Addis Ababa University

College of Business and Economics

Department of Public Administration and Development Management

Assessment of Municipal Solid Waste Management Practices: A case Study of Bishoftu City Administration

By

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This is to certify that the thesis prepared by **Endalkachew Abrhame** entitled **"Assessment of Municipal Solid Waste Management Practices: A case Study of Bishoftu City Administration"**, which is submitted in partial fulfillment of the requirements for the Degree of Masters in Public Management and Policy (MPMP), complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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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.

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List of Acronyms

SW:	**Solid Waste**
SWM:	**Solid Waste Management**
MSW:	**Municipal Solid Waste**
MSWM:	**Municipal Solid Waste Management**
ILO:	**International Labor Organization**
UN-Habitat:	**United Nations Commission on Human Settlements**
USEPA:	**United States Environmental Protection Agency**
FED:	**Finance and Economic Development**
SBPDD:	**Sanitation Beatification and Parks Development Department**
SPSS:	**Statistical Package for Social Sciences**
HHs:	**House Holds**
MSEs:	**Micro and Small Enterprises**
NGO:	**Non-Governmental Organizations**
ISWM:	**Integrated Solid Waste Management**
UNEP:	**United Nations Environmental Program**
USAID:	**The United States Agency for International Development**

Abstract

Municipal solid waste management (MSWM) refers to the collection, transfer, treatment, recycling, resources recovery and disposal of solid waste in urban areas. *This study aimed at assessment of MSWM Practices of Bishoftu City Administration Oromia regional state of Ethiopia. In the study researcher questions the existing MSWM practices look like and factors affecting MSWM system of Bishoftu City. Consequently, to accomplish the objectives descriptive type of research method was used and both primary and secondary data sources applied for the study. The primary data were collected via questionnaires, interview, and field observations. Whereas the secondary data were extracted from different published and unpublished materials. A total of 392 respondents were used in the study. The findings of the study revealed that the main types of MSW in Bishoftu are peels of vegetables, ash, plastic, paper and cardboard, garden trimmings or leaf and the physical composition of MSW in the city is composed from both biodegradable and non-degradable components, the current MSWM practice of City is weak and also there is a problem on solid waste reduction strategy: segregation, reuse, recycling, and resource recovery. According to the results three main factors that aggravate the existing poor status of MSWM practice in the city. These are: socio-cultural, technical and institutional factors. Finally, to alleviate the problems the study suggest that: SBPDD and health office of the city should engage continuous awareness creating campaign or education for the public, to improve the collection rate increase the number and capacity of MSEs, changing the open dumping system to sanitary land filling system, law enforcement section gives little attention and laws to be effective people need to know the presence of laws through awareness creation activities and implementers should aggressively work to minimize illegal disposal activities through continuous follow up.*

Key Words: Municipal Solid Waste Management; Solid Waste Management; Bishoftu

CHAPTER ONE

1. INTRODUCTION

1.1 Background context of the problem

Humans use resources to support life and produce waste (Singh & Ramanathan, 2010). Previously the disposal of wastes, according to this author, did not pose significant effect because of the assimilation capacity of the ecosystem was not exceeded. The rapid population growth followed by the fast quest for economic development, the growing complexity of technology-driven wastes and the expansion of urbanization added immense pressure on resources and the volume of waste produced (Tyagi et al., 2014). Moreover, Tyagi et al., (2014) stated that majority of developing countries are experiencing difficulties in the management of waste; especially managing the municipal solid waste produced by the growing urban dwellers.

In most developing countries, wastes are either scattered in urban centers or disposed-off and damped in unplanned way in slopes and gorges. The infrastructure, facilities and skills for collection, transportation, treatment and disposal of solid waste is not up-to-date. There are no proper solid waste management planning, adequate financial resources and technical expertise. The public attitude is low in terms of proper collection and sorting frameworks; these situations are exacerbating environmental and health related problems in urban areas of developing countries (Vaibhav et al. 2014).

Waste management is more than just collecting waste. It is the collection, transport, processing, recycling, disposal and monitoring of waste materials. Numerous factors, such as environmental, economic, technical, legislation, institutional and political issues, have to be taken into consideration (Beliën et al, 2011). The implementation of effective waste management practices has been identified as essential for economic development in low-income countries in particular (Scheinberg, 2010).

The management of MSW is going through a critical phase, due to the lack of suitable facilities for the collection, transportation, treatment and disposal of the larger quantity of MSW generated daily in urban areas (Thanh et al., 2010) . Municipal Solid Waste Management (MSWM) is one of the basic services that are receiving wide attention in many towns of Ethiopia. This is mainly because SWs that are generated in most towns of Ethiopia are not appropriately handled and managed (Solomon, 2011).

Environmentally acceptable management of municipal solid waste has become a global challenge due to limited resources, an exponentially increasing population, rapid urbanization and worldwide industrialization. Waste generation is not rare in urban areas or any part of the world. The only aspect that may differ is the way of managing or handling the wastes. The explosion in world population is changing the nature of municipal solid waste management mainly from a low priority and localized issue to an internationally social problem. The problem of managing municipal solid wastes is growing day by day, which results into a direct threat to the public health and to the environment (Chatterjee, 2010).

As stated in socio economic profile document of Bishoftu City Administration (2016), as population increased the amount of solid waste generated from households, street sweeping, garages, big installed institutions, cattle fattening enclosures and other commercial establishments have increased. According to Bishoftu City Administration Solid Waste Management Study Report (2017), the solid waste generated in the year 2012 of Bishoftu City was 43, 339.11 m^2 and the solid waste generated become 58,345.98 m^2 after five years in 2017. The waste is distracting the image of the city and is posing serious threats to human health. It is gradually becoming a breeding ground for diseases in the city. The city is gradually manifesting unhealthy condition for human dwelling in some locations. In general, the negative impacts on the environment, human and animal health is increasing from time to time. Therefore, the purpose of this study is to assess Municipal Solid Waste Management Practices of Bishoftu City Administration of Oromia Regional State.

1.2 Statement of the Problem

The population growth rate of urban population in Ethiopia, according to Birkie (1999), estimated in most urban areas especially small urban centers is doubling every 15-25 years. In line with this, Yohanis (2015) described that with economic development and population growth in urban areas results in increased solid waste generation, which demands municipalities in Ethiopia to be prepared for such challenges. Getahun et al. (2011) stated that poor solid waste management is a threat on sustainable development posing urban growth, which results in environmental pollution. Similarly, Feleke (2015) also noted that poor management of solid waste have a devastating impact up on the environment.

The research conducted by Vaibhav et al. (2014) stated that "lack of infrastructure for collection, transportation, treatment and disposal of solid waste, proper solid waste management planning, insufficient financial resources, technical expertise and public attitude have made the situation exasperating due to which several environmental and health related problems are increasing."

A research conducted by Gebretsadkan (2002) identified that absence of rules and regulations and public education on solid waste management as well as problems related with site selection for solid waste disposal, solid waste collection and transportation techniques aggravated by socio-economic factors.

However, there are researches undertaken on municipal solid waste management (see for instance, Koyachew, 2016; Solomon, 2011; Mohammed, 2015; Alie, 2015; Yohanis, 2015; Birkie, 1999; Habtamu, 2015; Nigatu, 2011) it is important to conduct another research with specific socio-economic context to confirm and extend the generalizability of the existing findings. Hence, this study was focus on Assessment of Municipal Solid Waste Management Practice in the case of Bishoftu City Administration.

1.3 Objective of the study

1.3.1 General Objective

The general objective of the study was to asses current Municipal Solid Waste Management Practices of Bishoftu city administration of Oromia regional state of Ethiopia.

1.3.2 Specific Objectives

In light of the above general objective, the study was to analyze the following specific issues related to Municipal Solid waste management practices of the Bishoftu city administration. The specific objectives of the study are to:

1. To identify the types and physical composition of MSW in Bishoftu City;
2. Assess the existing MSWM practices of Bishoftu City;
3. Analyze the factors that affect the MSWM in the City of Bishoftu

1.4 Research Question

1. What are the main types and physical Composition of MSW in Bishofu City?
2. What do the existing MSWM practices of Bishoftu City look like?
3. What are factors affecting the MSWM system of Bishoftu City?

1.5 Significance of the Study

This study is expected to be useful in three main points. First, the study will contribute to a better theoretical understanding of the overall features of municipal solid waste and problems faced in the process of municipal solid waste management. Second, it give some guideline information to policy makers, public administrators, solid waste managers, municipal leaders, researchers and environmental protection agencies who seek to improve existing solid waste management and to minimize related problems and also to see the practices in the study area. The study also important in putting baseline information to the next work as a springboard for researchers who would like to conduct detailed and comprehensive studies either in the city or another study area.

1.6 Scope of the Study

Solid waste management activities significantly vary from place to place. Regardless of scale, variation in SWM activities is related to the increasing socio-economic, financial and legal variables. The scope of this study is to assess the SWM system with the special focus of practices and challenges at local level, i.e. Bishoftu City. The study confined to small geographical area due to financial and time constraints. In respect to methodology descriptive research method was applied for this study. Moreover, although both liquid waste and solid waste are demanding subject to study, this study was dealt only Municipal Solid Waste Management Practices of Bishoftu City Administration of Oromia regional state of Ethiopia from December 2017 to May 2018.

1.7 Limitation of the study

Some of limitations of this study were lack of secondary data, financial shortage during data collection and respondents refusal to provide detailed information. But, the researcher was tried to minimize these problems and come up with reasonable findings.

CHAPTER TWO

2. REVIEW OF RELATED LITERATURE

2.1. The Concept of solid waste and its Generation

Waste is often found as a liquid or solid form (ILO, 2007). It is a by-product of human activities that tends to increase with the rate of urbanization, changing patterns of consumption and the improvement of living standards (ENPHO, 2008).

"Wastes are materials that are not prime products (that is products produced for the market) for which the initial user has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose. Wastes may be generated during the extraction of raw materials, the processing of raw materials into intermediate and final products, the consumption of final products, and other human activities. Residuals recycled or reused at the place of generation are excluded" (MacBride, R., Waste, C. & Idaho, C.P. 1953. P.89 as Cited in Alireza and Mahmoud, 2014)

The World Bank (1999) defines Solid waste (SW) as unwanted, thrown away or discarded as useless materials by human. These materials are non-liquid, non-hazardous, non-gaseous and consist of organic matter (that is easily degradable) and inorganic (non-biodegradable, for instance, metals, plastics, bottles and broken glasses). Solid waste, as stated by (Arukwe, 2012; Patwary et al., 2011; Zhang et al., 2010), are materials originate from households, commercial establishments, institutions, markets, and industries.

Rouse (2008) also noted that "Solid waste is defined as material which no longer has any value to its original owner, and which is discarded. The main constituents of solid waste, according to this author, in urban areas are organic waste (including kitchen waste and garden trimmings), paper, glass, metals and plastics , Ash, dust and street sweepings can also form a significant portion of the waste".

In Ethiopia, according to the Federal Democratic Republic of Ethiopia Proclamation No. 513/2007, Solid Waste Management Proclamation, "Solid Waste" means anything that is neither liquid not gas and is discarded as unwanted. The ever increasing amount of solid waste

generated which is exacerbated by lack of proper waste management system is of growing environmental and public health concern worldwide and in major towns and cities of Ethiopia (Endrias & Solomon , 2017).

Solid wastes generated are different from country to country or region to region which means the management system also varies. Solid waste is generated due to a lot of factors which includes the abundance and type of natural resource available, the lifestyle of citizens as well as their living standards. Solid waste is embarrassing and difficult to discuss with reason that policymaking and political discussions must deal with taboos in various locality which affects the process of arriving at achievable goals (UN-HABITAT, 2010).

Solid Waste Management (SWM) could be defined as the art of managing garbage in a specific location which may include; waste collection, recycling, treating and disposing in accordance with the agreed national or international standards (Nathanson, 2000).

In Ethiopia according to the Federal Democratic Republic of Ethiopia Proclamation No. 513/2007, Solid Waste Management Proclamation "Solid Waste Management" means the collection, transportation, storage, recycling or disposal of solid waste, or the subsequent use of a disposal site that is no longer operational.

EU Waste Directive 2008, also defines waste management as “the collection, transport, recovery and disposal of waste, including the supervision of such operations and the after-care of disposal sites, and including actions taken as a dealer or broker”

The human activities which take place in this world create waste. The wastes could be both solid and liquid types; and the way they are going to be handled, stored, and disposed can expose the environment and public health to risks (Zhu et al, 2008). SWM includes all activities that seek to minimize health, environmental and aesthetics impacts of solid waste.

Management of increasing amounts of solid waste has become a major challenge in many cities in developing countries. If solid waste is properly used, it can be a valuable resource, but if it is not effectively managed, it can result in serious adverse impacts on environment and public health. Solid waste management is therefore a critical component within urban sanitation and it

is also one of the most important and resource intensive services provided by municipalities (ENPHO, 2008).

SWM is a management system of solid wastes which embrace all the activities ranging from generation to disposal. According to Rouse (2008), the basic concept of SWM involves the "collection, storage, transportation, processing, treatment, recycling, and final disposal of waste". He also noted that, the management system should be simple, affordable, sustainable, economical, efficient, environmentally sound and socially acceptable , and providing the service for both the poor and wealthy households.

