

JIMMA UNIVERSITY
COLLEGE OF LAW AND GOVERNANCE
DEPARTMENT OF GOVERNANCE AND DEVELOPMENT STUDIES



**FACTORS AFFECTING MUNICIPAL SOLID WASTE MANAGEMENT IN
ETHIOPIA: THE CASE OF JIMMA TOWN**

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**A THESIS SUBMITTED TO THE DEPARTMENT OF GOVERNANCE AND
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Declaration of the Candidate

I, Fikadu Tadesse declare that this thesis represents my own effort and all sources of materials used for this thesis have been accordingly acknowledged. I have conducted the research independently with the guidance and support of the research advisor. The study has not been submitted to the award of any degree in any university.

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Abbreviations and Acronyms

CBOs: Community based organizations

CSA: Central Statistical Agency

HHs: Households

MOH: Ministry of Health

MSW: Municipal Solid Waste

MSWM: Municipal Solid Waste Management

NGOs: Non-Governmental Organizations

SBPDA: Sanitation, Beauty, Parking and Development Agency

SBPDD: Sanitation Beatification and Parks Development Department

SWM: Solid Waste Management

OECD: Organization for Economic Co-operation and Development

UK: United Kingdom

UNEP: United Nation Environmental Program

UNESCO: United Nations Economic and Social Council

USPA: United States Environmental Protection Agency

YDO: Youth development organization

ABSTRACT

The purpose of this thesis was to assess factors affecting municipal solid waste management in Ethiopia: The case of Jimmat Town and recommending possible solutions. The study also tried to answer the research questions accordingly. To this effect, the thesis was conducted in Jimma town Selected kebeles. Accordingly, four kebeles and 200 sampled house holders were included using simple random sampling. Questionnaires (open and close ended) was the main data gathering tool. An interview, observation and document analysis were conducted to validate the quantitative data. The quantitative data collected by using questionnaire was analyzed and interpreted by using mean scores and standard deviation. Percentage was also used during the analysis of the background information of the respondents. The qualitative data collected through interview was analyzed qualitatively by relating in line with quantitative data. Each of the sampled households were categorized according to their sex, age, educational level, per capita income, household size, and household occupational to assess associations with solid waste management.

According to the result of data analysis, the following major findings were identified. The findings of the study revealed that the problem of municipal solid waste management in the town became increased from time to time. The findings of this study also demonstrated that; most of the community members under the study area do not adequately participate in solid waste management due to the reasons such as perception that it is largely a responsibility of local authorities and lack of appropriate laws enforcement and even enforcement of the existing laws.

Similarly, the major factors which affect effective municipal solid waste management were financial factors, technical factors; social factors and institutional factors. Finally, researcher recommended that government should encourage the private service providers through clear institutional structure and create community awareness about effective municipal solid waste management's.

Contents

Declaration of the Candidate	ii
ADVISORS' APPROVAL SHEET.....	iii
ACKNOWLEDGEMENT.....	i
Abbreviations and Acronyms.....	ii
ABSTRACT.....	iii
CHAPTER ONE	1
INTRODUCTION.....	1
1.1 BACKGROUND OF THE STUDY.....	1
1.2 STATEMENT OF THE PROBLEM	2
1.3 OBJECTIVES OF THE STUDY	5
1.3.1 GENERAL OBJECTIVE	5
1.3.2. SPECIFIC OBJECTIVES	5
1.4. RESEARCH QUESTIONS.....	5
1.5SIGNIFICANCE OF THE STUDY	6
1.6 DELIMITATION OF THE STUDY	6
1.7. Limitations of the Study.....	6
1.8 ORGANIZATION OF THE STUDY.....	6
CHAPTER TWO	7
REVIEW OF LITERATURE.....	7
2.1 Concepts of Municipal Solid Waste Management.....	7
2.1.1 Sources and Types of Municipal Solid Waste	7
2.2 Municipal Solid Waste Management in Developing Countries	9
2.2.1 Constraining Factors affecting municipal solid waste management in developing countries	10
2.2.1.1 Human and Technical Constraints	10
2.2.1.2 Financial Constraints.....	11
2.2.1.3 Institutional Constraints	11
2.2.1.4 Social Constraints.....	12
2.2.1.5 Awareness and Attitudes.....	12
2.3 Municipal Solid Waste Management in Ethiopia.....	12
CHAPTER THREE	14
RESEARCH DESIGN AND METHODOLOGY.....	14

3.1 Description of the study Area	14
3.2 Research Design	14
3.3 Sources of Data	15
3.4 Sampling and population	15
3.5. Methods of Data Collection	16
3.5.1. Data Collection procedure	16
3.5.2 Data collection Instruments.....	17
3.5.2.1 Questionnaire	17
3.5.2.2 Interview	17
3.5.2.3. Observation.....	17
3.6. Validity and Reliability of the Study	17
3.7. Study Variables	18
3.8. Method of Data Analysis.....	18
3.9. Pilot Testing.....	18
10 Ethical Considerations.....	19
CHAPTER FOUR	20
DATA PRESENTATION, ANALYSIS ANDINTERPRETATION.....	20
4.1 Demographic Characteristics of the Respondents.....	20
4.2. Duration of respondents’ stay in the Study Area.....	22
4.3. Householders’ views on municipal Solid Waste Disposal Practice in Jimma town.....	23
4.4 Distance of containers utilization of households of Jimma town.....	26
4.5. Community awareness and perception about municipal solid waste management in Jimma town	27
4.6. Households responses about their view on the rules and regulations of solid wastemanagement in Jimma town.....	28
Table 9:Households responseson the rules and regulations of solid waste management in Jimma town	28
4.7. The major factors that strongly affect Municipal Solid Waste Management in Jimma Town	30
4.7.1. Analysis of Descriptive Statistics.....	30
4.7.1.1 Study Variables	30
4.7.2. Financial constraint and Solid Waste Management system in the town	30
4.8. Technical factors and Solid Waste Management practice in Jimma town	31

4.9 Social Factors and Solid Waste Management practice in Jimma town	32
4.10. Institutional factors and Solid Waste Management Practice in Jimma town.....	33
4.12 INFORMATION OBTAINED VIA INTERVIEW AND DOCUMENT ANALYSIS FROM SAMPLED JIMMA TOWN OFFICE MANAGERS.....	34
4.13. RESPONDENTS VIEWS ON STRATEGIES TO ALLEVIATE FACTORS AFFECTING MUNICIPAL SOLID WASTE MANAGEMENT IN THE JIMMA TOWN	35
CHAPTER FIVE	36
SUMMARY, CONCLUTIONS AND RECOMMENDATIONS	36
5.1. Summary of the major finding.....	36
5.2. Conclusion.....	38
5.3 Recommendations	39
REFERENCES	41
APPENDIX A.....	46
APPENDIX -B.....	52

<u>Table 1: Sampled Kebeles and households of Jimma town</u>	16
<u>Table 2: Demographic Characteristics of Respondents</u>	20
<u>Table 4: income</u>	22
<u>Table 5: Sampled householders views on Solid Waste Disposal Practice in Jimma town</u>	23
Table 6: Sampled householders views on Solid Waste Disposal Practice in Jimma town	23
Table 7: Distances of containers utilization by householders of Jimma town	26
Table 8:Community awareness and perception about municipal solid waste management in Jimma town	27
Table 10: sampled respondents view financial factors of SWM in Jimma town	30
Table 11: statistical analysis of Technical factors of solid waste managementsystem in Jimma town ..	31
Table 12: Social factors of solid waste managementpractice in Jimma town.....	32
Table 13: Institutional factors of solid waste management system in Jimma town.....	33

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Solid waste management is defined as the collection, transportation, processing, recycling, and disposal of solid waste materials so as to reduce their effect on health, environment and aesthetics. It is highly related with urbanization and industrialization (Solomon, 2011). For instance in early societies, solid waste management consisted of digging pits and throwing garbage into them.

When cities began to be more concentrated; however, solid waste management became a serious and complex issue. Houses that did not have room to bury their garbage would throw it into the streets. In response, many cities started to set up municipal garbage collection teams which would dispose of unusable garbage. This is mainly because modern societies generate far more solid waste than early humans ever did. As a result, recent events in major urban centers both in developed and developing countries have shown that municipal solid waste management has become a big challenge (Solomon, 2011).

In developed countries the daily life of people can generate greater quantity of solid waste than developing countries, but most parts of developed nations are efficient in handling waste when compared to developing countries because of their technologically complex, institutionally efficient and cost effective solid waste management systems. On the contrary compared to developed countries, developing countries produce less per-capita solid waste. But the capacity of developing countries to collect, process and dispose waste is limited due to inadequate infrastructure, finance, political instability, inefficient institutional capacity and structure, and low level of awareness. For example, Sarageldin (1995) and Rushbrook (1999)(as cited in Solomon,2006, p.3) stated that “about 30 to 50 percent of the solid waste produced in urban areas of low income countries as well as poorest parts of middle-income countries is estimated to be left uncollected”. These situations introduced numerous discomforts to communities and threaten humans’ health through direct contact, contamination of water and soil.

In most African cities the situation of solid waste management is insignificant and inadequate that could associate with different factors. The United Nations Environmental Program (UNEP) (2005) notes that the management of solid waste in Africa is often weak due to lack of

appropriate planning, inadequate governance, poor technology, weak enforcement of existing legislation and the lack of economic incentives to promote environmentally sound development. Similarly, the current condition of municipal solid waste management service in different towns of Ethiopia is also becoming a challenge for municipalities. For instance, according to Birke (as cited in Degnet 2003) study of municipal solid waste management practices of 15 regional cities of Ethiopia, a controlled solid waste disposal system was practiced in only two of them. That means small proportions of the urban dwellers are served and a large quantity of solid waste left uncollected. In addition, a study conducted by (MoH (cited in Gebrie (2009) revealed high percentage of solid wastes which are left uncollected and disposed anywhere without due attention regarding their consequences in different towns of Ethiopia.

