3.1%
	Total	Count	134	59	193
		% of Total	69.4%	30.6%	100.0%

Source: Computed from survey data, 2008

As Table 2a shows, 1.6 percent of the sample households are with no education; 1.0 percent can read and write only; and 15.5 percent have completed grades between 1 and 8. Furthermore, those who completed grade 9-12 account for 49.7 percent whereas those who have advanced their learning with diploma and above programs are found to be about 28.0 percent and 1.0 percent of the sample households have other qualifications while 3.1percent were non-responsive

Table 2b: The relation between level of education and solid waste separation practices

What is your educational level?		Do you separate decomposable waste from non-decomposable solid waste before disposing of?		
		Yes	No	Total
No education	Count	3	0	3
	% of Total	1.7%	.0%	1.7%
Read and Write only	Count	0	2	2
	% of Total	.0%	1.1%	1.1%
Grade 1- 8	Count	8	17	25
	% of Total	4.5%	9.7%	14.2%
Grade 9- 12	Count	34	57	91
	% of Total	19.3%	32.4%	51.7%
Diploma and above	Count	10	43	53
	% of Total	5.7%	24.4%	30.1%
Other	Count	2	0	2
	% of Total	1.1%	.0%	1.1%
Total	Count	57	119	176
	% of Total	32.4%	67.6%	100.0%

Source: Computed from survey data, 2008

To see the correlations between the households' educational level and their behavioral change towards using integrated solid waste management strategy, households were asked a question whether or not they separate (segregate) solid waste before they dispose of. As shown in Table 2b above, regardless of their various educational level achievements, 67.6 percent of the respondents do not have the practice of separating their solid waste before disposal; 30.7 percent of the respondents are educated and also segregate their wastes before disposal. And 1.7 percent of the sample households are uneducated but separate their solid waste at home before they dispose of. The highest percentages of respondents from those who do not separate solid waste

before disposal (32.4 percent) and from those who separate (19.3 percent) were educated between grade 9 and 12. And the least separating practice (0.0 percent) is carried out by those respondents who can read and write only.

Table 3: Monthly income of sample households

HH monthly Income (In Birr)	Count	% of Respondents	Cumulative %
Below 500	81	50.3	50.3
500--1000	42	26.1	76.4
1001--1500	21	13.0	89.4
1501—2000	9	5.6	95.0
2001--2500	3	1.9	96.9
Above 2500	5	3.1	100.0
Total	161	100.0	

Source: Computed from survey data, 2008

From the Table 3 illustrated above, about 50.3 percent of the respondents of the sample survey reported that their monthly household income is below Birr 500. The same table shows that the number of respondents rapidly decreases as the amount of household income level increases. Most of the respondents of the sample survey (76.4 percent) fall below monthly income of Birr 1000.

Sample households were asked to indicate their hometowns and villages with an intention to see the trend / trace the reason why people migrate/ and check whether their previous tradition and practice (habit) of waste removal preserves in their present residence. Accordingly, the survey result shows that 40.5 percent of the respondents were born and grew up in rural areas and small towns; 53.8 percent were from Addis Ababa; 0.5 percent from foreign country and 5.2 households were not willing to tell where they are from.

Table 4: Reason for migration of households to Addis Ababa

Reasons for migration	Frequency	% of Respondents	Cumulative %
To look for better a job and living opportunities	37	49.3.0	49.3
To live with parents / relatives	3	4.0	53.3
To attend further education	22	29.3	82.6
To flee from natural calamity	2	2.7	85.3
Other	3	4.0	89.3
No Response	8	10.7	100.0
Total	75	100.0	

Source: Computed from survey data, 2008

Following the question of place of birth, the rural born respondents were asked the reason why they migrated to Addis Ababa. As shown in Table 4 above, 49.3 percent were migrated to look for better job opportunities and better living environment; 29.3 percent to attend (advance) further education. Furthermore, 4.0 percent of the respondents mentioned to live with their relatives, 2.7 percent to run away from natural calamities, and the remaining 4.0 percent of the respondents gave other reasons which were not specified while the remaining 10.7 percent have not disclosed the reason.

Table 5: Accessibility of residence of HHs by solid waste collection vehicles

Is your place accessible to solid waste collecting vehicles?	Frequency	% of Respondents	Cumulative %
Yes	144	74.6	74.6
No	40	20.7	95.3
No response	9	4.7	100.0
Total	193	100.0	

Source: Computed from survey data, 2008

As indicated in Table 5 above, the sample survey respondents were also asked if their residential places are accessible to solid waste collection vehicles. Most of the respondents, 74.6 percent (144 HHs), answered 'yes', 20.7 percent (40 HHs) replied 'no' and 4.7(9 HHs) did not respond. By the same token, respondents who replied that their area is inaccessible to solid waste collection vehicles were asked the reason. About 83.3 percent indicated the reasons which were related with absence of access road and bad conditions of the roads whereas the remaining 16.7 percent were reserved to tell the reasons.

Table 6: Level of priority of SWM service compared with other municipal services

SWM is not a priority compared with other municipal services	Frequency	% Respondents	Cumulative %
Strongly agree	54	28.0	28.0
Agree	36	18.6	46.6
Neither agree nor disagree	29	15.0	61.6
Disagree	33	17.1	78.7
Strongly disagree	26	13.5	92.3
No Response	15	7.8	100.0
Total	193	100.0	

Source: Computed from survey data, 2008

The response to the survey question concerning the level of priority given to SWM service, compared with other services such as water, electricity, drainage, safety and security, traffic and other similar municipal services, shows that 28.0 percent (54 HHs) strongly agree and 18.6 percent (36HHs) agree with the idea that says SWM service is not a first priority. On the other hand, 13.5 percent (26 HHs) of the respondents strongly disagree and 17.1 percent (33HHs) disagree; while 15.0 percent (33HHs) were neutral and the remaining 7.8 percent (15HHs) preferred to be silent.

4.1.2 Generation and Composition of Household Solid Wastes

Although the rate of composition and generation of solid waste is not included in the scope of this study, the sample survey results on composition of household solid waste in the study area indicate the following are major types of solid waste that come out of the respondent households: Household rubbish including peels of vegetables and fruits (42.3 percent), grass and garden trimmings (11.5 percent), plastic bags and paper (18.9 percent), ash (17.3 percent) and other types (10.0 percent). In addition to this, from interview held with the head of the solid waste management team, with regard to variation of solid waste generation, it is learnt that there has not been a study made concerning the variation of solid waste generation.

4.1.3 Households' Solid Waste Storage Materials at Home

Respondents were asked to mark the materials they use to store their solid waste at home by giving them alternatives in the form of multiple choices. With regard to materials used for storing solid waste at home, the following results were obtained from the subject survey households.

Table 7: Solid waste storage material used by sample households

Storage Materials used by HHs	Count	% of Respondents
Carton	4	2.1
Local basket	20	10.4
Metal Bucket	19	9.8
Plastic bag (Madaberia)	102	52.8
Sisal sacks	10	5.2
Festals	22	11.4
Communal Container	10	5.2
Carton & Madaberia	2	1.0
Basket and Festals	2	1.0
Metal bucket & Madaberia	1	0.5
Fastal & Madaberia	1	0.5
Total	193	100.0

Source: Computed from survey data, 2008

As can be seen from Table 7 above, the sack commonly known as '*Madaberia*' is used by a little more than half of the respondents (52.8 percent). Next to that, about 11.4 percent of the sample

households use plastic bag, a material locally known as 'Festal'. A significant number of respondents use different storing materials such as local basket for 10.4 percent, metal buckets for 9.8 percent, sacks made of sisals and cartons for 5.2 and 2.1 percent respectively. Also, some 5.2 percent of the sample households dump their solid waste into a nearby communal waste collection container on a daily basis so that they don't need to keep a storage materials at their homes.

Furthermore, it is clear that the above solid waste storing materials in almost all the households serve to transfer the waste from each individual house to the communal solid waste containers. A question was asked to identify the responsible personnel for disposing of and handling solid waste for households.

According to the response obtained from the sample survey, a significant number, 53.4 percent (103HHs) of the respondents use solid waste workers of the MSEs; 16.6 percents (32 HHs) of the respondents use their children; and 7.8 percent (15 HHs) use housewives to transfer and dispose of their household solid wastes. About 12.0 percent (23 HHs) of respondents use other employed people including house maid, cleaners and watchmen. 10.0 percent of the respondents remained silent.

4.1.4 Solid Waste Reduction Practices of households

The study subjects were asked some additional questions concerning their practical experience and habits of segregating solid waste vis-à-vis their level of awareness.

Table 8: Experience and habits of households to segregate solid waste

Do you separate/ sort out solid waste before disposal?	Frequency	% of Response	Cumulative %
Yes	57	29.5	29.5
No	124	64.3	93.8
No Response	12	6.2	100.0
Total	193	100.0	

Source: Computed from survey data, 2008

About 93.8 percent (181 HHs) of the sample households have disclosed their habits and only 6.2 percent (12 HHs) of the respondents remained utterly quiet. And among those who responded to

this question, 68.5 percent (124HHs) told that they don't separate decomposable solid waste from non-decomposable and only 31.5 percent (57 HHs) stated that they do the separation.

A subsequent question why households do not use to separate decomposable from non-decomposable solid waste was forwarded. Based on the query posed, respondents gave their respective answers as indicated below.

Table 9: Reasons why respondents fail to segregate their solid waste at home

Why wouldn't you like to separate the different solid wastes? Because,	Frequency	% of Respondents	Cumulative %
Waste has no value	19	15.3	15.3
It is a difficult exercise	10	8.1	23.4
Lack of time and space	35	28.2	51.6
I have no knowledge	28	22.6	74.2
No opinion	18	14.5	88.7
No response	14	11.3	100.0
Total	124	100.0	

Source: Computed from survey data, 2008

Sample households told the reason why they wouldn't like to separate their solid wastes. As indicated in Table 9, about 28.2 percent told that they do not have enough space and time; 22.6 percent told that they lack the knowledge; 15.3 percent believe that waste has no value; 14.5 percent do not have opinion and 8.1 percent believe that separation is a difficult exercise whereas 11.3 percent did not respond to this query.

On the other hand, an additional question was posed to know if there are special purposes, and to crosscheck what motivates a household to make separation for few items such as shoes, clothes, metals and for other similar items from their solid wastes. Consequently, 69.9 percent (135 HHs) of the respondents have mentioned different purposes they often use the items for, and the remaining 30.1 percent (58 HHs) failed to respond. From those respondents who have purposes of using the items, 35.2 percent told that they use these items for selling; 12.4 percent reported to

ease the work so as to help waste collectors; 9.3 percent to present the items as a gift for others; 6.7 percent to reuse the items and 6.2 percent said for recycling.

Similarly, subject households were asked what they do with the organic wastes such as residue of food, leaves and garden trimmings that are produced in their houses. Results are shown below.

Table 10: Households' experience in the use of organic solid wastes

What do you do with the residue of food, leaves and trimmings that come out of your house?	Frequency	% of Respondents	Cumulative %
Make compost	10	5.2	5.2
Apply (direct) on the garden	13	6.7	12.0
Throw them away with other solid wastes	117	60.6	72.6
Burn in the back yard	23	11.9	84.5
No Response	30	15.5	100.0
Total	193	100.0	

Source: Computed from survey data, 2008

Regarding the above issue of organic solid waste, the highest number of the respondents, 60.6 percent, reported that they throw them away with other solid wastes; 11.9 percent stated that they burn these solid wastes in their back-yard; 6.7 percent apply directly on their garden; only 5.2 percent make compost and 15.5 percent of the respondents did not respond.

4.1.5 Availability of Communal Solid Waste Containers, Collection and Disposal Service in Arada Sub-City

Sample households were asked about the availability of solid waste communal containers in their respective surroundings to check the provision of appropriate solid waste collection and transportation services. Accordingly, the following result was obtained.

Table 11: Availability of municipal solid waste container in the study area

Is public solid waste container available in your neighborhood?	Frequency	% of Response	Valid %	Cumulative %
Yes	88	45.6	48.4	48.4
No	94	48.7	51.6	100.0
Total	182	94.3	100.0	
No Response	11	5.7		
Total	193	100.0		

Source: Computed from survey data, 2008

As shown in Table 11 above, 94.3 percent (182 SHHs) responded to this question and the remaining 5.7 percent (11 SHHs) did not respond. From those who responded, 48.4 percent (88 SHHs) stated that public solid waste container is available in their neighborhood and 51.6 percent (94SHHs) said that communal solid waste container is not available in their surroundings.

For those who indicated the availability of the communal solid waste container, the following table results are calculated, based on the estimated distance.

Table 12: Accessibility of the communal solid waste container

Estimated distance between home of HHs and solid waste containers	Count	% of Respondents	Cumulative %
Less than 100 mts	30	34.1	34.1
Between 101-200mts	22	25.0	59.1
Between 201-300 mts	13	14.8	73.9
Between 301-400mts	3	3.4	77.3
More than 400 mts	14	15.9	93.2
No Response	6	6.8	100.0
Total	88	100.0	

Source: Computed from survey data, 2008

The average distance between a residence and a communal container was found to be 220 meters. Most households walk 100 (mode) meters with median of 150 meters. It means that there are many people who could be located within 100 meter radius of the container, but as many other households travel long distance to reach the containers, the arithmetic mean is higher (more than

doubling) than the mode. In general, as indicated in Table 12, a container is located within 100 meter radius for 34.1 percent households; 200 meters for 25.0 percent of households; 300 meters for 14.8 percent of households; 400 meters for 3.4 percent of households, and more than 400 meters for 15.9 percent of households. The remaining 6.8 percent did not tell how far they live from the waste container.