Municipal solid waste (MSW) also called trash or garbage is defined at the national level as wastes consisting of everyday items such as product packaging, grass clippings, furniture, clothing, bottles and cans, food scraps, newspapers, appliances, consumer electronics, and batteries. These wastes come from homes, institutions, etc. such as schools and hospitals; and commercial sources such as restaurants and small businesses (U.S. EPA, 2016). Municipal solid waste, according to Solomon (2011), refers to "materials discarded in urban areas for which municipalities are usually responsible for collection, transportation, and final disposal."

Municipal solid waste (MSW) is defined to include refuse from households, non-hazardous solid waste from industrial, commercial and institutional establishments (including hospitals), market waste, yard waste, and street sweepings (Ogwueleka, 2009); (Schübeler, 1996). It is also known as municipal solid waste (MSW) as it is managed by local/municipal government bodies. Its characteristic differs depending on source and nature and exists in two forms, that is; refuse and trash (USEPA, 2009).

- Refuse; includes garbage (highly de-compostable food waste such as vegetables and meat scraps) rubbish (dry material, such as, metal, cans glass, slow decomposing materials, combustible materials, textile, woods).
- Trash comprises of bulky waste materials that require special handling for instance electronics, furniture's and household items and equipment's (World bank, 2006, 1999).

Municipal solid waste management (MSWM) refers to the collection, transfer, treatment, recycling, resources recovery and disposal of solid waste in urban areas. The goals of municipal solid waste management are to promote the quality of the urban environment, generate

employment and income, and protect environmental health and support the efficiency and productivity of the economy (Ogwueleka, 2009; Schübeler, 1996).

2.2. Characteristics of Municipal Solid Waste

Municipal solid waste (MSW) is a term usually applied to a heterogeneous collection of wastes produced in urban areas, the nature of which varies from region to region. The characteristics and quantity of the solid waste generated in a region is not only a function of the living standard and lifestyle of the region's inhabitants, but also of the abundance and type of the region's natural resources (Luis et al. 2005).

2.3. Source and Types of Municipal Solid waste

Solid waste classified based on its origin, risk potential, or characteristics. Based on origin, solid waste can be classified in to food waste, rubbish, ashes and residues, agricultural waste, municipal service, industrial process waste, and demolition and construction wastes. With regards to characteristics, it is also classify as biodegradable and non – biodegradable. In addition, based on its risk potential, is again it can be categorized in to hazardous and nonhazardous wastes (CED, 2003).

However, solid wastes are usually classified based on their sources (from which they emanate). Based on this bench mark, it can be categorized in to domestic or household, commercial, institutional, industrial, municipal services, construction and demolition, agricultural wastes (Hoornweg & Bhada-Tata, 2012). The explanation of each type of waste summarized as follows:

Table 1: Types of wastes

Source	Typical waste generators	Types of solid wastes
Residential	Single and multifamily dwellings	Food wastes, paper, cardboard, plastics, textiles, leather, yard wastes, wood, glass, metals, ashes, special wastes (e.g. bulky items, consumer electronics, white goods, batteries, oil, tires), and household hazardous wastes
Industrial	Light and heavy manufacturing, fabrication, construction sites, power and chemical plant	Housekeeping wastes, packaging, food wastes, construction and demolition materials, hazardous wastes, ashes, special wastes
Commercial	Stores, hotels, restaurants, markets, office buildings, etc.	Paper, cardboard, plastics, wood, food wastes, glass, metals, special wastes, hazardous wastes
Institutional	Schools, hospitals, prisons, government centers	Same as commercial
Construction and demolition	New construction sites, road repair, renovation sites, demolition of buildings	Wood, steel, concrete, dirt, etc.
Municipal services	Street cleaning, landscaping, parks, beaches, other recreational areas, water and wastewater treatment plants	Street sweepings, landscape and tree trimmings, general wastes from parks, beaches, and other recreational area, sludge
Process	Heavy and light manufacturing, refineries, chemical plants, power plants, mineral extraction and processing	Industrial process wastes, scrap materials, off specification products, slag, tailings
All of the above should be included as "Municipal Solid Waste."		
Agriculture	Crops, orchards, vineyards, dairies, feedlots, farms	Spoiled food wastes, agricultural wastes, hazardous wastes (e.g. pesticides)

Source: (Hoornweg & Bhada-Tata, 2012).

2.4. Functional elements of Municipal solid waste

The activities associated with the management of municipal solid wastes from the point of generation to final disposal can be grouped into the six functional elements:

Table 2: Functional elements of Municipal Solid Waste

Functional element	Description
Waste generation	Waste generation encompasses those activities in which materials are identified as no longer being of value and are either thrown away or gathered together for disposal. What is important in waste generation is to note that there is an identification step and that this step varies with each individual. Waste generation is, at present, an activity that is not very controllable.
Waste handling and separation, storage, and processing at the source	Waste handling and separation involve the activities associated with managing wastes until they are placed in storage containers for collection. Handling also encompasses the movement of loaded containers to the point of collection. Separation of waste components is an important step in the handling and storage of solid waste at the source. On-site storage is of primary importance because of public health concerns and aesthetic considerations.
Collection	Collection includes both the gathering of solid wastes and recyclable materials and the transport of these materials, after collection, to the location where the collection vehicle is emptied, such as a materials-processing facility, a transfer station, or a landfill.

Functional element	Description
Transfer and transport	The functional element of transfer and transport involves two steps: (1) the transfer of wastes from the smaller collection vehicle to the larger transport equipment, and (2) the subsequent transport of the wastes, usually over long distances, to a processing or disposal site. The transfer usually takes place at a transfer station. Although motor vehicle transport is most common, rail cars and barges are also used to transport wastes.
Separation, processing, and transformation of solid waste	The means and facilities that are now used for the recovery of waste materials that have been separated at the source include curbside collection and drop-off and buyback centers. The separation and processing of wastes that have been separated at the source and the separation of commingled wastes usually occurs at materials recovery facilities, transfer stations, combustion facilities, and disposal sites. Transformation processes are used to reduce the volume and weight of waste requiring disposal and to recover conversion products and energy. The organic fraction of MSW can be transformed by a variety of chemical and biological processes. The most commonly used chemical transformation process is combustion, used in conjunction with the recovery of energy. The most commonly used biological transformation process is aerobic composting.
Disposal	Today, disposal by landfilling or land spreading is the ultimate fate of all solid wastes, whether they are residential wastes collected and transported directly to a landfill site, residual materials from MRFs, residue from the combustion of solid waste, compost, or other substances from various solid waste processing facilities. A modern sanitary landfill is not a dump. It is a method of dis-posing of solid wastes on land or within the earth's mantle without creating public health hazards or nuisances.

Source: (Tchnobanoglous & Kreith, 2002)

2.5. Integrated Solid Waste Management

Integrated Solid Waste Management (ISWM) is a comprehensive waste prevention, recycling, composting, and disposal program. An effective ISWM system considers how to prevent, recycle, and manage solid waste in ways that most effectively protect human health and the environment. ISWM involves evaluating local needs and conditions, and then selecting and combining the most appropriate waste management activities for those conditions (Shaukat & Sajjad, 2016). It is also recognized at the international level, and they incorporate all the policies, programs, and technologies that are necessary to manage the waste stream. The mix and emphasis of approaches that are taken generally varies from region-to-region and from country-to-country, and depends on local conditions (UNEP, 2005).

The "Waste Management Hierarchy" is an internationally recognized strategy for management of municipal solid wastes and it is a key element of integrated solid waste management. It also places greatest emphasis on strategies and programs for avoiding and reducing waste, with treatment and disposal being the least favored options. The purpose of the waste management hierarchy is to make waste management practices as environmentally sound as possible. It has been adopted in various forms by most industrialized countries. Its principal elements are also included in international conventions and protocols, particularly those dealing with the management of toxic or hazardous wastes, and in regional attempts to develop a coordinated policy on the reuse of various byproducts of waste management processes. The hierarchy is a useful policy tool for conserving resources, for dealing with landfill shortages, for minimizing air and water pollution, and for protecting public health and safety. In many developing countries, some aspects of this hierarchy are already in place, since traditional practices revolving around waste prevention reuse, and recycling are prevalent (UNEP, 2005). According to (Shaukat & Sajjad, 2016) this solid waste management hierarchy includes:

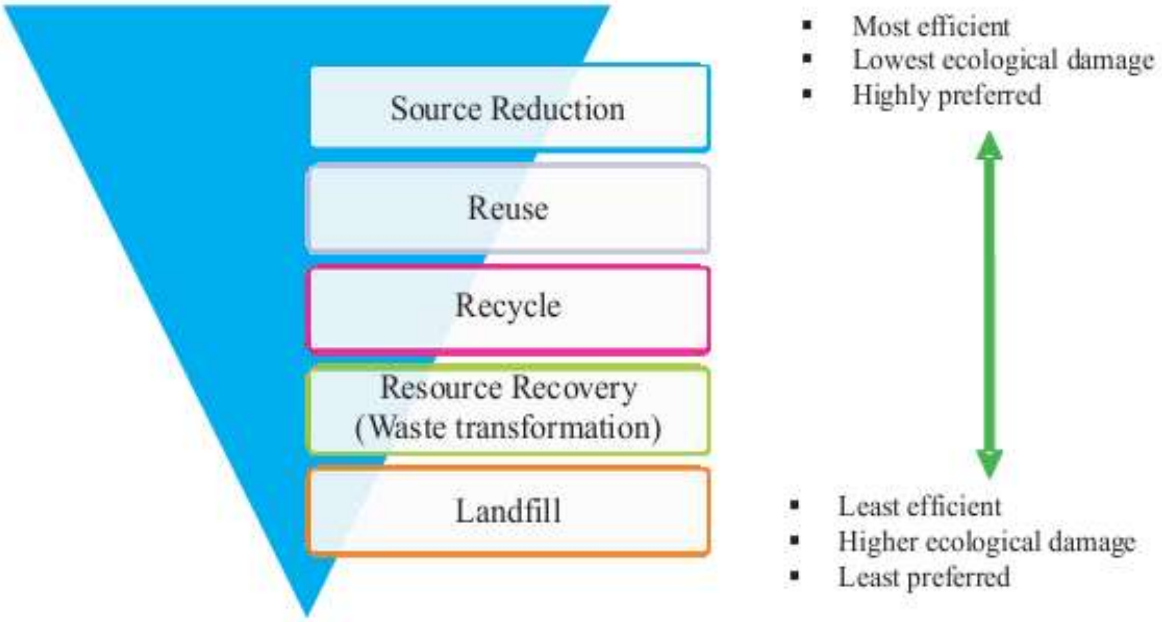

Figure 1: Waste Management Hierarchy

Source: (Shaukat & Sajjad, 2016)

2.5.1. Waste Reduction

The highest priority option in ISWM hierarchy is to avoid or reduce the solid waste generation at the source. It involves reducing the amount and/or toxicity of the waste generated. Waste reduction may occur through the designing, manufacturing, and packaging of products with minimum toxic content, minimum volume of material, or a longer useful life. Waste reduction may also occur at the household, commercial, or industrial facility through selective buying patterns and the reuse of products and materials.

2.5.2. Reusing

Municipal solid waste generation could be reduced through reusing the items that are no longer required by someone. Most of our daily use products are reusable. For example, plastic bags obtained from the market are often used to pack the household waste and transport it from the house to the waste bin. Newspapers are rolled up to make fireplace logs, and coffee cans are used to hold bolts and screws. All of these are examples of reuse. Reusing is thus about extending the life or giving a second life to something that we previously considered as

"garbage". In this way, the garbage we are sending to the landfill sites will be reduced and the operational life span of the landfill site will extend.

2.5.3. Recycling

The third option in the ISWM hierarchy is recycling, which involves (1) the separation and collection of waste materials; (2) the preparation of these materials for reuse, reprocessing, and re manufacture; and (3) the reuse, reprocessing, and remanufacture of these materials. Recycling is an important factor in helping to reduce the demand of resources and the amount of waste requiring disposal by landfilling.

2.5.4. Resource Recovery

The fourth option in the ISWM hierarchy, resource recovery (waste transformation), involves the physical, chemical, or biological alteration of waste. The transformation of waste materials usually results in the reduced use of landfill capacity. The reduction in waste volume through combustion is a well-known example.

2.5.5. Landfilling

Landfilling is the last and least preferred option of the ISWM hierarchy. It involves the controlled disposal of waste on or in the earth's mantle, and it is by far the most common method of ultimate disposal for waste residuals.

2.6. Solid Waste Management (SWM) Planning

Planning for the management of municipal solid waste becomes increasingly important as the complexity of management needs expands, the tools and procedures for addressing these needs require greater sophistication, and competition increases. In addition, as the roles and responsibilities of states and their subdivisions in the management of solid waste have evolved, both state and local or regional solid waste planning is required (Tchnobanoglous & Kreith, 2002).

European Commission Environment DG (2003) also stated that Waste management plans have a key role to play in achieving sustainable waste management. Their main purpose is to give an

outline of waste streams and treatment options. More specifically they aim to provide a planning framework for the following:

- Compliance with waste policy and target achievement: Waste management plans, national as well as local/regional are important instruments contributing to implementation and achievement of policies and targets set up in the field of waste management at the national and the European Union level.
- Outline of waste characteristics and sufficient capacity for managing waste: Waste management plans give an outline of waste streams and quantities to be managed. Furthermore, they contribute to ensuring that the capacity and the nature of collection and treatment systems are in line with the waste to be managed.
- Control of technological measures: An outline of waste ensures identification of areas in which technological measures should be taken to eliminate or minimize certain types of waste.
- Outline of economy and investment requirements: Waste management plans make way for a statement of financial requirements for the operation of collection schemes, treatment of waste etc. On this basis, the needs for future investments in waste treatment plans may be determined.