The fact that from major towns of Ethiopia Jimma town is one of the town by which proper provision of solid waste management services is still unsatisfactory and complete. Indeed, percentage of uncollected solid wastes in the town is in reality above 75 percent. In Jimma, illegal dumping of waste on open areas, in gullies, river courses is considered as routine task of residents. The efforts made by the municipality to change the situation in the town are also insufficient as it compared to the extent of the problem. As a result, in order to reduce this situation and achieve efficient solid waste management system of the town detail study of the existing condition of municipal solid waste management service is required. Therefore, it is hoped that this study will have importance in providing relevant information that is basic to design appropriate solid waste management system or as a step to conduct more systematic study in the town of Jimma.

1.2 STATEMENT OF THE PROBLEM

According to the United Nations Educational, Scientific and Cultural Organization (UNESCO) (2009), the population growth and the rate of urbanization are alarmingly increasing throughout the African continent. But the technology, technical knowhow, financial capacity, culture, and understanding of the community required to properly manage solid wastes are not adequately available. Like any other developing countries, Ethiopia has a range of solid waste management problem, including inadequate waste collection, transportation systems and inadequate waste handling and improper final disposal that resulting urban environmental pollution. These problems are being aggravated by the growing waste generation rates associated with population

growth change of composition of waste and economic condition of population (Degnet, 2008; Getahun, 2011).

In Ethiopia, among the well-known town, Jimma is one of the fast-growing towns. It is also a center of industrial and commercial activities. Adjacently, the daily waste generation rate in the town is also increasing from time to time (Forum for Environment, 2010). But the current waste collection capacity and disposal system is not matching with the rapid expansion of the town and its corresponding waste generation. It encounters problems like shortage of containers, road side waste bins, public toilets and the absence of proper and well prepared disposal site (FUPI, 2006). Hence, the people give no or little attention to SWM and they dump wastes along the roads and in open spaces.

Jimma, as one of rapid urbanizing town, is far from satisfying the infrastructure demand of its inhabitants. Its solid waste management is poor. One of the major issues that the development strategy should incorporate is the issue of urban environment, which mainly deals with the municipal waste management. According to 1994 national census report, the town had 107,314 total populations while in 2007 national census it reached 171,094 with growth rate of 3.38%/annum (Central statistical of Ethiopia, 1994; 2007).

Such rapid increase in population together with rapid development of the town has produced increasing volumes of solid waste and in turn it induced greater infrastructural demand, institutional setup and community participation for its management.

The area (Jimma town) is selected to this study for the following reasons. First, Jimma town is among the fast growing towns in the country where solid waste management problem is crucial. Second, the environmental and sanitary conditions of the town have become more serious from time to time, and people are suffering from living in such conditions. Third, the reports from the municipality show that the current system of municipal solid waste management is inefficient and most of solid wastes that are generated in the town remain uncollected and simply dumped in open areas, road sides, river courses, gullies. Furthermore, municipal solid waste management in Jimma town has not been carried out in a sufficient and proper manner.

Pictures from two Kebeles



Pic-1 taken from BosaKito Kebele, Jimma



Pic-2 taken from Bacho Bore Kebele, Jimma

In this regard, a few surveys and studies which have been conducted give more emphasis to the issues like; willingness to pay” (Muhdin, 2016) “generation rate of the waste” (Lemma, 2007; Melaku, 2008) and even special emphasis given to the “determinants of recycling of solid wastes”; which is revolving on developed nations (Sterner and Bartelings, 1999). But the situation of solid waste management of the town becomes a serious problem from time to time. Therefore, this study will be undertaken to fill these gaps by conducting the research on factors affecting effective municipal solid waste management of the town.

1.3 OBJECTIVES OF THE STUDY

1.3.1 GENERAL OBJECTIVE

The main objective of this thesis was to assess factors affecting municipal solid waste management in Ethiopia with particular emphasis on Jimma town.

1.3.2. SPECIFIC OBJECTIVES

The specific objectives of this thesis were:

1. To investigate the generation rate and physical composition of households municipal solid waste in the town
2. To evaluate the extent of resident awareness toward solid waste management practices in the town
3. To assess present institutional arrangement and capacity of municipal solid waste management of the town.
4. To identify the major factors that strongly affecting municipal solid waste management in the town.
5. Identify and suggest possible policy recommendations, technological innovations, delivery methods and further research.

1.4. RESEARCH QUESTIONS

To achieve the intended objectives stated above, the study seeks to answer the following research questions.

1. What is the rate of household solid waste generation and physical composition in the town?
2. To what extent the community is aware of appropriate solid waste disposal system in the town?
3. What is the existing institutional arrangement and capacity of municipal solid waste management of Jimma town?
4. What are the major factors that strongly affect Municipal Solid Waste Management in Jimma Town?
5. What are the possible solutions to alleviate factors Affecting Municipal Solid Waste Management in the town?

1.5 SIGNIFICANCE OF THE STUDY

This study would have several significances. First, it provides information for policy makers, solid waste managers and environmental protection agencies. Second, it helps to decide appropriate technology for the waste conversion. Third, it gives values for the control of municipal solid waste management and fourth, it provides baseline information for researchers.

1.6 DELIMITATION OF THE STUDY

The study was delimited to southwestern part of Ethiopia, Jimma town since there is a severe problem of municipal solid waste management and limited surveys which were conducted so far regarding the town solid waste management. On the other hand, the problem that the researcher studied was delimited to the overview of assessing the major factors affecting solid waste management in the town.

1.7. Limitations of the Study

Although this study fills a vital gap in the literature, there are few limitations that are worth noting. The survey did not obtain the determined sample size, due to the fact that some urban dwellers refused to participate in the survey. Out of the 200 respondents who were selected for the sample, 11 respondents refused to participate in the study. Although there was a non-response rate of 4.9%, the data yielded important descriptive information about waste management practices. The qualitative data were derived from highly technical and influential people in the communities who were purposively selected and, therefore, the findings from the in-depth interviews are not necessarily indicative of the situation in all urban communities.

1.8 ORGANIZATION OF THE STUDY

The study was divided in to five chapters. The first chapter deals with the introduction part which include: background of the study, statement of the problem, objectives of the study, research questions, significance of the study, scope of the study, and organization of the paper. The second chapter deals about the review of related literature on solid waste management. The third chapter will focus on research methodology. The fourth chapter provides the data presentation and analysis part of the study. Finally, the fifth chapter presents a brief summary of the findings, conclusions and recommendations.

CHAPTER TWO

REVIEW OF LITERATURE

2.1 Concepts of Municipal Solid Waste Management

Waste, according to the UK environmental protection act (1990), “is any substance which constitutes scrap materials, an effluent or other unwanted surplus arising from application of any substances or article which requires to be disposed of which has broken, worn out, contaminated or otherwise spoiled.” Solid waste can be defined as “any garbage, refuse, sludge, and other discarded solid materials resulting from industrial, commercial, agricultural operations, and community activities, but does not include dissolved materials” (U.S. Code of Federal Regulations as cited in Samuel, 2006,p.5). In short “it is anything that is neither liquid nor gas and is discarded as unwanted” (Federal NegaritGazeta of Ethiopia, proclamation number 513 of 2007). Municipal solid waste (MSW) refers to materials discarded in urban areas for which municipalities are usually responsible for collection, transportation, and final disposal. Municipal solid waste management is an activity of planning and implementation of solid waste management components such as collection, transfer and transportation, recycling, resource recovery, and disposal under jurisdiction of local government.

2.1.1 Sources and Types of Municipal Solid Waste

In order to categorize what exactly municipal solid waste constitutes, there have been different attempts of categorization based on numerous classification criteria. Some of those criteria are sources from which solid waste emanates, and nature of solid waste components. On the basis of the nature of items that constitute solid wastes, it can be classified into organic or inorganic, combustible or non-combustible, (Edelman as cited in G/Tsadkan, 2002). With respect to source from which solid waste emanates, Martin (2000) categorized municipal solid waste as household (residential) refuse, institutional wastes, street sweepings, commercial areas waste, as well as construction and demolition debris.

In developing countries, MSW also contains various amounts of industrial wastes from small scale industries. In these sources there are diverse types of solid wastes. But, some of the typical solid wastes of those sources are described by Dereje (2001) as follows.

Domestic solid wastes: wastes generated from household activities such as food preparation, cleaning, fuel burning, old cloths, furniture, obsolete utensils and equipment, packaging, newsprint, and garden wastes. In developing countries, food waste and ashes dominate households' solid wastes.

Commercial wastes: waste from shops, offices, hotels, restaurants, etc and typically consisting packaging materials, office supplies and food wastes. In low income countries food markets contribute the largest proportion of commercial waste.

Institutional wastes: waste from schools, hospitals, clinics, government offices, military bases etc, and comprise hospital and clinical wastes including potentially infectious and hazardous materials.

Industrial wastes: composition of industrial waste depends on the kind of industries involved. It consists of food waste from kitchens, and canteens, packaging materials, plastics, papers and metal items.

Street sweepings: dust, soil, paper, etc. In developing countries street sweeping also include fruit and vegetable residues, household wastes dumped along roads, drain cleanings, animal manure and plant remains.

Construction and demolition wastes: its composition depends on type of construction materials used, but it typically includes soil, brick, stone, concrete, ceramic materials, wood, packaging materials and the like.

