HOUSEHOLD SOLID WASTE DISPOSAL AND ITS MANAGMENT PRACTICE, THE CASE OF BISHOFTU TOWN, OROMIYA RIGINAL STATE, ETHIOPIA.

BY

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Household Solid Waste Disposal and its Management Practice in Bishoftu Town in the case of Bishoftu town, Oromiya Regional state, Ethiopia in 2019/20

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I, NigatuaMamo declare that this thesis is my original work and has not been presented to any other university, and that all sources of materials used for the thesis have been properly acknowledged

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ABSTRACT

Most of the developed countries recognized that household solid waste disposal and its effective management is very crucial for survival in addition to secure the safety of environment and human health. Because of various reasons, developing countries like Ethiopia does not begin to see the economic benefits of solid waste yet, they even dump the solid waste in unauthorized sites

The objective of the study assess household solid waste disposal and its management practice in the case of Bishoftutown. An explanatory type of study design was used and data were collected from 192 households, which were selected through simple random sampling method from three 'kebeles', from responsible staffs and private participants using interviews . Descriptive statistics was used to know the relationship between variables.

Though most households have temporary storage in their home, they did not store wastes separately based on its nature. Disposalof solid wastes in unauthorized sites by the households is highly practiced in Bishoftu Town. As shown by the empirical analyses on household heads' age, sex, educational level, monthly income, family size, willingness to pay for solid waste collection service, awareness on solid waste management and households' location that is distance from the main road, and households' access to the private waste collectors' service are the major challenges of effective household solid waste management in the study area. In addition , the qualitative analyses, which is done by using the interview and fuscous group discussion shows that other major problems of effective solid waste management practice in the household level are budget problems, limited man power, resources and facilities like adequate containers, vehicles, gown and gloves.

Although there are concerned bodies and stakeholders, the issue of proper management of house hold solid waste management should be in mind of every individual. Hence creating awareness for each individual and finding a way to increase the financial capacity of stakeholders in solid waste management is a recommended way out.

Key words; Household, solid waste, solid waste disposal, management practice, Bishoftu town.

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List of Acronyms /Abbreviations/

MSW =Municipal solid wastes

SW =Solid Waste

SWM =Solid Waste Management

UNEP = United Nations Environmental Programme

SSA = Sub Saharan Africa

BCA =Bishoftu City Administration

EPA= Environmental Protection Authority.

HHSW=Household Solid Waste

Chapter One.-Introduction

1.1 Background

House hold solid waste is a material discharged from each house hold of daily activities and those which leads to adverse impact on environment and human health. Solid waste means a material whichis thrown away and does not have any value to its first owner.In urban areas it mainly constitutes of organic waste like kitchen waste and garden trimmings, and paper, glass, metals and plastics. In addition ash, dust and street sweepings can also form portion of the solid waste. And solid waste management (SWM) refers to collection, storage, transportation, processing, treatment, recycling and final disposal of waste. Systems need to be simple, affordable, and sustainable (financially, environmentally and socially) and should be equitable, providing collection services for poor as well as wealthy households.Solid (Rouse, 2008)

In pre urban settings household solid waste management system was not a big problem across the globe. Today because of rapid population increase and the expansion of urbanization in Ethiopia house hold solid waste disposal and its management practice is a critical urban problem. "The first humans did not worry much about waste management; rather they simply left their garbage where it dropped" This implies that house hold solid waste management task is becoming a serious concern due to increasing rate of population growth and urbanization in the world. (Net Industries 2010).

There is alarming increase in volumes of solid waste due to rapid urbanization and population growth and modern people generate by far more wastes than early human ever did. It is stated as most cities on average generate 1.42kg per person solid waste. Therefore especially nowadays rapid population growth and urbanization are related togeneration of house hold solid waste. Thus, the town which shows increasing population growth and expansion of urbanization should know how to manage sold waste without impact of human health and environment.(Smith 2003).

In Sub-Saharan African (SSA) cities, like in other developing regions, rapid population growth as well as expansion of service and manufacturing sectors has led to an increase in the amount of solid waste currently. To achieve the above stated means of solid waste management each house hold members of the town should have their own responsibility.(Abdalahet al. 2016)

In Bishoftu town 75% of the solid waste is generated from households, the rest is produced from commercial areas, street sweeping, public institutions and industries. Among all waste, solid waste is a major visible source of environmental pollution in the town, which in turn, is the cause of pollution of air, water and soil. As a consequence, it is highly affecting human health, the quality of life and natural resources. Thus the solid waste littering the town is becoming one of the major areas of apprehension.

The primary objective of SWM is to make the environment safe to human health and protect the environment from pollution. But in developed countries not only disposing the solid waste properly, they also convert the solid waste to cash and use it to develop their economy. The benefits of proper solid waste management isbeyond the known one which is environmental and human health security. Today one who is disposing more garbage yearly could recycle and have more economical benefits. Therefore in most developed countries today, household solid waste management is a multibillion dollar investment which is also necessary for survival. (Smith2003)

In addition to the above advantagesproperly managed solid waste is essentialfor producing methane gas which in turn helps to produce electrical power (UNEP & CCN, 2010). Research has shown that in many cases, developing countries experience poor municipal solid waste management because cities and municipalities are not well equipped to manage waste in a sustainable way (UN-HABITAT) .Less than 70% of waste generated in low-income countries is collected and more than 50% of the collected waste is often disposed of through uncontrolled land filling while about 15 % is processed.(Rouse2008)

1.2 Statement of the problem

This research is designed to investigate the household solid waste disposal and its management practice in selected kebeles of Bishoftu Town. Accordingly in Bishoftu Town, most households dispose their wastewithout treatment either locally into the open fields, on the streets, in the lake or taken to the Golbadumpsite. The dumpsite receives all waste from the city (organic, inorganic, solid and fecal wastes) coming from individual households, public and private institutions. The dumpsites are found on the periphery of the urban areas, turning into the sources of contamination due to the incubation and proliferation of flies, mosquitoes, and rodents; that in turn are disease transmitters that affect peoples' health. Poor handling of household solid waste can result in various types of infectious and chronic diseases on the waste workers and peoples living near to the dumpsites. Therefore, a common problem among developing countries with rapid urbanization, like Ethiopia, is lack of appropriate institutional mechanisms to fully address household solid waste disposal and its management strategies. Rapid population growth and expansion of urbanization are increasing at an alarming rate in African continent. But the technology, technical knowhow, financial capacity, culture, and understanding of the community required to properly managesolid wastes are not adequately available". Solid waste generation rate in Bishoftu Town is increasing along with its population growth rate over time. It should also be noted that with the current growth of population, solid waste management would be the major problem for the responsible body. Thus, different measures should be taken to avoid its impact on the environment especially on biodegradable materials but if the current trendof solid waste generation and disposal method continues the area would be a place of unsanitary living condition.(Ali, 2001)(UNESC ,2009)

As a result inadequate household solid waste management capacity at the municipal level has constrained the ability of cities to provide basic collection and disposal services, hence; solid waste management (SWM) is one of the basic services that are currently receiving wide protection or appropriate design details for the handling of waste.- (Edward et al, 2010). Improper and unscientific management and disposal of the waste leads to the transmission of communicable diseases (Shamble. K et *al)*. Therefore poor management of solid waste has devastating impact up on the environment and human health. In addition, it leads to the ugliness of street litter and degradation of the urban environment and beauty of city.(EPHTI, 2OO4).

Different studies have been conducted in the aspect of household solid waste management and its determinants. However, these researches effort on the solid waste management, in general on household solid waste management methods, most have limitation in that they didn't consider the collection process. Hence of potential application of the research's findings will be based on the problems associated with collection and disposal.The impacts of poor solid waste management practices observed were very much unclear until decades ago. The main purpose of this studyis to identifyeffectivehousehold solid waste management system and to improve the performance of the system as a whole for the benefit of the public..

1.3 Objective of the study

1.3.1General objective

To assess household solid waste disposal and its management practice in Bishoftu town.

1.3.2 Specific objectives

- To investigate the major components ofhousehold solid waste disposal inBishoftu town.
- To assess the current house hold solid waste disposal and management practice Bishoftu town.
- To investigate the impact of improper household solid waste disposal in Bishoftu town
- To identify the challenge of proper household solid waste management practice inBishoftu town.

1.4Research question

- What are the major component of household solid waste disposals in Bishoftu town?
- What are the existing methods used in household solid waste management in Kudada, Dabaso and Horabishoftukebeles of Bishoftu town?
- What is the impact of house hold solid waste disposal in Bishoftu town?
- What are the challenges of proper household solid waste disposal and its management practice in Kudada, Dabaso and Horabishoftukebeles of Bishoftu town

1.5 SIGNIFICANCE OF THE STUDY

In most developing countries including Ethiopia household sold waste disposing mechanism and its management leads to water, air, soil, pollution and environmental degradation. Likewise improper household sold waste disposal in the streets, lake area and drainage dam in the proposed town of the study area seems to cause blockage of the drainage system,

flooding and different diseases. So this study is intended to look into the household solid waste disposal and the management practice in Bishoftu town.

In addition, this study could be used as a stepping stone to solve the problem on household solid waste disposal mechanism and its management practice, for the government and policy makers. Moreover the study would also provide valuable information for other interested researchers in the study area to carry out further research work.

1.6 THE SCOPE OF THE STUDY

This study was conducts in Kudada, Dabaso and Horabishoftukebeles of Bishoftu town. The town is located between 8^0,47' N latitude and 38^0,56'-39^0 east longitude located in East showa zone situated at a distance of 47k.m south east of Addis Ababa and 52km. from Adama town . In the north the city is bordered with YererSilassie in the south with Wedo and Katajara in the east with Kalitiand in the west with Dire Town.

1.7 LIMITATION OF THE STUDY

As conducted researches shows in developing countries like ours, improper solid waste management is a known and growing problem. Due to financial and time limitations this thesis is concerned on selected kebeles of single town and the output cannot be used to represent the household solid waste disposal and management of other geographical areas.

1.8. ORGNIZATION OF THIS THESIS

This research paper contains: five chapters, chapter one deals with introductory part which consists background of the study, statement of the problem, research objective, research question, significant of the study, scope of the study and limitation of the study and organization of the study.Second chaptercontains the literature review. Description of the study area, sampling method, data collection instruments and analysis methods are included under chapter three. Chapter four is on result and discussion and chapter five deals with conclusionand recommendation.

CHAPTER TWOREVIEW OF RELATED LITERATURE

2.1 THEORETICAL REVIEW OF LITERATURE

2.1.1 Concept of household solid waste

Household Solid waste may be defined as all discarded solid materials from each households resulting from households living conditions, Solid waste generated in a city is often referred to as municipal solid waste. In other literature and jurisdictions this category may exclude sewage, dissolved solids in water, and industrial waste (Abdhalah*et et al*, 2016) (Sandra, 2006). Solid waste is generally defined as waste from household, commercial, and institutional sources (Ebna*etetal*., 2013). In general terms the constituents of solid wastes can be categorized as: non-biodegradable inorganic matter, recalcitrant synthetic organic matter; biodegradable natural organic matter and toxic organic compounds (metals, metalloids and their derivatives)

.A study done by Rouse in 2008 notes 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 in urban areas are organic waste (including kitchen waste and garden trimmings), paper, glass, metals and lattices. Ash, dust and street sweep the impact of a day to day activity of human beings on the rate of waste production. Due to this, street sweepings can also form a significant portion of the waste".