As the solution too many waste management problems requires the involvement of several participants/authorities, coherent planning helps to avoid unnecessary duplication of effort and thus benefits all participants in their work together

2.7. Municipal Solid Waste Management in Developing Countries

Environmentally acceptable management of municipal solid waste (MSW) has become a global challenge due to limited resources, an exponentially increasing population, rapid urbanization and worldwide industrialization. In developing countries, these factors are further exacerbated by inadequate financial resources, and inadequate management and technical skills within municipalities and government authorities (Hazra & Goel, 2009); (Chatterjee, 2010).

The majority of waste in developing countries continues to be disposed of in landfills, which is the least desirable option in the waste management hierarchy. At the beginning, the conventional landfill methods just dispose the MSW without materials recovered, which produced series of

environmental and social problems, such as landscape breaking, farmland decreasing and groundwater polluting. During the last few decades, municipal governments have advanced from non-standard disposal of waste to a more controlled environment. The main focus of this evolution has been to close uncontrolled landfill plant and shift to more environmentally sound land disposal facilities (Li, 2007).

2.7.1. Municipal Solid Waste Management in Africa

Waste management problems in Africa are varied and complex with infrastructure, political, technical, social /economic, organizational / management, regulatory and legal issues and challenges to be addressed. Waste is typically disposed off without consideration for environmental and human health impacts, leading to its accumulation in cities, towns and uncontrolled dump sites. Co-disposal of non-hazardous and hazardous waste without segregation is common practice. Municipal Solid Waste (MSW) management has continually been an intractable problem in recent times beyond the capacity of most municipal/state governments. This has resulted in refuse heaps being dumped in the urban landscape in heavily populated cities as typically only about 40 to 50% of waste is reportedly being collected (Mwesigye et.al, 2009). Containers overflow with garbage and rain cause streets to flood as a result of the uncollected waste clogging the drainage channels (Davas & Rakodi,1993).

The insufficient handling of solid waste represents a source of water, land and air pollution affecting the urban environment and the health of the people living in the cities and is one of the most critical environmental problems that cities in Africa are facing today. The current capacity of most solid waste management systems in Africa is inadequate and too slow to meet the increasing demand of the solid waste generated (Bjerkli, 2005).

2.7.2. Factors that affect Municipal Solid Waste Management in Developing Countries

A typical solid waste management system in a developing country displays an array of problems, including low collection coverage and irregular collection services, crude open dumping and burning without air and water pollution control, the breeding of flies and vermin, and the handling and control of informal waste picking or scavenging activities. These public health, environmental, and management problems are caused by various factors which constrain the development of effective solid waste management systems (Ogawa, 1996). These factors,

according to (Ogawa, 1996), can be categorized into technical, financial, institutional, economic, and social constraints. Each of these constraints is discussed below:

a) Human and Technical Constraints

In most developing countries, there typically is a lack of human resources at both the national and local levels with technical expertise necessary for solid waste management planning and operation. Many officers in charge of solid waste management, particularly at the local level, have little or no technical background or training in engineering or management. Without adequately trained personnel, a project initiated by external consultants could not be continued. Therefore, the development of human resources in the recipient country of external support is essential for the sustainability of the collaborative project.

Another technical constraint in developing countries is the lack of overall plans for solid waste management at the local and national levels. As a result, a solid waste technology is often selected without due consideration to its appropriateness in the overall solid waste management system. In some cases, foreign assistance is given to a component of a solid waste management system for which the use of resources may not be most cost-effective. For instance, an external support agency provided its support to improve a general disposal site. However, the coverage of solid waste collection service is so low that solid waste generated is dumped at many undesignated sites (e.g., open areas, water channels, streets, etc.). As a result, improving the disposal site, although it may not be a bad project, would have little impact on the overall solid waste management effectiveness. In such a case, the low collection coverage is a bottleneck in the overall solid waste management system in the city, and it would be most cost-effective to provide resources to upgrade the collection service.

b) Financial Constraints

In general, solid waste management is given a very low priority in developing countries, except perhaps in capital and large cities. As a result, very limited funds are provided to the solid waste management sector by the governments, and the levels of services required for protection of public health and the environment are not attained.

The problem is acute at the local government level where the local taxation system is inadequately developed and, therefore, the financial basis for public services, including solid

waste management, is weak. This weak financial basis of local governments can be supplemented by the collection of user service charges. However, users' ability to pay for the services is very limited in poorer developing countries, and their willingness to pay for the services which are irregular and ineffective is not high either. An effective strategy for raising funds needs to be searched in any collaborative project to ensure its sustainability.

In addition to the limited funds, many local governments in developing countries lack good financial management and planning. For instance, in a town in a developing country, over 90% of the annual budget provided for solid waste management was used up within the first six months. The lack of financial management and planning, particularly cost accounting, depletes the limited resources available for the sector even more quickly, and causes the solid waste management services to halt for some periods, thus losing the trust of service users.

c) Institutional Constraints

Several agencies at the national level are usually involved at least partially in solid waste management. However, there are often no clear roles/functions of the various national agencies defined in relation to solid waste management and also no single agency or committee designated to coordinate their projects and activities. The lack of coordination among the relevant agencies often results in different agencies becoming the national counterpart to different external support agencies for different solid waste management collaborative projects without being aware of what other national agencies are doing. This leads to duplication of efforts, wasting of resources, and unsustainability of overall solid waste management programs. The lack of effective legislation for solid waste management, which is a norm in most developing countries, is partially responsible for the roles/functions of the relevant national agencies not being clearly defined and the lack of coordination among them.

d) Economic Constraints

Economic and industrial development plays key roles in solid waste management. Obviously, an enhanced economy enables more funds to be allocated for solid waste management, providing a more sustainable financial basis. However, by definition, developing countries have weak economic bases and, hence, insufficient funds for sustainable development of solid waste management systems.

Local industry which produces relatively inexpensive solid waste equipment and vehicles will reduce, or in some cases could eliminate totally, the need for importing expensive foreign equipment/vehicles and therefore foreign exchange. Such local industry can also supply associated spare parts, lack of which is often responsible for irregular and insufficient solid waste collection and disposal services. However, the lack of industry manufacturing solid waste equipment and spare parts and a limited foreign exchange for importing such equipment/spare parts are the rule rather than exception in developing countries.

Also in small developing countries, waste recycling activities are affected by the availability of industry to receive and process recycled materials. For instance, the recycling of waste paper is possible only when there is a paper mill within a distance for which the transportation of waste paper is economical. The weak industry base for recycling activities is a common constraint for the improvement of solid waste management in developing countries, such as those in the Pacific region where a large volume of package waste is generated.

e) Social Constraints

The social status of solid waste management workers is generally low in both developed and developing countries, but more so in developing countries then developed countries. This owes much to a negative perception of people regarding the work which involves the handling of waste or unwanted material. Such people's perception leads to the disrespect for the work and in turn produces low working ethics of laborers and poor quality of their work.

Because of insufficient resources available in the government sector, collaborative projects often have attempted to mobilize community resources and develop community self-help activities. Results are a mixture of success and failures. Failed projects with inactive communities usually did not provide people in the community with economic as well as social incentives to participate in activities. The social incentive is based on the responsibility of individuals as part of the community for the improvement of the community, and is created by public awareness and school education programs. The lack of public awareness and school education about the importance of proper solid waste management for health and well-being of people severely restricts the use of community-based approaches in developing countries.

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 the 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 effectively incorporated into a waste recycling system. Such an opportunistic approach is required for sustainable development of solid waste management programs in developing countries.

2.7.3. Municipal Solid Waste Management in Ethiopia

Municipal solid waste management (MSWM) is one of the basic services that are currently receiving wide attention in many towns of Ethiopia. This is mainly because SWs that are generated in most towns of Ethiopia are not appropriately handled and managed (Solomon, 2011).

According to Abebe et.al (2009), Ethiopia is still struggling to deal with the problem of proper management of solid wastes. With the current rate of urbanization municipal solid waste collection, transportation and disposal have been a major problem of municipalities in most of the Ethiopian cities. Collection of municipal solid waste in most of the cities is difficult and complex because the generation of residential, commercial and industrial waste is a diffuse process that takes place in every house, every building and every commercial and industrial facility as well as in the streets, parks and even in the vacant areas available within the community. In addition to this, as stated by (Abebe et.al 2009;Yukalang, 2017), many cities face problems such as lack of manpower and equipment and financial constraints.

CHAPTER THREE

3. RESERCH METHODOLOGY

3.1. Description of the study area

3.1.1. Location

According to Bishoftu City Administration FED Office, 2018 Bishoftu City Administration which is located at East shewa zone of the Oromia National Regional State situated between $8^{0}45^{1}$- $8^{0}47^{1}$ N and $38^{0}56^{1}$-39^{0} E longitude. It is located at a distance of 47 km south east of Addis Ababa and 52 km from Adama to the North. The foundation of Bishoftu was directly connected with the starting of Ethio-Djibouti Rail way in 1917. (Bishoftu City Administration FED Office, 2018).

The name Bishoftu is derived from the Afan Oromo language which means "BISHANOFTU" that refers to, "the land of excess water body". Literally speaking, the word Bishoftu is given to the city based on the locally available many crater lakes such as Bishoftu, Hora Arsadi, Cheleleka /seasonal/, Kuriftu, Kilole, Green Lake and Babogaya. Therefore, the name Bishoftu is derived from many water bodies that surrounded the town at a near distance. Administratively; regarding its growth the city becomes the administrative center of Adea Liban woreda from 1935 to 1982 E.C. From 1983-1994 E.C it was the administrative center of Adea woreda. Beginning from 1995 to till now, it is the 1st level city (city administration) which is administrated by Mayor. The city has a total area of 18,278 hectors. There about total of 14 kebeles in the City of which 5 kebeles are Rular kebeles (Bishoftu City Administration FED Office, 2018).

3.1.2. Demographic characteristics

The population of the city is rapidly growing from year to year at an average growth rate of more than 2.9 % per annum. Population dynamics of a given settlement area is the result of fertility, mortality and migration. In urban environment, *migration* (rural to urban) / urban to urban/ has predominant role in changing the population characteristics and reflects the urbanization rate.

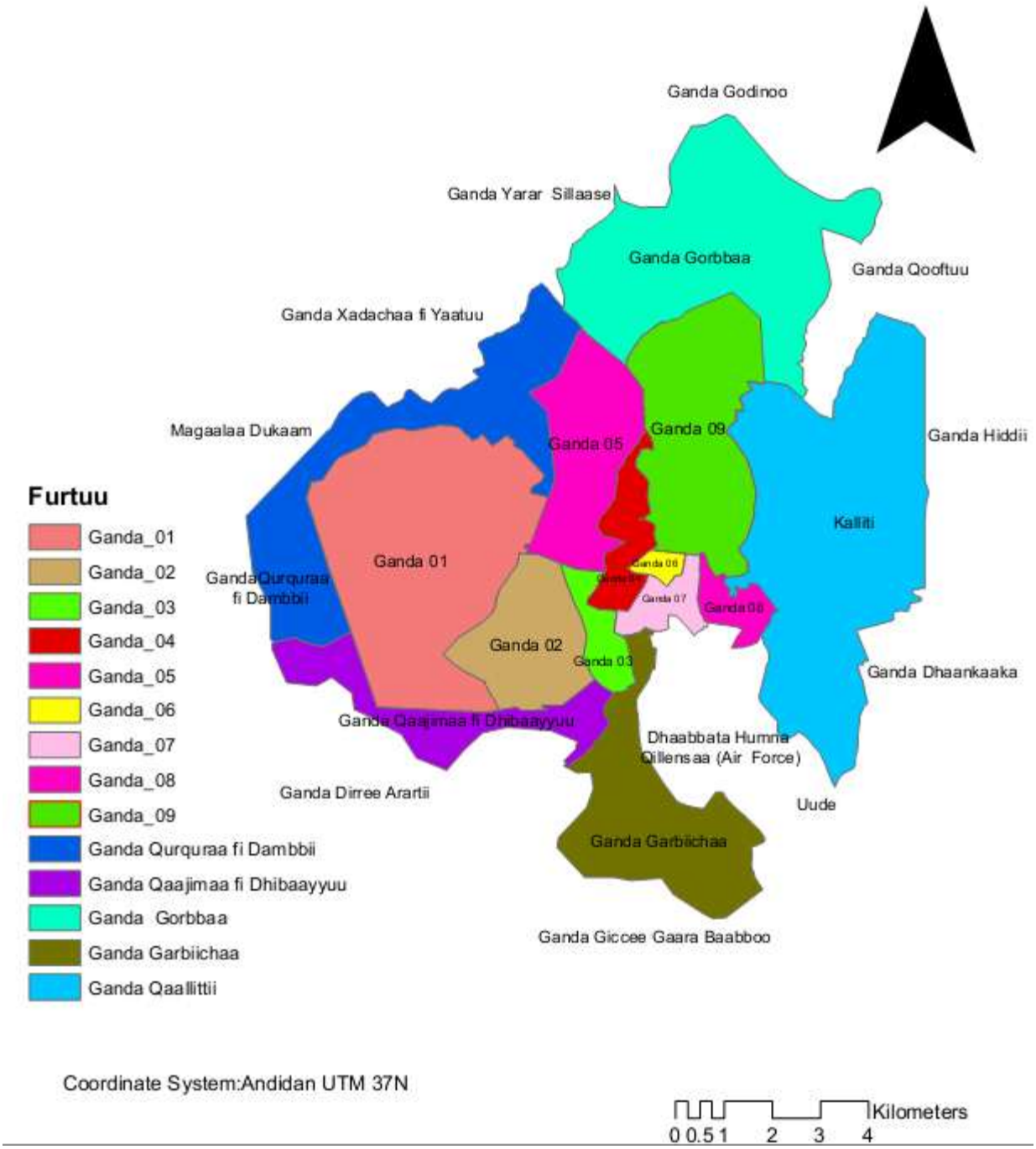

Figure 2: Map of Bishoftu City Administration

Source: Bishoftu City Administration FED Office, 2018

***Furtuu Oromic word refers to Key**

****Ganda Oromic word refers to Kebele (the smallest administrative unit)**

The 2007 national census reported a total population for Bishoftu was 99,928, of whom 47,860 were men and 52,068 were women but according to the data obtained from the population projection made by Bishoftu plan and Economic development office, the city has a total population of **205,858** by the year 2016/17. From the total population **48%** are males and **52%** are females including the rural kebeles currently incorporated under the administration of the city (Bishoftu City Administration FED Office, 2018).