2.2 Municipal Solid Waste Management in Developing Countries

The rapid extent and nature of urbanization in developing countries made MSWM as a major issue of concern in those countries. “In the next 35 years, the urban population of world is expected to be double to more than five billion people, and from this 90% of growth is taking place in developing countries” (World resource institute, 1997; in Ahmed and Ali, 2002,p.468). As a result of this, the existing MSWM of developing countries fail to catch up with the rapid increase of solid waste production in these countries. To show this situation, UNCHS (1996) (as cited in Schertenleib and Meyer, 1992,p.1) report identified “one third to one half of solid waste generated with in most cities in low and middle-income countries are not collected, rather it ends up as illegal dumps on streets, open spaces, and sewerage systems, and contribute to spread of diseases”. Furthermore, MSWM schemes generally serve only part of the urban population. For instance, “in Kenya –Nairobi municipal solid waste collection service is mainly concerned in central business district and more affluent communities. As a result, in poor suburban zones indiscriminate disposal of solid waste at riversides, roadsides, and other open spaces are common” (Henry et al. as cited in Gebrie, 2009, p.22).Zerbock (2003, p.4) also stated that,

Transport of waste from households, commercial areas, institutions and other generation sites is also a growing problem in developing countries. The transport of waste becomes longer and more time consuming, and hence, more expensive and less efficient. In developing countries many sources of waste might only be reached by roads or alleys which may be inaccessible to certain methods of transport because of their width, slope, congestion, and surface. This is especially critical in unplanned settlements such as slums or low-income areas. In addition to this vehicles that serve for waste transports are also outdated, poorly maintained and frequently out of action.

The operational inefficiency of MSWM in developing countries further reflected in resource recovery. Although the material recovery from the waste stream has a great potential in economic as well as environmental point of view, municipality and formal private sector contribution in this activities is minimum. Besides, waste disposal is also a neglected area in many low-income countries and causes for environmental health hazards. Most of municipal solid wastes in developing countries are dumped on land in a more or less uncontrolled manner

These dumps make very uneconomical use of the available space, allow free access to waste pickers, animals and flies and often produce unpleasant and hazardous smoke from slow-burning fires (Zurbrugg, 2003).

2.2.1 Constraining Factors affecting municipal solid waste management in developing countries

As it is noted earlier a typical solid waste management system in a developing country displays an array of problems including low collection coverage and irregular collection services, and crude open dumping and burning without air and water pollution control. These problems are caused by various factors which constrain development of effective municipal solid waste management systems. They can be categorized into technical, financial, institutional, social constraints, and awareness and attitudes (Ogawa, 2002). Each of these constraints is discussed below.

2.2.1.1 Human and Technical Constraints

In most developing countries, there is lack of human resources and technical expertise both at national and local levels. Many officers in charge of municipal solid waste management, particularly at the local level, have little or no technical background or training in engineering or management (Ogawa, 2002). This is a main reason for lack of comprehensive waste management planning in developing countries. Furthermore, collection and analysis of solid waste data are generally not given sufficient attention. As a result, there are few opportunities for waste management administrators to become experts and to formulate and implement waste management plans that are tailored to the actual situation in their country. This in turn makes it extremely difficult to license or develop technologies that are best suited to the local conditions.

Moreover, research and development activities in municipal solid waste management have often low priority in developing countries. This lack of research and development activities in developing countries leads to selection of inappropriate technology in terms of local climatic and physical conditions, financial and human resource capabilities, and social or cultural acceptability Ogawa as cited in Yebalework, 2014).

2.2.1.2 Financial Constraints

MSWM is given low priority in developing countries; as a result, very limited funds are allocated to the sector by government. This problem is acute at the local government level where local revenue collection system is inadequately developed and financial base for public service including MSWM is weak. In addition to limited funds, many local governments in developing countries lack good financial management and planning. For instance, Zurbrugg (as cited in Gebrie, 2009, p.22) stated that in a developing country town over 90% of annual budget provided for solid waste management was used up within first six months. Lack of financial management and planning, particularly cost accounting depletes limited resources available for the sector even more quickly and causes solid waste management services to halt for some periods, thus losing trust of service users.

2.2.1.3 Institutional Constraints

The waste management regime in developing countries is rarely integrated, and there is often no clear assignment of responsibilities and schedules among the organizations involved. Furthermore, there is often no umbrella organization to coordinate overlapping responsibilities for waste management that involve more than one agency. This situation not only hinders effective implementation of waste management operations, but also produces confusion in relation to technical cooperation and assistance projects among donors. Along with these organizational and structural problems, lack of an effective legal system and technical standards constitute a major constraint. Legal provisions related to solid waste are often incorporated as fragmented elements in disparate laws, such as laws for public hygiene, local administration, and environment protection generally speaking, there is no integrated legal framework to deal with waste management in developing countries Zurbrugg, C. (2002).

2.2.1.4 Social Constraints

Social status of solid waste management workers is generally low both in developed and developing countries, but more severe in developing countries than developed countries. Such

People's perception leads workers to disrespect their work and in turn produces poor quality of their work. At dump sites, transfer stations, and street refuse bins, waste picking or scavenging activities are common scenes in developing countries. People involved have not received school education and vocational training to obtain knowledge and skills required for other jobs. They are also affected by limited employment opportunity available in formal sector. The existence of waste pickers (scavengers) creates often an obstacle to the operation of solid waste collection and disposal services. However, if organized properly their activities can be effective in waste management system. Such an opportunistic approach is required for sustainable development of solid waste management programs in developing countries (Ogawa, 2002).

2.2.1.5 Awareness and Attitudes

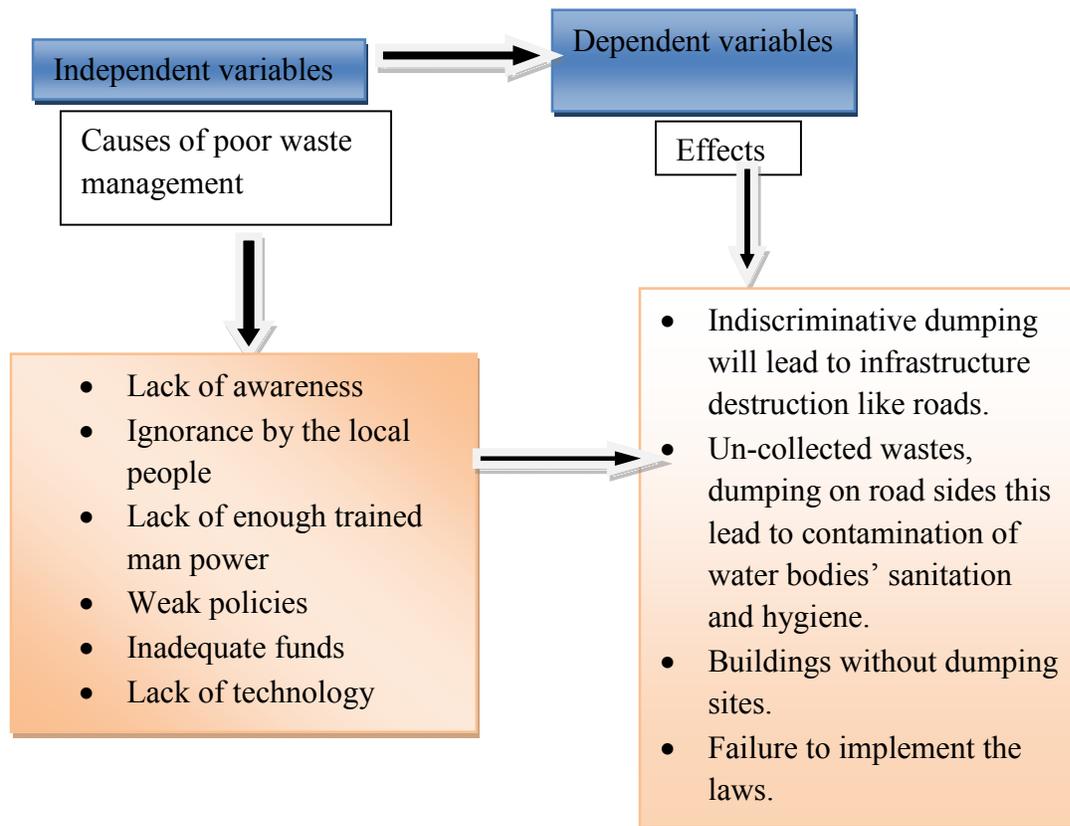
Public awareness and attitudes to waste can affect the whole municipal solid waste management system. All steps in municipal solid waste management starting from household waste storage, to waste segregation, recycling, collection frequency, willingness to pay for waste management services, and opposition to siting of waste treatment and disposal facilities depend on public awareness and participation. Thus, lack of public awareness and school education about the importance of proper solid waste management for health and well-being of people severely restricts use of community based approaches in developing countries and also crucial factor for failure of a MSWM service in developing countries (Zurbrugg, 2003).

2.3 Municipal Solid Waste Management in Ethiopia

Solid waste management is becoming a major public health and environmental concern in urban areas of Ethiopia. In Ethiopia, like developing countries, increase of solid waste generation is resulted from rapid urbanization and population booming. According to Zebenay(2010, p.39), "[t]he average solid waste generation rate is about 0.221kg per person per day and it is also estimated that only 2% of the population received solid waste collection services". This shows that the operational condition of MSWM service and efforts made to change the situation are low. As a result, small proportions of the urban dwellers are served and large quantity of solid waste left uncollected.

The involvement of private sectors are also very limited, but currently a number of micro and small scale enterprises are emerging to participate in primary solid waste collection i.e. collect garbage at source from households and transport it to the municipal waste containers and transfer points. To sum up the real situation of MSWM in Ethiopia indicates that the problem of solid waste cannot be solved only by mere effort of municipal government, there should be large involvement of the private sectors in general and participation of micro enterprises and community in particular (Abebe,2006).

Figure1. Conceptual Frameworks



Source: Computed by the Researcher

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Description of the study Area

This study was conducted at Jimma town, Southwestern part of Ethiopia. Jimma is one of the biggest and dominant political, Economic, cultural and historical towns in the southwestern part of the country, which has been, founded in the late 1830s. It is situated 335kms from Addis Ababa on the main road of Mettu – Gambella. Geographically, the town is located 70 40’N latitude and 360 60’E longitudes. According to the master plan of the town, the total area of land town is 4623 Hectares. The population of Jimma town is estimated to be 170,009 (Central Statistical Agency) (CSA, 2007) with annual population growth rate of 4.9%. The town has 17 administrative kebeles and River Awettu is crossing at the center of the town.