However, most people do not realize the role they play in solid waste generation or the impact of their actions on the bulk of waste disposed because of this they do not give enough attention to the directions given by the concerned bodies this leads to the improper disposal of solid waste. In line with this issue, (Prakriti et al 2007) also raised very interesting question, which is worthy enough to direct quote:

> *The sight of a dustbin overflowing and the stench rising from it are all too familiar sights and smells of a crowded city. You look away from it and hold your nose as you cross it. Have you ever thought that you also have a role to play in the creation of this stench? That you can also play a role in the lessening of this smell and making this waste bin look a little more attractive if you follow proper methods of disposal of the waste generated in the house?* (prakriti, et al 2007:2)

2.1.2 Solid waste generation

Solid waste generation refers to the sum total "of waste dispose of during a given period of time and the magnitude it involves diverse methods: by measurement at the point of

generation, through use of vehicle survey and by examination of records at the disposal facility" (UNEP 2009; cited in Zebenay 2010). The rate of solid waste generated in a given town is basically determined by demographic growth,

Solid waste is produced as a result of economic productivity and consumption (Sandra, 2006). Many human activities generate solid waste and these are major causes of environmental and houses, streets, public places, shops, offices and hospitals (Abhimanyu*et al.,* 2014). Solid wastes can be emanated from different areas such as household - solid waste from single-and multiple-family homes, hotels and recreation areas, commercial – solid waste from markets, stores, offices, restaurants and other nonmanufacturing activities and institutional areas, solid waste from schools and colleges, hospitals, prisons, etc. (U.S. Environmental Protection Agency, 2014). Developed countries with higher incomes produce more waste per person with higher percent of packaging materials and recyclable wastes. In low-income countries, there is less commercial and industrial activity, as well as less institutional activity, thus resulting in higher waste generation rate (Sandra 2006)

2.1.3. Urbanization and solid waste generation

As cited by Abdullah et al (2016), Solid waste generation and urbanization are intimately related and therefore it is important to briefly reflect on the urbanization phenomenon. In 1950, about 30% of the world's population lived in urban areas. It is currently estimated that by 2050, about 66% of the world's population will be living in urban areas. Sub Saharan Africa is urbanizing at a faster rate than any other part of the world.

While Africa is still the least urbanized (40%), it is estimated that by 2050, about 56% of the population in Africa will be living in urban areas. Going by the recent events, urbanization is a fast growing trend which leads to economic growth and associated with high waste generationurbanareas will also a center of ill health in the coming decades because of poor waste management. However, the developed countries manage to prevent the potential health impacts In countries that are rapidly urbanizing and developing economically such as China and India, the increasing volumes of waste generated and improper waste management practices pose serious health risks.

Today human activities and their products are now considered to be the major cause of global warming, environmental pollution and climatic changes that introduce a serious danger to human health and wellbeing. Likewise at a local level the bulk of waste generated as aresult of human activities is the main cause of environmental and health challenges including

infectious diseases such as malaria, dysentery, cholera, respiratory complications and injuries among others. The rapid growing of urban population can causethe production of more house hold solid waste and it causes the higher impact on environmental and human health and it needs improved management of household solid waste service. Even though urbanization is rapidly expanding in African cities there is still a great challenge when it comes to expansion of social amenity and economic opportunities thus many African cities face severe challenges to provide basic services such as shelter, water and maintaining a clean environment

Urban areas have been recognized as places of opportunity, wealth, better education and health. Undeniably, from the health point of view, urban populations have historically had overall better health indicators compared to rural populations and this became to be known as the urban health advantage. In the face of new urban challenges, the urban health advantage is declining.

The rate of solid waste generated in a given town is basically determined by demographic growth, seasonal variation, geographical location, economic scrub by development and people attitude toward waste. can also condition solid waste generation rate in the form of their pattern of material use and waste handling their interest in waste reduction and minimization, and degree to which they refrain from indiscriminate dumping and littering (Schubee1996)

Developing countries their quantum of waste is high owing to their higher levels of population growth. This clearly shows impact of rapid population growth on waste generation rate (Ibid, 2004).

The estimated quantity of municipal solid waste (MSW) generated worldwide is 1.7-1.9 billion metric tons per year making cities at threat to the environment(UNEP,2013).It is also expected to increase approximately to2.2 billion metric tons per year by 2025.

According to Environmental protection Authority (EPA) and World Bank the Study conducted in 2004 is showed that per capital amount of waste generate in Ethiopia range from 0.17to o.48kg/person/day for urban areas to about 0.11 to 0.35kg capita day for rural area. The total generation of municipal solid waste in Ethiopia in 2003 is estimated to8.8 million is capita/ day for rural areas the range depend on several factors such as income and season.

This can be split to approximately 0.6 to 1.8 million tons from rural area and 2.2 to 7million tone from urban area EPA/world Bank 2004). .

The existing information point out that the per capita waste generation of Bishoftu town is very high (0.48kg/person/day) and it 292m3 day. But the management and the operation of the existing land fill site and area based containers is very poor .According to the data oBCAined from the department of urban cleaning and beautification/302,873m^3(87 %) of solid waste is collected and.)13% 39,373.49 wastes is uncollected and dispersed open drain.

Modernization/ technology advancement and increase in global population created rising in demand for food and other essentials. This has resulted to rise in the amount of waste being generated daily by each house hold (Shaatoetal/, 2009)

2.1.4 Solid waste management practices

Solid waste management practices is different from region to region or country to country even it varies with in one country, Modern waste management practice usually supports re use, recycle, composting and dispose off their waste through land fill this encourages households to reduce the amount of waste generation . But this trend is not practiced in poor countries they do not use re use recycling, composting to reduce the bulk amount of solid waste. Sorting is very rare in these countries which makes it difficult to recycle or reuse compost waste therefore most of the solid waste produced are disposed off in open dumpsites or burnt.The difference in waste management practice is mostly caused by the existence and extent of enforcement of laws, policies and regulations related to waste management, the content and quality of waste generated and the availability of funding. In most poor countries solid waste management is the responsibility of both the municipality and private services in these countries waste collection is usually from source or temporary dumping ground and the final disposal is mostly at an open dumpsite which is located near the border of the cityDumping sites are usuallyextensive open grounds where truckloads deposit the waste.

Dumped waste is then searched for usable materials, recyclable articles and usually burnt to minimize the amount of solid waste. Since there is limited waste sorting at any stage the waste has a complex composition in different cases it may contain medical ,electronic, industrial, commercial, plastic or even household waste dumped on the same open field where all the other municipal waste are dumped

Municipal solid waste management refers to the planning, financing and implementation of programs for solid waste collection, transportation, treatment and final disposal in an environmentally and socially acceptable manner (Abdhalah*et al*., 2016 and Syed, 2005). Solid waste management is a growing challenge to many rapidly urbanizing areas.According

to EPA (1999), SWM is any of the work and programs to eliminate/collect recycle or land fill solid waste. Procurement or recycled content supplies and equipment and education are also part of SWM is refer to as the proper and correct handling of waste product at the lowest cost and minimum distraction and pollution to the environment. There is threat for need to manage waste to reduce the threat to the environment. Modern waste management approaches encourage reduced waste generation, re-use, recycling, composting, and safe disposal through landfills; however, these are often not practiced. In developing countries a large proportion of waste is not re-used (Abdhalah*et al.*, 2016). Proper management of solid waste by the government organization has not been successful and is somewhat poor in this urban center. Among the possible scenarios, it is clear that the most two clear options for efficient solid waste management either centralized or decentralized. However, to achieve financial solid waste management, some is a need to systematically analyses the strengths and weaknesses of the community as well as the municipal corporation based on which an effective decentralized system can be evolved with the participation of various stakeholders in Bishoftu town .(Abhimanyu*et al.,* 2014).

2.1.4.1 Components of solid waste management

Solid Waste Management (SWM) broadly, refers to the material flow stream of waste from generation to ultimate disposal and comprises storage, collection, transportation/ transfer, processing (reuse/recycling/ composting), and disposal.

2.1.4.2 Storage

The size of premises, nature (type) and generation rate of solid waste determines the type of storage to be used. Storage facilities must be animal and insect proof washable and robust enough to meet the exigencies in normal use. There is a limit to the duration that solid waste can be stored at source (in the premises) based on the type and source of solid waste.

Solid waste should be collected and disposed of from temporary stores to final disposal site before breeding various disease-carrying vectors. Uncovered containers of waste are exposed to human and animal scavengers that litter waste around and create community health problems.

2.1.4.3 Collection and transportation /transfer

Collection refers to the art of removing accumulated waste, be it containerized or not, from generating sources. Collection may occur at a centralized location where generators deliver their solid waste or by going from individual generator to another, which increases the

expense of collection. Transfer or transportation, as the name indicates, refers to the transportation or/and haul of solid waste from a central point to one or more distant final management facility (Gerald, 1997).

2.1.4.4. Transfer and Transport

These activities refer to the transfer of waste from public storage to collection vehicles followed by transport of waste to disposal sites Transfer refers to movement of waste or materials from primary collection vehicle to secondary collection vehicles which are large and more effective. Transfer stations are sometimes used if the final disposal site is far from the point of collection there are two basic modes of operations regarding transfer stations known as direct discharge and storage discharge. In storage discharge station the waste is first emptied from collection trunk to a large platform or storage pit.While in direct discharge station, each refuse truck empties directly in to larger transport vehicles" (Meenakshi, 2005).Transportation on the other hand covers all types of vehicles under operation it is aimed at transporting household solid waste from its source or generation point to transfer station then to disposal site

"All vehicles in operation refersto mechanically driven sophisticated transportation vehicles, including driven small carts, and special vehicles for hazardous, bulky, and recyclable wastes. Generally, an accurately planedtransfer and transportation system highly minimizes cost of collectionof household solid waste" (Ibid, 2005).

2.1.4.5. Processing and Recovery

All techniques facilities and equipments used to recover usable materials enhance the efficiency of other functional elements, conversion products, produce energy and compost are included in processing and recovery. In addition it also provides several advantages. First, it can be used to minimize total amount and weight of waste material that needs collection and final disposal. Volume reduction also helps to conserve land resources since land is the ultimate sink for most waste materials. On the other side, it also reduces total transportation cost of waste to its final disposal site. Solid waste processing and recovery is carried out starting from separation and processing of waste at the generation point. However, mixed waste is often sorted at transfer station , material recovery, facility disposal site and combustion facilities this often includes separation of large items, separation of waste components by size using screens, manual separation of waste components, and separation of ferrous and non-ferrous metals. Then they enter in small and large scale industries for recovery activities. For instance organic portions of MSW can be changed by a variety of

biological and thermal processes. The most frequently used biological transformation process is aerobic composting and, the most regularly used thermal transformation process is incineration.(Urinate et al, 2008).

2.1.4.6. Disposal

Disposal refers to the final practical element in household solid waste management system. Disposal activities are associated with final dump of house hold solid wastes directly to a landfill site. Today disposal of wastes by land filling or land spreading is the ultimate fate of all solid wastes whether they are residential wastes, or residual materials from materials recovery facilities. “However, in most developed countries this method is officially banned allowing only sanitary landfill for final disposal. Because sanitary landfill is not a dump it is an engineered facility used for disposing of solid wastes on land without creating nuisances or hazards to public health and environment” (Techobanglous, 2002). “Though it is the most common technology around the world, conventional and environmental unfriendly methods such as open-burning, open-dumping, and non-sanitary landfill can still be used as disposal method”(UNEP, 2009).

2.1.4.7. Incineration

Incineration is one option for sustainable solid waste management. It is defined as the process of refining solid waste under controlled conditions to reduce weight and volume of solid waste, and often to produce energy. This process can be described as waste reduction rather than disposal. But in the process of incineration ash must be disposed It is recognized as a handy means of disposing of certain harmful waste materials (such as medical waste). Incineration can be carried out both byindividual on small scaleand by industries on a large scale.