Subsequently, the same respondents were asked if they have participations or if they have a say in choosing and deciding location for the containers in their respective areas. Response of the sample households is shown in Table 13.

Table 13: Participation of households in choosing the location of containers

Did you have a say (participation) in deciding the location of the public containers in your area?	Frequency	% of Respondents
Yes	16	18.2
No	71	80.7
No response	1	1.1
Total	88	100.0

Source: Computed from survey data, 2008

Most of the respondents, bout 80.7percent (71HHs) stated that they had no participation or say in choosing or deciding the location for the containers in their areas; whereas 18.2 percent (16 HHs) of the respondents acknowledged their participation in choosing and deciding for the containers and 1.1 percent (1HH) respondents did not respond.

On the other hand, a subsequent question was asked with the intent to know where households usually dispose of their solid waste if waste containers are not available or if households are not aware of the availability of containers in their surroundings. Accordingly, the following results were obtained from the response of subject households.

Table 14: Households' solid waste dumping places where containers are not available

Where do you dump the solid waste when communal containers are not available in your area?	Frequency	% of Respondents	Cumulative Percent
Use MSE's Service Materials	55	58.5	58.5
Into a valley / stream	6	6.4	64.9
By the road side /ditch	1	1.1	66.0
Burry in the compound	2	2.1	68.1
Burn	8	8.5	76.6
Other	11	11.7	88.3
No response	11	11.7	100
Total	94	100.0	

Source: Computed from survey data, 2008

As can be noted from Table 14, about 58.5 percent of the respondents use solid waste containers provided by MSEs; 8.5 percent burn their solid wastes; and the remaining 9.6 percent of the respondents use other methods like burying solid waste in their compounds, disposing into a nearby river valley, dump into a road side ditches; whereas 11.7 percent reported that they dump their household wastes in other places which are not clearly specified; while the remaining 11.7 percent kept silent about where they dispose of their solid wastes.

To compare and contrast their responses given for places where respondents do dispose of their household solid waste, they were also asked a question if they have ever been served by MSEs against payment. Based on the above question, the following result was observed from the response of the sample households.

Table 15: Number of customers for MSEs solid waste collection service

Have you ever been served by private MSEs for SWM service?	Frequency	% of Respondents	Cumulative %
Yes	125	64.8	71.0
No	51	26.4	100.0
No response	17	8.8	
Total	193	100.0	

Source: Computed from survey data, 2008

As indicated in Table 15 above, 64.8 percent (125 SHHs) of the respondents are customers of solid waste collection service rendered by the MSEs, 26.4 percent (51 SHHs) of the respondents were found to be non-user of the service provided by MSEs; whereas the remaining 8.8 percent (17 SHHs) didn't disclose anything.

On the other hand, to assess if the sample households know the interval of the collection services rendered by MSEs and SWMT, they were asked the following crossing questions. Based on the query, the following result was revealed:

Table 16a: Number of HHs that know the frequency of service provisions

Do you know how often the private MSEs collect solid waste from your house and how often the public container is emptied?					
Yes		No		Total Respondents	
Count	% of Respondents	Count	% of Respondents	Count	% of Respondents
108	56.0%	85	44.0%	193	100.0%

Source: Computed from survey data, 2008

As shown in Table 16a above, concerning the two crossing questions, 56.0 percent (108 SHHs) know how often MSEs collect household solid wastes and SWMT emptied the public containers; 44.0 percent (85 SHHs) reported that they know nothing how often both services are provided.

Table 16b: Households awareness about frequency of collection service

Frequency of services			How often do the private MSEs collect solid waste from your house?			
			Weekly	Twice a week	By special deal	Total
How often is the public container emptied?	Every day	Count	3	4	4	11
		% of Total	2.8%	3.7%	3.7%	10.2%
	Once in a week	Count	25	5	3	33
		% of Total	23.1%	4.6%	2.8%	30.6%
	Twice in a week	Count	9	9	0	18
		% of Total	8.3%	8.3%	.0%	16.7%
	Three times in a week	Count	7	6	1	14
		% of Total	6.5%	5.6%	.9%	13.0%
	When it is full	Count	14	7	11	32
		% of Total	13.0%	6.5%	10.2%	29.6%
	Total	Count	58	31	19	108
		% of Total	53.7%	28.7%	17.6%	100.0%

Source: Computed from survey data, 2008

Out of the 56.0 percent (108 SHHs) respondents, who know about the frequency of the collection services, 53.7 percent (58 SHHs) reported that they know that MSEs collect household solid waste on a weekly bases, 28.7 percent (31 SHHs) indicated that MSEs collect solid waste twice in a week and the remaining 17.6 percent (19 SHHs) of the respondents said that MSEs collection service can be obtained by special arrangement.

In addition to the above, with the intention to know whether the current service delivered by the MSEs is sufficient and satisfactory or not, sample households were asked to forward their opinion. The result is presented in the table below.

Table 17: Households' satisfaction and opinion on sufficiency of the solid waste collection service delivered by MSEs

Do you believe that the service currently rendered by private MSE is sufficient and satisfactory?	Frequency	% of Respondents	Cumulative %
Yes	43	22.3	23.0
No	144	74.6	96.9
Not responded	6	3.1	100.0
Total	193	100.0	

Source: Computed from survey data, 2008

As illustrated in Table 17 above, 74.6 percent of the respondents believe that the solid waste collection service delivery by MSEs is unsatisfactory and insufficient. Whereas, 22.3 percent stated that it is satisfactory and sufficient. Only 3.1 percent of the sample households did not reply to this question.

Similarly, a question was asked to know the perception of households about the conditions of the surroundings of the public solid waste containers. Sample households explain the situation and status as follows, based on their daily observations.

Table18: Conditions of communal containers as perceived by households

How do you usually see the public solid waste containers?	Frequency	% of Respondents	Cumulative %
Always overflowing	112	58.0	58.0
Always full	42	21.8	79.8
Neither full nor empty	17	8.8	88.6
Did not pay attention	6	3.1	91.7
No response	16	8.3	100.0
Total	193	100.0	

Source: Computed from survey data, 2008

With regard to the conditions of solid waste containers, 79.8 percent of the study subjects reported that the communal containers in the sub-city are always full, and overflowing; whereas 8.8 percent of the respondents said that the communal containers are always neither full nor empty; 3.1percent of the respondents did not pay attention to the condition of the containers. Other 8.3 percent of the respondents did not respond to this question.

Subsequently, the same respondents were asked to explain what incidents they have witnessed in or around overflowing solid waste containers or transfer stations. In line with the given choices, respondents forwarded their replies as indicated in Table 19 below.

Table 19: Incidents observed by households in and around a full or overflowing solid waste container

What incidents you have in or around an overflowing solid waste container?	Count	% of Respondents	Cumulative %
Stinking odor disturbing passers-by	23	11.9	11.9
The waste eaten by domestic animals	7	3.6	15.5
Being searched by scavengers	12	6.2	21.8
Becoming harbor for rats, insects, flies, etc	1	0.5	22.3
Becoming cause for uncontrollable fire	1	0.5	22.8
All of the above mentioned incidents are commonly seen	140	72.5	95.3
Other: Creates semi-fluid matter	1	0.5	95.8
No response	8	4.1	100.0
Total	193	100.0	

Source: Computed from survey data, 2008

Among the sample households, 72.5 percent reported the existence of stinking odor disturbing passers-by, the solid waste being eaten by domestic animals, scavengers searching for materials, the solid waste being harbor for insects and flies and becoming cause for uncontrollable fire as incidents they have witnessed from overflowing solid waste containers; 11.9 percent of the respondents reported the incident they witnessed for stinking odor only; 6.2 percent stated that they have seen scavengers searching for valuable items; 3.6 percent said that solid waste has been eaten by domestic animals and 1.5 percent of the respondents reported that they have observed the container being harbor for rats and insects and the cause for uncontrollable fire. On the other hand, 4.1 percent of the respondents found non-responsive to this question.

4.1.6 Households' Awareness and Knowledge about Solid Waste

Sample households were given the following statement to see the relationship among awareness, behavioral change and situation of the solid waste in their residential areas. The hypothetical statement read as:

> *There are a number of overflowing containers, flying plastic bags (festals), and papers in every corner, peels of vegetables, dead animals and human faeces, demolished building debris, etc with an increasing pattern and overspreading widely in the Sub-City.*

Based on the above statement, 92 SHHs (47.7 percent) have strongly agreed and 51 SHHs (26.4 percent) agreed on the statement; only 8 SHHs (4.1 percent) have strongly disagreed and 26 SHHs (13.5 percent) disagreed; 12 SHHs (6.2 percent) remained neutral while 4 SHHs (2.1 percent) did not respond.

Similarly, the same subjects of the sample survey were asked if they have ever had awareness raising or sensitization education about solid waste in general.

Based on this question, 60.6 percent of the respondents replied that they haven't had awareness raising or sensitization education; 31.1 percent told that they have obtained awareness raising education about solid waste and the remaining 8.3 percent were not willing to disclose their exposure.

For those who obtained awareness raising education about solid waste, many more related and consecutive questions were forwarded so as to investigate the impacts of the education (training) on the behavioral change and performance of the respondents on SWM.

Following the logical sequence, respondents were asked a question about the media (ways) of transmission through which they have obtained the awareness raising lesson/training, with the intent to know about the type and effectiveness of the means used for awareness.

Table 20: Number of HHs who have got awareness raising education/ training

Media of awareness raising	Frequency	% of Respondents	Cum. %
Through school education /curriculum	2	3.3	3.3
Through Radio programmes	3	5.0	8.3
Through TV programmes	5	8.3	16.6
Through Public meetings	2	3.3	19.9
From posters and banners	1	1.7	21.6
Through all of the above	12	20.0	41.6
Others (religion related)	2	3.3	44.9
School & Radio	1	1.7	46.6
Radio & TV programmes	1	1.7	48.3
School, Radio & TV	1	1.7	50.0
Radio, TV &Poster	1	1.7	51.7
School, Radio, TV &poster	2	3.3	55.0
No Response	27	45.0	100.0
Total	60	100	

Source: Computed from survey data, 2008

As indicated in Table 20, more than half (55.0 percent) of the respondents mentioned through what programme and which medium they have obtained the awareness raising education (training) and the rest 45.0 percent of the respondents did not indicate from where and how they have obtained the education /lesson about SWM.

Furthermore, the same households were asked about the training organization/institution from which they have benefited most. The result shows that many of the sample households reported that they benefited from programme that were organized by government and school programmes.

4.1.7 Households' Perception on the Current Solid Waste Management Service

Since the collection and transportation service is provided by the SWMT of the sub-city, sample households were asked about their perception regarding the performance of this agency and the result is illustrated below.

Table 21: Households' perception about solid waste collection and transportation service delivered by SWMT in Arada sub-city

How do you evaluate the collection and transportation service given by the government agency?	Frequency	% of Respondents	Cumulative %
Very good	9	4.7	4.7
Good	36	18.7	23.4
Average	27	13.9	37.3
Bad	100	51.8	89.1
Very bad	9	4.7	93.8
No Response	12	6.2	100.0
Total	193	100.0	

Source: Computed from survey data, 2008

Based on the data from Table 21, more than half of the sample households, 56.5 percent (51.8 + 4.7) of the respondents, rated the solid waste collection and transportation service rendered by the agency below average and it is only 23.4 percent of the respondents rated the service above the average; while 13.9 percent of the respondents said is on average, and 6.2 percent abstained.

In addition to this, sample households were also asked about their general perception of the status and their level of satisfaction by the prevailing SWM service in their respective Kebeles. Accordingly, the result of the sample survey is presented as follows:

Table 22: Perception & satisfaction of households by the current SWM service

How do you evaluate the status of solid waste management service in your Kebele?	Frequency	% of Respondents
Has improved	60	31.1
Remains the same	30	15.5
Has deteriorated	68	35.2
No opinion	20	10.4
No Response	15	7.8
Total	193	100.0

Source: Computed from survey data, 2008

As noted from Table 22 above, the highest number (35.2 percent) of the respondents reported that the SWM service has deteriorated; 15.5 percent said that service remained the same (no change); 31.1 percent stated that service has improved; 10.4 percent reported that they have no opinion in this regard and the remaining 7.8 percent of the respondents didn't answer this question.

In the light of the above discussion, with the intention to know the factors, an additional question was given to those who noticed improvement of the service provision. The finding indicates that 60.3 percent of the respondents have mentioned various factors for the improvement of the service and 39.7 percent did not respond to this question.

Among those respondents who said SWM service has improved, 22.1 percent reported that the involvement of the private sector in the service contributed the most, while 14.7 percent of the survey households reported that the service improvement is the result of the combination of various factors. Additionally, 7.3 percent said service improvement is the result of raised awareness; 5.9 percent believed in the good start of source reduction strategies; 3.0 percent said that the increased service provision given by government and 7.3 percent mentioned other factors without specifying them.

Table 23: Degree of Understanding of the impact of SWM problems

How do you evaluate the impacts of SWM problem upon public health and environmental pollution in the sub-city?	Frequency	% of Respondents
Serious problem	139	72.0
Moderate problem	30	15.5
Not a problem at all	9	4.7
No opinion	15	7.8
Total	193	100.0

Source: Computed from survey data, 2008

As can be observed from Table 23 above, 72.0 percent of the respondent households perceived that the impact of SWM problem has become a serious problem for public health and environmental pollution; 15.5 percent believed that it has become a moderate problem and only 4.7 percent have said it is not a problem at all; whereas 7.8 percent of the respondents remained silent.