3.2 Research Design

Descriptive research design method was employed for this thesis. Because descriptive research method is suitable for describing the existing condition and invest phenomena in their natural setting (Koul, 1997). Thus, descriptive survey approach was employed in the study. It was used to describe analysis and interpret nature of the problem under study based on the data collected from both primary and secondary sources. In order to address the stated objectives both qualitative and quantitative research approaches were utilized.

3.3 Sources of Data

The data were collected from both primary and secondary sources. Primary source of data includes the residents, municipal management workers, and key informants using questionnaires and interview. The secondary sources of data include published and unpublished documents. It included strategic plan, reports, and documents from Jimma town municipality, and researches undertaken in the regional and country level. Besides, books, policy documents about factors affecting municipal solid waste management's and journal articles were used.

3.4 Sampling and population

In order to collect primary data, the researcher used three different sample sizes with different sampling procedures. . In all cases, sample sizes were determined by considering financial, time and resource constraints. To decide this sample size and selecting samples, the researcher employed three stages. In the first stage the researcher used stratified random sampling techniques to classify 17 kebeles of the town in to 4 separate strata namely inner (kebeles close to the center), middle (kebeles located in the middle distance to the center), and periphery (rural kebeles of the town) based on geographical location, population density and availability of different infrastructures.

The second stage was selected kebeles that represent those stratum. The researcher selected 4 kebeles, one from each stratum, by using simple random sampling method. This was mainly because; the researcher believed that those kebeles located in each stratum have homogenous characteristics with respect to proximity to the center of the town, population density, and availability of infrastructures as well as the severity of the problem toward waste management system of the town. In third stage, to determine the sample size of the study area the researcher used Yamane's formula (Yamane as cited in Israel, 1992).

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

n= sample size.

N= Population of sampled Kebeles

= the precision level (acceptable sampling error) (0.07) with the contingency of 5% the sample size

Finally, by using proportional allocation method the researcher decided to take sample households from selected kebeles. These sample households were drawn for data collection using simple random sampling method. Additionally, purposive sampling was used to select the responsible bodies or heads of each institution, sanitation and beautification bureau.

Table 1: Sampled Kebeles and households of Jimma town

No	Sampled kebeles	Total population	Numbers of sampled households (5%)	Sampling method
1	Bacho Bore	5779	98	Simple random sampling
2	BosaKito	1567	27	Simple random
3	MenderaAwettu	2818	48	Simple random
4	GinjoGuduru	2021	38	Simple random
	Total	12365	211	

Source: Jimma town municipality, 2017/18

3.5. Methods of Data Collection

3.5.1. Data Collection procedure

To collect data on the factors affecting municipal solid waste management practices, questionnaires were distributed to the randomly selected households in four kebeles of the town. The questionnaires were distributed and collected with the help of field assistants. In addition to this relevant and accurate information was collected from different stakeholders such as municipality, kebele administrators and sanitary committee through interview. Regarding the secondary data relevant published and unpublished documents were reviewed.

3.5.2 Data collection Instruments

The researcher was used three basic instruments in the process of collecting necessary data for the study, namely: questionnaire, interview and field observation.

3.5.2.1 Questionnaire

For data collection the researcher employed a questionnaire as the major tool. The questionnaires were composed of closed and open ended questions which were distributed to the respondents. Close ended questions have advantage of easier to filled by the respondent and they were easier to analyze, interpret, administer and economical, whereas the open-ended questions have benefits to allow greater depth and variety of responses from the respondents. This instrument was chosen for its flexibility in time management in the respondents since they could complete the questioner at their own time without promoting from the researcher.

3.5.2.2 Interview

Interview was conducted for gathered information from the municipalities, administration of the town, sanitary committee, and kebeleadministrator's office because it is an appropriate tool for the researcher to get responses given as well as to develop follow up questions to gain deeper insights in to the concerns of official. Interview was selected because of its advantages in providing the chance of obtaining in depth data related to the problems.

3.5.2.3. Observation

The observation method is the most commonly used technique in collecting primary data. The main advantage of this method is that the information obtaining under this method relates to what is currently happening; it is not complicated by either the past behavior or future intentions (Kothari, 2004). It was employed to observe solid waste management practices at the household level in the town. It is not about what people have written or what they say, but it is what they do. Thus, this technique was carried out through personal observation in the field by prepared checklist which was designed to generate data about the condition of the study area and also enable to assess the environmental problem of the study area.

3.6. Validity and Reliability of the Study

Validity and reliability issues intend to consider whether the tools used were addressing what they ought to study and whether the measures used are consistent. Reliability is the extent to which a measurement gives results that are consistent and validity of an assessment is the degree

to which it measures what it is supposed to measure. To check validity in this study, the instrument was given to experts in the field and to those who are well experienced in research in the field under study for their comment and critique. Reliability was judged via the calculation of a Cronbach alpha coefficient (Cronbach, 1951). Most researchers in the area suggest that a Cronbach Alpha test above 0.7 is well grounded in social science. Thus, alpha scores above 0.7 considered for further analysis.

3.7. Study Variables

In this study, the variables were organized in to three categories, based on the research questions being investigated. The independent variables were represented by cause of poor waste management whereas the dependent variable was its effect on waste management system.

3.8. Method of Data Analysis

Finally, after all relevant primary and secondary data were collected it was processed, analyzed and interpreted in both qualitative and quantitative methods. In the qualitative method, the existing situation of the problem was organized, summarized and explained thematically for the comparison and analysis of attributes. Quantitative data was also introduced into excel and simple statistical measures such as frequencies, percentages and means were used to reduce the volume of data, made it easier to understandable. In addition, tables, photos and figures were used to analyze the data. Finally, conclusion and recommendation were formulated based on the major finding of the study.

3.9. Pilot Testing

Pilot study was conducted in Jimma town selected kebeles of householders to check the reliability of items prior to the final administration of the questionnaires to all respondents. The pilot test was conducted to secure the validity and reliability of the instruments with the objective of checking whether or not the items included in the instrument can enable the researcher to gather relevant information. Besides, the purpose of pilot testing was made necessary amendment so as to correct confusing and ambiguous questions. The result of the pilot testing is statistically computed by the SPSS version 20 computer program. The Cronbach's Alpha model used for analysis. Based on the pilot test, the reliability coefficient of the instrument was found to be statistically calculated.

Checking the validity and reliability of data collecting instruments before providing to the actual study subject was the core to assure the quality of the data (Yalew, 1998; Daniel, 2004). The participants of the pilot test was also taken as firsthand informed about how to evaluate and give feedback on the relevance of the contents, item length, clarity of items and layout of the questionnaire. Based on the reflections, the instruments were improved before they were administered to the main participants of the study so that irrelevant items were removed, lengthy items were shortened and many unclear items were made clear

10 Ethical Considerations

To maintain the ethics requirement of the study, letter of permission was obtained from Jimma University to the respective concerned institutions. Informed consent was secured from the informant officers concerned and thus respondents before interview. The respondents were given the privilege of not writing and/or mentioning their name and other identities to encourage. They responded without hesitation and threat. Furthermore, responses were treated confidentially. No respondent was forced to fill the questionnaire unwillingly. Respondents were t free to express their opinions and feelings without any reservation.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

The main objective of this thesis was to assess the major factors influencing effective municipal solid waste Management in Jimma town. Subsequently, this chapter deals with the presentation, analysis and interpretation of data collected on the major factors affecting effective municipal solid waste management and strategies to improve municipal solid waste management system. This part presents characteristics of respondents and the results of findings from the data gathered through the questionnaire, interview and document analysis.

4.1 Demographic Characteristics of the Respondents

Understanding about the overview of the respondents characteristics was important for further analysis of their responses. Hence, attempts were made to describe the background of the respondents who are directly or indirectly related to the objectives of the study. Accordingly, the general demographic characteristics of the respondents in sex, age, levels of educational, house ownership condition, family size and average monthly income were analyzed and discussed in terms of frequencies and percentage as follows.

Table 2: Demographic Characteristics of Respondents

No	Variables	Respondents Category	Frequency	Valid percent (%)
1	Sex	Male	29	14.5
		Female	171	85.5
		Total	200	100
2	Age	18-29	120	60
		30-45	50	25
		46-60	30	15
		Total	200	100
3	Levels of education	Primary	29	14.5
		Secondary	82	41
		Diploma	46	23
		Degree and above	27	13.5

		Others	16	8
		Total	200	100
4	House ownership condition	Kebele rental house	60	30
		Private rental house	90	45
		Private house	50	25
		Total	200	100
5	Family size	1-3	70	35
		4-6	90	45
		7-9	30	15

Source: own survey, 2018

In terms of sex statistics only 14.5% of the respondents were females while the male respondents were 85.5%. This is an indication that we have more male participating in the study. In terms of age characteristics, 60% of the respondents were between the ages of 18 to 29; 25% of them are between 36 to 45 years; and 15% were above 45.

The other influentially relevant demographic characteristics is education, because a level of education tends to influence the performance of employees in all fields, and could much significantly influence the performance of SWM sector in the research area. Statistics from own survey shows the distribution of respondents by their level of education. It shows that majority (41%) of the respondents had completed secondary education; while 14.5% had primary education; the other 23% of the respondents had diploma; 13.5 % of the households had degree and above and 8% of the respondents were others.

This revealed that most of the respondents have secondary education background. Therefore, this educational distribution of householders leads us to the realistic conclusion that it has been carrying out the operation in the capacities of management and technical work required in solid waste management of the town sufficiently.