2.1.4.8. Composting

Composting is a process by which solid organic waste material are biologically decomposed by fungi, bacteria, warm, insects and other organisms in order to transform large quantities of organic material to compost(humus like materials). These organic materials that are produced by this process are added to the soil to supply plant nutrients such as potassium, phosphorus, nitrogen, sulfur, calcium and iron it also helps slow down soil erosion and make clay soils more porous or increase water holding capacity of sandy soils” (Enger and Smith, 2008).

2.1.4.9. Reuse and Recycle

Reuse involves cleaning and using materials over and over. In other words, it means the use of a product more than once in its original form for the same or a new purpose. This method is carried out on materials that can be used over and over again. It plays a great role when it comes to preserving energy resources, reducing the use of matter, creating local jobs, decreasing pollution and also saving money (Miller, 2007)."Since cleaning and reusing materials in their present form avoids the cost of money and energy for remaking them reusing materials is considered to be more effective than recycle and composting methods."(Cunningham et al 2008)

2.1.5 Challenges ofhousehold solid waste management

The basic challenges that faces the management of household solid wastes is that they consist ofcomplex mixtures and are frequently subjected to indifferent storage conditions resulting in deterioration before collection and subsequent treatment (Geoffrey, 2003). Major problems facing in solid waste collection, transportation services and management in the city include inefficiency of the transportation system due to lack of vehicle breakdowns; inadequacy of collection vehicles; and inaccessibility of some waste sources, such as unplanned undeveloped areas due to poor road conditions (Environment and Sustainable Development, 1992).

Several reasons are given in order to explain the poor status of the solid waste management programmers. A lack of financial and human resources as well as organizational inefficiency within municipal bodies are said to cause a lot of trouble (Syed, 2005). Transportation arrangements are generally insufficient this is because of theinaccessibility of proper vehicles as well as the low productivity of the personnel. There are also policy gaps that need to be addressed (e.g. to stop people from throwing garbage in public areas) (Singhal*et al*., 2001).

Household solid waste management is the main problem of urban center because of unplanned and under developed solid waste management infrastructure facilities especially in town of developing country like Ethiopia. This leads to improper waste disposal and high volume of uncollected solid wastes. A physical observation of waste storage containers in the sampled communities revealed that most of the communal collection centers were not disposed of frequently to the final disposal sites when these bins are in full capacity. This attitude towards waste management is likely to make the respondents more prone to solid waste related diseases. Studies revealed that the waste management companies had numerous problems, the waste collected is in most cases not recycled.(Singhal *et al* 2001)

2.1.6 Environmental issues and household solid wastes

The improper disposal of household solid waste such as vegetables; fruits peels and left-over foodstuff, as well as paper and plastics plays great role on the pollution of natural environment (Akinola*et al*., 2014) household. Solid waste is the stream of garbage collected by sanitation services from homes.(U.S. Environmental Protection Agency, 2014). A major environmental concern is gas release by decomposing garbage. Methane is a by-product of the anaerobic respiration of bacteria, this gasses has contribution to the enhanced greenhouse gas effect with waste product is pollution. Waste product can pollute the air you breathe and the water you drink.

Poor solid waste management has devastating impact up on the environment otherwise the responsible body timely. Award off the impact of improper management of solid waste and decide to take the necessary measure to tackle the problem of uncontrolled solid waste management activities aggravate endangering the safe and health exist. The closure of existing open dumpsites and the introduction of sanitary landfill is an urgent priority everywhere in the developing world. (Pervez, Kafeel et al 2013).

Even where complementary disposal technologies, such as composting or incineration (waste to energy plants), are practiced, a landfill is still required and is the backbone of any sustainable disposal system. Matching grants designed to encourage landfill investments and sustainable operations may be an appropriate instrument to consider, primarily because the environmental damages and benefits tend to spill over into neighboring municipalities and regions, or into underlying groundwater resources (Daniel, 1999). This statement is true.since the waste in the landfills is not appropriately being managed, it is bringing a negative impacts on the environment. Medina (2002) also supported the US Environmental Protection Agency by stating that pollution is not directly transferred from land to people, with the exception of dusts and direct contact with toxic materials. Pollutants deposited on land mostly enters the human body through the medium of contaminated food products or water, crops and animals,. Land pollution can also damage terrestrial ecosystems, resulting in the deterioration of the conservation on and amenity value of the environment.

2.1.7 Household Solid waste Situation in Bishoftu

Quantity of household solid waste generated by thesociety is increasing from day to day; the composition of waste is becoming more and more diversified, with increasing use of packaging materials made of both paper and plastic (U.S. Environmental Protection Agency, 2014). Such collection and disposal of solid waste is taking place improperly in the city.

Characteristically, in most countries in Africa, solid waste has a high organic content making it a fertile medium for pathogens to thrive (Abdhalah*et al*, 2016) and rarely sorted this makes recycling difficult however it's also more hazardous to handle from source or generation point to final disposal.

Urban municipal solid waste is a fast growing problem driven by rapid urban population growth which is generally at least twice the respective national population growth rate. This is evidenced by the increasing illegal dump site, irregular collection of garbage, rising garbage piles, dumps in city alleys/streets and residential area. Most cities and municipalities have failed to cope with the increase growth of west production. Both the world resources institute and USAIrD estimate that many urban centers in the developing world have to spend over 30% of their budgets on refuse collection and disposal (Babayemi and Dauda, 2009).

CHAPTER 3 METHODS AND MATERIALS

3.1 Description of the Study Area

3.1.1. Location of the study area

Bishoftu town is located between $8^{0}45^{1}$- $8^{0}47^{1}$ North latitudes and $38^{0}56^{1}$-39^{0} East longitudes. In the North the city is bordered with YererSilassie , in the south with Wedo and KetaJara , in East with Kaliti and in the West with Dire town and peasant association.

Burka horabishoftukebele bordered with Celelekakebele in the north, with Kajima in the south, Kudadkebele in the west and in the east with Dabasokebele.

Kudadkebele bordered with Kajima in the north, Celelekakebele in the south, Direjitukebele in the west, and Burka horabishoftukebele in the east.

Dabasokebele is bordered with Burka horabishoftukebele in the north ,Fokakebele in the south ,Filtukebele in the east and celelekakebele in the west.

Bishoftu town is situated at a distance of 47 km south East of Addis Ababa, and 52 Km from Adama town

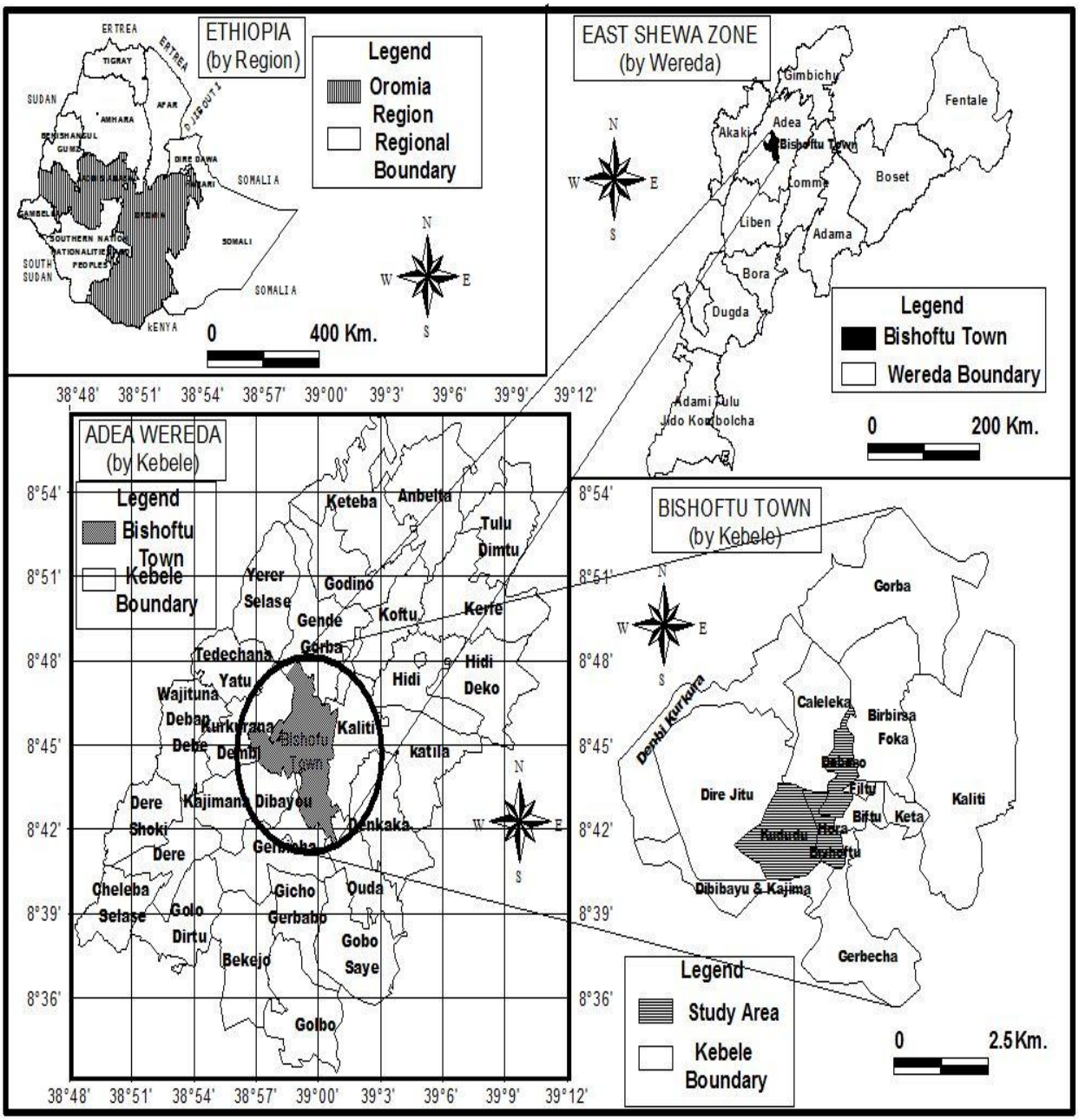

Figure 1 Map of Bishoftu Town

Source - BCA 2020

3.1.2. Historical Background of Bishoftu Town

The most remarkable year for the development of the small towns was 1889. During this time following Ethio -Djibouti rail way line a number of small towns were developed. During 1930 and 1940, towns of East Shewa had grown because of the construction of road that led to the east and southern parts of the country.

Based on the above details Bishoftu town is found in east shewa zonal administration and it was found in1917 with the coming of Ethio –Djibouti railway. The name Bishoftu comes from the Afan Oromo language called "Bishaan" which refers to "water". From the existing of volcanic crater lakes named as, HoraArsadi, Babogaya. Bishoftu, Cheleleka /seasonal/, Lake Kilole, Kuriftu and Green Lake. Despite the fact that the historical name of the town called Bishoftu, in post Italian aggression around 1947 the monarchy had given the name DebreZeit to the town by change the original name ignoring the cultural heritage of the society up to the Derge regime .However, the name Bishoftu had been thriving among Oromo in rather than the appellation called DebreZeit so that it is renamed as former beginning from the eruption of the new revolution i.e. 1991/1992G .C.

Some of the important Gada sites that are essential in Oromo history and tradition are located in Bishoftu town mostly around lakes, which are used for practicing religious activities and public event, like irecha festival (the worship of wakatokicha) is celebrated every year at lake HoraArsedi in the town .Currently its significance is realized by the government and the town is listed as a number one tourist destination town both at regional and national level. Also it has got a first rank urban grade level as per the classification of urban grade levels of Oromia Region urban centers.(BCA, 2020). Bishoftu is a resort town (usually referred as a town of lakes) because of seven crater lakes in the town. Because of these attractive lakes, military camps, many research and educational institutions, industrial establishments and developed urban agricultures, its area is believed to be much larger than implied by its population size.