3.2. Research Design

Descriptive type of research method was used to assess municipal solid waste management practice in the study area. Descriptive approach was applied because it enables to describe the existing situations of the solid waste and the management practices as it exists broadly MSWM.

3.3. Study site

To select the study site, purposive sampling was employed. Purposive sampling was used as the study site is convenient as the researcher is a resident of Bishoftu City. It was help to reduce time and costs that were spend and to have a better understanding about the existing problem in the city related to the study area.

3.4. Sources of Data, Data Collection Instruments and Data collection Procedures

3.4.1. Sources of Data

Both primary and secondary sources were used to collected data for this study. These sources were used to collect necessary information that addresses the research questions and objectives of the study. Primary data was collected from sample respondents of each sample Kebeles. To collect secondary data resources such as books, journal articles, government documents and websites were consulted.

3.4.2. Data Collection Instruments

3.4.2.1. Questioners

The questionnaire was have two parts. The first part of the questionnaire was consisting of questions related to respondent's profile. The second part of the questionnaire was incorporate questions related to municipal solid waste management practices and factors that affect

municipal solid waste management practices. The questioners were also including both open and close ended questions. Particularly open-ended questions are used to extract response and further explanation. The questioners were filled by data enumerators by asking sample respondents from the selected 3 kebeles.

3.4.2.2. Interview

To supplement the data collected through questionnaire the researcher also conduct structured interview with SBPDD head and SBPDD employee. The objective of this interview was to solicit ideas which will not be cover by the questioner and for the purpose of triangulation.

3.4.2.3. Observation

On top of personal life experiences, field tour to selected areas of the city was carried out the major area of focus include: 1) solid waste disposal site located in Golba; 2) the road sides and ditches of the sample kebeles. This observation and experience acquired from just being member of the community were help to assess research questions and objectives.

3.4.3. Data collection Procedures

First questioners were adopted from related previous works done by Solomon (2011), Ashenafi (2011) and Maeregu (2017). Secondly, the questionnaires adopted in English language were translated in to Amharic version to make easily understandable by respondents. Thirdly, the pilot test were conducted to test the validity and reliability of the questionnaire by distributing to 10 respondents that were not be included in the actual data collection and amendments is made based on the response during the pilot test. Finally, the actual data collection were made through data enumerates employed on temporary basis. Data enumerators were properly train and also they know both Amharic and Oromiffa. For households the purpose of the study were briefly explained and encouraged to cooperate.

On the other hand, interviews were conducted with interviewees on the basis of appointment. Data from secondary sources was obtained by getting permission from concerned officials.

3.5. Sample Size and Sampling Procedures

The required sample size for this study is determined by using the formula developed by Yamane (1967) below by considering the level of acceptable margins of error at 5% (or 95% confidence interval) :-

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

Where **n** = is the sample size

N= is the total number of households

∂ = is the margin of error

$$n = \frac{19719}{1+19719(0.05)2} = 392$$

Therefore, the sample size for this study was 392 respondents.

In order to select respondents among 9 kebeles of the Bishoftu City, the sample kebeles were selected using purposive sampling technique based on population density, commercial activity and location. As a result, kebele 01 (heavily populated), kebele 06 (commercial center) and kebele 09 (city outskirt) were selected. With regard to the sample households a total of 392 respondents were selected proportionally using stratified random sampling as shown in table 3 below:

Table 3: Sample Size

Sample Kebeles	No of Households	Sample Households	
		Frequency	Percentage
01	9500	189	48
06	4482	89	23
09	5737	114	29
Sub Total	**19719**	**392**	**100**

Finally, Interview respondents were selected from Bishoftu SBPDD employee by using purposive sampling technique as they are key informants.

3.6. Data analysis

This section deal with presentation, analysis and interpretation of data gathered from households and Bishoftu SBPDD office as well as field observation. Both qualitative and quantitative methods were used to analyze the data. Quantitative method was used for close ended questions and qualitative methods for open ended questions and interviews. Quantitative methods include percentages, tabular analysis and frequency distribution. Qualitative techniques were cause and effect relationships, inductive and deductive.

Questionnaires analyses by using quantitative methods i.e. tables have been widely used to present the collected data by using SPSS version 20 computer software were used to analyze the data.

CHAPTER FOUR

4. RESULTS AND DISCUSSION

Under this chapter the data gathered from the study households using questionnaire (open and close ended), structured interview from the key informants of Bishoftu city SBPDD staff and data obtained by the researcher observation were analyzed and interpreted.

4.1. Characteristics of the Respondents

In this study, the researcher was tried to constitute different sample households with various demographic and socio-economic characteristics.

4.1.1. **Demographic characteristics of the Respondents**

The demographic features of the respondents include gender, age structure and marital status have been presented in Table 4.

Table 4: Respondents Gender, Age and Marital status

Gender		**Frequency**	**Percentage (%)**
Valid	Male	161	41.1
	Female	231	58.9
	Total	**392**	**100.0**
Age of Respondents			
Valid	18-25	33	8.4
	26-45	251	64.0
	Over 45	108	27.6
	Total	**392**	**100.0**
Marital status			
Valid	Married	269	68.6
	Single	64	16.3
	Divorced	28	7.1
	Widowed	31	7.9
	Total	**392**	**100.0**

In this study, from a total of 392 household respondents, 41.1 % (161 HHs) were male- headed and the remaining 58.9 % (231 HHs) were female-headed. This was due to the fact that most of the time females stay and work inside their house rather than working outside. Such dominance of women is appreciated and important for this research since women have better knowledge than men about their residence solid waste property and its handling (Solomon, 2011). Beside this, out of the total respondents 251 (64%) of sample respondents are belongs to adult age group (26 – 45 ages). This is also contributed for the accuracy of the information gathered from such respondents. Furthermore with respect to marital status 269 (68.6 %) of the respondents were married; 64 (16.3%) were single; 31 (7.9%) were widowed and the remaining 28 (7.1%) were divorced.

4.1.2. Socio-economic status of the Respondents

The underlying table clearly illustrates socio-economic status of the sampled households. The educational status of respondent as Table 5 below shows that respondents with no formal education, those who attended grade 1-4 , those who attended grade 5-8 and those who attended grade 9-10 account for 4.8%, 10.7%, 13.5% and 22.7% respectively. Furthermore, those who attended grades 11-12 were 22.2%, whereas those with college or university were 26%. On the other hand, the survey on the occupation of sample households shows that 29.8% were government employees; 17.6% were engaged in private organizations; 18.6% were self-employed; about 13% were merchants and 14% were house wives.

Concerning the family size Majority, 205 (52.3%), of the respondent reported 3-4 family members; 90 (23%) respondent reported 1-2 family members; 72 (18.4%) respondent reported 5-9 family members and 25 (6.4%) respondents reported greater than or equal to10 family members are found in the HH.

Regarding monthly income, 34.2% of respondents have a monthly income of 1000- 2000 birr; 30.9% of respondents receive about 2000 – 3000 birr and 25.5 of respondents were average income of >3000 birr, and the remaining received below 1000 birr.

Table 5: Respondents Educational level, Occupation, Family size and Monthly income

Educational Level		**Frequency**	**Percentage (%)**
Valid	No formal education	19	4.8
	1-4 Grade complete	42	10.7
	5-8 Grade complete	53	13.5
	9-10 Grade complete	89	22.7
	11-12 grade complete	87	22.2
	College / University	102	26.0
	Total	392	100.0
Occupation			
Valid	Government	117	29.8
	Private sector	69	17.6
	Self-employed	73	18.6
	Merchant	51	13.0
	Housewife	55	14.0
	Others [1]	27	6.9
	Total	392	100.0
Family Size			
Valid	1-2	90	23.0
	3-4	205	52.3
	5-9	72	18.4
	>=10	25	6.4
	Total	392	100.0
Average Monthly Income (in birr)			
Valid	<1000	37	9.4
	1000-2000	134	34.2
	2000-3000	121	30.9
	>3000	100	25.5
	Total	392	100.0

[1] Refers to NGO employee, Jobless, students and retired

Table 6 below shows that among the study population, 44.4% were live in their own private houses; 38% live in kebele rental house and the remaining 17.6% were live in rented houses from private owners.

Table 6: House ownership condition, year of stay and length of period in current house

House ownership condition		**Frequency**	**Percentage (%)**
Valid	Kebele rental house	149	38.0
	Private rental house	69	17.6
	Private house	174	44.4
	Total	**392**	**100.0**
Year of Stay in Bishoftu			
Valid	<=5	27	6.9
	6-10	50	12.8
	11-15	46	11.7
	>=16	269	68.6
	Total	**392**	**100.0**
Length of period in current house			
Valid	<1	17	4.3
	1-5	99	25.3
	6-10	48	12.2
	>=11	228	58.2
	Total	**392**	**100.0**

Table 6, also shows that 269 (68.6%) responded greater than or equal to 16 years; 50 (12.8%) of responded 6 – 10 years; 46 (11.7) responded 11 – 15 years and the rest 27 (6.9%) responded for less than or equal to 5 years were stay in Bishoftu and with regard to length of period in the current house and they responded 228 (58.2%) responded greater than or equal to 11 years; 99 (25.3%) responded 1- 5 years; 48 (12.2%) responded 6 – 10 years the rest 17 (4.3%) responded < 1 year were live in the current house.

Table 6, further shows that highest concentration (over half) of the respondents that live in Bishoftu were found greater than or equal to 16 and 11-15 years. The next highest concentration of the respondents that live in the current house were found greater than or equal to 11 and 6 -10 years. From this it can be stated that over three-quarter of the respondents knows the city very well.

4.2. Characteristics of Municipal Solid Waste

4.2.1. Type of Municipal solid waste generated in Bishoftu and source

Regarding the major types of solid waste of the study area the total households participated in this study was 392 but due to multiple response rate the number of households exceeds to 1405. The description in Table 7, below indicated the major types of solid wastes regularly generated. Accordingly, the sample households were asked about the types of solid waste mostly produced from their house, and 368 (93.9%) responded peels of vegetables; 171 (43.6%) responded ash; 171 (43.6%) responded plastic; 66 (16.8%) responded paper and cardboard; 136 (34.7%) responded garden trimmings or leafs; 159 (40.6%) responded peels of vegetables and Ash; 46 (11.7%) responded peels of vegetables, Ash and garden and trimming or leafs; 168 (42.9%) responded peels of vegetables and plastic and 120 (30.6%) responded other wastes are mostly produced from their houses. In Bishoftu city six major sources of solid waste namely households, street commercial institutes, industries, hotels and hospitals are identified by the city administration. Available data for 2016/2017 shows that households take the lion share of solid waste generated. The share of household is 75%, street commercial institutes 3%, commercial institutions 12%, industries 5%, hotels 4% and hospitals 1%.

Table 7: Types of Municipal solid waste in Bishoftu

Types of waste	Frequency	Percentage (%)
Peels of Vegetables	368	93.9
Ash	171	43.6
Paper and cardboard	66	16.8
Plastic	171	43.6
Garden trimmings or leafs	136	34.7
Peels of vegetables and Ash	159	40.6
Peels of vegetables, Ash and Garden and trimming or leafs	46	11.7
Peels of vegetables and Plastic	168	42.9
Others [2]	120	30.6
Total	**1405**	

[2] Dog waste, home sweeping (dust), food left over and animal dung

4.2.2. Composition of municipal solid waste in Bishoftu

As it is an indicated in review of literature parts of this research municipal solid waste is a term usually applied to a various mixture of solid waste produced in urban areas. But commonly urban waste can be sub divided in to two major components called biodegradable and non-biodegradable. The biodegradable component of urban solid waste constitutes organic waste such as food waste, garden waste, agricultural waste which undergoes biological degradation under controlled conditions and cab be turned in to compost or organic fertilizer. While non-biodegradable wastes include inorganic materials which can't be decomposed and degraded. Likewise, from researcher observation in disposal site. Illegally dumping areas and in residential areas Bishoftu city physical composition of municipal solid waste is also composed from both biodegradable and non-degradable components.