Finally, income level of participated households' also illustrated in table 4 .Households were categorized into four groups based on their monthly household income Thus, dominant (15 %)

number of sample households' average income is grouped in the first category who earns less than 600 birr per month. But the highest numbers of households (35 %) were earning greater than 2000 birr.

Table 4: income

		Freque ncy	Percent	Valid Percent
Val	<2000	30	15.0	15.0
id	2001-3000	80	40.0	40.0
	3001-5000	70	35.0	35.0
	above 5000	20	10.0	10.0
	Total	200	100.0	100.0

Source: own survey, 2018

4.2. Duration of respondents' stay in the Study Area

The majority of the respondents (55%) have been staying in the study area for more than 5 years whereas, 35% of the respondents have been staying in the study area more than one year. Duration of respondents' stay in the study area is expected to influence the willingness to pay for municipal solid waste management system, since the longer the period of stay in a study area, the more they are likely to understand the problems of municipal solid waste management in the area and the more they would be willing to pay for improvement in the waste management. Only 10% of the respondents have been in the study area for less than one year.

Table 5: The rate of household solid waste generation

No	Solid waste type/category	Mean	SD	SA		A		U		DA		SD	
				No	%	no	%	n	%	no	%	no	%
1	Solid waste in Jimma Town has been increasing over time	1.93	.7536 2	45	22.5	140	70	2	1	10	5	3	1.5

Source: own survey, 2018

The results revealed that majority 140(70%) of the respondents were agreed that solid waste generated increasing from time to time whereas 5% of the respondents were disagreed on the issues.

4.3. Householders’ views on municipal Solid Waste Disposal Practice in Jimma town

Table 6: Sampled householders views on Solid Waste Disposal Practice in Jimma town

No	Solid waste disposal practice	Mean	SD	SA		A		U		DA		SD	
				No	%	no	%	no	%	No	%	no	%
1	The existing disposal site is far-away from your collection point	2.96	1.074	2	1	100	50	15	7.5	70	35	13	6.5
2	Municipality did provide designated and accessible land	2.34	0.432	7	3.5	78	39	11	5.5	100	50	4	2

	fill site												
3	The existing disposal site is maintained (regularly removed)	3.570	.8995			46	23	4	2	140	70	10	5
4	The situation of sanitation around the waste container is not convenient	3.015	.9692	4	2	70	35	55	27	61	30	10	5
5	the waste disposal arrangement is convenient	3.11	1.197	21	10	55	27	20	10	89	44	15	7.5

Source: own survey, 2018

As Table 6 item 1 indicates, the existing disposal site is far-away from their collection point. Consequently, 100(50%) of households under the study area agreed on the issues, whereas, 70(35%) of the sampled respondents were disagreed on the issues at a mean value of (2.96). Therefore, it is possible to conclude that, the existing disposal site of the town is far-away from householders' collection point. Regarding item 2, 100(50%) of the sampled households disagreed that municipality did provide designated and accessible land fill site; whereas 78(39%) of the respondents agreed on the raised point. Accordingly, households with (\bar{x} =2.34, SD=0.432) mean scores respectively reported that municipality did provide designated and accessible land fill site very weak.

Similarly, as item 3 of the table above indicates, respondents were asked whether the existing dumped waste is maintained (regularly removed). Accordingly, 140(70%) of the sampled respondents disagreed on the issues at a mean value of 3.570

As Table 6 item 4 indicates the respondents were asked whether the situation of sanitation around the waste container is not convenient. Accordingly, 70(35%) of the sampled respondents agreed on the issues at a mean value of 3.015 whereas, 61(30.5%) of the sampled respondents were disagreed on the issues. Therefore, it is possible to conclude that, the situation of sanitation around the waste container is not convenient. Similarly, as revealed in item 5 of the above table, respondents were asked whether the waste disposal arrangement is convenient. Accordingly, 89(45.5%) of the sampled respondents disagreed on the issues at a mean value of 3.11 whereas 20(10%) of the sampled respondents were agreed on the issues. This indicates that the waste disposal arrangement is not convenient.

On the other hand, the data collected from the interview indicates that there was one open dumpsite where all collected waste is disposed off. It has been established 3 years ago. The site is known as "kofe" located about 5 km away from the city center. The method of disposal was crude open dumping: hauling the wastes by truck and spreading on it the wastes. The disposal site was one of the identified challenges to the system. This problem has forced the agency to introduce new dumping site at Kofe way' which is much further away than the old one at Boye.

This new dumpsite also creates major clash between the agency, waste collectors and the surrounding community due to low compensation or no compensation for land owners, or negative externalities to community and additional distance to waste collectors as said by one of the key informants. The survey result from respondents also confirmed this fact. When we sum up the current disposal practice indicators, 75 percent of the respondent says the existing disposal site is far-away from the collection point. This indicates a deficiency on the indicator (the agency did not provide designated and accessible landfill site). The respondents view, interview and observation show that the current disposal site shows poor status.

4.4 Distance of containers utilization of households of Jimma town

Table 7: Distances of containers utilization by householders of Jimma town

no	Distance	No	Valid percent
1	100-500m	10	5
2	501-1000m	40	20
3	1001-1500m	30	15
4	1501-2000m	30	15
5	>2000m	90	45
6	Don't known	-	
	Total	200	100

Source: own survey, 2018

Based on the information in the above table, only 40 (20%) of the households were found within the service area of the container. From personal observation, it was known that some households were far away (more than 2km) from any nearby container. These containers are also not properly covered and as a result they act as good breeding sites for microorganisms and insects. They are also characterized by bad smell during this study time and some Kebeles did not have containers at all.

4.5. Community awareness and perception about municipal solid waste management in Jimma town

Table 8:Community awareness and perception about municipal solid waste management in Jimma town

No	Details	Indicator	F	%
1	Does solid waste management service in your area is a burning issue as it compared with other service like road service, water supply etc	Yes	146	73
		No	54	27
2	Have you ever obtained training, education or information about solid waste management	Yes	168	84
		No	32	16
3	Do you and your neighbors ever discuss the waste situation in these neighborhoods?	Yes	147	73.5
		No	53	26.5
4	Have you ever participated in a cleanup campaigns in your kebele	Yes	126	63
		No	74	37

Source: own survey, 2018

The result in table 8 item 1above revealed that the majority (73 %) of the respondents agreed thatsolid waste management service in their area is not a burning issue as it compared with other service like road service, water supply etc.Similarly, item 2 revealed that the majority (84%) of the respondents agreed that they were not obtained training, education or information about solid

waste management whereas (16%) of the respondents believed that they have obtained training about solid waste management. When we see whether households' participated in a cleanup campaigns in their kebeles, majority (63%) of respondents were not participated whereas (37%) of the respondents were participated. Therefore, it is possible to conclude that the respondents have low perception towards solid waste management. The results are consistent with the observations and interviews which indicated that most members of the community perceive solid waste management to be the responsibility of Local government and they have of the opinion that solid waste management exclusively implies collection and disposal of the wastes by municipal authorities. A significant proportion of respondents perceive solid waste management simply as disposal in open and undesignated places such as water streams, market places and roadsides. Therefore, from the analysis it can be concluded that the community's awareness is a key factor for effective participation and successful implementation of community activities.

4.6. Households responses about their view on the rules and regulations of solid waste management in Jimma town

Table 9: Households responses on the rules and regulations of solid waste management in Jimma town

Details	Indicator	F	%
Do you know the rules and regulations of solid waste management of the town	Yes	59	29.5
	No	141	70.5
Have you ever seen when violators of regulation in solid waste management are penalized	Yes	62	31
	No	138	69
Have you ever seen the sanitation agent making supervision and control on illegal dumping of solid wastes on the streets, open areas, river side's and other areas	Yes	58	29
	No	142	71

How do you evaluate the municipal solid waste management service of the town which is delivered by sanitation, beautification and park development of Jimma under the jurisdiction of municipality	Verysatisfactory	23	11.5
	Satisfactory	54	27
	Fair	53	26.5
	unsatisfactory	70	35

Source: own survey, 2018

Table 9 item 1 and 2 revealed that the majority (70.5%) and (69%) of the sampled householders indicated that they do not know about the rules and regulations and they didn't see when violators of regulation in solid waste management were penalized respectively. Conversely, (29.5%) and (31%) of the sampled householders under the study area stated that they know the rule and regulation and they have seen when violators of regulation in solid waste management were penalized respectively. This may not necessarily mean that they actually know, rather it shows their good will to know. According to the sampled kebeles administrative, the low awareness of the community on the rules and regulations of solid waste management of the town were due to the absence of training and their low educational level.

Similarly, item 3 revealed that 71.5% of the respondents were didn't see the sanitation agent making supervision and control on illegal dumping of solid wastes on the streets, open areas, river side's whereas 29% of the respondents had seen the sanitation agent making supervision and control on illegal dumping of solid wastes. This indicated that there were low supervision and control on illegal dumping of solid wastes by sanitation agents. Similarly, when we see households' satisfaction towards solid waste management in Jimma town, table 9 item 4 revealed that the majority (35%) of the respondents were not satisfied with the municipal solid waste management service of the town which is delivered by sanitation, beautification and park development of Jimma under the jurisdiction of municipality. This implies that there is a desire for the improvement of SWM services in Jimma town. From among the respondents, 11.5% of the respondents indicated that they are satisfied with the current service system but they believe that there are still so many problems that need to be considered.

4.7. The major factors that strongly affect Municipal Solid Waste Management in Jimma Town

4.7.1. Analysis of Descriptive Statistics

Therefore, more power should be devoted to the department, and legal responsibilities should be made to match the required financial resources, so that the department can effectively perform the duties assigned to it. Otherwise, solid waste management in the town will continue to suffer with shortage of financial resource since it is very difficult for waste management system to be effective without generating its own efficient and sustainable revenue base.