Bishoftu is guided by structured plan which was prepared in 2010. The first master plan of the town was pared in 1954 and the revision has been made in 1978, 1992 and2009. In 1976, it had 3280 hectare, area of land, a decade later in 1986 the area of town had grown to 3300 hectare. In 1996 the total area grows to 4500hec and in 2001, it increase to 14,500 hectare. Now a day the total area of the city incorporated under the master plan is enlarged to 18,278 hectare. It is a liner shape town with an altitude between 1800-1995m.a.s.l (6300 ft). (Bishoftu City Administration 2020)

3.1.3 Physical characteristics of Bishoftu Town

The natural topography of Bishoftu town with buffer zones has been characterized in the north and east by flat land which is broken by swamp ,express road ,rail way and lakes. In south by undulating land that is dominated by hills, In general, the topography of the city is undulating, that is dominated by hills. The elevation of the city ranges from 1800-1995 meter from mean sea level (M.S.L). It is very important to note here that the city is part of the rift valley .(BCA)

3.1.4 Climate

The climate of the city in general belongs to woinadega (Agro climatic zone). The Maximum annual temperature is 29.8^0c and the Minimum is 4.9. Annual average rainfall of the city is 797.2mm. April is the hottest month of the year (29.3^0C), December is the coldest month (4.9^0C) and July is the rainy month (225.3.mm) of the year. The highest wind speed is registered in May (2.91m/s) and the most common wind direction seen in the city is easterlies. (Bishoftu City Administration2020)

3.1.5. Topographic Features /Landscape

The natural topography of Bishoftu city with buffer zones has been characterized in the north and east by flat land, which is broken by the swampy, express road, rail way and lakes. In the south by undulating land that is dominated by hills, in general, the topography of the city is undulating, that is dominated by hills .It is very important to note here that the city is part of the rift valley. The greatest proportion of the altitude of the town ranges between 1853 to 1930mThe central part of the town where the lakes are surrounded by higher elevations ranging from 1853 to 1930 meters with little lower altitude to the lake and almost covers western, northern, and southwestern parts of the town.

3.1.6. Demographic characteristics of Bishoftu Town and the three kebeles

Demographic analysis is focuses on the size, composition, and distribution of populations; their patterns of change over time through births, deaths, and migration; and the determinates and consequences of such changes‟ population study is important for planning, particularly by governments, in fields such as health, education, housing, social security, employment, and environmental preservation

Population

Bishoftu town is characterized by rapid population growth similar with other part of Ethiopia. Bishoftu town is the fourth largest urban center in Oromia region in population size, next to

Adama, Jimma and Shashemene and indeed one of few towns in the country with a threshold population of over 100,000.The total population of the town is 205,858.

The population of the town is rapidly mounting from year to year at an average growth rate of more than 2.9 % per annum. In urban environment, migration (rural to urban) / urban to urban/ has predominant role in changing the population characteristics and reflects the urbanization rate. Much of the population growth has been the result of internal migration and expansion of different pulling factors.

Sex Composition

Sex is one of the basic characteristics of population. Sex composition is important for any analysis, as data on sex it gives useful information about reproductive potential, human resource, and level of school attendance by each sex, and so on. In the study area female population is slightly higher than male population. From the total population 48%are males and 52%are females including the rural kebeles currently incorporated under the administration 0f bishoftu town.

Age Composition

Age is one of the basic demographic characteristics of a population. Age data is useful for demographic analysis and socio economic development planning. In Bishoftu town economically independent population accounts for about 70%. 3.3% of the total population is above 65 years of age and 45% of the total population is youth/15-29/ and <14 years accounts 26.7% of the total population and 30-64 years accounts 25% 0f the total population.

Source BCA 2020

The following tables show the population of Bishoftu town and the three kebeles

Table 1, Total population of Bishoftu town based on age and sex.

Age category	**Sex**			**%**	**Growth rate.**	**Doubling Time=70/ G.R**	**Density=P/he or km^2**
	Male	Female	Total				
≤14	27,757	29,049	56,806	26.7	≥2.9 %	24 years	11pe/hector or
15-29	45,044	47,508	92,552	45			
30-64	25,141	25,671	50,812	25			1100pe/KM^2
≥65	2957	2,731	5,688	3.3			
Grand total	100,899	104,959	205,858	100			

Table 2 Total population of the three sample kebeles

	Total population of sample kebeles			**Total households of sample kebeles**		
	M	F	T	M	F	T
Kudadakebele	10193	11042	21235	3399	1404	4803
Horabishoftukebele	4594	4938	9532	1950	868	2818
Dabasokebele	2663	2982	5645	884	818	1702
Total	17450	18962	36412	6832	3159	9323

Source; from three kebele's administration

Infrastructure development of Bishoftu town and the three kebeles

The infrastructure available in the town areimportant factors that are agitating the development of this sector. The city administration is also playing its' part by facilitating some important facility by allocating the required budget to build different infrastructures to upgrade the trade activities in the town such as market centers and shades in different adjoin areas.

Transportation system development has a vital and valuable role for the overall growth of any city. Bishoftu Town is served by two modes of transport. The standard of road network is

both gravel and asphalt. Currently, the city has 32.66 km asphalt 130.2 km cobblestone and 157.8 km of red ash/black ash.

3.2 Research Metrology

3.2.1 Research Design

This study is an explanatory type of study because, it is more appropriate to describe the existing situation of house hold SWD and its management practice in the case of Kudada, Dabaso and Horabishoftukebeles of Bishoftu town by direct observation and through grasping residents' and officials' responses, opinions, and perceptions about household solid waste disposal and its management practice in the study area. The researcher also collected primary data and secondary data. The data for this study were collected from a wide variety of sources to present a description of the phenomenon or the experience from the perspectives of the respondents.

3.2.2 Research approach

Mixed research approaches (quantitative and qualitative approaches) were used to address the issue under study. The quantitative approach is the numerical variables of waste generated and the qualitative approach is the information collected from respondents through questionnaire and interviews.

3.2.3 Data source

A combination of primary and secondary data sources was used so as to capture important and relevant information. Primary data for the research was collected using questionnaire, interview with people who live in the selected households, community representatives, and the heads of sanitation and beatification office of Bishoftu Town. . The secondary data was collected from review of literatures, published and unpublished documents, municipal office documents, and internet sources.

3.2.4Data collection instruments

Questionnaires, interviews and observation were used in this study to obtain in important information about household solid waste disposal and its management practice.

3.2.4.1 Questionnaires.

Close ended and open-ended questionnaires were formulated for the purpose of this study. Self-administered questionnaires were distributed to the heads of households and leaders in the community residents. Also, interviews were held for the issues which are not covered in the questionnaires. To get relevant information from randomly selected representatives of households, questionnaires were developed.

3.2.4.2 Interview

Interview aimed at supporting and strengthening the first-hand information obtained from the response of sampled households/respondents and targeted to examine the response of the sampled households in relation to the response of key informants, were conducted withselected kebelesrepresentatives and with beautification and sanitary workers of municipality of Bishoftu towns.

3.2.4.3 Field Observation

In addition to strengthening and realizing the information obtained from the sampled households/respondents using open ended and close ended questionnaire, and from selected key informants using semi structured interview, the researcher also conducted field observation using check list.

3.2.5 Sample size and sampling techniques

Simple random sampling method was used to select the representative households of target population for the study. This sampling method is important to determine household solid waste disposal and its management practice in study area. Moreover, in simple random sampling every household of the kebeles had an equal chance of being selected to be part of the study. The selected study area, Bishoftu Town, has 14 kebeles. Among these 14 kebeles, the study was conducted in three randomly selected sample Kebeles (K-02 or Kudadakebele, K-03 or Horabishoftuand K-04 or Dabasokebele). The total households of Kudadakebele is 4803, the total households of Horabishoftukebele is 2818 and the total households of Dabasokebele is 1702. So the sum total households of the three Kebele is9323. Through sample size determination formula a total of 192 sample respondents were taken from the three kebeles for the study.proportional divided sample size of eachkebeleswere calculated as shown on the table below. To determine the desired sample size the researcher used the formula Sample size determination through statistical technique, which is developed by (Cochran, 1977; as cited by Lemma, 2007). According to the formula the sample size was determined

$$\boldsymbol{n = \frac{NZ^2PQ}{d^2(N-1) + Z^2PQ}}$$

n = sample size of household P = Housing unit variable(residential houses) Q= Nonresidential houses (offices schools interims of % age) 1-p N=Total No of targeted households pppZ= standardized normal variable and its value that corresponds to 95% confidence interval equal 1-p d= allowable error (0.05).According to obtained data from the targeted kebeles of the town (2012), there are about 9323 households units (N): from these about 85% (P) are of residential and the rest 15% (Q) are of non-residential. Thus,

$$n = \frac{NZ^2PQ}{d^2(N-1) + Z^2PQ}$$

$$n = \frac{9323 \times 1.96^2 \times 0.85 \times 0.15}{0.05^2 \times (9323-1) + (1.96^2) \times 0.85 \times 0.15}$$

$$n = 191.91 \sim 192$$

Therefore, 192 sample householdstaken for this study

Table 3- Sample size of the study kebeles

Sample kebele	**Total number**	**Sample proportion**	**Sample**
02	4803	$\frac{4803\times192}{9323}$	99
03	2818	$\frac{2818\times192}{9323}$	58
04	1702	$\frac{1702\times192}{9323}$	35
Total	9323		192

Source From the three kebeles 2020

CHAPTER FOUR- RESULT AND DISCUSSION

4.1 Introduction

This chapter presents the data of the study and its analysis. To achieve each specific objective of the study, data obtained from survey are analyzed using different methods of analysis. As mentioned in the methodology section of this paper descriptive statistics and different methodare used to analyze household solid waste disposal and its management practice in the case of Kudada, Dabaso and Horabishoftukebeles of Bishoftu town.

Response rate

In this study 192 samples were taken for the survey the questionnaire with a response rate of 100% as it was indicated in table 4.1

Table 4.1 Response rate

Kebele	No of questionnaire distributed	No of questionnaire returned	Percentage of the responded questionnaire
02(Kudada)	99	99	100%
03(Horabishoftu)	58	58	100%
04(Dabaso)	35	35	100%

Source Survey result

4.2. Socio-demographic characteristics of respondent

It is known that household Solid waste disposal and its management practice is different at different socio-demographic characteristics of the respondents. Thus it is necessary to analyze solid waste disposal and its management practice of the town based on various respondents'

Table 4.2 : Socio-demographic characteristics of the respondents

S.N	Characteristics	Categories	Frequency	Percent	Cumulative Percentage
1	AGE	20-30	54	28.1	28.1
		31-40	68	35.4	63.5
		41-50	44	23	86.5
		>50	26	13.5	100.0
		Total	192	100.0	
2	Sex	Male	124	64.6	64.6
		Female	68	35.4	100.0
		Total	192	100.0	
3	Educational status	Illiterate	6	3.1	3.1
		Read and write	15	7.8	10.9
		Primary school (1-6)	23	12.0	22.9
		Junior school (7-8)	29	15.1	38.0
		High school (9-12)	50	26.0	64.1
		College and University	69	35.9	100.0
		Total	192	100.0	
4	Marital status	Single	52	27.1	27.1
		Married	103	53.6	80.7
		Divorced	26	13.5	94.3
		Widowed	11	5.7	100.0
		Total	192	100.0	
5	Monthly income	500-2000	54	28.1	28.1
		2001-3500	59	30.7	58.9
		3501-500	39	20.3	79.2
		>5000	40	20.8	100.0
		Total	192	100.0	
6	Family size	1-5	125	65.1	65.1
		6-10	63	32.8	97.9
		>10	4	2.1	100.0
		Total	192	100.0	
7	Year of stay	1-10	46	24.0	24.0
		11-20	40	20.8	44.8
		21-30	56	29.2	74.0
		>30	50	26.0	100.0
		Total	192	100.0	

Source: Survey result 2020

According to the table above socio demographic characteristics of the sample households of the study area are different and it directly and indirectly affect the solid waste disposal and its management practice of the respondents. Thus, it is necessary to analyze HHSWD and its

management practice of the town based on various respondents' characteristics. As it was indicated in Table 4.2, out of those total samples, 35.4% of the respondents lie in the ages between 31-40 years old.In addition as it can be seen from the survey result that the sexual composition of respondents is dominated by male. As it is given in table 4.1, majority of the respondents (64.6%) are male-headed households and 35.4% are female headed households

As one can see from the table, the educational level of sample respondents range from illiterate to those educated up to college and university level. Specifically, from the total of 192 household respondents 3.1%, were illiterate, 7.8% read and write 12% are elementary school 15.1% were junior, 26% were in high school, 35.9% were in college and university; Concerning marital status, about 53.6% of the respondents were married, whereas 27.1% of them were single.

