



WOLKITE UNIVERSITY

COLLEGE OF SOCIAL SCIENCE AND HUMANITIES

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

Assessment Of Urban Solid Waste Management: The Case Of Gongebe Kebele, Bensa Daye

Town, East Sidama Zone, Sidama Region, Ethiopia

A Senior Essay Submitted To The Department Of Geography And Environmental Studies For

The Partial Fulfillment Of The Requirement For Bachelor Of Art Degree In Geography And

Environmental Studies.

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DECLARATION

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This is to clarify the Senior Essay prepared by Amare Asefa, Abdusanur Mohammed, and Biniam Mengaw entitled “Assessment of urban solid waste management in case of Gongebe kebele, Bensa Daye town, East Sidama Zone, Sidama region, Ethiopia”. It is submitted to the department of geography and environmental studies for the partial fulfillment of the requirement for bachelor of art degree in geography and environmental studies.

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## ACRONYM AND ABBREVIATION

Co<sub>2</sub>: carbon dioxide

MSW: Municipal Solid Waste

SWM: Solid Waste Management

ISWM: Integrated Solid Waste Management.

UNEP: United Nation Economic Planning

NGOs: Non-governmental organization

## ABSTRACT

*This study was done in Bensa Daye town specifically in Gongebe kebele. The major objective of this study is to assess urban solid waste management in case of Daye town. In the study area there are different waste sources like commercial, domestic, industrial, institution, and etc. Wastes that are generated from different source have diverse features like corrosive, toxicity reactivity, and ignitability, based on the level of the toxicity affect the environment. But urban solid waste management practice (reuse, reduce, recycling, incineration and disposal) were not applied effectively due to institution, environmental, economic, financial, social, and technical factors. The researchers used simple random sampling techniques. From the whole population of the kebele researchers took 78 households as a sample. For this study researchers used both secondary and primary data sources. They employed different data collection tools like questionnaires, interview and by field observation. By analyzing the data, the result shows that there is a widespread problem of waste disposal in the town, effects of waste on the environment, factors that affect the waste management system. Finally, the researchers suggest that, waste and its management is a serious problem in the study area. Therefore, each and every individual's participation in the solid waste management by handling and storing the waste until they are placed in a storage area is very important. Adopting the Integrated Solid Waste Management strategy, relatively using a landfill site, using modern technology and establishing an industry that recycles and uses solid waste as input are necessary to ensure effective solid waste management.*

**Key Term:** *Waste, management, incineration, landfill, combustible, ignitable, corrosive, reactive, toxic, and ignitable.*

# CHAPTER ONE

## 1. INTRODUCTION

### 1.1 Background of the study

Solid waste is referred to the used and leftover materials called trash, comprising of domestic waste (generated by household), industrial and commercial waste( generated from shops, hotels, offices, hospitals), construction and demolition waste.(Jin Wang ,& Ran, 2012). Solid waste can mean different things to different peoples. Many people in Somalia believe that waste is a source of an income. On the other hand, majority of the developed countries see that waste is a problem and it must be addressed to solve it (Moore, 2013).

Solid waste has complex negative effects on public health in different circumstance for many developing countries of the World including our country Ethiopia. This solid waste is major source for breeding of insects which are responsible for pollution of environment and some transmitted diseases like malaria, typhoid, and another air borne diseases.

Solid waste management an overall intervention associated with control of generation, storage, collection, transport or transfer, processing and disposal of solid waste materials in a way that best addresses the range of public health, conservation, economic, aesthetic, engineering, transmission of different diseases like malaria. The scope of, solid waste management includes planning, administrative, financial, engineering, and legal functions. Solutions might include complex inter-disciplinary relations among fields such as public health, city and regional planning, political science, geography, sociology, economics, communication and conservation, demography, engineering, and material sciences. Solid waste management practices can differ for residential and industrial producers, for urban and rural areas, and for developed and developing nations (Jyotesinha, 2019).

The management of non-hazardous waste in metropolitan areas is the job of local government authorities. On the other hand, the management of hazardous waste materials is typically the responsibility of those who generate it, as subject to local, national, and even international authorities. Solid waste management means collecting, treating, and disposing of solid material

that is discarded because it has served its purpose or is no longer useful. Improper disposal of municipal solid waste can create unsanitary conditions, and these conditions in turn can lead to pollution of the environment and to outbreaks of vector-borne disease that is, diseases spread by rodents and insects. The tasks of solid-waste management present complex technical challenges. They also pose a wide variety of administrative, economic, and social problems that must be managed and solved. Solid waste management is reducing and eliminating adverse impacts of waste materials on human health and the environment to support economic development and superior quality of life. This is to be done in the most efficient manner possible, to keep costs low and prevent waste buildup (Giusti, L, 2009).

## **1.2 Statement of the problem**

Currently planet Earth is degrading in different circumstances due to many reasons'. One is solid wastes generated from different sectors. Everyday tones of solid waste were disposing at various landfill sites. This waste comes from homes, offices, industries, various agricultural related activities and so on. Solid waste is a total of all materials commonly called trash. Waste is produced by all sectors of the economy. Every person is a potential producer of waste (Gebere 2016).