4.7.1.1 Study Variables

4.7.2. Financial constraint and Solid Waste Management system in the town

Table 10: sampled respondents view financial factors of SWM in Jimma town

no	Indicators	mea	SD	SA		A		U		DA		SD	
		n		no	%	no	%	no	%	No	%	no	%
1	There is adequate revenue generation, for provision of effective solid waste management in the town	3.93 5	.987 7	6	3	20	10	8	4	113	56.5	53	26.5

Source: own survey, 2018

Table 10 item 1 revealed that the majority (56.5%) of the sampled households indicated that there was no adequate revenue generation, for provision of effective solid waste management in the town. This finally results very weak financial performance of solid waste management service of the town since the municipality cannot collect adequate annual revenue to run all work processes. An interview conducted with the Jimma town administrative, related to indicators of financial factors as well indicated poor condition. Particularly interviewees claimed the existing payment as unfair due to shortage of adequate revenue. The combined statistical evidence and interview about the factors of financial indicators from the surveyed kebeles indicated that

financial resource was the main constraint on the solid waste service delivery practice in the research area. Hence, financial constraint was one of the major factors negatively influencing the effectiveness of solid waste management system in Jimma town.

4.8. Technical factors and Solid Waste Management practice in Jimma town

The researcher developed criteria/indicators to assess the status of technical factors of government solid waste managers. These are inadequate and weak solid waste management equipment, environmentally adaptable and maintainable equipments with sufficient spare parts, good infrastructure to collect and transport with skilled personnel.

Table 11: statistical analysis of Technical factors of solid waste managementsystem in Jimma town

N o	Indicators	Mea n	SD	SA		A		U		DA		SD	
				No	%	no	%	No	%	No	%	no	%
1	Jimma town has well planned with appropriate infrastructure, accessible spare parts when vehicles and equipments are breakdown to collect and transport waste.	4.22	.643 1	2	1	2	1	6	3	130	65	60	3 0

Source: Own survey, 2018

Table 11 items 1 revealed that the majority (65%) of the sampled households indicated that there was no adequate solid waste management equipment with enough spare parts, skilled personnel and adequate infrastructures. In consequence, it was evident that technical factors pose serious factor on solid waste management system in Jimma town. The combined result from survey, observation and interviews data analyzed revealed that technical factors were at poor level.

Hence, poor level of technical factors was one of the negatively influencing effective solid waste management in the town under the study area.

4.9 Social Factors and Solid Waste Management practice in Jimma town

The most important factors that have influenced level and quality of operation of solid waste management services related with manpower of resource are actual size and required size, job requirement and actual qualification of staff, recruitment qualification, payment system, staff management activities like incentives and promotional opportunities, adequacy of waste management training and technical assistances, and moral aspiration of workers.

Table 12: Social factors of solid waste management practice in Jimma town

no	Indicators	mea	St.D	SA		A		U		DA		SD	
				N	%	No	%	no	%	no	%	no	%
1	Institution carries out awareness raising programs, adequate salary and sufficient additional benefits for those workers.	4.02	.704	4	2	7	3.5	2	1	154	77	33	16.5
		5	8										

Source: own survey, 2018

In this regard, 77% and 16.5% of respondents disagreed and strongly disagreed with their respective institution carried out awareness raising programs and sufficient additional benefits for their workers respectively. The survey finding using statistical value, interview and observation conclude that the department has very weak manpower and this condition can be considered as a major problem for the existing solid waste management activity of the town.

Based on the information obtained from interview made with the manager, the reason behind this inadequacy of manpower is lack of budget and low attention given by the department as well as higher officials to employ.

4.10. Institutional factors and Solid Waste Management Practice in Jimma town

Institutional strength indicators were proper organizational set ups for responsibility, integrated participation between private and public agencies, beneficiaries and the authority, and waste managing institute that are responsible to service reliability (UN-Habitat,2013).

Table 13: Institutional factors of solid waste management system in Jimma town

no	Items	Mean	St.D	SA		A		U		DA		SD	
				No	%	no	%	no	%	No	%	no	%
1	There is proper institutional set-up for solid waste management service in the town	4.11	.837	2	1	16	8			122	61	60	30
2	Several institutions or agencies are involved in SWM in the town	4.130	.810	4	2	8	4	6	3	122	61	60	30

Source: own survey, 2018

Table 13 items 1 revealed that 61% of the respondent agreed that there was no proper institutional set-up for solid waste management. Similarly, 61% of the respondents responded that there was no involvement of several institutions in solid waste management. Using interview, the researcher confirmed that there was not proper institutional set-up for solid waste management service and involvement of different stakeholders. The combined information from survey, interview and observation indicates weak institutional capacity on the waste management that would negatively influence the service delivery practice. Therefore, Jimma town needs to encourage both individuals and private institutions to provide proper solid waste management for the improvement of the required equipment to strengthen the service delivery system.

4.12 INFORMATION OBTAINED VIA INTERVIEW AND DOCUMENT ANALYSIS FROM SAMPLED JIMMA TOWN OFFICE MANAGERS

From, concerning the municipality's objectives on solid waste management during interview, it forwarded that keeping the town tidy and comfortable to its dwellers is the primary objective. There is urban cleanness, beauty and parking service department in the municipality's organizational structure, which is directly accountable for the town's purity. In addition, the municipality explained that, it is involving few micro enterprises on solid waste management and their number is three, in the three kebeles of the town, which constituted only 67 members with less functionality.

With regard to the presence of waste storage containers, the municipality responded that, the town has no waste storage containers, but there are places that are serving as waste collecting area and the municipality is using one old car for transporting solid waste. During the interview, Ato Mekiya Mohammed, who is the head of municipality of Jimma town mentioned about the sources of solid waste and its related problems? According to it, one of the factors that exaggerate solid waste related sanitation problem in the town is the absence of well-organized solid waste collection and disposal system. The main sources of solid waste in the town include household organic waste and commercial waste.

As the municipality responded, it is working on awareness creation for the community about the wise management of solid waste. The absence of any tradition of solid waste composting further aggravated the unwise management of solid waste. Concerning the municipal solid waste open dump, it forwarded that currently it is using open dump site, which harms the environment i.e. polluting the river Boye and Awatu River. Regarding the organizational strength and financial efficiency, the municipality is not well organized so as to manage the solid waste and keep the town clean. As a result, concerning the future plan to minimize the problem, he stated that

participating stakeholders and fund rising to fulfill the necessary tools, equipment's and vehicle so as to manage the solid waste in sustainable manner.

4.13. RESPONDENTS VIEWS ON STRATEGIES TO ALLEVIATE FACTORS AFFECTING MUNICIPAL SOLID WASTE MANAGEMENT IN THE JIMMA TOWN

The following were the suggestions of respondents on the implementing effective solid waste management system in the study area;

- Prepare effective and appropriate materials related to solid waste management for communities and target groups
- The community has to be provided with adequate education and develop awareness how to manage its solid wastes
- Increase residents' participation in solid waste management and adequate budget allocation
- Increase understanding of the links between solid waste management practices and other stakeholders
- Residents' understanding of the seriousness of laws regarding solid waste management

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary of the major finding

Solid waste management system is one of a serious confronts to Jimma town, mainly due to rapid urbanization and population growth. Based on the analysis more than half of the population are not familiar with the laws governing solid waste management and also not fully informed about waste treatment methods. The findings reported in chapter four summarized along the following themes that reflect the research questions. The solid waste management in Jimma town has not been carried out in a sufficient, suitable and appropriate manner. As a result, the quality of environment in town has become more serious from time to time, and people are suffering from living in such conditions.

The thesis was conducted in selected kebeles of Jimma town. Four kebeles and 200 sampled households were included using simple random sampling. Questionnaires (open and close ended) was the main data gathering tool. Interview, observation and document analysis were conducted to validate the quantitative data. The quantitative data collected by using questionnaire was analyzed and interpreted by using mean scores, standard deviation and percentiles. The homogeneity of the response was checked by comparing the mean scores of the three groups of the respondents. For this, "F" value was computed by using t-test and ANOVA. Percentage was also used during the analysis of the background information of the respondents.

The qualitative data collected through interview was analyzed qualitatively by narration in line with quantitative data. Each of the sampled households were categorized according to their sex, age, educational level, per capita income, household size, and household occupation to assess associations with solid waste management. According to the result of data analysis, the

following major findings were identified. Therefore, based on the analysis of data, the findings of the study summarized as follows

1. The findings of the study revealed that the principal sources of municipal solid wastes in Jimma town are residences, commercial areas, street sweeping, and institutions. In addition, municipal authorities in the town are unable to organize adequate collection and safe disposal of solid waste generated by the residents of the town. Thus it can be concluded that the current municipal solid waste management practice in the town was very weak and worse both environmentally and socially. Concerning storage of municipal solid waste management at household level, most kebeles in Jimma town are facing problems of similar nature. The equipment used for solid waste storage is of poor quality. In most cases plastic bags and plastic buckets are used. These containers are not properly covered as a result they act as a good breeding sites for microorganisms and insects. They are also characterized by bad smell.

2. The findings of this study also demonstrated that most of the community members under the study area do not adequately participate in solid waste management due to reasons such as perception that it is largely a responsibility of local authorities and lack of appropriate law enforcement and even enforcement of the existing laws. As a result, lack of awareness is one of the barriers to effective community participation in solid waste management system in Jimma Town.

3. The findings confirmed that Jimma town solid waste management service is very weak in terms of status, spatial coverage and solid waste management facility. Presently, in the town there are few public solid waste storage containers and road side dust bins. Those stations are located at the edge of main roads, and they are not well designed. Simply they are road side open dumps without any health, aesthetic and environmental impact considerations.

Furthermore, municipal solid waste collection and transportation activity of the town is carried out by two types of collection methods such as door to door and transfer stations solid waste collection. Door-to-door collection system is provided by municipal solid waste collectors and rarely by municipality collection truck. It is largely implemented for collection of solid waste from residential areas to transfer stations. But, the status and spatial coverage of this service is very unsatisfactory, only covers residents who are living in the center of the town and along accessible streets.