Figure 3: Composition of MSW in Bishoftu

Source: Researcher field observation

The dominant types of biodegradable solid waste wastes are food left over, vegetable peelings, animal wastes, Ash, dust levels, scrap of chat, market place wastes (vegetable and fruit wastes) papers, bones, dead animals, card board, cartons & paper packing materials etc where as non-bio-gradable wastes of the city includes different types of plastics (like, plastic bags or "festal" plastic packaging materials) glass or bottles , cans, textile scraps, discard old shoes and etc.

In general it can be said that the current practice has short comings regarding solid waste separation and sorting out at the source of generation.

A part from these, construction and demolition waste that is generated during the course of repair, construction, destruction activity consisting broken pieces of ceramics, sands, soil, stone, nails and cement concrete are also observed in the city. This is due to high construction activity of the town and such wastes are not stored by waste generator within their compound rather they deposited just outside in street and open areas but these wastes from construction activities containing cement products have high re-use value. It is used to prepare residential parking areas, car hard standing, and walk ways, sometime trough pulverization it can be used as a selected material for back filling in construction activities wastes are not a serious problems relatively due to their high re-use value .

4.3. Solid waste Management practice of Bishoftu City

4.3.1. Solid Waste Storage Facility and Its Handling

Studying solid waste storage facilities and their handling has significant impact for betterment of municipal solid waste management activity. This is from the point of identification of type and quantity of storage material to be used, appropriate location (sitting) of it, deciding the collection method to be used, and avoidance of health, environment and aesthetics impacts of storage materials (Gebretsadkan, 2002).

As a result of this, the researcher collects information about solid waste storage and its handling in Bishoftu city was collected and briefly explains in two categories. The first category constitutes primary or temporary storage facility of households. The second category comprises secondary or communal storage facility which includes public solid waste containers and dustbins. The detail examination of both of these storage facilities is described in the following sections.

4.3.1.1. Primary solid waste storage facility and its handling

The selected sample respondents were asked first that they have temporary solid waste storage material and the result showed that almost all, 378 (96.4%) of sample respondents had temporary solid waste storage material while the remaining 14 (3.6%) of sample respondents do

not have temporary solid waste storage material and with regard to the materials they use to store their solid waste at home by giving them alternatives in the form of multiple choices, the following results were obtained from the subject survey households.

Table 8: Solid waste storage material used by sample households

Possession of Temporary Solid Waste Storage Facility		**Frequency**	**Percentage (%)**
Valid	Yes	378	96.4
	No	14	3.6
	Total	**392**	**100.0**
Type of storage material			
Valid	Bamboo basket	11	2.9
	Sack	304	80.4
	Plastic container ('festal')	60	15.9
	Other	3	0.8
	Total	**378**	**100.0**

As can be seen from Table 8 above, residents of Bishoftu used a different type of storage materials in their compound which is bamboo basket and sacks local name of "Madaberia" plastic containers local name 'festal' and others. The result has shown that majority 304 (80.4%) of sample respondents were used sacks local name of "Madaberia". This is highly related to the least cost of sack, easily availability in the market, its suitability for holding large volume of solid wastes and easily delivered by MSEs of the City and plastic container ('festal') about 60 (15.9%) has next to plastic about 11 (2.9%) has also used basket because of their frequent but low generation of waste and economic power to utilize replicable storage materials such as plastic bags, and while the remaining 3 (0.8%) used other storage material.

It is also observed that most of the households who use the 'Festal', as a 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.

4.3.1.2. Secondary solid waste storage facilities and their handling

Secondary storage facilities refer to different types of solid waste containers which involve keeping solid waste generated from different households at a common or central point from where collection vehicles can pick it and transport to final disposal site (Zebenay, 2010 as cited in Solomon, 2011). These facilities are provided by municipality which is responsible for management of the city solid waste. According to the data gained from Bishoftu city SBPDD the department was put 78 public solid waste containers (each with 8m3 capacity) was distributed to each 9 kebeles for temporary storage, later to be collected and transported to the disposal site by the municipal skip loader truck more over 22 communal containers was kept in store because of the constraint posed by storage of skip loaders for secondary collection. But this operation was caused odor and dust problems. This was mainly due to absence of frequent collection of those public solid waste containers, and misuse of the society. As a result, the city SBPDD was forced to displace those public solid waste containers and put some of the containers in transfer station site i.e Kebele 01 and Kebele 08, some of on disposal site and others in store instead of serving the intended purpose. According to the interview with SBPD head, those transfer stations give service only to MSEs workers who collect solid wastes from households, institutions and commercial areas. Apart from transfer stations, there are also dustbins which used to collect walkers' solid wastes like napkins, pieces of paper, and remains of fruits etc. Nevertheless, according to the interview taken from SB head, there were around 60 dust bins that were located at the major roads, recreational areas, institution and market areas.

4.3.2. Solid Waste Separation, Processing and Recovery Activities

In this study solid waste separation, processing and recovery activities at source and by municipality refer all activities or efforts of separation of recyclable, reusable, compostable wastes to sell or to recover resources by themselves. Practicing these types of activities is very

important to waste generators as well as municipality since it minimizes cost of disposal, generates revenue, and prolongs lifespan of disposal site. This is one of the reasons why solid waste managers in many parts of the world are now exploring ways to reduce flow of biodegradable and recyclable materials to landfill sites (Solomon, 2011).

In the following sections the separation, processing and recovery activities both at the households and SBPDD level of the City are presented.

4.3.2.1. Solid Waste Reduction Practices of households

The study subjects were asked some questions concerning their practical experience and habits of segregating solid waste vis-à-vis their level of awareness. As indicated in table 9 below among those who responded to this question, 259 HHs (66.1%) told that they don't separate solid wastes and only 133 HHs (33.9%) stated that they do the separation.

As we observed from households' solid waste separation activities in the city, indicated in table 9 below only solid wastes that are sold to "Quraleos", exchangeable to "Liwach" are separated. Response of sample households also showed that about 69 (51.9%) of them are separately store solid wastes which are sold to "Quraleos" and exchangeable with "Liwach" A subsequent question also asked to those respondents that what the reason behind for not practicing waste separation. Based on the question, respondents gave their respective answers as 108 (41.7%) told that they do not have understanding about waste separation; 94 (36.3%) told that they do not visualize the importance of separation; 27 (10.4%) believe that waste is not their responsibility.

Table 9: Households waste separation practice

Practice of Waste Separation at Household Level		**Frequency**	**Percentage (%)**
Valid	Yes	133	33.9
	No	259	66.1
	Total	**392**	**100.0**
Purpose of separating Waste at Household Level			
Valid	To reuse	20	15.0
	To sell / exchange	69	51.9
	To present as a gift to others	7	5.3
	To help waste collectors (to make collection easier)	24	18.0
	Other	13	9.8
	Total	**133**	**100.0**
Reasons for not Separating Waste			
Valid	I do not have understanding about waste separation	108	41.7
	I did not think as it is my responsibility	27	10.4
	I did not visualize the importance of separation	94	36.3
	Other	30	11.6
	Total	**259**	**100.0**

4.3.2.2. Solid waste separation, processing and recovery activities by SBPDD

Even though the rapid pace of urbanization and parallel increment of its solid waste volume are adding burden to SBPDD of bishoftu the city, Bishoftu City SBPDD is carried out some type of composting activities as a pilot test in two kebeles of a city and this activity creates job opportunity for 26 persons. Towards recycling and reusing, the department has not made any attempt, rather it totally engaged in collection, transfer, and final disposal of solid waste as the only means of municipal solid waste management. This is attributed to lack of commitment, finance, material, and manpower resource.

4.3.2. Solid Waste Collection and Transportation Systems

The function of the collection of the solid waste management is one of the most complex and difficult tasks in MSWM. It includes both gathering the MSW from sources and transporting them to the place where the containers should be emptied. Currently, in Bishoftu city there are two methods of waste collection such as door to door and transfer stations collection.

4.3.3.1. Door to door solid waste collection and transportation systems

This method is largely implemented for collection of solid waste from residential areas.The responsibilities of solid waste collection are entrusted to the city "SBPDD". The department was responsible for the overall solid waste management in the city while there are 7 MSEs collect door to door wastes the other 4 MSEs who operates the street sweepings all have 10 members their group. But the service of MSEs is reached to very small number of residents.

Figure 4: MSEs Door to door collection service

Source: Researcher field observation

Beside, Households were asked a question if they have access of collection service given by MSEs. Based on the question, the following result was observed from the response of the sample households.

Table 10: Households that get service from MSEs

Access to door to door waste collection from MSEs		**Frequency**	**Percentage (%)**
Valid	Yes	276	70.4
	No	116	29.6
	Total	**392**	**100.0**
Adequacy of access to door to door waste collection MSEs (in number)			
Valid	Enough access	114	41.3
	Not enough access	162	58.7
	Total	**276**	**100.0**
Length of Access to the waste collection Service by MSEs (in Years)			
Valid	<1 year	94	34.1
	1-2 years	142	51.4
	>=3 years	40	14.5
	Total	**276**	**100.0**
Frequency of MSEs Collection per Week			
Valid	Twice a week	11	4.0
	Weekly	185	67.0
	Twice a month	51	18.5
	Monthly	29	10.5
	Total	**276**	**100.0**
Amount of Payment for the MSEs Service of Solid Waste Collection per Week			
Valid	20 birr	181	65.6
	30 birr	69	25.0
	40 birr	20	7.2
	50 birr	6	2.2
	Total	**276**	**100.0**

As indicated in Table 10 above, 276 (70.4%) of the respondents were customers of solid waste collection service rendered by the MSEs and 116 (29.6%) of the respondents were found to be non-user of the service provided by MSEs. Respondents who have not been served by designated MSEs, they were practiced indiscriminately dump their waste in open spaces, ditches and roads. (using informal sector, burning wastes, using container etc).

On the other hand, to assess if the sample households know the frequency of the collection services rendered by MSEs, they were asked the following crossing questions. Based on the query, how often do private MSEs collect solid waste from your house? Therefore, the result indicated that 67% reported that MSEs collect solid wastes on a weekly basis, 18.5% indicated that MSEs collect solid waste twice in a week, 10.5% indicated that MSEs collect sold wastes on Monthly basis and the remaining 4% of the respondents said that MSEs collect solid wastes on twice a week. During the time of MSEs infrequent collection, most of the households (63%) wait until collectors are coming and the rest (37%) households have been disposed of their waste by using daily labor, burring in around home, dumping in open place and sewerage.

Accordingly, to know the sufficiency of solid waste service delivered by the MSEs, households were asked the question that what do they think on the current number of MSEs? As shown in (Table 10), 162 (58.7%) of the respondents replied that the coverage of service delivered by MSEs is not enough whereas 114 (41.3%) mentioned that the current number of MSEs is enough.

Referring to Table 10, 181 (65.6%) of responded 20 birr / month ; 69 (25%) responded 30 birr / month 20 (7.2%) responded 40 birr and the rest 6 (2.2%) respondent responded 50 birr / month were paid for the service provided by to MSEs.

According to the researcher personal observation and the respondent general comment, these door-to-door waste collectors (MSEs) were at their infant stage (they did not have sufficient waste collection facilities to do their assignment). Due to this, the area/place where the households live in may be one reason for those who are not using the service of private enterprises. Therefore, the selected respondents were asked whether their home/ village/ is a factor for not the user of door to door waste collectors service (see table below).

Table 11: Residential area and accessibility of MSEs

Opinion on the Location of Home as Factor Preventing Access to Solid waste Collection Services		Frequency	Percentage (%)
Valid	Yes	62	53.4
	No	54	46.6
	Total	**116** [3]	**100.0**

As one can see from the table 11, 62 (53.4%) of the respondents stated that their living area has a great impact to access waste collectors service and 54 (46.6%) of respondent stated that their living area were not the preventive factor for waste collectors services. Moreover, those households who said "No" were asked the question like "if your living area is not a constraint to use the service, what do you think the main reasons? Their responses were:

- I don't know when they are come to hear;
- We have enough open place at the back of our home;
- Economically, we do not have an affordable capacity to this service;
- We can store and burn why we incur unnecessary cost.
- The time when they come are not suitable for me

One can clearly understand from the above responses that the municipality weak follow up that MSEs are discharge their responsibility, provided poor orientation / information to the residents about the negative implication of improper solid waste management like dumping on the free space of their back yard, and store and burn it. Due to this, the households preferred to use any alternative as per their convenience.

[3] It is not the total samples of the study; rather the number of sample households, who are not using the MSEs collection service.

Table 12: Preferred disposal time by households

Time of waste disposal		Frequency	Percentage (%)
Valid	Early morning	134	34.2
	Late morning	2	.5
	Afternoon	9	2.3
	Early night	57	14.5
	at the time of private waste collectors	190	48.5
	Total	**392**	**100.0**

As can be clearly seen from table 12 above, from the total selected households, who disposed their wastes illegally, significant number of the respondents 134 (34.2%) replied that they preferred to dispose off their wastes early in the morning. And also, about 57 (14.5%) of the illegal disposer households preferred to dispose their solid wastes at early in the night. The rest 9 (2.3%) and 2 (0.5%) of those illegal disposers are preferred afternoon and late morning to dispose solid wastes respectively. However, all of the legal disposers responded that they disposed their solid wastes at the time when private waste collectors come. Therefore, they store wastes in temporary storages at source and handover to door to door waste collectors at their regular schedule.

From this one can understand that most households who do not use the service of private waste collectors often prefer to dispose their wastes in unauthorized (illegal) places at the time of early night and early morning, which is out of official working hours.