Finally, the same sample households were given multiple choices to forward their opinion regarding what would be the best solution to improve and for the betterment of SWM service their Kebeles in the future.

Respondents have forwarded the following preferences and suggestions to change the current situations and for the improvement and betterment of SWM service in their locality.

- 53.3 percent preferred partial outsourcing of solid waste management activities to companies (Partnership)
- 23.3 percent suggested total outsourcing of solid waste management activities to companies (Privatization)
- 16.7 percent through assigning all the activities of SWM to Kebele (local government)

- 5.6 percent through undertaking of all activities of SWM at a federal level (Federal Government monopoly)
- 7.7 percent preferred unspecified other ways.

4.1.8 Opinion and Institutional Preference of Households on the Enforcement of Rules for Solid Waste Management Service

Sample households were asked about the role of the Kebele administrations in relation to SWM service in their residential places. About 30.6 percent of the respondents stated that Kebele does nothing in relation to SWM service provision; 22.3 percent said that Kebele coordinates the society to be abide by the law and takes action against violators; 17.0 percent reported that the Kebele coordinates and supervises the work of SWMT; 6.7 percent said that Kebele is there to collect service charge and fines, 8.8 percent have different opinion and 14.5 percent of the respondents were uncertain about the role of the Kebele and did not respond to this question.

On the other hand, the same respondents were asked if they pay service charges/ fees and if they participate in sanitary meetings.

Table 24: Number of households who pay fee for SWM service of government

Do you pay fee / charge for the SWM service rendered by the government?	Frequency	% of Respondents
Yes	90	46.6
No	92	47.7
No Response	11	5.7
Total	193	100.0

Source: Computed from survey data, 2008

According to Table 24 shown above, 46.6 percent of the respondents reported that they pay service fee / charge for the SWM service rendered by the government while 47.7 percent reported that they don't pay and 5.7 percent did not respond to this question. Those respondents who reported that they pay fee/charge were asked how much they pay monthly. Only 20% have

provided response on the issue of payment. However, even those whose who responded to this question did not mention the amount clearly, in most cases respondents seem mix up this part with the payment they pay for the service rendered by MSEs.

Concerning their participation in a meeting of public health or in sanitary agenda in their Kebeles, the majority of the subject survey, 77.2 percent (149 SHHs) disclosed that they don't participate; 15.0 percent (29 SHHs) reported that they have participations in issues of SWM and the remaining 7.8 percent (15 SHHs) did not respond to this question.

However, among those households who have participation in a meeting of sanitary agenda, only 24.4 percent of the respondents mentioned that SWM was one of their discussion agenda; 39.4 percent reported that SWM was not their points of discussion while 36.2 percent did not respond to this question.

The researcher posed a question to check the level (depth) of awareness and legal observation of the respondents and asked if they know about the endorsement of the national SWM law (the existence of proclamation) and the source of the information they obtain from. As a result, the following result was revealed accordingly.

Table 25: Number of households who knows the existence of national SWM law

Have you heard about the newly endorsed solid waste management law / proclamation?	Frequency	% of Respondents
Yes	22	11.4
No	160	82.9
No Response	11	5.7
Total	193	100.0

Source: Computed from survey data, 2008

As can be seen from Table 25 above, 82.9 percent (160 SHHs) do not know the existence of a national SWM law; while11.4 percent (22 SHHs) reported that they are aware of the endorsement of national SWM law and the remaining 5.7 percent (11 HHs) abstained.

The following result was reported in response to the hypothetical question what action the survey households might have taken against people who dump solid waste in unauthorized places.

Table 26: Actions that households preferred to take against illegal waste dumpers

What action do you take when you find someone dumping SW in a wrong place?	Frequency	% of Respondents
I will call and report to the Kebele administration	15	7.8
I will report to the solid waste management team (SWMT)	21	10.9
I will call the near-by police to stop his illegal act and take action on him	10	5.2
I will, peacefully, ask him to stop his illegal act and try to convince him	105	54.4
I will do nothing, as it is not my duty and responsibility	26	13.5
Other	2	1.0
No Response	14	7.2
Total	193	100.0

As noted from Table 26 above, 54.4 percent of the respondents told that they would like to convince the violator, 13.5 percent said that they would do nothing since that is not their concern and responsibility. Similarly, respondents mentioned different government agents as places where they would like to go to report. 10.9 percent like to report to SWMT; 7.8 percent preferred to report to Kebele and 5.2 percent like to go to a near-by police station. On the other hand, 7.2 percent of the respondents did not respond to this question, whereas 1.0 percent of the respondents did not mention the type of action but responded to the question.

Finally, a hypothetical question was forwarded to the sample households to see their reaction towards to the establishment of solid waste processing plant (industry) that converts solid waste into other form of resource, in their locality. Accordingly, 86.5 percent of the sample households stated their willingness to contribute their share if such a plant (industry) is installed, whereas, 13.5 percent of the survey households decline to show interested in it.

4.2 Analysis of Findings

Since solid waste management is a complex task associated with the control of generation, storage, collection, transfer and transport, processing and disposal of waste in a manner that is in accordance with the best principles of public health, economics and responsive to public attitudes, this part of the study analyzes the main findings of the field survey within these contexts and based on the major factors that determine the performance of SWM in Arada.

4.2.1 Generation and Composition of Solid Waste in Arada Sub- City

There is no separate record or study made on the rate of solid waste generation for Arada sub-city. However, the data from SBPDA reveals that the rate of solid waste generation for the city was estimated to be 801,000kgs by weight or 2165 m^3 by volume in 2003. During that time, the population of the city was approximately about three million. This means that, the daily solid waste generation rate during the given year was about 0.267k.g per capita per day.

Hence, the above average per capita generation rate estimated for the city is assumed to be valid for all the sub-cities too. Hence, the household solid waste generation rate for Arada sub-city is considered to be similar to the above.

This fast growth of the urban population in the city as well as in Arada sub-city has been followed by a number of mixed consequences. The survey households confirmed this important fact by stating the important factors that contributed for the fast growth of the population and the increase in solid waste generation in the study sub-city. From the factors mentioned by the respondents, natural growth and rural-urban migration of people are reported as the main causes for the fast population growth in the sub-city.

Household waste in Arada sub-city is, therefore, produced by the residents and by the increased number of guests. As a result of this, many of the facilities are becoming overburdened due to this population pressure. As many of the facilities are becoming overburdened due to population pressure, household SWM service provision for the residents and for the increased number of guests is also suffering from the consequences.

If solid waste is not handled and treated properly, it creates a negative environmental impact that can have significant consequences for the public health and environment. Therefore, a hygienic

and efficient management system for collection and disposal of solid waste is paramount in any urban center and that also depends on the amount of income.

However, most residents in the sub-city, as indicated in Table 3 of the field survey, are low income earners, if not poor. Since poverty by itself has limitations on the service provisions and the investment that can be made, SWM service in the sub-city has been affected by the low level income of the residents. In addition to public health and environmental pollution risks, the growth of solid waste in Arada sub-city increases the cost of waste removal, intensifies the pressure on urban infrastructure which already is overburdened with the provision of other urban services and reduces the lifespan of the available SWM facilities such as the vehicles, containers and dump site.

On the other hand, since constituents of household solid waste vary from place to place and from season to season depending on lifestyle, food habits, standard of living, and the extent of industrial and commercial activities in an area, the average income level of the society affects the composition (both physical and chemical) and quantities of solid waste generation.

Accordingly, the survey result revealed that major types of solid waste that comes out from the respondents' households in Arada sub-city include house rubbish, residue of vegetables and fruits, grass and garden trimmings, plastic bags, paper, ash, clothes, metal, etc. This implies that household solid waste composition in this sub-city is highly dominated by biodegradable materials. More specifically, these types of solid wastes that come out from households could mostly be used either as compost material or some could still be recycled.

Besides indicating prospects of potential economic opportunities, knowing the physical and chemical characteristics of solid waste, is important for the selection and operation of the appropriate equipment, to determine feasibility of resource and energy recovery that could be explored from the waste materials. It also helps to design and analyze the disposal facilities so as to reduce the risks of public health and to promote environmental conditions by controlling pollution (including water, air and soil pollution) and ensuring the sustainability of the ecosystem in the city. The above results, in general, indicate the potential of the household waste to be used for socio-economic purpose in the sub-city.

4.2.2 Storage Materials and the Practices of Households

As shown in Table 7, the survey result indicates that majority of the study subjects have garbage containers at their homes. An empty sack commonly known as *'Madaberia'* is used by the majority of the respondents followed by a material locally known as *'Festal'*. Similarly, a significant number of respondents use different storing materials such as locally made baskets, metal buckets, sacks made of sisals and cartons. Furthermore, the survey result revealed the existence of some households who dump their household wastes into a nearby communal solid waste container on a daily basis. The same source (Table 7) indicates that 5.2 percent of the sample households reported that they don't use storage material at their homes as they are using the nearby solid waste container daily.

One important aspect that should be noted in relation to the usage of storage materials is that almost all the households use the storage material to transfer their waste from each individual house to the communal solid waste containers.

It is also observed that most of the households who use the *'Festal'*, as storage material for their solid waste at home, throw it away together with the waste it contains. This experience of the households shows that storage materials are meant one time use only. This means that no more value is given for the storage materials once they are used for waste storage and, very soon, the storage materials become part of the waste that increases the quantity of non-decomposable solid waste that increasingly littering most part of the city in general.

However, one way to manage solid waste is to reduce the waste we generate at the source and hence storage materials have to be designed for many times use so that these items do not wear out so quickly and become part of waste instead.

As has been explained under section 4.1.2, the dominant types of household solid wastes in the sub-city are household rubbish including fruits and vegetable refuse, grass, paper, ash, etc which are collected and disposed mostly once in a week. The nature of these wastes is easily decomposable and with the mentioned frequency of dumping together with poor storing practices, may result in reproduction of bacteria and germs and decomposing. This might be explained by the bad smell emanating from the accumulated wastes and may cause health

problems particularly to the households and to the persons who handle the solid waste. From personal life experience and the field observations, the researcher believes that the situation explained above exacerbates the negative perception and attitudes of the society towards solid waste. This in turn reduces the potential need of the household to use waste for economic benefits. As a result, households prefer not to have a use of solid waste and even prefer to have a 'use and throw' or one time use type of storage materials. Hence, determining the right type of storage material and the appropriate frequency for solid waste disposal needs an in depth professional study.

4.2.3 Household Solid Waste Reduction Efforts in Arada Sub-City

Since the ultimate goal of source reduction is to decrease the amount and the toxicity of waste generated, the study subjects were asked subsequent questions concerning their practical experience and habits of separating, composting, recycling and re-using household solid wastes, vis-à-vis their level of awareness about the importance of the strategies.

As observed from Table 8, about 93.8 percent of the sample households responded to a question forwarded to them and a greater number (68.5 percent) of the respondents have disclosed their negative experience and lack of good habit of separating the household solid waste at source. These households not only told their negative experiences, but also included their reasons for not being engaged in the above mentioned waste reduction activities.

As indicated in Table 9, lack of knowledge, lack of enough space, time and the difficulty of the segregating exercise compared with the expected benefit that can be earned and so on are the main reasons mentioned by respondents as to why they do not separate solid waste.

Similarly, the survey result obtained from a query concerning what the households do with organic solid waste materials like garden trimmings, residue of vegetables, grasses and leaves illustrates that about 60.6 percent of the respondents always dispose of those kind of solid wastes with other wastes. Some others (11.9 percent) burn these wastes in their compounds or elsewhere. It is only 5.2 percent of the sample households told that they make compost out of it (see Table 10).

The above presentation and discussion of data implies that composting, recycling and reusing of solid wastes are not common practices among respondents of the study area. On the other hand,

the attitude and awareness of the society towards solid waste, the know how about the importance of proper handling and the benefit that can be earned from implementing the above mentioned strategies of waste reduction at source is at a very low level in general.

However, from another related question asked concerning the wastes that have direct economic values, the field survey result revealed that solid wastes which can generate immediate benefits such as shoes, clothes, metals, glasses, etc are widely separated by the households for commercial use (To sell for itinerants), to be presented as a gift and to be exchanged with other items (for '*Lwach*' in Amharic).

This again implies that only materials that can generate direct income or immediate economic benefit are mainly sorted out by households in the study area whereas sorting out biodegradable solid wastes is carried out by a very small number of sample households (see Table 8 for further understanding).

As a principle, reducing the solid waste generated at the source is believed to be one way to manage solid waste. However in the light of the above discussion and the actual practice observed by the researcher from the study area, it has different implications which are strongly related with poverty and absence of a well designed program. (At the time of this study, there was no single project applying at least one of the waste reduction strategies in the sub-city to be visited as a sample).

The poor not only generate a very low volume of waste but also they recycle it; the poor generate income from recycling efforts by sorting the waste, by collecting the already sorted waste, by marketing the separated waste, and often by clothing or even feeding themselves with waste. This means that only the poor separate solid waste for economical benefit and accept the axiom of solid waste management that says '*No material is waste as long as it has a use*'.

Generally, steps like source reduction, reusing, composting, recycling and waste-to-energy has not been considered first, rather than looking at dump site, as the primary way of taking care of the household solid waste in Arada sub-city in particular, where a great potential exists.