4. The findings of the study further revealed that the major factors that strongly affect municipal solid waste management in Jimma Town are weak institutional arrangement and capacity of sanitation, beautification and parks development department, low financial capacity and, insufficient manpower resource, low motivation and productivity of workers due to failure to address fundamental needs of workers, scarcity of solid waste management facilities. Meanwhile, weak enforcement of rules and regulations, linkage of the department with other sectors and organizations and poor solid waste management practices of the town households, weak participation of communities and contribution of stakeholders. Besides there is no involvement of non-government organizations, and private sector and lack of rules and enforcement specific to the issue, and lack of awareness creation under the study area were the main impediments of solid waste management system in Jimma Town.

5.2. Conclusion

Based on the findings of the study, the following conclusions were drawn:

The evidences allow the researcher to conclude that solid waste management is one of a serious confronts to Jimma town, mainly due to rapid urbanization and population growth. The solid waste management in Jimma town has not been carried out in a sufficient, suitable and appropriate manner. As a result, the quality of environment in town has become more serious from time to time, and people are suffering from living in such conditions.

Although waste was disposed appropriately at communal sites, some community members practiced crude dumping in any available space, including gutters, holes, streets, and bushes. Although, indiscriminate dumping was frequently done, the community expressed interest in controlling waste disposal through the use of bins and regular collection to dump sites. The communities appreciated improved waste management practices and were willing to pay for improved services.

The study found that the majority of the solid waste generated at home was largely food remains and plastics, which were mainly stored in uncovered plastic containers and disposed without separation. With a little push, support, and education to improve people's practices and perceptions regarding waste management, some of the challenges confronting municipalities in the area of waste management can be minimized. As a result, Spearman's correlation measurement suggested that set of indicators as influencing factors (technical, institutional,

social and financial conditions) were significantly and positively associated at different strength with sets of effective solid waste management practice measured with (collection, transportation and disposal). This indicates that the current ineffective municipal solid waste management practice was associated with factors of financial constraint, technical problem, low social condition and weak institutional set-up. Finally, environmental education's role in this case would increase understanding, skills and promote positive attitudes among residents towards environmental protection

5.3 Recommendations

Based on the findings of the study, the following recommendations were drawn to minimize and solve the problems that hinder the practice of solid waste management system of Jimma town

- The residents of Jimma town have low awareness and knowledge about solid waste management issues. This clearly indicates the need of wider public awareness creation activities. Indeed, the community has to be provided with adequate education and develop awareness how to handle its solid wastes at home and about the consequences of disposing solid wastes everywhere illegally, and not placing of solid wastes into the disposal sites properly. Jimma town Sanitation, Beautification and Parks Development Department should organize efficient controlling mechanism and sanitation agent to prevent illegal solid waste disposal. It has to work to improve the number and productivity of sanitation workers by giving reasonable salary increment, moral respect, and training.
- Jimma town should allocate enough money for the provision of solid waste management. Improving the service payment rate of private collectors, providing incentives, designing revenue generation mechanisms and access to credit system are required. The newly introduced payment system for private collectors should be revised through detailed information about their cost of collecting and transporting.
- For solid waste management to be effective there should be proper waste collection systems with qualified personnel, availability of modern vehicles and equipments so as to reduce environmental pollution and prevent health hazards. The city government and private firms should ensure better waste management through waste reduction, reuse,

and recycling of compost waste. The government should support business communities through pilot projects, funding training, and technical assistance information exchange follow up support and monitoring. The agency should facilitate proper institutional structure and integrated waste management between stakeholders. It should elongate the duration of the contract agreement with private waste managing firms for potential cost recovery; besides, the contract agreement should be modified to allow the private firms work in a flexible manner. There should be continuous assessment of satisfaction about the service delivery and supervision function as well. Prepare specified rules and regulations that focused on local problems such as institutional issues about the town's solid waste management service responsible body, stakeholder's participation and sustainable solid waste management options, and strictly enforce this rules and regulation under close supervision and inter organizational linkage.

- The cleaning agency and service delivering firms should provide awareness raising programs to inform the community about the danger and the consequences of waste, especially on illegal open dumping. Private waste managing firms also need to improve the status and conditions of workers by providing clothing adequate salary and benefits.
- The research found out that there are policies and laws that promote about effective solid waste management but it lacks strict enforcement by-laws, by the waste cleaning agencies such that dumping of waste on open pits and drainages are common. This thesis recommends that existing by-laws should be strictly enforced in all kebeles of Jimma town.

Finally, Jimma town municipality needs to encourage implementation of an integrated waste Management system would effectively solve the problem of poor waste management in the town.

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APPENDIX A
JIMMA UNIVERSITY

COLLEGE OF LAW AND GOVERNANCE

DEPARTMENT OF GOVERNANCE AND DEVELOPMENT

MANAGEMENT

Dear resident, this questionnaire was prepared for an academic purpose of the fulfillment of MA degree in Governance and development studies and it was intended to facilitate study on factors that hinder effective municipal solid waste management of Jimma town. The ultimate goal of the study was to find ways of improving solid waste management in the town. As a resident of this town your views and ideas are considered very important for the success of this academic study and it would be very much appreciated if you could spend a little time to answer this questionnaire.

Part I: Background information about the respondents

Instruction: In order to answer the following questions, put a right sign (√) in the boxes.

1. Sex: A. Male B. Female

2. Age _____

3. Educational level:

A. primary B secondary C diploma D degree and above E others

4. House ownership condition: A. Kebele rental house B. private rental house C. private house

5. Family size: _____.

6. Kebele _____

7. How long have you lived in this neighborhood? Years.....Months.....

8. Name of enumerator _____

Part II: Questionnaire for household survey

1. How often do you clean your house?

- A. Every day B. with two days interval C. with three days interval D. with one week interval
E. if others please specify it_____.

2. What type of solid waste storage material do you use in your house to store solid waste produced from your dwelling?

- A. Sack B. basket C. metal container D. plastic container ('festal') E. if others please specify it_____.

3. How will you describe the general waste situation in your neighborhoods?

- A) Very satisfactory B) Satisfactory C) Poor D) Very poor

4. How would you rank environmental sanitation in your community in relation to others in the city?

- A) One of the cleanest neighbor B) averagely clean C) Dirty D) One of the dirtiest communities in the city

5. Do you have access to door to door solid waste collection service delivered from the municipality solid waste collection vehicle?

- A. Yes B. No

9. Do you use informal sectors such as daily workers, laborers, and mentally retarded people for door to door solid waste collection from your residence?

- A. Yes B. No awareness

10. If your answer for question no 9 is 'yes', how much do you pay for the service render per month, and specify solid waste service provider criteria for fixing your charge.

11. Is there any micro and small enterprises that collect solid wastes via door to door System in your area awareness

A. Yes B. No C. I do not know

12. Apart from the above bodies what are other means you frequently use to dispose the solid waste of your household?

A. at the road sides and open fields B. dumping in river side's and gullies
C. dumping in bridges D. burn in my compound E. simply disposes in my compound

13. Is the waste container close to your home or other homes in the neighborhoods?

A) Yes how close? (E.g. distance in meters)

B) No

14. How will you describe the sanitation situation around the waste container?

A) Very satisfactory B) Satisfactory C) Poor D) Very poor

15. Is the waste dump maintained (e.g. is the waste regularly removed or burned)

A) Yes who maintains it?

B) No

16. Do you find your waste disposal arrangement convenient?

A) Yes

B) No. Why is it not convenient?

17. Does solid waste management service in your area is a burning issue as it compared with other service like road service, water supply etc.

A. yes B. no C. if other please specify it _____.

18. Do you and your neighbors ever discuss the waste situation in these neighborhoods?

a) Yes what have you?

b) No why don't you?

19. Have you ever obtained training, education or information about solid waste management?

A. Yes B. no

20. Would you be interested to learn more about solid waste management, environmental impact awareness of waste, and various ways of minimizing and treating the waste stream?

A. yes B. no

22. Have you ever participated in a cleanup campaigns in your kebele?

A. yes B. no awareness

23. If your answer for question no 22 is "yes", how many times you participate in the last year _____.

24. Do you know the rules and regulations of solid waste management of the town?

A. yes B. no awareness

25. From your views, are the Municipal practice rules and regulations in relation to solid Waste Management?

A. None at all B. Regulations are weak C. Regulations are strong D. I do not know

26. Have you ever seen when violators of regulation in solid waste management are penalized?

A. Yes B. No

27. Have you ever seen the sanitation agent making supervision and control on illegal dumping of solid wastes on the streets, open areas, river side's and other areas?

A. yes B. no institutional

28. In general, are you satisfied with the municipal solid waste management service of the town which is delivered by sanitation, beautification and park development of Jimma under the jurisdiction of municipality?

A. Very satisfactory B. satisfactory C. fair D. unsatisfactory E. very unsatisfactory

29. If your answer for question no 28 is ‘unsatisfactory or very unsatisfactory’, what would you suggest for the Environment and Sanitation, Beautification and Parks Development Department to do in order to overcome the constraints and improve the service?

30. How do you evaluate the effort made by the municipality to provide efficient solid waste management service compared with other services of the town such as water supply, electricity, telephone etc?

A. Very weak B. weak C. fair D. strong E. very strong

31. What do you think the main reasons, that hinders effective municipal solid management of the town factor

32. In your view, how can waste disposal be improved in your community?

33. If you have any additional comments, suggestions, or would like to elaborate on any of your previous answers, please include it here, or attach a separate sheet.