When we see about year of stay (56) 29.2% of the respondents stayed for years between 21-30 and (50) 26.0%of the households stayed for more than thirty years.

The average monthly income of the sample households were 3512.5 birr.In addition we also tried to investigate the relationship between household solid waste generation and family size, thus it can be concluded that as the number of family size increases the amount of waste generated increases.

4.3 The major household solid wastes disposed in Bishoftu Town

As Table 4. 3the major household solid wastes generated in the study area is food waste, ash and plastic waste respectively.As indicated in table 4.2 from major HHSW generated and disposed from households, food waste takes up the upper hand 34.5 %(68) next to this Ash occupies about 28.6% (55) followed by plastic waste 16.7% (32).

Table 4.3the major HHSW averagely disposed per week

Valid	Frequency	Percent	Cumulative percent
Ash	55	28.6	28.6
Food waste	68	34.5	64.1
Plastic	32	16.7	80.7
Grass and leaves	20	10.4	91.1
Paper	4	2.1	93.2
Cow dun	13	6.8	100.0
Total	192	100.0	

Source survey result 2012

This implies that the household solid waste generated is varied depending on the living condition and consumption habits of each household

In the interview with Head of Sanitation and Beautification Office of Bishoftu Town, the following information were obtained,

“The total amount of waste generated in the town in the year 2020 was 98076m3.

Table 4.3.1 main areas of solid waste generation in Bisahoftu town

Areas of waste generated in Bishoftu Town	**Total amount in %age from total of98076m^3**
Household solid waste	75
Commercial places	12
Industries	5
Street sweeping	5
Other institutions together	3
Total	100

Source: SBO ,2020

4.4 Household solid waste disposal and its management practices in the town

This section is designed to analyze and briefly describe how solid waste management is practiced in the town, particularly solid wastes which are generated from households. Thebest practices in solid waste management (SWM) starts from households and failures at this stage could affect the entire system of SWM.

As result of this study and field observation indicates, due to inadequate waste collection services and households' unwillingness to pay for such services, wastes were dumped in nearby lakes, open space and on streets,. Such actions or failures in household solid waste management really contribute a lot to environmental pollution and human health problems.

The practices of solid waste management in the households include use of temporary waste storage in their homes such as basket, plastic bags, sacks etc. For those who do not store their waste within households, the alternative is a common collection point outside the household

Table 4.4 Practice of household SWM in Bishoftu

SN	**Characteristics**	**Categories**	**Frequency**	**Percent**	**Valid percent**	**Cumulative percent**
1	Type of solid waste container	Basket or cartoon	30	15.6	15.6	15.6
		Plastic bags	50	26.0	26.0	41.7
		Sacks	81	42.2	42.2	83.9
		No container	31	16.1	16.1	100.0
		Total	192	100.0	100.0	
2	Collection service	Yes	83	43.2	43.2	43.2
		No	109	56.8	56.8	100.0
		Total	192	100.0	100.0	
3	Reasons for not using the service	Financial problems	56	29.2	29.2	29.2
		Lack of interest	27	14.1	14.1	43.3
		Not giving emphasis to the service	26	13.5	13.5	56.8
		Total	109	56.8	56.8	
4	Type of collection service serving your house	Private	48	25.0	25.0	25.0
		Public	35	18.2	18.2	43.2
		No collection service	109	56.8	56.8	100.0
		Total	192	100.0	100.0	
5	Regularity of the service	Regular	46	24.0	24.0	24.0
		Irregular	37	19.3	19.3	43.3
		Total	83	43.3	43.3	
6	Frequency of the service	Daily	16	8.3	8.3	8.3
		Once a week	41	21.4	21.4	29.7
		Twice a month	14	7.3	7.3	37
		Once a month	12	6.3	6.3	43.3
		Total	83	43.3	43.3	

Source: Survey result 2020

As it can be seen from table 4.4 most of the households have a temporary solid waste storage in their house.

The selected sample households were also asked whether they had waste collection material (temporary storage) at home.83.9% of the respondentsreplied that they have temporary

storage in their home. With regard to the kind of storage they used, majority of the respondents (42.2%) used sack as waste storage, whereas, 26% and 15.6 of the respondents used plastic bags or baskets and carton storage materials respectively The rest of the respondents (16.1%) stated that they have no waste container of any kind, and mentioned that they throw the waste in open fields on the street and in the lake.

One of waste collection facilities, placing container in the town is very important for proper management, so the selected sample respondents were asked a

question regarding the existence of communal container in the town. 56.8% of the respondentssaid no container is available in most places of the town. The key informants (head of beatification of the municipality) also stated the importance of container for waste management. But because of budget and related problem containers are not assigned in any parts of the town. There were about 86 containers but now they had been taken off from all parts of the town and instead it was preferred to establish door to door waste collection by the help of MSE

The other is the availability of collection service of garbage. Thus, 43.2% of the respondents had collection service of solid waste and 56.8% of them do not have collection services. Those respondents who do not receive the service also had their reason, that is 29.2% of them were not part of the service because of financial problem and 14.1% due to lack of interest and the rest13.5% were due to not giving emphasis to the service

Regarding the type of solid waste collection service received by the households as shown in table 4.4, about 25.0% of respondents receive private type of garbage collection services whereas 18.2% receives public collection services of solid waste collection.

Regarding the frequency of collection services, 24.0% of the respondents answered that the service is regular and 19.3% stated that there is an irregular collection services. About 21.4% of the households get the collection of solid waste service once in a week, 8.3% of the respondents receive the service daily and 7.3% of the respondents get the service twice a month and 6.3% of the households receive the service once a month.

The sanitation and beautification office estimates that about 20% of the collection of household sold waste done by the private entrepreneurs at present. The collection operation seems to be on a better condition as compared to previous years since the municipality has acquired additional track and skip transporter. However, open field disposal is still significant. On the other hand, house to house collection is facilitated by the municipality and

private waste collectors. There are 4-micro-enterprises in the selected-kebeles of Bishoftu Town. The micro-entrepreneurs collect the solid waste through payments made by each house hold. The private operators charge 10-30 birr per month for collection and transportation of household refuse; and 40-70 birr/month for institutions. They collect the waste from the houses and transport it to the dumpsite.

The head of town Sanitation, Beatification responds from the interview that:

"The frequency of clearance time from the transfer station is up to 10 times a day with one skip loader but there are only two skip loaders in the town. Besides there are about eleven MSE with thirteen vehicles (eleven tractors and Two Bajaj)"

As the head of town sanitation and beautification stated above, the cost of efficient solid waste collection remain a challenge for many households.

photo 4.1 The way of transportation

Source : Field survey

Table 4.5Location characteristics of the dumpsite

S.N.	Characteristics	Category	Frequency	Percentage	Valid %	Cumm %
1	Is the site of HH waste disposal	Authorized dumpsite	59	30.7	30.7	30.7
		Unauthorized dump site	76	39.6	39.6	70.3
		In the lake	20	10.4	10.4	80.7
		Free land	29	15.1	15.1	95.8
		On the streets	8	4.2	4.2	100.0
		Total	192	100.0	100.0	
2	Is there any dumpsite near your neighborhood?	Yes	81	42.2	42.2	42.2
		NO	111	57.8	57.8	100.0
		Total	192	100.0	100.0	
3	How clean is your neighborhood?	Dirty	105	54.7	54.7	54.7
		Very dirty	59	30.7	30.7	85.4
		Clean	23	12.0	12.0	97.4
		Very clean	5	2.6	2.6	100.0
		Total	192	100.0	100.0	
4	Household view about the location the dumpsite?	Happy when closer to your house	23	12.0	12.0	12.0
		Complain when closer to your house	104	54.2	54.2	66.1
		No complain either way	65	33.9	33.9	100.0
		Total	192	100.0	100.0	
5	Do you practice Waste separation?	Yes	78	40.6	40.6	40.6
		No	114	59.4	59.4	100.0
		Total	192	100.0	100.0	
6	Reasons for not separating waste	Lack of understanding	49	25.5	25.5	25.5
		Not taking it as my responsibility	28	14.6	14.6	40.1
		Not knowing the importance of it	31	16.1	16.1	56.2
		Other reason	6	3.1	3.1	59.3
		Total	114	59.3	59.3	

Source: survey result 2020

Regarding the site of household waste disposal, as table-4.5 shows 39.6% of the households responded that they use unauthorized dumpsite 30.7% stated that they used authorized dumpsite where 15.1%,10.4%,4.2% responded that they dump their waste on free land, in the lake and on the streets respectively.

The head of town Sanitation and Beatification of the town responds from the interview that:

"There is one modern land fill and one compost sites in the town, each dumpsite cover 6 hectares and 11hectares respectively. By now there are 3MSE actively on job on composting site. This year, 56860m3 compost was produced in the town. There are 2 workers arranged in the recycling of waste in the dumping sites but they are not well organized. In addition 11 personnel are involved in the municipal solid waste management that is in the beautification service. The office creates community awareness programs at monthly level."

During the interview the head of sanitation and beautification of Bishoftu town was asked if solid waste disposing containers were available in different parts of kudada, Dabaso and Horabishoftukebeles adequately. The town's Sanitation and Beautification office head replied that:

"Although the town municipality has 86 containers these are not found in all places of the town instead location of solid waste dumping containers are at the transfer station and also in the special places like resort areas."

The study also tried to investigate if there was dumpsite near the sample households in the selected kebeles. Thus as stated in table 4.5, the majority of the respondents (57.8%) replied that there was no dump site near their neighborhood and the rest (42.2%) stated that there is a dumpsite around their neighborhood. Regarding this when the head of sanitation and beautification of bishoftu town was asked the distance of the dumpsite from the town, he replied that the dump site was in 1 km distance from the center of town.

54.7% of the households said that their surrounding area is dirty and it was only 12% of the respondents who said that the area they currently living in is clean. Furthermore, the view of respondents on the location of dumpsites was also asked, and most respondents (54.2%) answered that when the dump site is closer to their house, they would always be disturbed by the bad odor around the dump site and the health impact it has on people living around it. Whereas 33.9% of the households said that they had no complaints regarding the location of garbage areas.