4.3.3. Solid Waste Disposal Practices in Bishoftu

4.3.4.1. Households' Solid Waste Disposal Practices

In addition to this, 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 13: Availability, Distance and participation on deciding container placement

Category	Variables	Count	Percentage (%)
Availability of Waste Disposal Container Near Home Location	Yes	**61**	15.6
	No	331	84.4
	Total	**392**	**100**
Distance of the Container from Home Location	20-50 meters	7	11.5
	51-100 meters	11	18.0
	101-200 meters	12	19.7
	201-500 meters	17	27.9
	>500 meters	14	23.0
	Total	**61**	**100**
Participation of Respondent in Deciding the Location/placement of Waste Container	Yes	2	3.3
	No	59	96.7
	Total	**61**	**100**

As shown in Table 13 above, 331 (84.4%) of sample respondents were stated that communal solid waste container is not available and the rest 61 (15.6 %) of sample respondents stated that public solid waste container is available. In addition to the availability of the communal solid waste container, the accessibility of solid waste storage container was asked to know the average distance between a residence and a communal container so, a container is located between 20 - 50 meters radius for 7 (11.5%) of households; between 51 - 100 meters for 11(18%) of households ; between 101-200 meters for 12(19.7%) of households ; between 201 - 500 meters for 17 (27.9%) of households, and more than 500 meters for14 (23%) percent of households.

Consequently, the same respondents were asked if they have participations in deciding the location or placement of the containers in their respective areas and most of the respondents, bout 59 (96.7%) stated that they had no participation or say in choosing or deciding the location for the containers in their areas; whereas 2 (3.3%) of the respondents acknowledged their participation in choosing and deciding for the containers.

On the other hand, a subsequent question was asked how they dispose off their solid wastes or what alternative do they have. Accordingly, the following results were obtained from the response of subject households is presented in the following table.

Table 14: Alternative means of households to dispose their solid wastes

Means of Solid Waste Disposal Available for Households in the Location		**Frequency**	**Percentage (%)**
Valid	Throw it on an open space, in sewerage or on street	55	14.6
	Digging a hole around the house and burn it	59	15.6
	Disposing on the backyards of the house	26	6.9
	MSEs take it	219	57.9
	Others	19	5.0
	Total	**378**	**100.0**

As can be noted from Table 14, about 219 (57.9%) of the respondents use MSEs ;59 (15.6%) of respondents disposing by digging a hole around the house and burn it; 55 (14.6%) of respondents disposing by throw it on an open space, in sewerage or on street 26 (6.9%) respondents use by disposing on the backyards of their house , and the remaining 19 (5%) of respondents use other means of disposing methods like using for daily laborer.

4.3.4.2. Existing Situation and Management of Solid Waste Disposal Site

Solid waste collection and transportation is not an end to solid waste management. Proper solid waste management also requires proper disposal of waste in a proper place. In sight of this in my field observation Bishoftu city solid waste disposal site and its management is inadequate and below the standard. The waste collected is disposed on open field at a place called “Golba” in b/n Kebele 04 and 05, some 1.5km away from the center town. The disposal site is surrounded by mountain ridges at distant location, but there are settlement areas, a church and agricultural fields (crops, animal grazing, children play ground) just adjacent to the disposed waste.

Figure 5: Current disposal site (a)

Source: Researcher field observation

Waste of all nature is indiscriminately disposed with no further treatment in the existing dumping site. The windblown waste is scattered all over the site and some light plastics and paper might travel back all the way to the city. Hauling of solid wastes and final dumping is not well scheduled & coordinated as refuses are observed to have been disposed of haphazardly, litters spatter everywhere before reaching the designated final dumping site and such practices are even worsen during the rainy seasons. There are several agro-industries in the town that disposal the waste improperly causing a series threat to public health and environment. The storage and collection of waste is covered with their own resources

Figure 6: Current disposal site (b)

Source: Researcher field observation

The major problems associated with the disposal site are: the site being crop field and grazing ground where children and farmers frequently stay, has no fence, no soil cover, it is surrounded by housing areas and religious sites, nuisance and health hazard for people living nearby, it is very close to Ethiopian air- force Bishoftu base airport (takeoff and landing route) and situated in a seasonal flood plain land etc.

4.4. Factors that affect Municipal Solid Waste Management in Bishoftu city

The decomposition of waste into constituent chemicals is a common source of local environmental pollution. This problem is especially acute in developing nations; very few existing landfills in the world's poorest countries would meet environmental standards accepted in industrialized nations, and with limited budgets there are likely to be few sites rigorously evaluated prior to use in the future. The problem is again compounded by the issues associated with rapid urbanization. As land becomes scarce, human settlements encroach upon landfill

space, and local governments in some cases encourage new development directly on top of operating or recently closed landfills (Chukwubueze, O. 2011).

The information obtained from the sampled respondents and researcher observation that some of the factors affecting the MSWM system of the were lack of appropriate skilled man power in the area to coordinate SWM activities as well as the appropriate site, absence of labor engaged in daily removal of solid wastes and in street sweeping in the city affects the sanitary of some parts of the city by making it ugly and smelly, absence of materials/equipment's to collect the waste in different parts of the city is the another challenge. The other challenge was the municipality didn't work a lot on community mobilization regarding SWM system.

The interview conducted with the staff of the municipality of the city to get the necessary information regarding factors affecting the MSWM system of the study area revealed the existence of the following major factors behind the poor management of the city.

Above all it is a financial problem that made the office not to give the necessary attention for MSWM. As a result, the municipality was unable to provide the necessary materials used for hauling of solid wastes, to prepare sufficient and safe disposal sites, to employ labor engaged in daily removal of solid wastes, etc. The information gained from the staff of the municipality also indicated that, the absence of local NGOs those contribute financial and technical support on such aspects made the problem to entirely rely on a shoulder of the municipality.

In general, regarding the factors behind the poor MSWM of the study area, responses from the sampled households, Key Informants, and the researcher's observation revealed the following major factors.

4.4.1. Socio-cultural Factors

Socio-cultural factors are normally expected to have an influence on the effectiveness of household solid waste management practices. Since it mainly focused on people's attitudes and the patterns of waste handling (Ashenafi, 2011).

Therefore, this section discussed about, household's awareness, attitude, perception and participation towards solid waste management.

4.4.1.1. Public awareness, attitude, perception and participation

Public awareness and attitudes to waste can affect the whole municipal solid waste management system. All steps in municipal solid waste management starting from the areas of household waste storage, waste reduction strategies: segregation at source, recycling, reuse and resource recovery and location to sitting of waste containers and disposal facilities depend on public awareness and participation. Thus, the little available promotional efforts are not supported by appropriate types of media and teaching and learning materials 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 an MSWM practice in developing countries (Zurbrugg, 2003).

Therefore, to know whether the households were aware about the existence of solid waste related laws and regulations selected respondents were asked the following question.

Table 15: Households awareness on solid waste rules and regulation

Knowledge of Respondents on Rules and Regulations of Solid Waste Disposal		**Frequency**	**Percentage (%)**
Valid	Yes	132	33.7
	No	260	66.3
	Total	**392**	**100.0**

As per the data in table 15, about 260 (66.3%) of the respondents revealed that they did not know that there is solid waste related laws and regulations are available. The rest 132 (33.7%) of the selected households stated that they knew about the presence of laws and regulation.

Public education or awareness of solid waste and its management is very crucial to improve management system. Public attitudes towards in appropriate disposal of solid wastes must be adjusted in order to avoid placing of additional burden on the collection program. While create awareness on generators sides, it is very important to give emphasis on selection of

information that flow to the public. In other words, the information should give an assurance about whether the public (generators) are aware of the negative aspect of inappropriate solid waste management (USAID, 2004).

Table 16: Household education, training or information about solid waste management

Education, training or information obtained by Respondent about Solid Waste Management		**Frequency**	**Percentage (%)**
Valid	Yes	83	21.2
	No	309	78.8
	Total	**392**	**100.0**
Respondent Source of Information on SWM			
Valid	Municipality	3	3.6
	Kebelle	29	34.9
	Learn by yourself	34	41.0
	NGO	9	10.8
	Other	8	9.6
	Total	**83**	**100.0**
Interest of Respondents to learn more about SWM			
Valid	Yes	347	88.5
	No	45	11.5
	Total	**392**	**100.0**
Respondent's Preference on the Method of Increasing Knowledge on SWM			
Valid	In general meeting of the town	25	7.2
	In kebele Meeting	145	41.8
	In Idir meeting	29	8.4
	Other	148	42.7
	Total	**347**	**100.0**

The survey results were also shows that awareness creation by the municipality of city on solid waste management is very low. As shown in table 16, the majority of the respondents 309 (78.8 %) stated that they have not obtained education, training or information about solid waste management and the rest 83 (21.2%) of respondent replied that they are obtained education, training or information about solid waste management.

Besides, the sample respondents who said "YES" (those who obtained education, training or information about solid waste management) were asked their source. From the total of 83 respondents majority 34 (41%) of them stated that they got information by themselves; 29 (34.9%) of them stated they got information from the kebelle. Therefore, lack of public awareness and attitudes creation priority was another challenge for the municipal solid waste management in city. The majority of the households were not well informed about the consequences of poor solid waste handling and disposal methods.

Table 17: Households Opinion, attitude and perception about Solid waste

Opinion of Respondents on the Use of Solid Wastes		**Frequency**	**Percentage (%)**
Valid	Useful	116	29.6
	Somewhat useful	116	29.6
	Useless	119	30.4
	Do not know	41	10.5
	Total	**392**	**100.0**
Opinion of Respondents on the Importance of Appropriate Waste Handling Practices			
Valid	Yes	262	66.8
	No	130	33.2
	Total	**392**	**100.0**

Among the households, 119 (30.4%) of them stated that solid waste means totally useless whereas, 116 (29.6 %) were stated somewhat useful and again 116 (29.6 %) were also stated solid wastes are useful. Similarly, the vast majority 474(92.8%) of the respondents agree on the issue of proper management of household solid wastes.

Respondents were also asked to evaluate on different efforts made by the municipality that provide solid waste management service in the city and responses were drawn in Table below

Table 18: Households perception on efforts of Municipality on SWM

Respondents Evaluation of the Efforts Made by the Municipality on SWM in the Location		Frequency	Percentage (%)
Valid	Very good	15	3.8
	Good	86	21.9
	Fair	138	35.2
	Bad	153	39.0
	Total	**392**	**100.0**

The results on the effort made by the municipality of the city to provide solid waste management service indicated that 153 (39%) respondents reported that the effort is bad; 138 (35.2%) of the respondents claimed that the effort is fair. While 86 (21.9%) of respondent reported that the effort is good and about 15 (3.8%) of respondent reported that the effort is Very good.

Table 19: Households perception on MSEs responsibility

S. No	Respondents Opinion of the SWM Service Provided by the MSEs in the Location	Household Response			
		Yes		No	
		Freq	%	Freq	%
1	Equal treatment to all households	150	54.3	126	45.7
2	They have Adequate capacity	123	44.6	153	55.4
3	They have Adequate skill	95	34.4	181	65.6
4	They collect wastes at the right and needed time	146	52.9	130	47.1
5	The Payment of their service is fair	194	70.3	82	29.7
6	Generally, They are committed in providing their services	145	52.5	131	47.5

As clearly shown in Table 19, on the view of households, the private solid waste collectors not serve the society and have not appropriate skill and commitment. According to the given data, 150 (54.3%) responded that the private solid wastes collectors treat households equally and the rest 126 (45.7%) responded that that the private waste collectors did not treat all households equally; 153 (55.4%) responded that private solid waste collectors did not have adequate capacity to cover all areas of the city and the rest 123 (44.6%) of the households stated as they had required capacity to do their assignment; 181 (65.6) responded that they did not have adequate skill for solid waste collection and management and the rest 95 (34.4%) responded

that they had adequate skill; 146 (52.9%) responded that they were collecting solid wastes from each residents at the right and needed time and the rest130 (47.1%) responded that they did not take wastes from residents at the right time; most 194 (70.3%) responded that their payment received from the household was fair and the rest 82 (29.7%)) the payment was not fair related to their services and 145 (52.5%) responded on general evaluation the private solid waste collectors are committed to deliver their service and the rest 131 (47.5%) responded generally they were not committed to render their services.

From this result one can understand that the private solid waste collectors not treat the households equally have not match with the households who are using their service. But they are tried to treat equally in terms of timely collecting wastes with fair payment. Because of this, on the view of service user households, the door to door solid waste collectors are committed to provide their services. But as indicated in the table the private solid waste collectors not have required capacity and skill.

Table 20: Households awareness and participation on Cleanup Campaigns

Respondents Opinion on the Frequency of Cleanup Campaigns in the Location		**Frequency**	**Percentage (%)**
Valid	Rare	190	48.5
	Weekly	28	7.1
	Monthly	27	6.9
	I do not know such campaign exists	147	37.5
	Total	**392**	**100.0**
Respondents Participation in the Cleanup Campaigns			
Valid	Yes	209	53.3
	No	183	46.7
	Total	**392**	**100.0**

Table 20 above shows that the households awareness and participation on cleanup campaign in there kebele and 190 (48.5%) responded there was clean up campaigns rarely and 147 (37.5%) responded they don't know such campaign exist and the rest 28 (7.1%) and 27 (6.9%) responded weekly and monthly. With respect to the participation in cleanup campaign sample households also asked did they participated on cleanup campaigns and responded that 209 (53.3%) of respondent participated cleanup campaigns and the rest 183 (46.7%) didn't participated in

cleanup campaigns. The staff members of SBPD were also asked two questions via interview their response were they prepare a cleanup campaigns in the city two times a year.