4.2.4 Solid waste Collection and Disposal Service in Arada sub-city

As household solid waste originates from wide range of sources, it also poses highly complex and heterogeneous environmental problems if it is not handled and treated properly. The negative impacts of mishandling of the generated solid waste can have significant consequences on public health and environment. Therefore, the need for collection and disposal of solid waste are vital activities in solid waste management service for any urban center.

The amount of solid waste that can be collected transported and safely disposed depends partly on households conscious effort to collect, store and systematically dispose the waste that comes out from the house and partly on the abilities of the municipal agent to collect , store and safely dispose wastes that are collected from the households.

Although there are different arguments for modalities of the solid waste collection service, local government authorities are generally responsible for the provision of solid waste collection and disposal services in many cases.

As in most countries, solid waste collection and disposal service in Addis Ababa is under the responsibility of the newly established SWMT within the sub-cities, since February 2003. In other words, the SWMTs in each sub-city become the legal owner of solid waste once it is collected or put out for collection.

Solid waste collection service requires the provision of storage containers, collecting wastes, transporting, processing and finally disposing of the waste into selected site in an appropriate and controlled manner. To meet this, the Arada sub-city solid waste management service provision is designed in such a way that it provides the service through the provision of containers, collection, and transportation and disposal site services.

The sub-city administration is currently collecting waste from households through containers placed around households, and through involving the MSEs workers. In this regard, the availability of adequate number of solid waste collection containers at reasonable distance and with sufficient quantity is a prerequisite for successful waste collection and urban sanitation.

Based on these principles, the sub-city SWMT has distributed 63 communal solid waste collecting containers (with a holding capacity of $8m^3$) for the entire residents. There are also 80

small size containers (with 1.1m^3 holding capacity) distributed for institutions on rental basis. These 63 site containers distributed among the ten Kebeles in the sub-city can accommodate 504 m^3 (186,480 kgs) of solid waste at a time.

The SWMT of the sub-city has also a total number of nine solid waste transportation trucks/vehicles that transport all types of solid waste from the entire sub-city collection centers to the current dump site "*Reppi*". According to the information from SWMT of the sub-city, four lift, two side loaders and three compactor trucks with loading capacity of 8m^3, 10m^3 and 15m^3 respectively are available currently.

If we calculate the estimated household waste production per day for the sub-city, it will be around 93,450 kgs (350,000 X 0.267kg) and the current transportation service capacity of the available vehicles is about 66,045kgs (50% of 132,090kgs). If we want to know the gap between waste generation and transportation service capacity of the sub-city, it is simply to take the difference between the above two figures i.e. 27, 405 kgs or 74 m^3 household solid waste will be left uncollected per day. (Measurement and conversion information in relation to equipment and material capacity is obtained from SWMT of the sub-city).

Based on the above calculation, 29.3 percent (27,405 / 93,450) of household solid waste generated per day will remain uncollected. It should be noted that these limited number of vehicles and equipment are not meant to collect solid waste of the household only, but also used to collect and transport all types of wastes including the commercial, institutional, industrial, market and street sweeping from the sub-city. With this in mind, one can imagine that the quantity of solid waste that can possibly be uncollected. This in turn may lead to imagine poor transportation performance of the team. The actual finding indicates that the SWMT is performing below the required quality and quantity in its collection and disposal activities. It should also be noted that performance is a cumulative measure and the above factors should not be taken as the sole indicators or measure of performance of the team. Other internal and external factors that affect the SWMT shall be discussed latter.

In addition to the information obtained from SWMT and from the above observation, with the effort made to check the availability and distribution criteria of containers, and level of participation of the residents, sample households were asked questions. Based on this query, the unequal distribution of containers in the sub-city has been witnessed by the majority of the

sample households. As shown in Table 11, more than half (51.6 percent) of the respondents confirmed the unavailability of communal solid waste container in their residential area.

Apart from this, 80.7 percent of sample households, among those who have access to communal containers in their Kebele, reported that they did not have participation and had no say concerning the selection of the current location and placement of the communal solid waste containers (see Table 13). This shows the absence of the participation of the community in the affairs of SWM service in one way or another.

Subsequently, from a crosschecking interview query presented to the SWMT of the sub-city about the same issue, the following response was obtained from the head of the agency office.

According to the explanation of the SWMT of the sub-city, there are criteria to select places and allocate containers. These criteria include suitability of the location for entrance and exit of solid waste collecting vehicles, the willingness of the Kebele administration to give the place for the placement of containers in the required quantity and depending on the location of the place to render the best service for the households.

The result of the sample survey, as to where households dump their wastes in situations where communal solid waste containers are not available in their locality, shows that a greater number of the households use MSEs for their household wastes (see Table 14 &15). Similarly (as indicated in Table 16a &16b), the same respondents reported that they know about the frequency of the collection service rendered by MSEs and the container empting and transportation service provided by SWMT of the sub-city. This shows the growing trend of concern of the community about SWM service delivery and the increasing participation of the private sector in the service.

At the same time, the response obtained from the SWMT regarding the emptying of containers shows that containers in the sub-city are not simultaneously emptied. Priority is given to those areas which they have high solid waste production. And those priority places like the vegetable market or commonly called '*Ataklit Terra,*' for example, are already identified. So, areas already prioritized get a daily emptying service while other areas are served on every other day basis. This in turn implies that the SWMT sets a plan for priority areas and activities. However, the problem arises on the implementation of the plan compared with the capacity and other unforeseen problems on vehicles and workers.

Another observation obtained from site visit showed that there are different kinds of dead animals, human faeces and various kinds of sanitation and healthcare materials in the site containers. There are also a considerable number of individuals who use to dump their household wastes near the container either deliberately or negligently. This may be due to poor public awareness or may be due to the loathing for odor associated with the container use. And most of the kids dump outside the container as they are short and /or their immaturity to know the negative externalities of poor waste handling.

Nowadays, municipal workers and trucks have stopped rendering the door-to-door solid waste collection service to households since 2006. And this primary waste collection activity is currently performed by MSEs only. The main reason why the agency has stopped providing the primary collection service, as explained by the SWMT of the sub-city, is to curb the municipal free service users, so as to strengthen the capacity of the MSEs, and to shift the focus and efforts of the SWMT towards the provision of improved solid waste transportation service.

Due to the above reasons, the effort of the agency, concerning the household solid waste collection service is limited to the provision of containers and the transportation services.

When we turn our focus of attention to the recent past history and present status of household solid waste collection and disposal service in Arada sub-city, the service was given by joint effort between the agency and the MSEs. The municipal workers and vehicles were providing door-to-door collection service. There were also workers assigned to inform households by blowing a horn to get their solid waste ready for the municipal collection service. Whereas, the MSEs use a hand push cart to collect solid waste from their client households and put into the municipal containers. Households told that the emergence of MSEs has improved the collection and frequency of transportation made by the sub-city more than before.

Despite all these efforts, field survey results and personal observations confirmed that solid waste containers in most areas of Arada sub-city are full to the brim, if not overflowing and heap of rubbish in the surroundings due to the delayed transportation service provided by the agency.

Generally, the field survey results collected through a questionnaire, the response obtained from interview with the agency workers, the discussion held with concerned residents, and interview

held with selected MSEs confirmed that the existing containers in the sub-city are not sufficient to adequately serve the total population with its increased waste generation.

As shown in Table 18, to better understand the situation, level of awareness of the residents, the concern and the degree of responsiveness towards to the current SWM service provisions in their living environment and to the surroundings, sample households were asked questions. Based on these crossing questions, about 79.8 percent of the respondents confirmed that containers are full and overflowing in most of the times. Furthermore, they explained the incidents they always encounter under such situations. Some of the incidents they observed on full and overflowing containers include stinking smell, harbored insects such as flies, rats etc, domestic animals eating the waste, scattered wastes as searched by scavengers, becoming causes for uncontrollable fire and disease. They report the delay of emptying service as the main cause of the above problems.

Consequently, perception of the respondents about the impact of this poor SWM service up on health and environmental pollution is reported high. As shown in Table 23 About 72.0 percent believe that their environment is not clean due to poor solid waste management service and hence, it is a serious problem that needs immediate attention. Whereas the sub-city SWMT and 15.5 percents of the survey households believe that impacts of current poor solid waste management service is moderate problem for health and environmental pollution and therefore, it may or may not need urgent solutions. Finally, 4.7 percents of respondents did not say anything about the impact of poor SWM service.

Though the understanding of the respondents about the impact of poor SWM seem high, their actual practice and the effort they show to implement waste reduction strategies is reported very low. These two contrary results are questions that need farther investigation on the issues of awareness in its real sense. In other words, residents who know about the impacts of poor SWM may not necessarily know about the right to claim the service for waste or may not be aware of the important methods of implementing integrated sustainable SWM strategies (Recycling, composting, reusing, etc). The level of awareness of residents in the study sub-city seems at its infancy stage.

As can be seen from Table 21 and 22, the respondents are not also satisfied with the collection and disposal services rendered by the sub-city SWMT in general. Downtime of transportation trucks, inability of sub city SWMT offices to empty containers regularly, inappropriate location

Regardless of fulfilling the pre-requisites to develop the capacity of the private sector so as to enable them to take share in the transportation service, and with out considering the potential risk, the city government of Addis Ababa has transferred the primary collection service of household solid waste to be conducted by MSEs.

These pre-requites that had to be fulfilled by the city government of Addis before taking the action of transferring the solid waste collection service to the MSEs include:

- Preparing and making available good quality waste data for the effective planning and monitoring of operational improvements.
- Ensuring the existence of a well developed and capable private sector (and public sector) with the capacity to provide an effective service and generate sustainable competition
- Ensuring the existence of effective finance and cost recovery mechanisms, ensuring that the private sector companies are confident that they will be paid for the services that they provide
- The presence of capacity in the 'client' function to develop contracts with detailed specifications and to carry out tendering processes in an effective and transparent manner
- Ensuring the availability of efficient contract monitoring and enforcement systems, etc

However, there is no enough enabling environment and legal system established for the private sector participation in the city in general and in the sub-city in particular so far . As stated above, the complete transferring of the solid waste collection service to MSEs under the current situation, without putting the above safeguards in place, will lead to a number of potential risks. One of the possible risks is the increase of illegal dumping of household solid waste, by households who cannot pay the service charge to MSEs. The repeatedly reported illegal dumping of wastes during the night, in the sub-city, may be one of the consequences of this early and complete transfer. On the other way, it seems discouraging to the growing moral of MSE and the service users.

When residents violate the rules and regulations related to SWM, this would be administrated by the legal service through code enforcement department. The same rule is applied in the sub-city but does not help to much as dumping takes place in the dark.

In general, the number of collection vehicles in operation are few and insufficient coupled with a number of operational problems; communal waste storage containers are often full and

overflowing for several days before being emptied; the private sector is not strong enough as there are no enabling legal, institutional and financial framework that fosters the development and effective participation in the municipal solid waste transportation service and level of participation from the public in supporting the service is not sufficiently developed.

In general, the performance of the SWMT and the participation of the private sector (the MSEs in this case) in the solid waste collection and transportation services in Arada sub-city are unsatisfactory. This implies that there are things that need to be done by all the stakeholders of SWM service. Above all the sub-city administration has a legal obligation to provide adequate solid waste collection and disposal services systems.

Taking the above conditions into consideration, sample households in the study area were asked about their preference and suggestion on the best arrangement for better and improved service provision options they preferred for their areas.

Accordingly, the respondents have forwarded their various preferences and suggestions which they believe to improve SWM service so as to have a clean and better living environment in their locality. Accordingly, 53.3 percent of respondents preferred partial outsourcing of SWM activities to companies (Private-Public-Partnership); 23.3 percent of the respondents preferred total outsourcing of SWM activities to companies (Privatization); 16.7 percent preferred assigning all the activities of SWM service to Kebele control (local government administration); and only 5.6 percent of the respondents preferred all the SWM service activities to be under SWMT only (Government monopoly).It should also be noted that about 7.7 percent of the respondents have preferred other options which they did not mention clearly.

The overall implication of these different preferences of the respondents on the SWM service based on the above question gives a hint that the present SWM service needs improvement. It is also important to note that SWM service whether provided by the public or the private sector, service costs must be financed and financial flows must be predictable and reliable. A combination of municipal transfers and user charges may be the best approach to fund these costs. To this effect, services must be appropriate and affordable to the community being served, and cost considerations should weigh heavily in the planning process, with close attention being paid to the findings of incomes and expenditure surveys.

The final stage in SWM service is the disposal process in which wastes of different origin have to be collected in disposal sites. Whatever proper waste collection and transportation service is delivered, if wastes are not disposed of properly, the waste management service cannot be satisfactory. But the basic question is how and where wastes can be disposed of. Currently the solid waste collected from Arada and other sub-cities is disposed on a site called *Reppi*. This site is located 13kms away from the center of the city to the south west direction. *Reppi*, according to SWM standard, is not a sanitary landfill but an open field (open dump). Although this open dump site is located at a relative far distance, still it is used as the only dumping place for all kinds of solid waste from the entire City of Addis Ababa.

The SWMT of Arada sub-city transports and disposes of solid wastes of all kind collected from all the containers and transfer stations available in the sub-city onto *Reppi*. According to the SWMT report, the daily disposal capacity of the sub-city would be 357 M^3 (132,090kgs) if all the available vehicles were able to serve properly. However, because of many downtimes due to different reasons, the quantity of solid waste that can be transported and disposed of is by far below the generation rate. According to the performance report of the SWMT Arada sub-city, 75-80 percent of its plan has been achieved in the year 2005/6. But this figure seems to be unrealistic when it is viewed against the existing problems that the department is facing and may need extra evaluations.