Moreover, the selected households were asked whether they separate their waste at source or not, thus 59.4% of the respondents said they don't and 40.6% answered that they do separate. The respondents reason for not separating waste was asked, and most households (25.5%) replied that they do not have an understanding of waste sorting, 16.1%of the sample households stated that not knowing the importance of waste sorting was their primary reason for not separating solid waste whereas 14.6% answered not considering waste separation as their responsibility was the reason for not separating waste. As the Head of Sanitation and Beautification of Bishoftu town informed to the researcher "Most households do not separate their waste; this is mostly because of lack of awareness but it is sorted at the transfer station in this area where the organic waste is first separated from the inorganic ones, then the organic waste which is collected from households goes to market areas to be composted shade and changed to natural fertilizer. Inorganic waste such as plastic and metal are used as raw materials for industrial purposes, the rest of the waste is dumped at Golba landfill."

photo 4.2.Partial view of solid waste disposal at 'GOLBA site

Source; Field Observation

There are different strategies that households use to reduce the volume of waste. These include burning/ incineration/ of waste, selling solid waste (plastic, metal etc.) In some cases re-use of items such as bottles, plastic, metal occurs. This is known as a multibillion industries in the developed countries but in countries like Ethiopia re-using solid waste is not common

Table 4.6 Treatment strategies of solid waste in Bishoftu Town

S.N	Characteristics	Categories	Frequency	Percentage
1	Re use of waste	YES	57	29.7
		NO	135	70.3
		Total	192	100.0
2	What type of waste do you reuse	Plastic	23	12.0
		Metal	16	8.3
		Cow dun	18	9.4
		Total	57	29.7
3	Do you compost solid waste	YES	52	27.1
		NO	140	72.9
		Total	192	100.0
4	Do you sell solid waste	YES	66	34.4
		NO	126	65.6
		Total	192	100.0
5	What type of waste do you sell	Plastic	25	13.0
		Metal	18	9.4
		Cow dun	23	12.0
		Total	66	34.4
6	Method of solid waste reduction	Burning	74	38.5
		Dumping	49	25.5
		Composting	30	15.6
		Re use	21	10.9
		Others	18	9.4
		Total	192	100.0
7	Level of Satisfaction with SWM	Satisfactory	23	12.0
		Somewhat satisfactory	77	40.1
		Not satisfactory	92	47.9
		Total	192	100.0
8	Reasons for dissatisfaction	The service is not reliable	26	13.5
		Frequency of the service interval of collection is too long	20	10.4
		Location of the container and pick up is un satisfactory	25	13.0
		Waste collector workers are impolite	21	10.9
		Total	92	47.8

Source Survey result 2020

Reuse is an important factor to reduce the amount of waste to be dumped at the final disposal site. The study result indicates that there is practice of waste reuse for different purposes like industrial waste, plant origin waste for fuel, animal source (meat and bone) waste for

domestic animals feed..However, the practice of reusing waste is varied among different income classes.

As it was indicated in Table 4.6 the respondents were questioned whether they reuse the waste or not; thus there were some proportion of the respondents who re use the waste (29.7%). From these plastic, cow dung and metal are amongst the common solid waste that are re used by most households. Most, 70.3%, of households do not re use the waste they simply dump in the site. As the result indicates some households (34.4%) reduce their waste by selling. The majority (13.0%) of the participants sold plastic wastes, 9.4% of them sold metallic wastes and 12.0% of them sold cow dung.

In addition the researcher also investigated how many of the respondents compost their waste thus it was understood that (27.1%) of the households use composting as a solid waste treatment and the rest (72.9%) do not compost their waste.

Regarding the satisfaction of the community in the present solid waste management practice, most of the respondents 47.9% households were not satisfied by the waste management practice of the town, only12.0% of them were satisfied by the current solid waste management. Those who were not satisfied were asked their reason of dissatisfaction with the management process and 13.5% of households said the service is not reliable, 13.0% feel the location of the container and pick up time is unsatisfactory, and the rest 10.9% and 10.4% of the respondents said the waste collector workers are impolite and the frequency of the service interval of waste collection is long respectively.

4.4. Impacts of poor solid wastes managements

Today all over the world rapid increase of population has led to the expansion of urban areas and the world around us is revolving greatly although this transformation has created better way of life. It also has its own side effects one of this is increase of solid waste generation that is continuously being disposed from households and from industries. This increase in solid waste generation has in turn increased the impact of solid waste in the environment and on human health more importantly land, air, and water pollution resulting from poor solid waste management.

Furthermore, in general, less than half of all household solid waste in Bishoftu is collected implying that a large fraction of waste is disposed of in unsafe ways posing health risks to the general public, particularly children.

photo4.3:Disposal area of Bishoftu town

(Source: Field Survey, 2020

Poor SWM can result in serious health hazards and the spread of infectious diseases. When improperly managed, waste lying in the streets, sewage, landfills and dumpsites attract flies, rats, and other vectors which, in turn, spread infectious diseases. Plastic waste is another cause for ill health. A review of waste management practices showed that activities such as land filling, incineration, sewage treatment and composting affect the health of people exposed to waste directly, for instance, workers in waste management and waste-pickers or indirectly to residents living in proximity to landfills and dumpsites.

During the interview with waste collection workers they said that;

"There are very high health risks that come from poor solid waste disposal and since we are the ones that have direct contact with waste we are exposed to many health risks many of us here are asthmatic patients and we get allergies and diarrhea frequently we are also very vulnerable to skin problems this is mainly because we don't have the necessary equipments like gloves and masks to protect ourselves."

In addition according to the result of an interview with the Head of Sanitation, Beautification office of the town he said that:

"There are different impacts made by improper solid waste management practices in our town. A number of environmental (soil, water and air impacts) and health impact (the occurrence of different diseases) occur as a result of poor solid waste management practices. But in the town impacts on water resources are not still identified, impact on air can be treated with EM technology and impacts on soil are treated with compost preparation".

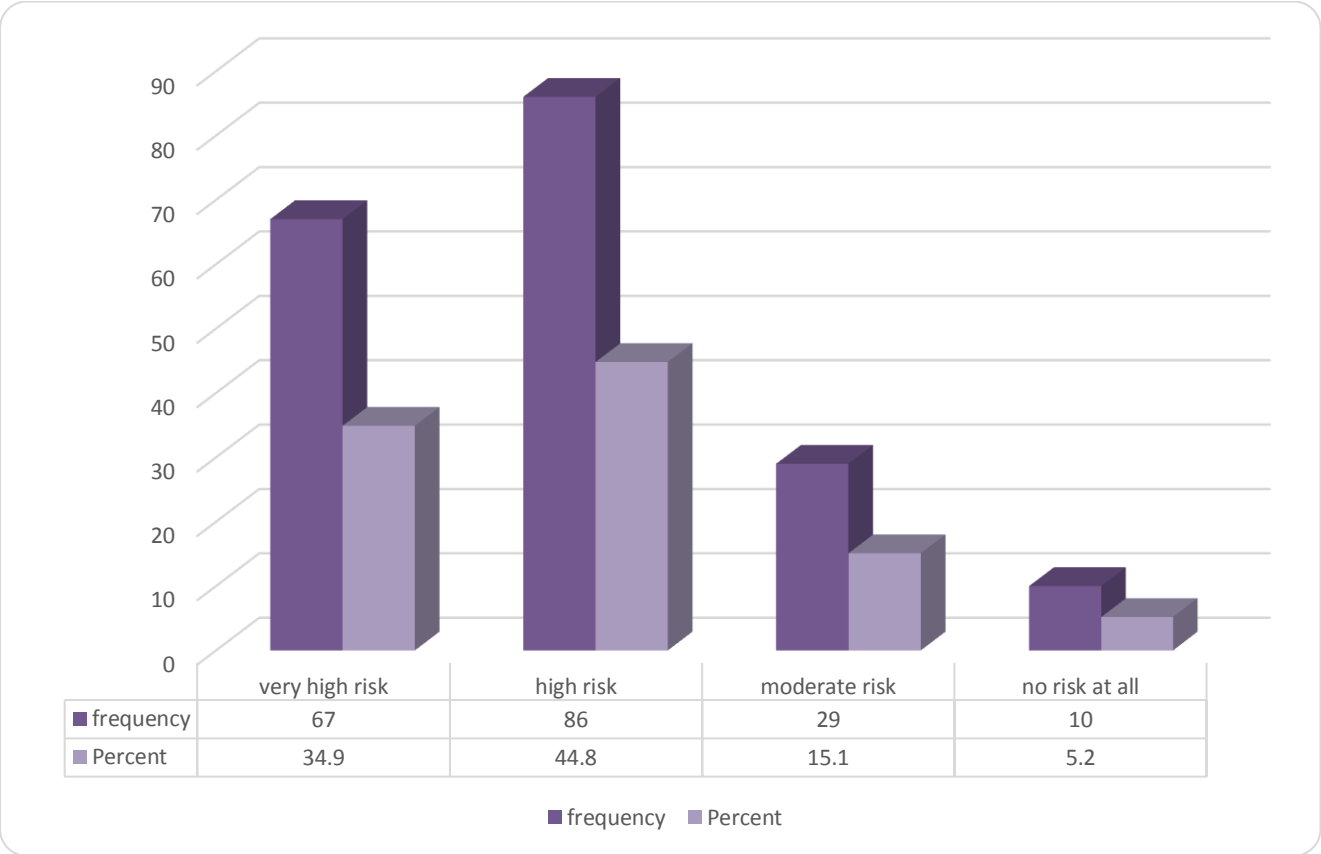

Figure 4.1 Level of health risks associated with poor solid waste management

Source Survey result 2020

As it was shown in figure 4.1 the respondents were asked the degree of their household health risks associated with poor solid waste management. The majority 44.8% of the households felt that they were at high risk due to the solid waste and 34,9% of the others felt they were at a very high risk as a result of solid wastes. The second risk takers were residents who reside far from the dumpsites. Thus, 15.1% of households perceive that they were at a moderate risk of health related because of the solid wastes and it was only 5.2%of the residents who were far from the dump site that said there were no risk at all.

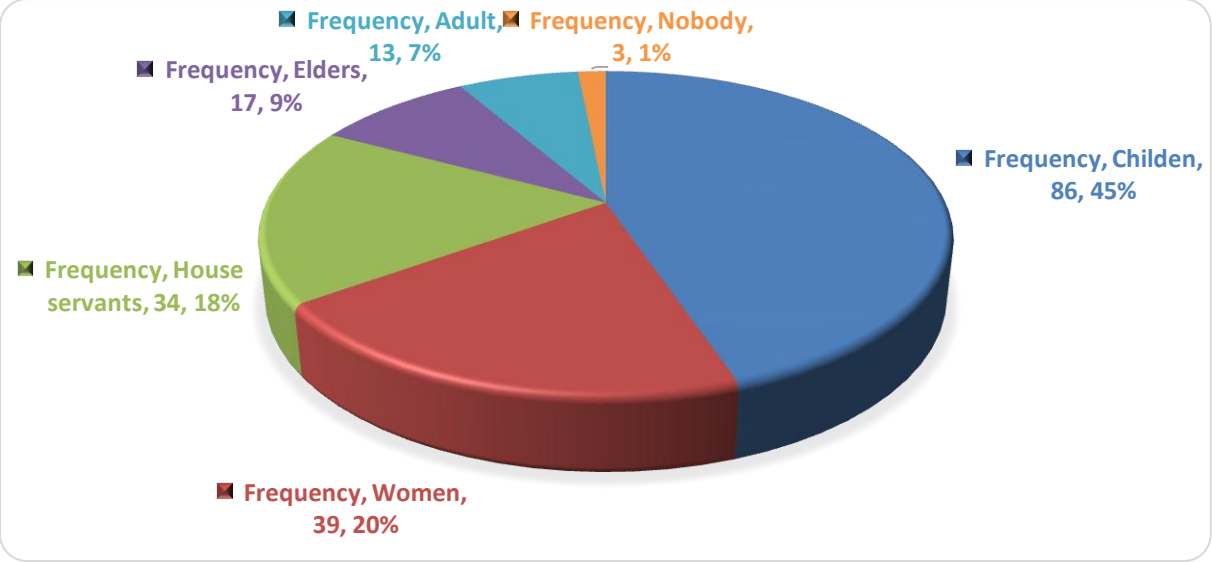

Figure 4.2Vulnerable groups of people due to poor SWM

Source: Survey result 2020

Figure 4.6 shows the vulnerable people group due to poor solid waste management. According to the survey result 44.8%of the respondents said that children are the most vulnerable people group. 20.3% of the selected households wrote that women were the most vulnerable people group. Next to this 17.7%, of the respondents stated that they consider house servants to be more at risk than the other people group due to poor solid waste management. 6.8%, 8.9% of the sample households said that the most vulnerable people group are adults and elders respectively

.In relation to this, the Head of Beautification Office confirmed that;

"Among the peoples in our community mostly it is the children who severely are more vulnerable to such health risks since they play on the open fields with no care of themselves, parents should control their children".