The response of sampled households strongly reflected the poor awareness of the community about the close relationship existing between solid waste and their environment and their health. This was due to the fact that little effort made by concerned body to give health and environmental education so as to create awareness among the people.

4.4.2. Technical Factors

The information obtained from sampled households indicated that some of the respondents in the city as an alternative means of disposal by digging a hole around the house and burn it, throw it on an open space, in sewerage or on street and disposing on the backyards of the house. This indicates as more attention is not given on recycling and resource recovery as a common practice. In addition the location of solid waste disposal sites of the town also indicates as no focus made on the environmental impacts of solid waste, waste of all nature is indiscriminately disposed without any further treatment in the existing dumping site. The windblown waste is scattered all over the site and some light plastics and paper might travel back all the way to the city. The major problems associated with the disposal site are: the site being crop field and grazing ground where children and farmers frequently stay, has no fence, no soil cover, it is surrounded by housing areas and religious sites, nuisance and health hazard for people living nearby, it is very close to Ethiopian air- force Bishoftu base airport (takeoff and landing route) and situated in a seasonal flood plain land etc. As a result it possible to mention technical factors as another cause of SWM problem of the study area.

4.4.3. Institutional factors

The institutional factors are the main problems that highly influence Municipal solid waste management in the city; or the main causes for the existence of such waste management related problems in addition to the previous determinant factors. In this section, the researcher investigated the influence of institutional factors on effective solid waste management; particularly, it includes law of enforcement, facilities (equipment's), budget and manpower.

4.4.3.1. Law enforcement

This variable is expected to have a positive relation with the effectiveness of solid waste management. In other words, if the residents have awareness on the existence of solid waste related laws and regulation and also the municipality apply it, at least the rate of unauthorized site disposal would be minimized.

Besides, the sample respondents (those who are aware about the availability of waste related law and regulation) selected respondents were asked another question to know municipality of the city in what extent the rules and regulation are enforced or applied in to ground and the following results obtained.

Table 21: Enforcement of Rules and regulation on solid waste management

Respondents Evaluation on the Follow-up by the Responsible Bodies to practice the Rules and Regulations of Solid Wastes Disposal in the Location		**Frequency**	**Percentage (%)**
Valid	Regulation is strong	15	11.4
	Regulation is week	92	69.7
	None at all	25	18.9
	Total	**132**	**100.0**
Respondents' Opinions on Penalization of Violators is SWM Rules and Regulations in the Location			
Valid	Yes	12	9.1
	No	120	90.9
	Total	**132**	**100.0**
If Yes, how do you evaluate the appropriateness of the penalty			
Valid	Weak	6	50.0
	Very weak	6	50.0
	Total	**12**	**100.0**

From the total of 132 respondents 15 (11.4%) of them stated that the regulation is strong. But majority of sample households 92 (69.7%) responded that the regulation is week and this implies that related to waste disposal and environmental protection issues the municipality intervention is really low. Finally, 25 (18.9%) of the selected respondents also specified that the follow – up on rules and regulation in the city is none at all. It implies that they did not observe any penalty

related action, which is taken by the municipality because of illegal solid waste disposal. Sample respondents also asked another questions (have you seen the violators are penalized) and most 120 (90.9%) of respondent responded that they don't see when the violators penalized and the rest 12 (9.1%) of respondent seen when the violators are penalized. The respondents were also asked to evaluate the appropriateness of the penalty and table 15 shows that 6 (50%) responded that the penalty is very weak and the rest 6 (50%) respondent stated that penalty is week. From this one can understand that since awareness creation on the existence of solid waste laws and regulation and its enforceability are very poor, it is one of a serious cause or constraint for the performance of solid waste management in the study area.

The staff members of SBPDD were asked question via interview (i.e. to what extent the municipality regulate the process of waste disposal by households) and they replied that the regulation is fair but to triangulate this response and to know its enforceability those staff members were asked another two question again via interview (i.e. have you across with solid waste thrown away in the city illegally and what measure did your department take to penalize the regulation violators and to prevent such action in the future) their response were Yes and With regard to its enforceability, in principle, it has two steps: warning and then penalize the violator of laws. As per the response of the interviewees, this enforceability of regulations is not that much followed in a regularly base. Therefore, enforcement of existing legislation and by-laws are the main constraints to solid waste collection service delivery.

4.4.3.2.Willingness to pay

Table 22: Respondents willingness to pay to improve the service

Respondents' Willingness to Pay to MSEs to improve SWM service in the Location		**Frequency**	**Percentage (%)**
Valid	Yes	331	84.4
	No	61	15.6
	Total	**392**	**100.0**

The respondents in the study area were assessed on their willingness to pay to improve solid waste management and the responses were as in Table 22.The table shows that majority of the participants 331 (84.4%) were actually willing to pay to improve the waste collection services. Only 61 (15.6%) respondents replied that they were not willing to pay for solid waste management services. Therefore based on the findings of the study almost all the respondents are willing to pay for the service of solid waste management.

CHAPTER FIVE

5. SUMMARY OF MAJOR FINDINGS, CONCLUSION AND RECOMMENDATION

The final part of the paper deals with the summary of major findings, conclusion and the recommendations forwarded based on the findings. The major purpose of this study was to asses current municipal solid waste management practices of Bishoftu city administration in general and factors that affect MSWM in the city in particular. This investigation was addressed by employing questionnaires, structured interview with head and workers of Bishoftu SBPDD, field observation and reviewing published and unpublished documents. Finally, on the basis of quantitative and qualitative analysis of data, the findings of this study are summarized as follows.

5.1. Summary of major findings

- The main types of MSW in Bishoftu are peels of vegetables, ash, plastic, paper and cardboard, garden trimmings or leafs and the physical composition of MSW in the city are composed from both biodegradable and non-biodegradable components. It implies that, the type and rate of household solid waste production are varied depending on the living condition of each household.

- Almost all (96.4%) of the respondent have temporary storage facility in their home. Besides, majority (80.4%) of sample respondents were used sacks local name called "Madaberia". This is highly related to the least cost of sack, easily availability in the market, and its suitability for holding large volume of solid wastes and easily delivered by MSEs of the City.

- Most (66.1%) of the respondent told that they don't separate Solid Wastes. Moreover, from the households who separate SW about (51.9%) respondent replied that they separately store to sold to "Quraleos" and to exchange with "Liwach". Besides, nearly half (41.7%) of replied that they don't have understanding about waste separation.

- Bishoftu City SBPDD is carried out some type of composting activities as a pilot test in two kebeles and this activity creates job opportunity for 26 persons.

- SBPDD was distributed 78 public solid waste containers to each 9 Kebeles for temporary storage but this operation was caused odor and dust problems. This was mainly due to absence of frequent collection, and misuse of the society. As a result, SBPDD was forced to displace those public solid waste containers. As replacement of these facilities, the department was built two communal solid waste transfer stations in Kebele 01 and Kebele 08 that give service only to MSEs.

- Municipal solid waste collection and transportation activity of the city 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 MSEs waste collectors and most (70.4%) of the respondents uses this MSEs collection service. Besides, the majority (58.7%) of the respondents replied that the coverage of service delivered by MSEs is not enough. Whereas the transfer stations collection method is directly performed by the SBPDD using its collection truck.

- Majority (78.8 %) of the respondents stated that they have not obtained education, training or information about SWM.

- Most (66.3%) of the respondents revealed that they did not know that there is SW related laws and regulations are available. Moreover, most (69.7%) of sample households responded that the regulation is week. Besides, majority (90.9%) of respondent reported that they don't see when the violators penalized.

5.2. Conclusion

Based on the findings, the following conclusions are drawn:

- SWM in general and waste handling, in particular, is weak. The result of the study revealed that MSEs were at infant stage (they did not have sufficient waste collection facilities to do their assignment).

- Disposing wastes by digging a hole around the house and burns it; throw it on an open space, in sewerage or on street and disposing on the backyards of their house are other means of disposing methods used by the respondents.

- Households, who used unauthorized (illegal) site, mostly preferred to dispose their wastes at the time of early night and early morning. Besides, sample respondent replied that sometimes the municipality also collected wastes, which are disposed by the households on free space, and removed through open burning. Thus, all the above discussions can be witnessed that solid waste management in the city is very poor and in need of a solution.

- There is a problem of solid waste reduction strategy (segregation, reuse, recycling, and resource recovery).

- SBPDD built two communal solid waste transfer stations but this transfer stations are characterized by uneven distribution both in terms of distance from beneficiaries and Kebele specific locations.

- The disposal site and its management also found inadequate. This is because the site is surrounded by mountain ridges at distant location, but there are settlement areas, a church and agricultural fields (crops, animal grazing, children play ground) just adjacent to the disposed waste, all types of Waste nature is indiscriminately disposed with no further treatment.

- The general awareness and participation of households in the SWM are very low. Assessment results revealed that very few of the households have the awareness of Solid waste and its management. The participation of households in the SWM activities is insignificant.

- Very weak enforcement of rules and regulations are some of institutional factors that hindering the performance of the city MSWM.

As a conclusion, this study investigated three main factors that aggravate the existing poor status of municipal solid waste management practice in the city. These are: socio-cultural, technical and institutional factors.

5.3. Recommendations

Based on the findings of the study and the conclusion drawn, the researcher has suggested the following recommendations as the solution measures need to be taken by all stakeholders to solve the solid waste management problems of the study area.

- The present solid waste collection rate of the city is very low which shows that more efforts should be made to change the situation. To improve the collection rate increase the number of MSEs and also increase their capacity by providing them waste collection trucks. Because the assigned trucks are not sufficient and consequently a small proportion of the waste is collected currently. So, to improve the collection rate more trucks are necessary. The trucks that may added should be compatible with the existing system and the overall health of the population. Furthermore, trucks that have covers are preferable to stop wastes from being spread while being transferred or transported to the dumpsite. The resources needed for this purpose may be injected by the central/regional government and/or other funding agents.

- Along with the proper management of the wastes that must be disposed of, the reuse or recycling of some of the waste items may be considered. This can help to minimize the amount of waste that requires to be disposed of on the one hand and to use recyclable materials for economic benefits on the other. Although sophisticated recycling systems are experienced in some countries, it is either the direct use or the use of some of the materials after minor processing. Based on the research finding, Bishoftu City SBPDD is carried out some type of composting activities as a pilot test in two kebeles of a city but this activity not enough. So, this activity should continue in other kebeles of the city and ISWM system which combines a range of solid waste treatment options like reusing, recycling, composting, and waste to energy transformation is recommended.

- According to the study SBPDD built two communal solid waste transfer stations that are not sufficient for the city and uneven distribution of those transfer stations both in terms of distance from beneficiaries and kebeles. Therefore, building additional transfer stations is recommended to improve the SWM service.

- The present waste disposal site is an open field and it has negative effects to humans by affecting human health. Thus some measures are needed to lessen the negative consequences. One of the important actions to take is changing the open dumping system to sanitary land filling system. Sanitary land filling is a more advanced system used by many cities nowadays. But it is an expensive system, which may not be implemented at once given the current degree of importance given, and budget allocated to it by Bishoftu city administration. Therefore searching for another alternative financial source is required.

- Since the poor awareness of the community was one of the major factor , SBPDD and health office of the city should engage continuous awareness creating campaign or education for the public through competitions among schools, institutions, NGOs, businesses and by using popular individuals via the different medium of communication about MSWM in general and ISWM in particular.

- The result of this study reported that illegal dumping is practiced in Bishoftu. Besides, the law enforceability shows a significant impact on effective solid waste management at household level. It means that the law enforcement section of the local government gives little attention Thus, for laws to be effective people need to know the presence of laws through awareness creation activities and implementers should aggressively work to minimize illegal disposal activities through continuous follow up.

- The study is conducted mainly on the assessment of Municipal Solid Waste Management Practices. But, the study is not considered the health and environmental aspect. Hence, further study should be conducted in this aspect.

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Appendixes

ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF PUBLIC ADMINISTRATION AND DEVELOPMENT MANAGEMENT

Annex I: English Version of Participant Information Sheet

My name is _____. I am working as a data collector for the study being conducted by Mr. Endalkachew Abrhame on Municipal Solid Waste Management Practices in Bishoftu city, who is studying for his master's degree at Addis Ababa University, College of Business and Economics Department of Public administration and Development Management. I kindly request you to lend me your attention to explain you about the study and being selected as the study participant.

Title of the study:

Assessment of Municipal Solid Waste Management Practices: A case Study of Bishoftu City Administration

Purpose of the study:

The main purpose of this study is to write a thesis as partial requirement for the fulfillment of Master program in Public Management and Policy. In the meantime it will also assess status of solid waste management practice and factors associated in Bishoftu City. This will help us to improve the solid waste management activity of the city based on the information you provided.

Procedure and duration:

I will be interviewing you using a questionnaire to provide me with pertinent data that is helpful for the study. There are 56 questions to where I will fill the questionnaire by interviewing you. The interview will take about 30 minutes, so I kindly request you to spare me this time for the interview.

Risk and Benefit of the study:

Your participation in this study will not involve any known risks or minimal risk to you. By participating in this study and answering the questions you will not receive any direct benefit. However, this will help us to improve the solid waste management activity in Bishoftu city based on the information you provided us.