4.2.5 The Role of Stakeholders in Solid Waste Management Service

As has been stated in the literature part of this study paper, MSWM is a complex service which requires the involvement of appropriate organizational, technical, and managerial capacity and cooperation among numerous stakeholders. And stakeholders are various social, business, and environmental groups, as well as formal and informal agencies in both the public and private sectors, including non-governmental organizations (NGOs) that can affect as well as be affected by the solid waste.

Though, a number of stakeholders are available and have stake in SWM in Arada sub-city, the MSEs are the main private (cooperative) type of institutions who started working in collaboration with the local governments in the field of SWM service since 2003/4. There are also NGOs and other groups of society who support the sector. But in this research, due attention is given to the

role, challenge and prospects of the recently established MSEs in Arada sub-city are discussed as follows:

The present SWM system in Addis Ababa city relies on the municipality which is expected to provide a full range of waste collection and disposal services parallel to other urban services. Nevertheless, in the last nine years, some MSEs have started to develop and joined the sector, filling the gap that the municipality has in providing the service. The private sector involved in SWM of Arada sub-city is constituted by private enterprises or individuals who operate with valid and registered licenses from the municipal government.

As the information obtained from SWMT of the Arada sub-city, the following are pre-requisites that should be fulfilled by MSEs to secure work permit from the municipality. Accordingly, MSEs should at least have:

1. A capacity to provide service at least for two Kebeles.
2. A cart that has a capacity of transporting $28m^3$ solid waste twice a week.
3. 20-25 standardized waste collecting sacks.
4. Registered members in one of the Kebeles in the sub-city and must be resident.

According to the present data of SBPDA, there are about 616 MSEs that met the above requirements and been involved in SWM activities in Addis Ababa.

If we compare the number of MSEs formally operating in Arada sub-city with the entire number of MSEs in the city, that proportion will account for 6.4 percent only (i.e 40/ 616). However, there are private individuals who also operate informally in the sector which raises the actual number of MSEs in the sub-city.

Seven MSEs operating formally in Arada sub-city were included in this study. These sample MSEs have a total of 384 employees. The total estimated number of employees working in all registered and active MSEs in the sub-city is reported to be 1500 people.

As has been indicated in the previous chapter, SWM service in Arada has been basically delivered by the SWMT with a joint effort of the recently established MSEs. When it comes particularly to the present MSEs, they are the ones that are responsible to collect solid waste from

each household in the sub-city. This means that the whole municipal effort is limited to the provision of containers and transportation of solid waste to the dump site *(Reppi* or '*Koshe*' as some people call it)

The private sector may involve in SWM service by providing capital, management and organizational capacity, labour and / or technical skills operating in various forms of partnership with the public sector. The roles the private sectors play is vital to efficient and proper service delivery.

The need to integrate the private sector with Addis Ababa City Government is to make the management of solid waste more efficient in terms of the rate of collection, to reduce the municipal expenses, and to improve the urban environment. In addition, the municipality aims to create new jobs so as to reduce unemployment. Consequently, the city government has issued a policy on SWM and beautification to gradually bring about full participation of the private sector.

The SWM policy issued by the City Government of Addis Ababa in 2003 has put forth the following policy directions under Article 6.2 of the policy.

1. The private sector in cooperation with the government or alone shall be encouraged to participate in solid waste collection, transportation or preparation of disposal facilities.
2. The collection, transportation and disposal of solid waste of institutions shall be handled by the private sector.
3. The private sector shall be involved in equipment maintenance, supply of vehicles and materials or local manufacture of equipment, alternative transportation means or production of facilities and spare parts.
4. Organized micro and small enterprises and cooperatives shall be encouraged to participate in public cleansing services.
5. The private sector shall be encouraged to participate in development of composting and sale of compost as well as in collection, buying, selling, or transportation of waste materials for recycling or transformation of wastes by reprocessing in industries.

6. The private sector can provide financial support and grants for solid waste management as part of their joint social responsibility.

Nevertheless, the participation of the private sector in Arada sub-city SWM service is constituted mainly by the current weak capacity of MSEs which collect waste from households and institutions using push carts. The waste is then transported and disposed of into the municipal containers or on a transfer station where there is no enough container service. Currently, there is no at least a single individual or private investor involved in the transportation service from this sub-city. The main reason for this, as stated by experts and researchers, is the absence of enabling legal system established for the private sector development and participation.

The failure to implement the issued policy and relevant stipulations is manifested by the current degree of private sector participation, and by the level of performance in the SWM service provision of the sub-city. Further more, some interviewed MSEs reported that the effort made by some of their members who have the understanding and awareness of the importance of solid waste to produced compost became futile because of lack of support and open space from the sub-city. This has affected their progress and motivation.

Despite what is stated in the policy, the actual capacity of MSEs remained very weak. And the basic source of revenue for MSEs in the sub-city is the users' charge that has been collected from the service beneficiaries. The amount of money that households pay also differs according to their income. This research findings revealed that the amount of money households pay ranges from Birr 2- 20 per month. This depends up on the agreement made between the service providers and the service users. This shows that the existence of a gap between what is written in the book and the actual practices. Therefore, the need to support these small enterprises to enable them act as per the demand of the society for the service has never been given paramount priority.

Besides their limited capacity and the problems mentioned above, interviewed MSEs have reported the following challenges that face them in the process of solid waste collection service they provide.

- Communal solid waste containers are often so full that, the MSEs workers will not have space to dispose of the collected solid waste

- Un-willingness of the residents to pay service charge especially by tenants when they change residential area for different reasons
- Unfair and strong competition among new entrants and the existing MSEs
- Low household income and poor ability to pay
- Lack of cooperation and support from few individual households during service
- Sickness of workers due to lack of proper support for medical care
- User' low level of awareness that impede the swift collection of solid waste

Despite the above listed and other similar constraints, the pre-collection system represents a good starting point for building private sector participation and realizing the associated benefits. In sub-cities like Arada, where the number of jobless people increases at an alarming rate, the role of MSEs to create job opportunities should not be underestimated, for example.

4.2.6 Awareness and Participation of the Households

Raising the awareness of the public about the impacts of poor SWM and the benefits of improved waste management is an essential part of strengthening the improved waste system. Based on this, to evaluate the influence of the respondents' knowledge, skill, attitude and behavior in the handling of household solid waste, some households of Arada sub-city were asked some questions.

Among the respondents, 74.1 percent agreed on the existence of a number of over flowing containers, flying plastic bags (commonly called *festals*) and papers in every corner, overspread residue of vegetables, dead animals, building debris, etc in their locality with an increasing rate (see section 4.1.6).This implies that perception of the sanitation and environmental problems by the residents are high.

However, as discussed in earlier topics, both the SWMT and the residents believe that their environment is not clean due to the problem of poor SWM and illegal dumping of waste. However, they attribute the poor management to less and inadequacy of the code enforcement organ to deal with the problems in most cases, by paying little attention to issues of awareness.

As a matter of fact, rapidly growing population, poverty and constructed residential houses without plan, pose a particular challenge to MSWM. Besides the physical constraints of dense,

low-income settlement, the inadequacies of infrastructures such as roads, drains and sanitary facilities often exacerbate waste management problems. For example, the access to residential houses with unleveled and unpaved roads for collection vehicles or push carts is difficult. This means that waste management problems in low income settlement areas are aggravated by inadequacies in other sectors. Government is one of the main stakeholders that have the role and responsibilities of awareness raising and communicating the environmental and waste management issues through its different organs.

In Addis Ababa, the SBPDA has been recognized as the main government institution responsible to deal with the importance of raising awareness and ensuring stakeholder participation. The Agency is now exercising increased awareness raising initiatives in conjunction with key stakeholders.

As the study made by the World Bank (2004) suggests, there are opportunities that can serve to increase public awareness on SWM issues. According to the above cited study, public awareness on SWM can be included in the agenda of public meetings of sub-city and kebele structures of the AACG. Similarly, Article 22 (5) of The Waste Management Collection and Disposal Regulation of the Addis Ababa City Government Proclamation No.13/2004 empowers the Kebele administration "*...to coordinate residents of the Kebele in their effort to keep their surrounding clean, or shall coordinate the organization of the Kebele and village sanitary committee and their activities to conduct sanitation campaign*"

In assessing to what extent the Kebele Administration is discharging its responsibilities, sample households were asked about the extent of contribution of their Kebele administration in awareness raising about SWM service. As indicated in section 4.1.8, only 22.3 percent of the respondents reported that their Kebele has contributions and participation role in issues related with awareness raising on SWM service. And again, it is only 24.4 percent from those who have participated in public meeting reported that SWM was included in the meeting agenda of their Kebeles.

On the other hand, on assessment and checking the efforts made to disseminate the relevant laws, regulations, information and experiences to raise awareness of the sub-city residents, 82.9 percent of the respondents have no idea or do not know about the existence of a national solid waste management proclamation (see Table 25).

This implies that the on-going effort made by the Kebele administration for awareness raising is not as expected and empowered by the law. However, discovering the genuine reason for the failure to implement what is written in the book and the cause for poor performance in SWM service may require a separate study. However, the researcher of this study believes that lack of coordination and implementation of the existing rules, codes and absence of standards are the main causes. In view of this, none of the institutions has as yet fully undertaken the task of awareness raising, monitoring and enforcements. In addition to this, it is advisable for potential researchers to explore more on this topic.

At this stage, to strengthen the SWM management delivery, increasing the level of coordination among the concerned organs to implement the endorsed laws on SWM and maximizing the awareness raising is a more advisable method than taking punitive actions.

Generally, most of the society members consider waste as something bad or relate with a word 'dirt' from their past social learning and traditional life experiences or from whatsoever exposure they have had. In addition to this misunderstanding, most, if not all, of the community know about the impact of poor SWM. But many of residents seem don't understand the negative externalities of improper waste management and to implement the mechanisms for integrated sustainable solid waste reduction strategies. It is therefore necessary to initiate intensive and extensive awareness raising program on the sanitation problem of the sub-city using various communication methods so that all residents would know their responsibility in safe guarding their environment ultimately, making our city convenient for healthful living and other far reaching returns.

Besides that, there is a need to clearly define the roles and responsibilities of the organizations involved in the delivery of SWM services, including enforcement and regulation, and further building the capacities of the various institutions to fulfill their obligations and duties.

Since the public are the ultimate service users, their awareness and participation and engagement are vital to the success of SWM initiatives and plans. The public and other key stakeholder organizations should therefore be closely involved in the planning and decision making processes.

4.2.7 Other Factors Affecting Solid Waste Management Service in Arada Sub-City

It is known that improper handling and disposal of solid wastes constitutes a problem on public health and environment. Some issues are identified as potential barriers to improved solid waste management service provision in Arada sub-city. These are population pressure and poverty, low level infrastructure development, low institutional capacity, decision making process, absence of research, and inadequate progress in bringing behavioral change, space, finance and awareness status. For easy reference, these constraints are grouped (by the researcher of this study) into four categories: institutional, financial, human and technical.

4.2.7.1 Institutional Constraint

Different documents reveal the existence of several agencies that are involved, at least partially, in SWM of Ethiopia. The Environmental Policy for Ethiopia published in April 1997 by the Environmental Protection Authority (EPA) and Ministry of Economic Development and Cooperation (MEDAC), for example, has given weight to MSWM in its conservation strategy. Similarly, the Ministry of Health (MoH) has developed some guidelines which include solid waste handling from a hygienic and sanitary practice point of view. And, the SBPDA which was established in 2003 has been taking sensible initiatives to work closely with sub-city administrations to improve the organization of waste management.

However, it has problems of distribution of functions, responsibilities and authority among local, regional and central government institutions (i.e. decentralization), and among local governments in the city. On top of that, there are no clear roles (functions) of the various agencies defined in relation to SWM and there is no single agency or committee designated to coordinate their activities either. Similarly, the constraints observed and identified as causes of poor SWM service in Arada sub-city are presented as follows.

The Arada Sub-city SWMT is the local authority responsible for SWM service in Arada. As a basic principle, decentralization of authority should be accompanied by a corresponding distribution of financial and administrative powers and capacities for system planning, implementation and operation. As opposed to this principle, the Arada sub city SWMT is not

given the authority to manage all SWM related affairs including power to collect and allocate user charges and other revenues.

Not only that, appropriate strategic planning and financial management methods including cost oriented accounting system, unit cost calculation, financial and economic analyses are not practical. This implies that the SWMT, the agency responsible for SWM of the sub-city, compared with other sectors, often pays too little attention to integrated management approaches. This indicates the poor planning and management experience of the SWMT of the sub-city.

The institutional arrangement and sectoral integration, the relationships and linkages between the SWMT and other municipal service sectors (sewage and drainage, public works, roads, public health, etc.), is weak. This shows the need for more decentralization and improved solid waste management and may be new organizational structures.

According the SWMT head, there are also large discrepancies between the job requirements and the actual qualifications of the staff at the managerial and operational levels of the SWMT of the Arada sub-city.

Of course the private sector has started to participate in the SWM service. This is manifested with the involvement of the MSEs in the primary collection service in the sub-city. As noted earlier (section 4.2.5), the involvement of the private sector in SWM only, does not guarantee efficiency in itself. The preconditions for successful private sector involvement include the existence of enterprises with adequate technical and organizational capacity, competitive bidding, effective regulation of the partnership arrangements (see political aspects in section 2.10.1) and adequate management of the private partners through clear specifications, monitoring and controlling. When we examine the involvements of the private sector in the light of the above points, the result shows the weak capacity and the infanthood age of the sector in general.