4.5 Environmental impact of household solid waste disposal

Proper disposal of household solid waste is an important factor to create healthy and attractive environmental. The study indicated that some of the households used unsafe household solid waste disposal methods, such as discharge into streets, in the lake or empty space. This can pollute groundwater sources, air and soil. When solid waste is disposed into open field, lakes, the surface water will be polluted. This will result in a great health risk if people and animals using this water for drinking. Thus to reduce this impact solid waste should be disposed properly

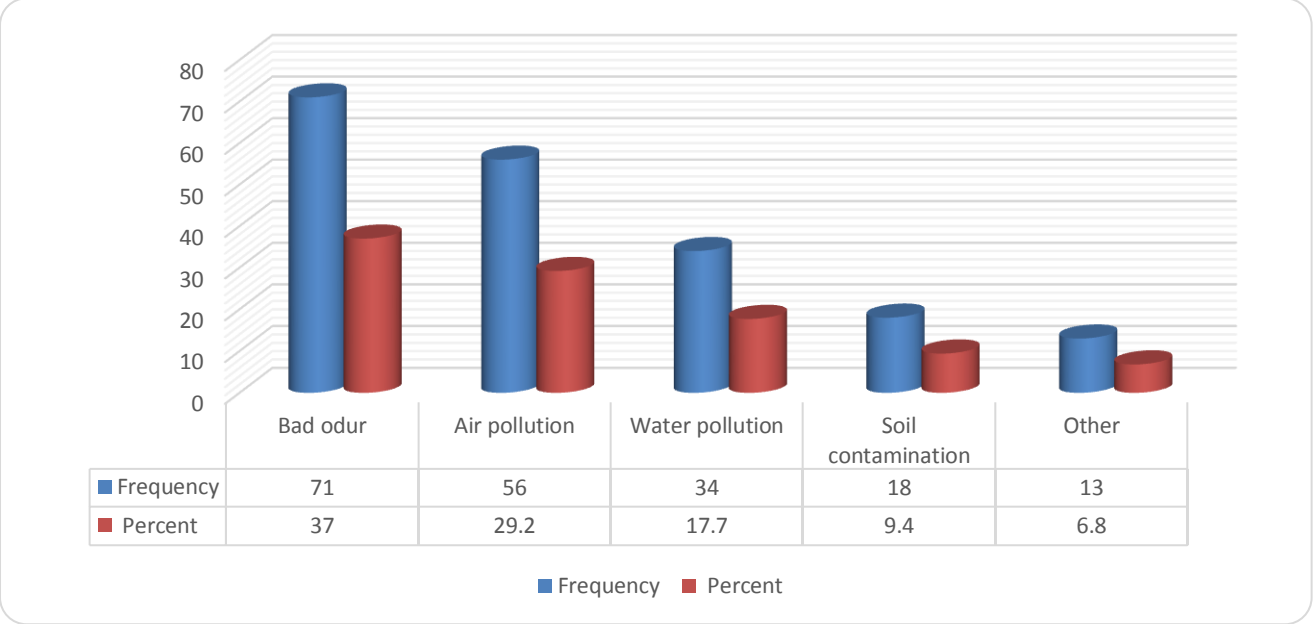

Figure 4.3 Environmental impact of household solid waste disposal

Source: Survey result 2020

The above figure shows some of the major environmental impacts that are brought about by improper house hold solid waste disposal As one can see from figure 4.3 the majority of the respondents (37%) took bad odour as the main environmental impact next to this air pollution(29.2%) was mentioned to be the greatest environmental impact brought by poor solid waste disposal. 17.7%,9.4% of the sample households stated that the primary problem was water pollution and soil contamination respectively, the rest (6.8%) stated other environmental impacts

4.5 Challenges of effective SWM practice in the study area

Respondents also identified challenges for efficient actions and practices to address the impact of wastes including health risks associated with poor solid waste management. These challenges were no control over illegal dump site, luck of public education, lack of solid waste sorting, unsafe disposal of solid waste and ineffective collection of solid waste and distance from the main road were the main challenges of effective solid waste management in Bishoftu town at household levels.

Table 4.7 Challenges of proper SWM practice in the town

Characteristic	Frequency	Percent
Ineffective collection of SW	23	12.0
Lack of SW sorting	28	14.6
No control over illegal dump site	60	31.3
No recycling option	20	10.4
Lack of public education	32	16.7
Unsafe disposal of SW	29	15.1
Total	192	100.0

Source: Survey result 2020

As table 4.7 showed that 31.3% of the households said lack of control over illegal dump site was the main challenge of proper solid management, 16.7% of them responded lack of public education,14.6 % of the households stated lack of solid waste sorting as the main problem, 15.1% believed that unsafe disposal was the greatest challenge in effective solid waste management whereas12.0% of participants took ineffective solid waste collection as an impediment factors for effective practice of solid waste management in the study area.

In association with the above idea, the head of Sanitation, Beautification office of the town, expressed in such a way that:-

" Over the years the three most serious challenges faced in the solid waste management were lack of logistics, lack of budget, waste conversion into compost and recycle and re-use of wastes that impeded us not to deal with solid wastes. The municipality has done its best to solve this problems and has succeeded in converting waste in to re-usable materials and composting waste in traditional ways, but the municipality is planning to compost waste in modern means at an industrial level for the future".

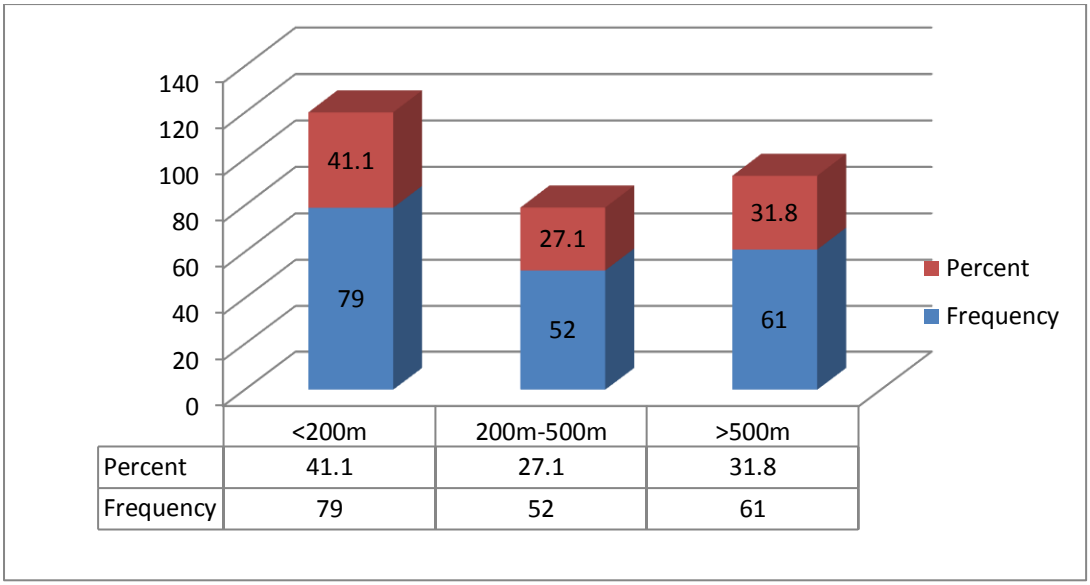

Figure 4.4: Distance from the main road

Source: Survey result 2020

From the data that was collected, it was understood that when the respondents were far from the main road the effective management of solid waste decreases this is because the waste collector workers do not visit their neighborhood frequently and since the town municipality has removed all waste containers except for special places (resorts) it makes it harder for the residents to manage and dispose their waste properly, thus the people who live far away from the main road are forced to dump their waste in lakes streets or on free land.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

The major household solid waste generation in Bishoftu Town is mostly consisting of food waste, ash and plastic materials. This implies that, the type and rate of household solid waste production are varied depending on the living condition of each household.

The current household solid waste disposal & management practice seems to be poor ,only a few percent of the sample households used a collection service, the majority of them did not use the service instead they preferred to dispose their solid waste in unauthorized sites .The reason of the respondents for not using a collection service was primarily financial problems and lack of interest. In additionit was understood that most households do not have the habit of selling reusing or composting their waste. This is because most of the respondents considered solid waste to be completely useless.

Lack of control over illegal dump site, lack of public education, lack of solid waste sorting, unsafe disposal of solid waste and ineffective solid waste collection were the main challenges for proper solid waste management in the town. This implies that the current situation of household solid waste management in the town is poor and in need of a solution

Poor solid waste management has a negative impact on the environment and on human health more importantly land, air, and water pollution.

5.2 Recommendations

Based on the findings of the study, the researcher forwarded the following recommendations

Waste is generated by everybody and the impacts will also affect every one, therefore its management should not be the work of one group of individuals or institution it is hence recommended to city authorities and other concerned groups to:

- Create awareness and promote community participation in sanitation improvement programs.further, awareness on reuse, recycling and composting should be carried out to reduce the bulkof waste disposed from each household
- The residents in the Town should be willingness to pay waste collection fee that can be used to run waste collection operation.In addition the budget for solid waste management should be increased and adequate equipment and vehicles for solid waste collection need to be facilitated.
- Improving the working conditions of SWM personnel including, but not limited to enforcement of safety regulations, regular medical check-ups, and decent wages.
- Create more opportunity than before for small macro enterprises to join the field of waste collection which will increase the quality of waste management in the town.

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Appendix 1 Questionnaire

Addis Ababa University

College of social science

Department of Geography and Environmental studies

Appendix 1: QUESTIONNAIRE PREPARED FOR SAMPLE HOUSEHOLDS

Dear responders

The main purpose of this questionnaire is to gather information as an input for the study titled as the house hold solid Waste disposal and its Management Practice , in the cause of Bishoftu town Oromiya Region, Ethiopia . This questionnaires shall be used for academic purpose only. Besides, the information you are going to provide through this questionnaire will be kept confidential. Thus, you are kindly requested to provide genuine responses to each of the questions incorporated in the questionnaire. Therefore please read and respond to each item in the questionnaires and indicate your answer by ticking in the provided box for close ended questionnaires and indicate your answer on the provided space for open ended questions.

I appreciate your willingness to support my effort. Thank you in advance.

General direction.

1. This questionnaire is to be filled by household head / the wife can substitute her husband/
2. You are not required to write your name
3. You are kindly asked to read carefully and respond to each and every questions included within the questionnaire
4. You are required to return back the questionnaire, after you completed, to its administrator soon, preferably within 2 days.
5. Please put a **"√"** mark in the box of your choice.