Confidentiality:

The information you will provide us will be confidential. There will be no information that will identify you in particular. The findings of the study will be generalized for the study population and will not reflect anything particular of individual persons or housing. The questionnaire will be coded to exclude names and identity card of the participants. No reference will be made in oral or written reports that could link participants to the research.

Rights:

Participation for this study is fully voluntary. You have the right to declare to participate or not in this study. If you decide to participate, you have the right to withdraw from the study at any time and this will not label you for any loss of benefits which you otherwise are entitled. You don't have to answer any question that you don't want to answer.

Contact address:

If you have any questions or concerns about the research you can contact the concerned person with the following address given below.

Principal investigator

Name: Endalkachew Abrhame

Address: Bishoftu / Debre Zeit

Tel: 0920951377

E-mail - endab10@gmail.com

Annex II: English version questionnaire

Questionnaire prepared for sample households in Bishoftu City Administration

Date _____ Time started_____ Time ended _____

Kebelle _____ Code _____

Section One: Socio demographic characteristics of the respondent

1. Sex: A. Male B. Female
2. Age: A. 18 - 25 B. 26 - 45 C. over 45
3. Educational Status:
   - A. No formal education B.1-4 grade complete
   - C. 5-8 grades complete D. 9-10 grades complete
   - E. 11 – 12 grades complete F. College / University
4. Marital Status: A. Married B. Single C. Divorced D. Widowed
5. Occupational Status: A. Government B. Private sector C. Self-employed
   D. Merchant E. Housewife F. Other_____
6. House ownership condition:
   - A. Kebelle rental house B. Private Rental house C. Private house
7. Family size: A. 1-2 B. 3-4 C. 5-9 D. ≥ 10
8. Average monthly income of household (in birr):
   - A. < 1000 B. 1000 - 2000 C. 2000-3000 D. > 3000
9. Year of stay in Bishoftu (in Years):
   - A. ≤ 5 B. 6 – 10 C. 11- 15 D. ≥ 16
10. Length of period living in current house (in Years):
    - A. < 1 B. 1 – 5 C.6 – 10 D. ≥ 11
11. Distance from main road (in meter):
    - A. < 50 B. 50-100 C.101-150 D. ≥ 150
12. Do you have adequate space in your backyard:
    - A. Yes B. No

Section Two: QUESTIONS RELATED WITH SOLID WASTE MANAGEMENT PRACTICE (TYPE, STORAGE, COLLECTION AND DISPOSAL)

1. What kinds of the household wastes are mostly produced from your house? (More than one answers possible)

   A. Peels of Vegetables B. Ash C. Paper and cardboard D. Plastic

   E. Garden trimmings or leafs F. Other _____

2. Do you have a temporary solid waste storage in your house? (If No, go to Q4)

   A. Yes B. No

3. What type of solid waste storage material do you use in your house to store solid wastes?

   A. Bamboo basket B. Sack C. Metal container

   D. plastic container ('festal') E. Other _____

4. If No, how can you store solid wastes or how you come across with the problem of solid waste storage? _____.

5. Do your household practice waste separation? A. Yes B. No

6. If your answer for question no 5 is 'Yes', for what purpose do you separate those wastes?

   A. To reuse B. To sell / exchange C. To present as a gift to others D. To recycle

   E. To help waste collectors (to make the collection easier)

   F. Other, specify :_____

7. If your answer for question no 5 is 'No', what do you think the reason behind?

   A. I do not have the understanding about waste separation

   B. I did not think as it is my responsibility

   C. I did not visualize the importance of separation

   D. if any other reason, please specify it _____

8. Is solid waste disposing container available in your neighborhood?

   A. Yes B. No

9. If your answer for 8 is yes, how far is container from your house?

A. 20 – 50 meters B. 51 – 100 meters C. 101 – 200 meters

D. 201 – 500 meters E. > 500 meters

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

A. Yes B. No

11. What other means do you use to dispose solid wastes of your household?

A. Throw it on an open space, in sewerage or on street

B. Digging a hole around the house and burn it

C. Disposing on the backyards of the house

D. Private collectors take it

F. Others, please specify_____

12. How often do you empty your wastes to either of your choice dumping place?

A. Everyday B. Every 2 to 3 days C. Every week

D. Every two weeks E. Once a month F. Others: _____

13. What time do you prefer to dispose your household wastes?

A. Early morning B. Late morning C. Afternoon

D. Early night E. the time of private waste collectors

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

A. Yes B. No

15. If your answer for question no 19 is 'yes' , how much do you pay for the service render per month, and specify solid waste service provider criteria for fixing your charge.

_____

_____

_____

16. Do you have access to door to door solid waste collection service delivered from the MSEs? (If No, go to question No 23)

A. Yes B. No

17. What do you think is the current number of private wastes collectors (MSEs)? Do you have enough access to them?

A. Enough access B. Not enough access C. None at all

18. How long have you been getting the service?

A. < 1 year B. 1-2 years C.>=3 years

19. If your answer for question no 13 is 'Yes', How often do the private MSEs collect solid waste from your house?

A. Twice a week B. Weekly C. Twice a month

D. monthly E. Indicate if any other arrangement: _____

20. How much do you pay for the MSEs Services, indicate in birr?_____

21. What do you do with the solid waste from your household if the MSEs did not come at the right time and find your temporary storage full? (More than one answer possible)

A. I keep the waste at home until the collectors are coming

B. I burn it in the back of my home

C. I dump it on open space, which is far from the main road

D. I dump it in sewerage

E. Other_____

22. To what extent the MSEs discharge their responsibility?

22.1	Treating all households equally	A. Yes B. No	
22.2	Have adequate capacity to serve the given place/ household	A. Yes B. No	
22.3	Have required skill to collect and manage household wastes effectively	A. Yes B. No	
22.4	Collect wastes from households at the right / needed time	A. Yes B. No	
22.5	The payment they receive from household is fair	A. Yes B. No	
22.6	Generally, they are committed in providing their services	A. Yes B. No	

23. If you are not getting the MSEs Services, do you believe that the location of your home/village/ is one factor to prevent you from such services?

A. Yes B. No

24. What do you think the main reasons why you did not get the MSEs waste collection services? (Only for HHs not engaged in the service)_____

_____

_____

Section 3: Attitudes and Awareness towards Solid Waste Management

25. How do you think of solid wastes? Do you think solid wastes are:

A. Useful B. Somewhat useful C. Useless D. Do not know

26. Do you agree with the importance of appropriate waste handling?

A. Yes B. No

27. Who do you think is responsible for solid waste management? (More than one answers possible)

A. The municipality B. The private waste collectors

C. The households D. Other_____

28. How do you evaluate the efforts of made so far by the municipality of the city to provide solid waste management services?

A. Very good B. Good C. Fair D. Bad

29. Do you know that there are rules and regulations of solid wastes in Bishoftu city?

A. Yes B. No

30. How do you evaluate the follow – up by the responsible bodies to practice the rules and regulations of solid waste disposal in Bishoftu?

A. Regulation is strong B. Regulation is weak C. None at all

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

A. Yes B. No

32. If your answer for question No. 31 is "yes", how do you evaluate the appropriateness of the penalty to prevent violators of solid waste management rules and regulations?

A. Very strong B. Strong C. Fair D. weak E. Very week

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

A. Yes B. No

34. If your answer for question No. 33 is "YES", who provide the information?

A. Municipality B. Kebelle C. Learn by yourself

D. NGO E. Other_____

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

A. Yes B. No

36. If so, what would be your favored method of increasing your knowledge?

A. In general meeting of the town B. In kebele meeting

C. In Idir meeting D. if any other_____

37. How is cleanup campaigns frequent in your kebelle?

A. Rare B. Weekly C. Monthly D. I do not know such campaign exists

38. Have you ever participated in a cleanup campaigns in your kebelle?

A. Yes B. No

39. If your answer for question no 38 is "yes", how many times you participate in the last year_____.

40. Have you ever provide any complain to the municipality when the private waste collectors did not come in your household at the right time? (only for HH who use MSEs)

A. Yes B. No

41. If your answer for question number 40 is "No", what action did you take to solve such problem?_____

42. Are you willing to pay for the private waste collectors" service in order to improve solid waste disposal practice in your town?

A. No B. Yes

43. Based on the following information, evaluate the municipality service with the evidence of its collection / management system:

S. No.	Do you observe disparity in service provision between:	YES	NO	If YES, which areas are better Served
43.1	Lower income and higher income residents			A. Lower income B. Higher income
43. 2	The area at or near the main road (the center of the city) and the area far from the center of the city (main road)			A. Near to main Road /center of the city B. Far from main road/center of the city
43. 3	The area of higher official residents and the ordinary people			A. Higher official residents B. Ordinary people residents
43. 4	The residential area and the commercial area			A. Residential B. Commercial

44. If you have any additional comments, suggestions, or would like to elaborate on any of your previous answers_____

_____

_____

_____

_____

Thank You for Your Participation!!!

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DEPARTMENT OF PUBLIC ADMINISTRATION AND DEVELOPMENT MANAGEMENT

Annex V: Interview questions prepared for Bishoftu City Sanitation, Beautification and Parks Development Work Process Department Employee.

Dear respondent this Interview is conducted for an academic purpose for the fulfillment of MA degree in Public Management and Policy. Specifically the objective of the study is to assess the current Municipal Solid Waste Management Practice of Bishoftu City Administration. 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 one: Background information about the respondents

1. Job title in your department _____.
2. Employment condition

   A. Permanent B. contract

3. Educational level

   A. No formal education B.1-4 grade complete C. 5-8 grades complete
   D. 9-12 grades complete E. Certificate F. Diploma
   G. First degree H. Second degree and above

4. Work experience_____.
5. Monthly salary _____.
6. Family size _____

Section II: General Interview questioners on MSWM

1. Do you plan your work?

A. Yes B. No

2. Does your department have specific job description for its employees?

A. Yes B. No

3. If 'No', what do you think the reasons behind?

_____

_____

4. How do you evaluate the current human resource capacity of your department in terms of:				
4.1	Quality?	A. Inadequate	B. Adequate	
4.2	Qualification?	A. Low	B. Medium	C. High
4.3	Motivation?	A. Less motivated	B. Medium	C. Motivated

5. What is the source of your income for solid waste management services?

A. Budget from the federal government

B. Fees collected from the services

C. Budget from the Bishoftu city administration

D. Please specify, if any other _____

6. Have you ever faced budget deficit?

A. Yes B. No

7. If yes, from where did you get subsidy to solve such problem?

_____

8. Is solid waste disposing container available in different parts of the town?

A. Yes B. No

9. If yes, do you believe that it is enough for the city's people?

_____

10. If No, what other means does your institution provide to the households in order to dispose their wastes appropriately?

_____

11. Are the vehicles currently in use enough to dispose solid wastes in the town?

A. Yes B. No

12. How do you evaluate the practice of the community in source separation, recycling and reuse?

A. Very Good B. Medium C. Low

13. Did your department give education, training or information to the community about solid waste management?

A. Yes (If yes, for how many times)_____and method of delivery_____

_____

B. No (if No, tell the reason:_____

14. Did your department Prepared a cleanup campaign?

A. Yes (If yes, for how many times did you prepared in the last Year)_____

B. No (if No, tell the reason):_____

15. Rank the cause of the Poor Solid Waste Management Practice in Bishoftu?

		1st	2nd	3rd	4th
15.1	Lack of awareness				
15.2	Lack of public participation				
15.3	In appropriate policy				
15.4	Shortage of tracks				
15. 5	Shortage of man power				

16. To what extent does the municipality regulate the process of waste disposal by the households?

A. Bad B. Fair C. Good D. Very good

17. Have you come across with solid waste thrown away in the town illegally?

A. Yes B. No

18. If yes, what measure did municipality take to penalize the regulation violators and to prevent such action in the future?

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19. Do you believe that the municipality provides adequate facility to the households?

A. Yes B. No

20. How many male and female functional private waste handlers that engaged in Solid Waste Management services so far?				
		Male	Female	Total
20. 1	In primary collection (From Households to transfer station)			
20. 2	In secondary collection (From transfer station to final disposal site)			
20. 3	From Households to Final Disposal sites			
20. 4	In Composting			
20. 5	In Steer Sweeping			

21. Have your department ever established any system for such enterprises to get training and consultation services with regard to:			
21.1	How to collect and handle wastes from households	A. Yes	B. No
21.2	The extent of their responsibility:	A. Yes	B. No

22. Do you have a follow– up form or criteria to know whether the private waste collectors discharge their responsibility as expected or not?

A. Yes B. No

23. How do you evaluate the enforceability of rules and regulation of solid wastes in Bishoftu?

A. Very strong B. Very weak C. None at all

22. How do you evaluate the follow-up by the responsible bodies to practice the rules and regulations of solid waste management in Bishoftu?

A. Very strong B. Strong C. Weak D. There is no follow up

23. Do you believe that these private waste collectors are paid fees benefiting the service they render?

A. Yes B. No

24. What effort is being made to improve SWM practice, with regard to?

(A). the supply of enough facilities like containers, door-to-door collection services

(B). encouraging households to apply waste separation at sources

(C). improves the understanding level of the households about waste management and the impact of inappropriate management / disposal

25. List challenges of your department?

26. If you have any additional comments, suggestions, or would like to elaborate on any of your previous answers?