Different evidences of this research show, the institutional capacity to transport solid waste, to enforce regulations and set standards, to calculate and allocate costs and carry out planning and management functions of the sub-city by SWMT is very low in general.

In addition, there are no concerted campaign efforts to raise the awareness of the community and there is lack of promotion in the areas of waste reduction strategies: segregation at source, recycling, reuse and composting. The little available promotional efforts are not supported by

appropriate types of media and teaching and learning materials. Generally there are no well coordinated efforts with different actors. Moreover, there are no well organized institutional arrangements for the public to participate at all levels especially at grass root levels.

In general, the weak procedures and methods employed for planning and management; the lack of capacities of the institution responsible for SWM; the incompetence of the staff; and the weak private sector capacity and participation of user community groups are the reflection of weak institutional structure and arrangements that have a negative influence on the SWM service delivery of the Arada sub-city.

4.2.7.2 Financial and Economical Constraint

Although there are three main options for financing the substantial recurrent costs of MSWM (user charges, local taxes and intergovernmental transfers), the Arada sub-city municipal administration for the SWM service provision depends on the annual budget allocated by the Addis Ababa City Government.

The municipality lacks adequate financial resources to procure improved solid waste transport vehicles and disposal technologies. These financial aspects of the problems are the direct manifestations of poverty. Besides, there has not been any adequate study on the financial aspects of SWM for the city in general as well as for the sub-city. Hence, the required budget needed for waste management is not well-known in relation to what the service seekers can afford.

Currently the SWMT of the sub-city collects service charge from different organizations and offices (both from governmental and non governmental) for the service it renders, and this service charge differs according to the type of service. However, the main generators of the municipal waste, households, do not directly pay service charges to SWM agency.

In this study, the researcher tried to know if households are aware of what services they get from the municipality and what payment they effect for. Accordingly, most of the sample households, 47.7 percent (see Table 24), stated that they get the service free of charge except the charges they pay for the service they get from MSEs. Though these respondents say that they do not pay service charges for SWM service but those who are clients of Addis Ababa Water and Sewerage Authority (AAWSA) indirectly pay. It is clearly stated on the water bill that 5 percent of the monthly payment is paid for the sanitation and beautification service. This shows that only client

households of AAWSA are paying service charge for SWM service, against the general generation and public externalities of the impact of waste. For instance, people who get water supply from communal taps, known as '*Bono*', dependents and house renters do not pay the service charge. This shows that the existence of discrimination of service charge collection. This means that determination and collection of the service charge is unfair and inequitable, according to the view of this researcher, which may need to be studied and revised.

Although the SBPDA is in the process of collecting and analyzing more data to give a better indication of existing service costs and revenues, the availability of enough data to carry out a detailed assessment of the exact level of cost recovery in the city is questionable unless there are well organized and feeding sub-cities and lower level organs in this regard.

Therefore, we cannot assume transparency with regard to SWM service provisions as the real cost of waste management is not known; as partial, unfair and discriminatory collection of service charge is prevailing in the system and practical budgeting system and cost accounting are not applied.

In addition to the above, lack of good governance, inadequate financial management, unwillingness of the community to pay are assumed to be core elements of the problem. Hence, an effective and participatory strategy should be devised to develop proper SWM and to acquire the required fund for sustainable service.

Generally, the financial basis for SWM service in the City of Addis Ababa particularly in Arada sub-city is weak. This weak financial basis is one of the main causes of insufficient collection and improper handling of solid waste.

4.2.7.3 Human (Social) Constraints

Population explosion and the associated anthropogenic activities generate huge amounts of different wastes that adversely affect the physical environment of the given area. Arada sub-city, as one of the central parts of Addis Ababa, is also affected by this fast population growth in different ways. Often a discrepancy exists between the growing population and the increasing demand for sanitation and solid waste collection services on one hand and increasing the waste generation rate on the other.

Apart from that, the handling pattern and underlying attitude of the residents, conditioned by their social and cultural context has greatly affected the performance of the SWM service of the sub-city. Jobs related to waste disposal are considered low and shameful. Thus, the rapid population growth combined with old and long-held tradition and lack of training in modern SWM practice complicate the efforts to improve the solid waste service.

It is true that urban services like waste management need a large number of service providers. Besides, they also need a well trained, skilled and organized manpower to deliver improved and better standard of services.

In the interview held with the head of the SWMT of the Arada sub-city to know about the number, education skill, and earning, health and general conditions of the staff, the head provided the following information. There are only 226 workers to perform such a demanding task. More than 95 percent of the agency's workers are unskilled and 75.5 percent are female. Access for the employees to social and health services is ensured. The quality of equipment is reported low, and there is shortage of safety clothes for the employees. The range of the salary scale of the employees is from 381 to 2225 birr.

Besides the above conditions, the sub-city waste workers and the formal private sector, MSEs, workers complain about being socially underestimated because of the view of the society associated with waste work and being subject to unhealthy working conditions and poor social security.

Nevertheless, the result obtained from the sample survey, concerning the social status of solid waste workers, indicates that only 37.3 percent of the sample households reported that the society is respectful towards the solid waste workers and the remaining 62.7 percent reported that the society undermines and show less respect towards to waste workers. This implies that the awareness of the society about waste and waste workers is still low. This can only be changed by continuous awareness programmes.

4.2.7.4 Technical Constraints

Even though the human knowledge and skill are vital elements for SWM, the availability of different kinds of tools, equipments and materials to be used for the SWM service play a substantial role.

The Arada sub-city SWMT uses three types of equipment for the service in combination with the available human resource. The equipment include: carts, waste containers (both $8m^3$, 1.1. m^3 and waste bins) and vehicles. But the problem is associated with inadequacies and improper use of these equipments.

As has been discussed in the previous chapter, the existing 63 containers are not enough to serve the entire population of the sub-city. Another challenge for SWM system in the sub-city is the unavailability of sufficient space to put the allocated containers for each Kebele. In most cases, residents living near by the containers frequently complain about the stinking smell coming from the open containers which at times cause health problems.

Most of these problems are the results of improper design of the materials and selection of transfer site for the solid waste, and lack of technical know-how of the staff.

With respect to this, the researcher thinks that the containers are too high to reach for short and medium height people. Thus, servants and children who are most of the time assigned for disposal by households dump waste outside the containers instead of inside. This is one of the reasons for waste accumulating beside and around containers.

As a result, the site becomes so filthy and shanty that it becomes a blemish to the beauty of the area and hazardous to public health. In addition to the above, the filthy and shanty areas where the containers are placed affect the public health and the beauty of the sub-city. This in turn exacerbates the improper use of containers by the residents.

According to the principle of waste management, selection of equipment should be based on area specific data. This principle, however, does not seem to work for Arada sub city as the power to purchase the containers and vehicles remains in the hands of the city government.

The low priority and lack of research and development activities, in the city in general and in the sub-city in particular, leads to the selection of inappropriate technology in terms of the local

physical conditions, financial and human resource capabilities as well as social or cultural acceptability.

In Arada sub-city, the technical systems established for primary collection, storage, transport and final disposal are often poorly situated to the operational requirements of the sub-city. This is partially due to the technical planning and designing problems.

4.2.7.5 Community (User) Participation

Lack of community participation has negative consequences on the smooth operation of SWM service. First, highest number (77.2 percent) of the sample households in Arada (section 4.1.8) does not have participation in SWM and sanitary meetings. Second, people do not properly use containers due to various reasons. Third, there is lack of taking initiatives on the part of households to participate in sanitary campaigns that are organized by the Kebeles and NGOs. Finally, some households do not have awareness about solid waste management and its impact on the environment. These altogether shows the lower level users participation in SWM service of the study sub-city.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

The final part of the paper deals with the conclusion withdrawn and the recommendations forwarded based on the findings. The major purpose of this study was to examine the main causes for problems of SWM service delivery in Arada Sub-city, the core of Addis Ababa.

Addis Ababa has 10 administrative divisions called 'sub-cities', each having their own responsibilities to provide and administer the municipal services in their respective jurisdiction. Arada Sub-City is one of these sub-cities, which is bordered by Yeka Sub-City in the east, Gulele Sub-City in the North, Addis Ketema Sub-City in the west and Kirkos and Lideta Sub-Cities in the south. Arada Sub-City has ten Keble Administration units with estimated total population of 35, 000 people.

The booming growth of population has forced the sub-city administration to give timely response for basic urban services. The continuing deterioration in the environment due to the rapid population growth has challenged the capacity of this local government to work up to the expectation of the people. The major urban services delivered by the sub-city include housing, road maintenance, recreation, sanitation, etc.

The Solid Waste Management Team (SWMT) of the Arada Sub-City has started to provide the solid waste management service for the residents of the sub-city right after the establishment of the SBPDA in 2003. Currently the team has 226 permanent workers, and 9 trucks, 63 standardized $8m^3$ metal and 80 plastic $1.1m^3$ containers and 350 waste bins for the service delivery.

As the survey result revealed, the solid waste containers are not enough to serve the entire demand of the population for the service, and the available ones have not been located in the right places either. Users are not invited to participate in selection of the locations; the selection is decided only by the top officials of the sub-city. Not only that, there is no consideration of user population size. Although the SWMT has cited population size as one of the criteria for container

distribution, it does not practically apply. As confirmed by observation, most, if not all, of the containers available in the sub-city are overflowing with wastes. As a result, the surrounding areas are covered with heap of various solid wastes, which are scattered by dogs, cats and other scavengers. In addition to that, since the containers are not protected from rain or sun, the garbage stinks due to decomposition and becomes harbor for various vector insects making the area disgusting to see and disturbs people to pass by. This is causing deterioration of environment and disruption of the peoples' activities. The insufficient number of containers and improper use and placing them in unsuitable sites has put their contribution to cleanliness and healthy environment under a big question mark.

The number of trucks the SWMT uses for delivery is nine only, which is extremely less as compared to the amount of waste generated in the sub-city and the demand for transportation. Of these trucks, about 50 percent are not working regularly due to oldness and technical problems. Most of them are parked in workshops due to expensive spare part cost. Furthermore, the long distance drive to waste disposal sites, which are located in outskirts of the city, together with the traffic congestion of Addis Ababa streets has prevented the truckers not to deliver the service as efficiently as expected. It is, therefore, unquestionable that the sub-cities solid waste management team needs assistance.

The involvement of the private sector in the form of investment in the household SWM in the sub-city is not yet satisfactory. However, the sub-city works with different stakeholders mainly with MSEs and NGOs. There are 40 MSEs and 4 NGOS working in the sector in collaboration with the SWMT of the sub-city. The MSEs are the most active and widely used partners in the service. Currently, the MSEs have become the sole provider of primary collection service for household waste since 2006. Nevertheless, as the survey revealed only 53.4 percent of the households in the sub-city use the service of the MESs due to various reasons mainly because of poverty. It is also possible to say that the involvement of the private sector in the household SWM in form of investment in the study sub-city is nearly absent compared with the demand for the service. Under this condition and without securing the private sector development, the complete transfer of the primary collection service provision from the government agent to the MSEs seems a premature decision that may need reconsiderations.

The study finding shows that about 53.8 percent of the solid waste from sample households is composed of organic materials. Although there is high potential for composting waste and is believed as one of the strategies that can significantly reduce the solid waste at the households level, there is no single project engaged in producing compost in the sub-city. This shows that there has not been real initiative for introducing and implementing the strategies of integrated sustainable SWM in the sub-city's solid waste management system. Consequently, most households and MSEs do not apply this important method of SWM.

Majority of the households in the sub-city do not sort out wastes. Without understanding the importance and the concept of waste reduction, however, some households and MSE workers separate very limited types of solid wastes. The only reason that motivates the households and the MSE workers to do the separation is its commercial value. It is not for facilitating the waste disposal or for implementing the useful methods, but just for the sake of taking something out of the waste so as to earn economic benefit. This shows the absence of deliberate action to apply any of the waste reduction strategies like recycling, reusing and incineration-to-energy.

The general awareness and participation of households in the SWM is below expectation. Assessment results revealed that very few of the households have the awareness of SWM and its related impacts. The participation of households in the SWM activities is insignificant as reported by the respondents.

Finally, to conclude, the SWM service delivery in Arada Sub-City is below the rising demand of the residents for the service and its status is in a poor state. The inadequacy of the service is caused by different barriers like population pressure, poverty, absence of infrastructure, poor management, low institutional capacity, financial problems, absence of research and regular awareness raising programmes. And, other constrains derived from different backgrounds such as weak institutional arrangement, lack of adequate financial and resource planning and management are affecting the service delivery. In addition, the multifaceted factors like political, social, technical, financial, and environmental. The above-mentioned factors have been reflected in varying degree on the provision of SWM service in Arada Sub-City.

In spite of the fact that they still have these problems, the SWMT of the Sub-City and all the concerned stakeholders have contributed a lot to change the situation that could have been worse without their role. The introduction and expansion of small private sector enterprises has played a considerable role in improving waste collection service and in reducing unemployment. At present, the involvement of MSEs in the service has become an income generating activity for the ever-increasing jobless in the sub-city.

5.2. Recommendations

Based on the findings, the following recommendations are forwarded for the improvement of the system and sustainable service delivery of SWM in Arada Sub-City.