Thank for your cooperation

APPENDIX -B
JIMMA UNIVERSITY
COLLEGE OF LAW AND GOVERNANCE
DEPARTMENT OF GOVERNANCE AND DEVELOPMENT MANAGEMENT

Dear respondent, this interview was conducted for an academic purpose for the fulfillment of MA degree in governance and development managements. Specifically the objective of the study was to assess the major factors affecting Municipal Solid Waste Management in Ethiopia: the Case of Jimma Town. Therefore, your response is very important for the success of the study because all information that you provide determines the analysis and conclusion of the research. Hence, you are kindly requested to give your response. Please be informed that your response is kept in confidential. I would like to thank you for your cooperation.

Part II: Interview Questions prepared for key informants

1. What are the plans of your offices with regard to solid waste management of the town? Is it implemented; if yes how and if not why not?
2. How do you evaluate the problem of solid waste management in this town?
3. How do you evaluate the existing solid waste management practice in the town?
4. Are there stakeholders in solid waste management in your town?
5. Who is responsible for solid waste management in the town?
6. How is your institution's integration with municipality on solid waste management of the town?
7. What is the appropriate way in carrying out integrated solid waste management?
8. What are the major problems associated with the existing solid waste management practice in the town?

9. In your opinion what measures should be taken to improve the existing solid waste management practice in the town? By your institution, by the municipality, by the community other (mention)

JIMMA UNIVERSITY

The following is questionnaire for households which prepared in national language (Amaharic)

ውድየመኖሪያነዋሪ,

ይህመጠይቅ

MA

ዲግሪበአስተዳደርናየልማትጥናቶችአፈፃፀምላይያተኮረትምህርታዊዓላማተዘጋጅቶየተጠናቀቀሲሆን,

የጅምርተማንውጤታማየሆነየከተማማጠንከሪያቆሻሻአያዝንየሚያግዙጉዳዮችንለማመቻቸትየተዘጋጀነበር.የጥናቱየመጨረሻግብከተማውስጥጠንካራየቆሻሻአወጋገድንየማሻሻልዘዴዎችመፈለግነበር.

የዚህከተማነዋሪዎችንደመሆንዎመጠንየእርስዎአስተሳሰብእናሃሳቦችበዚህየትምህርትመስክስኬታማነትበጣምአስፈላጊእንደሆኑ ተደርጎይቆጠራሉእናለዚህመጠይቅለመመለስትንሽጊዜቢያጠፉምበጣምየሚደነቅይሆናል

ክፍል 1: ስለምላሽሰጪውዳራመረጃ

መመሪያ-ለሚከተሉትጥያቄዎችመልስለመስጠት, በሳጥንውስጥትክክለኛምልክት (✓) ያድርጉ.

- 1. ያታ:ሀ. ሴትላ. ሴት
- 2. ዕድሜ _____
- 3. የትምህርትደረጃ:
 - ሀ. የመጀመሪያለየሁለተኛዲህዲፕሎማሠዲዲግሪእናከዚህበላይ
- 4. የመኖሪያቤትባለቤትነትሁኔታ-ሀ. ቀበሌየቤትኪራይ B. ለግልየቤትኪራይC. የግልቤት
- 5. የቤተሰብብዛት: _____.
- 6. ቀበሌ _____
- 7. በዚህሰፈርውስጥለምንያህልጊዜኖረዋል? አመታት
- 8. የመዘገበስም _____

ክፍል 2: ለቤተሰብየዳሰሳጥናትመጠይቅ

- 1. ቤትዎንምንያህልገደዳሉ?
 - ሀ. በየቀኑላ. በሁለትቀናትመካከልያለውየጊዜልዩነትሐ. በሦስትቀናትመካከልያለውልዩነት
 - D. በአንድሳምንትጊዜውስጥ
- ሠ. ሌሎችአባክዎንይጥቀሱ _____.

2. በቤትዎውስጥየተካሄደውቆሻሻዎችንለማከማቸትበቤትዎውስጥምንዓይነትቆሻሻመጣያቁሳቁሶችምንንይጠቀማሉ?
ሀ. እንጨቶችሉ. የቅርጽቅርጫትሐ. የብረትኮንቴይመ . የፕላስቲክእቃ ('ፊስቲቫል')ሠ. ሌሎችእባክዎንይጥቀሱ

3. በአካባቢያችሁያሉትንአጠቃላይየቆሻሻመጣያሁኔታየሚገልጹትእንዴትነው?
ሀ) በጣምአጥጋቢነው)ለጥልቀትሐ) ደካማመ) በጣምደካማ

4. በከተማዎውስጥከሌሎችጋርበተዛመደበአካባቢያችሁያለውንየአካባቢንየንፅህናአጠባበቅእንዴትያክብሩ?
ሀ) በጣምንጹህነረቤትለ) ንጽሕናንጠብቆሐ). ቆሻሻመ) በከተማውስጥከሚኖሩትበጣምቆሻሻዎችመካከልአንዱ.

5. ከኮምፕዩተርቆሻሻየእቃማንንጥተሽከርካሪየሚመጣውከቤትወደበርጥገኛቆሻሻማሰባሰብአገልግሎትያገኛሉ?
ሀ አዎን-----

ለአይደለም-----

9. መደበኛካልሆኑትየሰራዘርፎችማለትምከፊትቀንሰራተኞች, ከሰራጠባቂዎችእናከአምሮላሎችግሮችአሏቸው?
ሀ አዎ-----

ለአይደለም-----

10. ለጥያቄ 9 መልስዎ<አዎ>ከሆነ, በወርለተሰጠውአገልግሎትምንያህልይከፍላሉ,
እናየእርስዎንጥሬገንዘብለማስተካከልየጠንካራቆሻሻአገልግሎትአቅራቢመስፈርቶችንይጥቀሱ.

11. በአካባቢያችሁያሉጥልቀትየሌላቸውጥቃቅንእናጥቃቅንተቋማትከቤትበርወደቤትየሚሰራእቃዎችመሰብሰብይችላሉ?
ሀ. አዎአይደለምላ. እኔአላውቅም

12. ከላይከተጠቀሱትአካላትሌላለቤተሰብዎየማይረገውንበክነትለማስወገድበተደጋጋሚየሚጠቀሙትምንድንነው?
ሀ. በመንገዶችዳርእናበክፍትመስመሮችላይ. ለ. በወንዝወንዝእናጅብቶችውስጥመትከል
ሐ . በግድግዳዎቹውስጥመገልበጥ

13. በቆሻሻማጠራቀሚያ (ኮንቴይነር) መሰብሰብያቤትዎወይምበአካባቢዎያሉሌሎችቤቶች?
ሀ) ምንያህልቅርብነው? (ለምሳሌ, ርቀትበሜትር)

ላ.) አይ-----

14. በቆሻሻማጠራቀሚያዙሪያያለውንየንጽህናሁኔታየሚገልጹትእንዴትነው?

ሀ) በጣምአጥጋቢነው) ጥልቀትለለ) ደካማሐበጣምደካማ

15. የተረፈቆሻሻመጣያቦታ (ለምሳሌ, ቆሻሻውበመደበኛነትየተወገደውወይምየተቃጠለነው)

ሀ) አዎ, እሱያቆየዋል?

ለ) አይ-----

16. የእርስዎቆሻሻማስወገኛዝግጅትምቹነው?

ሀ) አዎ

ለ) አይሆንም ,ለምንጥሩአይደለምየምንለው?

17. በአካባቢዎየተከማቸዎቆሻሻአይያዝአገልግሎትከሌሎችየመንገድአገልግሎት, የውሃአቅርቦት, ወዘተጋርሲነፃፀርየሚነካችግርነው.

ሀ / አዎአይደለምሐ. ሌላካለእባክዎንይግለጹ. _____.

18. እርስዎናጎረቤቶችዎበእነዚህሰፈሮችውስጥያለውንቆሻሻሁኔታበተመለከተተወያዩበት?

ሀ) አዎምንድንነው?

ለ) ምንምአይሆንም?

19. ስለቆሻሻቆሻሻአይያዝሥልጠና, ትምህርትወይምመረጃአግኝተዋል?

ሀ. አዎ ለ. አይደለም

20. ስለቆሻሻቆሻሻአወቃቀርተጨማሪመረጃ,

ስለብክነትመከሰትእናየአካባቢብክለትንግንዛቤለመጨመርእናቆሻሻውንለመከላከልእናለማከምየተለያዩዘዴዎችንለመማርፍላጎትአለዎት?

ሀ. አልችልምለ. አጥጋቢመልስየለም

29. ለጥያቄቁጥር 28 መልስዎ 'አጥጋቢወይምአጥጋቢአይደለም' የሚለውከሆነለጉዳዩእናለንፅህና,

ውበትእናየመዝናኛዲዛይንመምሪያዎችምንያህልእገዳዎችንለማሸነፍናአገልግሎቱንለማሻሻልምንያደርጉዎታል?

30. በኮምፎኑውስጥየውሃ የኤሌትሪክ፣

የቴሌፎንወዘተየመሳሰሉትንከከተማውሌሎችአገልግሎቶችጋርበማነፃፀርበኮምፎኑውስጥውጤታማየሆነየተጣራየቆሻሻአይደለም፤
ልግሎትለማቅረብየሚደረገውንጥረትእንዴትይገመግሙታል?

ሀ. በጣምደካማለደካማሐ. ፍትሐዊ. መጠንካራሠ. በጣምጠንካራ

31.

የከተማውንተጨባጭሁኔታበማስተካከልየተደራጀውውጤታማየከተማዋጠንካራአስተዳደርእንዳይታወቅየሚያደርጉዋናምከንያ
ቶችምንይመስልዎታል?

32.በእርስዎአመለካከት፣ ቆሻሻንበአካባቢ ማህበረሰብውስጥእንዴትማሻሻልይቻላል?

33. ማንኛውምቀዳሚምላሾችዎላይማንኛውምተጨማሪአስተያየቶች፣ አስተያየቶች፣ ወይምመግለጫዎችካለዎት፣
እባክዎእዚህያይዘት ወይምሌላወረቀትያያይዙ.

ለትብብርዎእናመሰግናለን!