Back ground of the respondents.

I. DEMOGRAPHIC CHARACTERISTIC

1. Age of the household head:

   20-30 ☐ 31-40 ☐ 41-50 ☐ Above 50 ☐
2. Sex of the household head is (0) male ☐ (1) female ☐
3. Current resident Kebele----------
4. Educational status of household head is:

   Illiterate ☐ Read and Write ☐ Primary school (1-6) ☐
   Junior school (7-8) ☐ High school (9-12) ☐
   College and University ☐
5. Marital status

   Single ☐ Married ☐ Divorced ☐
   Widowed ☐
6. monthly income _____birr/month
7. could you please tell me the size of your household including yourself_____

   (number of family members)
8. How long have you stayed here in the city of Bishoftu _____year

II. I would like to ask you some question regarding the collection and removalmanagemrnt of solid waste from your house hold

1. What are the major solid wastes that your household averagely disposes per week?

   (Rankthem from 1 up to 5 in terms of higher proportion in volume of all of the wastes)

	1	2	3	4	5
Ash					
Food wastes					
Wood					
Grasses and leaves					
Paper					
Bones					
Metals					
Plastics/ textile					

If there is any Other, please specify……

2. How much waste do you dispose from your house per a week in kilo grams----------
---

3. Do you have a solid waste storage in your house ?

(A) YES ☐ (B) NO ☐

4. If your answer is yes for question no 3, what kind of storage do you use?

A. Basket/ carton/ ☐ (B) plastic bags ☐

C. Sack ☐

(D) write, if any other _____

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

6. Do you reuse the solid waste

A. yes ☐ B. No ☐

7. If your answer is yes for question number 6 what type?

A plastic ☐ B metals ☐

C If any other please specify----------
---

8. Do you compost your solid waste

A. yes ☐ B. No ☐

9. Do you sell your waste

A. yes ☐ B. No ☐

10. If your answer is yes for question number 9 what type?----------
---

11. Does your house hold receive a collection service of any type?

A-Yes ☐

B-No ☐

12. If your answer is yes for question number 11,What type of collection service is serving your house hold

A- Private Service ☐

B- Public service ☐ C I don't use any of them ☐

13. If your answer is no for question number 11 what is the reason behind it ?

A. finical problem ☐

B Lack of interest ☐

C. Not giving emphasis to the service ☐

D. specify if any other reason please specify----------

14. How frequently does your waste collector visit your house?

A. Daily ☐ B. once a week ☐ . C Twice a month ☐

D. once a month ☐

15. What do say about the regularity of garbage collection?

A -Regular ☐

B-Irregular ☐

16. Which dump site does your collector use to dump your waste?

A- Authorized dump site ☐

B. Unauthorized dump site ☐

C. In the lake ☐

D. Free land ☐

E. on the streets ☐

F. If other please specify----------

17. What types of solid waste treatment do you use?

A-burning (incineration) ☐

B-Dumping ☐

C- Composting ☐

D- Re usual ☐

E- If any other please state it ----------

18. Have you ever seen solid wastes from residential houses thrown away (dumped) on streets, in sewerages or in nearby lakes?

A-YES ☐ B- NO ☐

19. Is there any dump site near your neighborhood?

A-Yes ☐

B-No ☐

20. If your answer is yes for question number 19 How clean is your neighborhood?

A- dirty ☐ B- Very Dirty ☐ C- clean ☐

D very clean ☐

21. What is your view about the location of the dump site?

A. Happy when closer to your house ☐

B. Complain about it when it is closer to your house ☐

C. No complains either way ☐

22. Level of satisfaction with waste management in the community

A-Satisfactory ☐

B- Somewhat satisfactory ☐

C. Not satisfactory ☐

23. If you are not satisfied with the service; would you state your primary reason?

A-The service is not reliable ☐

B-frequency of service-the interval of big collections is too long ☐

C-The location of the communal container or pickup point is unsatisfactory ☐

D-The solid waste collection workers are rude or impolite ☐

24. Does your household practice waste separation at source? ☐

A- Yes ☐ B- No ☐

25. If your answer is yes for question number 24, how do you separate it?

_____

26. If your answer is no for question number 24, 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 _____

27. How would you perceive health risks associated with poor solid waste management in your town

A-No risk at all ☐ B-Moderate risk ☐

C- High risk ☐ D-Very high risk ☐

28. From your experience who is more at risk if the solid waste is not properly managed?

A-Children ☐ B- Women ☐ C-house Servants ☐ D-Adult ☐

E- Elders ☐ F- No body ☐

29. What is the distance to the main road from your house _____meter (s)

30. The distance from your house to the nearest waste disposal container (in meters)……..

31. What are the challenges with solid waste management in your town?

A-Ineffective collection of solid waste ☐

B-Lack of solid waste sorting ☐

C-No control over illegal dumpsites ☐

D-No recycling options ☐

E-Lack of public education ☐

F-Unsafe disposal in open dump site ☐

G All ☐

H If there are any other please specify----------

32. What is the main Environmental impact of solid waste on your community?

A- air pollution ☐ B- soil contamination ☐

C Water pollution ☐ D -Oder around the disposal site ☐

E. Other health impacts ☐

F .All ☐

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

A- Good ☐ C- poor ☐

B- Very good ☐ D- very poor ☐

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Appendix 2: Interview for head of sanitation and beautification office of Bishoftu town (focus group discussion)

Dear responders

The main purpose of this interview is to gather information as an input for the study titled as the house hold solid Waste disposal and its Management Practice, in the case of Kudad, Dabaso and Burka Horabishoftukebelesof Bishoftu town Oromiya Regional state, Ethiopia

This interview shall be used for academic purpose only. Besides, the information you are going to provide through this interview will be kept confidential. Thus, you are kindly requested to provide genuine responses to each of the questions in corporate in the interview. Therefore please respond to each item in the interview.

I appreciate your willingness to support my effort. Thank you in advance.

General direction..

1. This questionnaire is to be answered by focus groups
2. You are not required to write your name

1 Back ground of the respondents.

Socio demographic data

1. Age ----------
2. Sex ----------
3. Educational status ----------
4. Marital status ----------
5. Responsibility----------
6. Condition of employment ----------

I. I would like to ask you some questions regarding the management of house hold solid wastediposal

1. What was the ground for the establishment of your department ----------
2. when was it established? ----------
3. What is the source of income for solid waste handling services?----------
4. Which sector generates the highest amount of solid waste in the town ?----------
   ----
5. How much do you charge service payment from households?----------

6. What is the current condition of household solid waste management facilities in the town ?----------
7. Is solid waste disposing container available in different parts of Bishoftu town adequately ?
8. Do you believe that the waste disposal containers are enough for the residents of all kebeles of the town?----------
9. Where are the containers located?----------
10. What is the attitude of the households towards the establishment of your department?

    _____

11. Are the vehicles that are currently in use adequate to dispose solid wastes in the town?
12. How many small macro enterprises are currently involved in door to door collection of solid waste in allkebelesBishoftutown ? ----------
13. How many solid waste transportation tracks are provided by the town administration currently?_____
14. how many transportation tracks are provided by the small macro enterprises?_

    _____

15. What type of solid waste dumping site is organized by the town administration

    _____

16. How much area is covered by the dumping site?_____
17. How far is the dumping site from the town?_____
18. How many people are working at the disposal site? _____
19. What is the current condition of solid waste management facilities in the town?
20. To what extent does the municipality regulate the process of waste disposal by the households? ……
21. Do you believe that the municipality provides adequate facility to the households?
22. Have the municipality ever established any system for enterprises (cooperative) to get training and consultation services with regard to:

- how to collect and handle wastes from households
- the extent of their responsibility

23. What effort is made to improve HHSWM practice, with regard to

- . the supply of enough facilities like containers, door-to-door collection service
- encouraging households to apply waste separation at sources
- improves the understanding level of the households about waste management and the impact of inappropriate management / disposal?

  ---

24. . List down all factors which you think can impede the household solid waste disposal services of the town that may raised from both household sides and municipality sides including its solution----------
    ---

25. What are your suggestions to improve solid waste disposal system in your town?_____
    _____

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Appendix 3: Interview for workers engaged in solid waste management sector

Dear responders

The main purpose of this interview is to gather information as input for the study titled as house hold solid Waste disposal and its Management Practice , in the case of Kudad, Dabaso and Burka Horabishoftukebeles of Bishoftu town Oromiya Regional state Ethiopia. . This interview shall be used for academic purpose only. Besides, the information you are going to provided through this interview will be kept confidential. Thus, you are kindly requested to provide genuine responses to each of the questions in corporate in the interview. Therefore I kindly request you to respond for the following interview questions.

I appreciate your willingness to support my effort. Thank you in advance.

General direction..

1. This interview is going to be held with waste collector workers.
2. You are not required to give your name

Back ground of the respondents.:

I. Socio demographic data

1. Age ----------
2. Sex ----------
3. Responsibility ----------
4. Condition of employment ----------
5. Educational status ----------
6. Marital status ----------
7. Could you please tell me your monthly income _____birr/month

II. questions regarding the collection of solid waste

1. Does your collecting agents have a criteria for employment ?----------
2. if the answer to question no 1 is yes then what are the criteria?----------

   _____

   _____
3. If No, what do you think is the reason behind it?----------

   ----
4. Have you ever received any orientation from concerned body , which is related to Solid waste collection?

5. How much waste do you collect every day in quintals?_____
6. Do you believe that the municipality provides adequate facility for you ?
7. Do you face any health problems while collecting solid wastes?
8. If your answer is yes for question no6 what kind of health problem ?
9. Do you have personal protection equipment for solid waste collection ?
10. If your answer is yes for question number 9 what type please specify----------
    ----
11. Is the payment for the service fair ?----------

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Appendix 4: questions for head of kebeles(Kudad, Dabaso and Burka Horabishoftukebeles)

Dear responders

The main purpose of this interview is to gather information as input for the study titled as house hold solid Waste disposal and its Management Practice , in the case of Kudad, Dabaso and Burka Horabishoftukebeles of Bishoftu town Oromiya Regional state Ethiopia. . This interview shall be used for academic purpose only. Besides, the information you are going to provided through this interview will be kept confidential. Thus, you are kindly requested to provide genuine responses to each of the questions in corporate in the interview. Therefore I kindly request you to respond for the following interview questions.

I appreciate your willingness to support my effort. Thank you in advance.

General direction..

1. This questionnaire is to be answered by focus groups
2. You are not required to write your name

1 Back ground of the respondents.:

Socio demographic data

1. Age ----------
2. Sex ----------
3. Responsibility ----------
4. Condition of employment ----------
5. Educational status ----------
6. Marital status ----------
7. Could you please tell me your monthly income _____birr/mont

1. I would like to ask you some questions regarding the management of house hold solid waste

1. What is the source of income for household solid waste handling services?
2. How much do you charge from each households for waste collection ?----------
3. What are the common HHSWM (household solid waste management) practices in your kebele particularly at household leve?_____
4. Is solid waste disposing container adequately available in different parts of your kebele
5. Where are the containers located?

6. Are the vehicles that are currently in use adequate to dispose house hold solid wastes in your kebele?
7. How many small macro enterprises are currently involved in door to door collection of solid waste in your kebele?----------
8. How many solid waste transportation tracks are provided by the town administration to your kebele currently? _____
9. How many transportation tracks are provided by the small macro enterprises?____ _____
10. What is the current condition of solid waste management facilities in your kebele?
11. To what extent does the municipality regulate the process of waste disposal by the households in your kebele?

    ……
12. What are your suggestions to improve solid waste disposal system in your kebele?_____