In Arada Sub-city, the delivery of SWM service is in poor state and lagging behind the demands of the residents for the service. Insufficient resource and institutional capacities, lack of awareness are the main problems identified. It is therefore indispensable to apply integrated and sustainable SWM system to have improved service delivery in the sub-city. To achieve the required sustainable waste management, integrating the use of different service options, coordinating stake holder groups, working with other urban services and integrating the different aspects of solid waste management service in the sub-city are very important components of the activities that are to be recommended for the sub-city in general. To this end, the following are suggested to be reinforced and implemented by the sub-city to achieve a better and improved level of solid waste management service provision.

1. As the study findings revealed, there is no project which is applying the important methods of waste reduction. Applying waste reduction strategies play a role not only in protecting environmental pollution but also in the economy also. Therefore, the sub-city should support the "waste management hierarchy" by giving the preference to waste prevention, source separation, composting and reuse and recycling than mere collection and disposal activities.

2. The sub-city has to initiate transparent rules and regulations together with legal guidelines that are not ambiguous and easily understandable by the majority of the population and has to devise a mechanism by which the sub-city checks out the implementation of these rules and regulations and controls quality of work and proper follow up.

3. Designing far-reaching awareness raising programmes and implementations through regular campaigns, training and preparing competitions among schools, institutions, NGOs, businesses and popular individuals is of paramount importance.

4. The sub-city has to be convinced about the advantages of individual effort. We have seen how people's attitude had been changed by the efforts of individuals like Seleshe Demisse (Gashe Abera Molla). Keeping this in mind, the sub-city has to work-hard to be the best model on making practical differences and to bring change.

5. Initiating, organizing and extending support to form cleanliness and beautification committee comprising elderly and respectable people at village level. The committee should have the mandate to take action on those who litter and reward benevolent citizens who do well in this regard and demonstrate to the public.

6. Creating favorable conditions for continuous public participation and impartial enforcement of rules, regulations and freedom of expression regarding the service is decisive in bringing about change.

7. The sub-city has to recognize the role of various stakeholders by supporting, rewarding and applying incentive schemes. For example, giving material or financial reward particularly for MSEs in recognition to the role they have played in service will initiate them for further and better performance in the future. In addition, the sub-city has to take an initiative to implement the relevant laws particularly applying Article 29 of Regulation No. 13/2004 will encourage other stakeholders of SWM service.

8. Initiating the issue of identifying the true cost of the service since the public need to be more aware of the real cost and this in turn will help to introduce the concept of cost recovery step by step, and to assess the potential role of the private sector.

9. The Sub-city should have proper financial planning and control, ensure the availability of adequate quantity and quality of facilities, equipment and machines; take proper assessment in choosing sites for placing containers and make sure that regular follow up and inspection on transfer stations is in place.

10. SWM service in Ethiopia is at its infant stage and a lot should be done to get it on its feet. Therefore it is advisable that if SWM service delivery of the study sub-city is led by the

principles of professionalism and its planning be made in a strategic way and encourage inter-sectoral cooperation with other service sectors.

11. Proper assessment of impact and consequences should be made before taking decisions otherwise, the service will be crippled. The complete shifting of primary collection service to the MSEs, for example, seems a hasty decision made without taking various considerations. Therefore it is advisable to reconsider the decision and be revised.

12. Since Arada is a sub-city which has sights like the national palace, museums and parks frequented by officials and tourists, poor SWM service will leave bad impression and harm reputation of the city as a whole. Therefore, the Arada sub-city should work-hard more than ever to discharge its responsibilities and make its contribution towards ensuring cleanliness and beauty of the sub-city and for the good-will of the city.

13. Ensuring the availability of flexible and convenient time schedule for collection of solid waste from all sources, providing training, adequate quantity and quality of equipments and implementing various incentive plans for employees and fencing the site containers will help to reduce the adverse effect of solid waste in the sub-city.

14. Finally, the strong commitment of some levels of government and non-government bodies in the expansion of private sector municipal services is encouraging but there is still a need to strengthen both the public and private sectors in terms of carrying out their functions. To this end, developing the capacities of all stakeholders; including the households and communities requiring the service, private sector enterprises and workers (both formal and informal), and government and non- government agencies at all levels is vital.

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ANNEX I

SURVEY QUESTIONNAIRE

PREPARED FOR SAMPLE HOUSEHOLDS: THE CASE OF ARADA SUB-CITY

ADDIS ABABA UNIVERSITY SCHOOL OF GRADUATE STUDIES

FACULTY OF BUSINESS AND ECONOMICS

DEPARTMENT OF PUBLIC ADMINISTRATION AND DEVELOPMENT MANAGEMENT

MASTERS IN PUBLIC ADMINIST-RATION (MPA) PROGRAMME

Dear respondents,

The objective of this study is to identify the problems of solid waste management and to evaluate the role of the stakeholders in Arada sub-city by assessing the coverage and extent of the service so as to enable to recommend and find better solution for improved service in the future.

Thus, your response and correct answers to this questionnaire are of great help to the study.

I would like to appreciate your cooperation and assure you that any information you provide will be used for academic purpose only, strictly confidential and will not be used for any other purpose outside of this research.

Thank you very much for your cooperation.

The student

ADDIS ABABA UNIVERSITY SCHOOL OF GRADUATE STUDIES

FACULTY OF BUSINESS AND ECONOMICS

DEPARTMENT OF PUBLIC ADMINISTRATION AND DEVELOPMENT MANAGEMENT

MASTERS IN PUBLIC ADMINISTRATION (MPA) PROGRAMME

GENERAL INSTRUCTIONS

A. Please put a tick mark (✓) in one of the following coding boxes on the first page to indicate which group / stakeholder category you belong to before you start answering the other questions.

B. Please follow the instructions given under each part of the questionnaire for your answers.

C. You are kindly requested to answer all the questions and please feel free to ask clarification from the data enumerators whenever you have any doubt.

D. Do not write anything in the boxes located on the right edge of the pages (boxes will be used by researcher)

1- ADDRESS:

A. Kebele: _____

B. House no.:_____

C. Telphone no:

Office_____

Mobile_____

Residence_____

2- EMPLOYMENT STATUS

A. Employed [ ]

B. Unemployed [ ]

3- IF EMPLOYED, PLEASE TELL THE SECTOR OF YOUR WORK

A. Government sector employee [ ]

B. Private sector employee [ ]

C. Self-employed [ ]

D. NGO/ CBO sector [ ]

E. Other, specify [ ]

SURVEY QUESTIONNAIRE

PREPARED FOR SAMPLE HOUSEHOLDS: THE CASE OF ARADA SUB-CITY

ADDIS ABABA UNIVERSITY SCHOOL OF GRADUATE STUDIES

FACULTY OF BUSINESS AND ECONOMICS

DEPARTMENT OF PUBLIC ADMINISTRATION AND DEVELOPMENT MANAGEMENT

MASTERS IN PUBLIC ADMINISTRATION (MPA) PROGRAMME

Instruction 1: please circle your best choice for the answer and give a written opinion when necessary.

A. GENERAL INFORMAITON

A1. What is your gender? 1. Male 2. Female

A2. What is your educational level / schooling completion?

1. No education
2. Read and Write only
3. Grade 1- 8
4. Grade 9- 12
5. Diploma and above
6. Other, specify_____

A3. How much is your income level in Birr?

1. Below 500
2. 501----1000
3. 1001 --1500
4. 1501—2000
5. 2001-- 2500
6. Above 2501

A4. . Where was your origin/birth place?

1. Rural Ethiopia
2. Foreign country
3. In other town
4. Addis Ababa (If your answer is Addis Ababa, go to **A7**)

A5. If your answer to **A4** is other than Addis Ababa, please tell why did you come to Addis Ababa?

1. To look for better job opportunity
2. To visit parents / relatives
3. To attend further education
4. To run away from natural calamity
5. To have better living
6. Other, specify: ____

A6. How many years has it been since you started living in Addis Ababa?

1. Less than 2 years
2. Between 3 and 5 years
3. Between 6 and 10 years
4. More than 10 Years

A7. Is the place where you are living now suitable to be accessed by solid waste collection vehicles?

1. Yes
2. No (If no, go to A8)

A8. Why your living place is not accessible by solid waste collection trucks?

1. There is no access road to my place (there is only footpath) due to topography reason
2. The road is unpaved/ in a bad condition that cannot allow the vehicles to reach my place
3. The bridge over the river can not allow the vehicles to cross to my place
4. There is no infrastructure development in my place as the area is under new establishment
5. Other, specify:_____

A9. Do you have private toilet enough to serve your entire household / family members

1. Yes
2. No.

A10. How many persons are currently living in your house? _____

A11. Please indicate your opinion about the following statement.

Solid waste management service, for Arada sub-city, is not a first priority compared with other services such as water, electric, drainage, safety and security, traffic congestion and other similar services.

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

B. QUESTIONS RELATED WITH SOLID WASTEMANAGEMENT ACTIVITIES (GENERATION, STORAGE, COLLECTION AND DISPOSAL)

B1. What is your understanding, from your daily observation, about the general trend of solid waste production volume in you kebele?

1. It is increasing from time to time (If your answer is this, go to B2)
2. No change (it neither increases nor decreases)
3. Decreasing from time to time
4. Other, specify: _____

B2. If you think that solid waste is increasing for the past few years, what would you think be the most important reason for the increment?

1. Population increase in the sub-city
2. Increased consumption as a result of increased income of the residents
3. Deterioration of solid waste management service provision by government.
4. Weak involvement of stakeholders due to different reasons
5. All of the above are important reasons
6. Other, specify :_____

B3. What type of solid wastes you generate in your residence and to what extent?

Type of items	1=Very high	2=High	3=Average	4=Low	5=Very Low
3.1 Paper and carton	1	2	3	4	5
3.2 Plastics (bags/bottles)	1	2	3	4	5
3.3 Food waste	1	2	3	4	5
3.4 Glass bottles	1	2	3	4	5
3.5 Metal tins	1	2	3	4	5
3.6 Ash	1	2	3	4	5
3.7 Garden trimmings	1	2	3	4	5
3.8 Old clothes	1	2	3	4	5
3.9 Home Appliance	1	2	3	4	5
3.10 Others, specify:_____	1	2	3	4	5

B4. What type of container do you use to store your waste at home?

1. Carton
2. Basket
3. Metal bucket
4. Plastic sacks (Madaberia)
5. Sisal sacks (Yekacha joniya)
6. Festals
7. Other, specify :_____

B5. Who removes and carries away the solid waste from your house, most of the time?

1. The father
2. The mother
3. The children
4. The house boy/ girl/servant/guard
5. The MSE (solid waste collection) workers
6. By all of the above.
7. Other, specify:_____

B6. How often do you remove / dispose the solid waste of your house/ compound?

1. Everyday
2. Every other day
3. Every fourth day
4. Every week
5. Other, specify: _____

B7. Is the public solid waste container available in your neighborhood?

1. Yes 2. No (if No, go to B10)

B8. If your answer for **B7** is **yes**, how far is the estimated distance between the container and your house?

1. Less than 100 mts
2. Between 101-200mts
3. Between 201-300 mts
4. Between 301-400mts
5. More than 401 mts

B9. Do you have a say or participation in deciding the location /placement of the public container?

1. Yes 2. No

B10. If your answer for **B7** is **No**, where do you dispose the solid waste you generate regularly?

1. Use the MSEs to collect the waste from my house
2. Into a valley/ stream
3. By the road side
4. On the open space available around
5. Burry in the compound
6. Burn
7. Other, specify: _____

B11. Do you pay fee / charge for the SWM service rendered by the government?

1. Yes 2. No

B12. Have you ever been served by private MSEs for SWM service?

1. Yes (if yes, how much do you pay per month? _____Birr / month)
2. No (if no, tell the reason for not using MSEs:_____)

B13. How often do the private MSEs collect solid waste from your house?

1. Weekly
2. Twice a week
3. Indicate if any other arrangement :_____

B14. Do you believe that the service currently rendered by such private MSE is satisfactory?

1. Yes 2. No

B15. By what means is the waste usually transferred form your place to the public waste containers?

1. Carrying using human labor
2. Using wheel barrow
3. Motorized Vehicle
4. Using animals
5. Others, specify:_____

B16. How often is the public container emptied?

1. Everyday
2. Every other day
3. Every fourth day
4. Every week
5. Other, specify: _____

B17. How do you usually find the public solid waste container?

1. Always overflowing (beyond full)
2. Always full
3. Neither full nor empty
4. Always empty
5. Other: specify_____

B18. What are the causes / incidents that decrease the frequency of service that could be rendered by the available solid waste transporting vehicles?

1. Frequent breakdown and lack of technical skill of maintenance team
2. Old age of vehicles and lack of spare parts
3. Negligence of operators (Drivers & loaders)
4. Traffic problems
5. All of the above
6. Other, specify:_____

B19. How do you evaluate the impacts of failure of on time transportation and delayed disposal of solid waste upon public health and environment pollution within the sub-city?

1. Serious problem
2. Moderate problem
3. Not a problem at all
4. No opinion

C. ATTITUDES AND PERCEPTIONS OF STAKEHOLDERS TOWARDS SOLID WASTE MANAGEMENT

C1. There are a number of overflowing containers, flying plastic bags (festals), and papers in every corner, residue of vegetables, dead animals and human faces, demolished building debris, etc with an increasing pattern and overspreading widely in the Sub-City

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

C2. Which one of the following incidents have you ever noticed **in** and/or **around** an overflowing solid waste container or waste transfer station?

1. The stinking odor disturbing people passing-by
2. Eaten by domestic animals (dogs, cats)
3. Searched and speeded by scavengers
4. Being harbor for vectors flies, mosquitoes, cockroaches, etc)
5. Cause for uncontrollable fire and disease
6. Create bad look as semi-fluid matter coming out from waste
7. All of the above
8. Other, specify :_____

C3. Have you ever had awareness / sensitization education about solid waste?

1. Yes 2. No (If No, go to C6)

C4. Through which way/s you have obtained the awareness / lesson about solid waste management?

(More than one answer is possible)

1. Through the school / as per education curriculum
2. Through Radio programmes
3. Through TV programmes
4. Through Public meetings
5. From posters and flying awareness materials
6. Through all of the above
7. Other, specify: _____

C5. From which training organizations / awareness education you benefited most?

1. Organized by Government (sub-city/ kebele waste team)
2. Organized by Private sector service providers
3. Organized by Academic institutions
4. Organized by NGOs
5. Organized by CBOs
6. Other, specify :_____

C6. How would you describe the attitude of the society towards the waste collection team/staff?

1. Respectful
2. Neither respectful nor disrespectful
3. Disrespectful
4. No opinion

C7. Have you heard about the newly endorsed solid waste management law / proclamation?

1. Yes (If yes, from where? Please tell the source : _____)
2. No

C8. Do you separate decomposable waste from non-decomposable solid waste before disposing of?

1. Yes (If yes, go to C11) 2. No

C9. Why wouldn't you like to separate the different solid wastes? Because,

1. It has no value
2. It is a difficult exercise
3. No opinion
4. I have no time
5. I have no knowledge
6. Other, specify: _____

C10. For what purpose do you often use solid waste items like bottles, tins/cans, plastics, metals, shoes or clothes, after you separate / segregate them?

1. To reuse
2. To sell
3. To present as a gift to others
4. To recycle
5. To help waste collectors (to make the collection task more easier)
6. Other, specify :_____

C11. What do you do with the residue of food, leaves and trimmings that come out of your house?

1. Make compost
2. Apply directly on the farm/garden
3. Throw them away with other solid wastes
4. Burn in the back yard
5. Other, specify:

C12. How do you evaluate the state of solid waste service in your Kebele?

1. Has improved (If improved, go to C13)
2. Remains the same
3. Has deteriorated (If deteriorated, go to C14)
4. No opinion

C13. If there are improvements, what are the reasons for the improvements of solid waste management service?

1. Because, government has increased its solid waste management services at large
2. Because, the private sector has started to play a role in the service as a partner in the service
3. Because, waste has reduced as the society has started to recycle, reuse and sell the waste
4. Because, the society's awareness has increased and stopped to throw waste everywhere.
5. Because of all the above factors together
6. Other, specify :_____

C14. If there are no improvements what are the reasons for non-improvement of solid waste management service?

1. Due to government's stagnant service provision
2. Due to decline of stakeholders participation
3. Due to the society's unchanged behavioral problems (culture, tradition, attitude, awareness, etc)
4. Due to lack of proper resource (human & financial) and poor management system
5. All of the above
6. Other, specify :_____

C15. Have you ever had participated in meeting concerning public health or any sanitation agenda in your Kebele?

1. Yes (if yes go to C16) 2. No

C16. During the kebele meeting about public health, was the issue of solid waste management a point of discussion?

1. Yes 2. No

C17. According to your understanding, what is the role of kebele in solid waste management?

1. The kebele directly coordinate and supervises the work of the solid waste management team
2. The kebele collects users charge and fines related with solid waste management service
3. The kebele has no role as it has nothing to do with solid waste management activities.
4. The kebele coordinates the society to abide by the law and takes action against violators
5. Other, specify :_____

C18. What action do you take when you find someone throwing solid waste across the sub-city illegally?

1. I will call to the kebele administration to report the situation and to take action on the person
2. I will report to the solid waste management team to take action
3. I will call a near by police to stop him from his illegal act
4. I will ask him, peacefully, to stop his illegal act and try to convince him not to do it again
5. I will do nothing, because it is not my duty and responsibility
6. I will expose the man on a public meeting on the issues of health or related topics

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C19. How would you best evaluate the collection and transportation service given by the government agency?

1. Very good
2. Good
3. Average
4. Bad
5. Very bad

C20. What do you think is the best solution to address efficient and effective solid waste management service in your kebele?

1. Through totally outsourcing of solid waste management activities to companies (Privatization)
2. Through partially outsource of solid waste management activities to companies (Partnership)
3. Through undertaking all activities of SWM by Federal government (Government monopoly)
4. Through assigning all the activities of SWM under Kebele control (local government)
5. Other, specify:_____

C21. Do you believe that Addis Ababa has a proper and sufficient landfill site?

1. Yes
2. No (if no, go to C22)

C22. If your answer to C21 is no, what should be done?

1. Additional landfill must be prepared as soon as possible
2. Recycling must be encourage to reduce solid waste
3. Improving the existing landfill is enough for the current problem
4. Introducing export of solid waste to other territories
5. Other, specify :_____

C23. Do you believe that you have fulfilled your duties and responsibilities expected from a citizen in the solid waste management service?

1. Yes (If yes, go to C24)
2. No

C24. If your answer to C23 is yes, what have you done to encourage effective solid waste management?

1. I properly follow the rule to handle the solid waste I produce and advise others to do the same
2. I use my own initiatives to keep my surrounding clean and try to be a role model for others.
3. I have raised / presented, to the concerned body, a complaint about the impacts of poor solid waste management on public health and environment and suggested a better solution for improvements.
4. I have contributed / donated valuable materials to support solid waste management service
5. By performing all of the above activities
6. Other, specify :_____

C25. Would you be willing to contribute your share for the establishment of organic waste (paper, plant,etc) recycling industry in your kebele (neighborhood)?

1. Yes (If yes go C27) 2. No

C26. If your answer for C25 is yes, what will be your contribution for the establishment of solid waste recycling plant in your kebele?

1. I will participate in the investment buying a share (I will be a shareholder)
2. I will be a supplier of the input (organic solid waste)
3. I will purchase the end product of the plant
4. I will work as an employee for the industry with fair salary
5. I will work as a volunteer for some times
6. I will support the industry by sorting solid waste in house and will advise the same for others.
7. Other, specify:_____

ANNEX II

CHECKLIST INTERVIEW

ADDIS ABABA UNIVERSITY SCHOOL OF GRADUATE STUDIES

FACULTY OF BUSINESS AND ECONOMICS

DEPARTMENT OF PUBLIC ADMINISTRATION AND DEVELOPMENT MANAGEMENT

MASTERS IN PUBLIC ADMINISTRATION (MPA) PROGRAMME

GENERAL INTERVIEW QUESTIONS PRESENTED TO SWMT OF ARADA SUB-CITY

1. Would you please explain, briefly, about the general profile of Arada sub-city? (Example: Total Population, Number of kebeles, No of households, SW generation rate per day/ capita and share of Arada Sub-City in the city total solid waste production.
2. Would you please explain how the Arada Sub-City Solid Waste Management Team has been established?
3. What are the major activities of the sub-city's solid waste management team? (Please focus on the activities that are particular of household solid waste management)
4. Would you please tell us the number of stakeholders involved in the Solid Waste Management activities of the Sub-City? (e.g. Private Sector (MSEs), NGOs, CBOs, Volunteers.....)
5. Please tell us the profile of agency staff engaged in Solid Waste Management service (Total permanent employees, Temporary Employees, Total Skilled labor and Total Un-skilled labor
6. What do you do when you find someone throwing away solid waste across your sub-city illegally?
7. What kind of relationship do you have with other solid waste concerned institutions? (Please explain, briefly, the relationship you have with Ministry of Health and Environmental Protection Authority).
8. What are the sources of the finance for SWM services you provide?
9. How do you finance the SWM service when you face budget deficit?

10. Please tell the subsidy you earned in the past three years. (Please mention the amount in Birr and start with the most recent fiscal year)

11. Does your organization collect fees/ service charges directly from the service users? (Households only)

12. If yes for B4, from whom? how much (Birr for each year) you have collected for the past three consecutive fiscal yeasts? 2004/5, 2005/6 and 2007/7

13. If you don't collect fees/ service charges from your clients, would you please tell the reason?

14. How many solid waste containers you have for the service? (Number, type, volume and Distribution)

15. What basic criteria do you consider to determine the number of solid waste disposal containers that should be placed in each kebele?

16. What are the number and type of vehicles you use for SW disposal service?

17. Which activity of the solid waste management service takes the highest budget share? Please explain the reason why it takes the largest portion? (Activity & Reason)

18. Do you have the power to decide the purchase of equipments including vehicles for SWM service? If no, how does decision takes place? What complaints do you have on the current decision making system of SWM service?

19. Are there private organizations, particularly from Arada sub-city, that provide transport service?

20. If your answer to item **17** is yes, what role do they play in the solid waste management service?

21. What types of solid waste reduction strategies have you introduced and when did you start? (Mention type of strategy, Date of commencement, Current status)

22. Is there any waste reduction strategy introduced / implemented by the private sector Solid Waste Management Teams in Arada sub-city? (Please specify the Kebele, Name and Owner of the project)

23. How often solid waste is transported from the public containers/ transfer station to the central landfill?

24. Are the vehicles currently in use enough to dispose the solid waste in the sub-city? Why?

25. Have you ever achieved targets of the solid waste management service plan for the last three years?

26. If service plans were achieved, what were the most important reasons for your improved performance? And if not, what are the constraints that prevent you not to achieve goals?

27. What other problems impede the smooth, effective and efficient SWM service in the sub city? (Probe the institutional, technical, financial, human (skill) and such problems)

28. What solutions do you suggest to make the transportation service more sustainable and improved? Why?

29. Do you strictly follow your schedules for emptying containers and transportation service? Why or Why not?

30. Whom do you think is responsible for the current SWM problems in the sub-city? And why?

31. How is the satisfaction and moral conditions of the staff with their job? What complaints they have frequently? What solutions have been given?

32. When did the cooperatives (MSEs) start the solid waste collecting/ disposing service? Please indicate the starting year for each:

33. In what way do cooperatives have played the biggest role to decrease the problems of solid waste management?

34. How do you evaluate the efficiency and effectiveness of MSEs in their service compared to your team?

35. Do you believe that these cooperatives (MSEs) are benefiting from the service they render? Why?

36. Is the sub-city solid waste management agency strong enough in implementing the laws, rules and regulations and practicing follow up for feedback and improvement? How?

37. What are the strength and weaknesses of MSEs in performing the solid waste management service?

38. What are the strong sides of the Solid Waste Management Team?

39. What are the weaknesses of the Solid Waste Management Team?

40. How do you evaluate the transport and disposal problem of solid waste in the sub-city?

41. What do you propose as the best solution to solve the problems of SWM service in the sub city?

ANNEX III

CHECKLIST INTERVIEW

ADDIS ABABA UNIVERSITY SCHOOL OF GRADUATE STUDIES

FACULTY OF BUSINESS AND ECONOMICS

DEPARTMENT OF PUBLIC ADMINISTRATION AND DEVELOPMENT MANAGEMENT

MASTERS IN PUBLIC ADMINISTRATION (MPA) PROGRAMME

GENERAL INTERVIEW QUESTIONS PRESENTED TO SELECTED MSEs INVOLVED IN SWM SERVICE DELIVERY OF ARADA SUB-CITY

GENERAL QUESTIONS

1. When did you start the providing service in Arada sub-city? (Ask for joining year)
2. Was there any requirement from you to be registered and start to operate in the sector? (Probe the procedure and the institution interacted with them to get their license)
3. What type of solid waste management service are you providing to your clients?
4. How many customers do you have at present? (Total & households)
5. Do you charge the same fees for household and other institutions? (How much for Households?)
6. Do you provide services for free for the poor residents?
7. What is the general trend of the number of household customers to your service (Is it increasing or decreasing?) what are the reasons for the decrease or the increase?
8. What is the attitude of the community towards to you and your service?
9. Are you working in an area (kebele) where you were assigned / delimited to work by the sub-city/ kebele?
10. Do you like the idea of zoning or working only in a limited kebele where you are assigned to work by the sub city/kebele? Why?

11. What sort of problems do you face (or might have faced) through your experience of delivering SWM service to your clients (service users)? (Ask for the most serious in the process)

12. What problems / challenges are facing to you from the sub city/ kebele solid waste management agency to efficiently carry out your SWM activities

13. What reasons do the SWMT give when they do not empty the solid waste containers on time?

14. Do you provide Transportation service to your clients? (If no, why?)

15. Is your income (payment for your service) you earn worth your SWM service (equitable to the service you render)?

16. What support you need to increase the service delivery to your clients? (Get the expectation both from the government and households)

17. Do you think the service you provide is sufficient to cover all the area in the sub-city?

18. Have you ever have sensitization / awareness raising lesson/ training? (ask the source, for how long and its effectiveness)

19. Do you segregate and apply any of the source reduction strategies? (composting, recycling, reusing...and the reason why, if they don't use the strategies)

20. What do you suggest for the improvement of solid waste management services?

DECLARATION

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other University, and that all sources of materials used for the thesis have been duly acknowledged.

Declare by:

Name: Hailemariam Ali

Signature:

Date: 16/07/2008

Confirmed by Advisor:

Name: Mr. Yirga Hiruy

Signature:

Date: July 18, 2008