It is as old as the existence of human beings. In early times, in order to minimize the health impacts of wastes, transporting the waste out of residential places been the primary concern of authorities. After the end of Second World War a high rate of population and urbanization has brought an increased demand of urban and waste disposal land. In developed countries, different mechanisms of waste management have been discovered and applied. However, the condition is different in developing countries (Weldmer G, 2019).

Generally, the larger economic growth and increase in the percentage of urban population, the greater amount of solid waste is produced. For the municipal planners, recent years, the management of solid waste continues to be one of the major issues, due to rise in population levels. Without damaging the ecosystem and human population, planners are thus forced to consider alternate and available means of waste management. Improper management of these solid wastes causes environmental pollution. Therefore solid waste management is an important factor for maintenance of environment hygiene and eco-friendly environmental planning (Manado C. Dash chairman, 2015).

In many developing countries, including our country, solid waste management is considered as one of the most tedious environmental problems faced by municipal authorities. This is due to rapid urbanization and population growth in the country, many towns in the country lack of the financial resources, impacts of technology and institutional capacity to provide the needed municipal infrastructure for adequate solid waste management practices (Dagneu et al, 2012). In low income communities wastes were dumping. In this connection, less than 50 percent of the population is served and 30-60 percent of all the urban solid wastes remain uncollected. The

budget varies from countries to countries to apply effective solid waste management practices and to collect wastes properly. The collection of solid waste consumes up 20-25 percent of municipal management budget in low-income countries, like Ethiopia. In mid-income countries, however, the collection cost decreases to 25-30 percent of total budget. The cost of collection further decreases to less than 10 percent in high-income countries (UNEP, 2019).

Still now, solid waste management commonly in developing countries has not been effectively managed. This improper management of solid waste degrades air and water quality in the urban environment, leads pollution across the region, discourage environmental beauty or its attractiveness, causes health problem, economic problem (Rush brook, 2017).

In the study area, wastes were not effectively managed and the problem of management of urban solid waste is mainly found, because of low participation of households for their own producing waste management, management problems, social operation problems, financial and other problems of the community. Wastes generated from different sectors in the town were not properly treated, managed, and also even not well collected. However, partially wastes were dumped off at landfill site, near the Bonora River. This landfill site produces foul smell for nearer community. Due to its hill topographic feature, these wastes during rainy season (summer), by flooding wholly enter in to the Bonora River. Finally it becomes the cause for water pollution, air pollution, extinction of the species, health problem, and so on. Due to these issues primary goal of this study is to fill the gap between waste generation and its management through identifying and recognizing the main problems of the waste leads on the environment and human beings, creating awareness for society regarding to impact of waste, its management practice and indirect impacts of it on their daily life, establishing effective municipal policy and applying integrated waste management approach. These issues are very importance to reducing and eliminating adverse impacts of waste materials on human health, environment, for sustainable economic development and superior quality of life in the study area.

## **1.3. Objective of the study**

### **1.3.1. General objective**

The general objective of this study is to assess urban solid waste management practices and its socioeconomic effects which are prevailing in Bensa Daye town especially in the Gongebe kebele.

### **1.3.2. Specific objectives**

The specific objectives of this study are:-

- ❖ To identify the main sources and problems of urban solid waste on environment in the Bensa Daye town.
- ❖ To analyze the perception of society towards urban solid waste management practice.
- ❖ Assessing the role of municipality towards urban solid waste disposal and management process.
- ❖ To identify the factors that hinders to apply effective waste management strategies.

## **1.4. Research questions**

Based on the above objectives, the study intended to answer the following research questions.

- ✓ What are the main sources and problems of urban solid waste leads on the environment in the study area?
- ✓ What is the attitude of society towards urban solid waste management practice in the study area?
- ✓ What is the role of municipality for urban solid waste disposal and management process?
- ✓ What are the factors that affecting effective waste management strategies?

## **1.5 Significance of the study**

This study will be provides much importance's for different organization, local communities, individual, researcher, and other people. Because every individual generate certain amount of waste based on their use. It also provides important information regarding waste management problem. It helps to provide adequate information and creates awareness for people to how solid waste is managed effectively and its associated environmental problems in the study area and across a region. This study will be serve as “benchmark” or “stepping stone” for further study, where other researchers who want to study this issue more deeply on the prevailing solid waste management in the town. For researcher it was provides skill, attitude, knowledge and, experience to do research in the future. In addition, the major significance of this research finding is to create awareness on the society about solid waste management practice and the side effect of solid waste on the environment and human being. Generally, this study is will be serves the initial points as for all who are interested to know about solid waste management and to take possible measures to tackle the problems.

## **1.6. Delimitation of the study**

This study was delimited to the assessment of solid waste management which is prevailing in Bensa Daye town. The spatial scope of this study was particularly emphasized on Gonjebe from the whole kebeles of town administration. Because, solid waste management practice in this area is not effectively applied.

## **1.7 Limitation of the study**

In this study researchers were faced on the different factors that hinder their research work and diminish research quality. Such as budget, and time constraint, lack of well documented report concerning solid waste management and its cause and consequences, unwillingness of the respondent to give right information in the study area, In addition to these lacks of experience in research operation is also another limitation of the study.

## **1.8 Operational definitions**

**Solid waste** is defined as non- liquid, non-gaseous disposal of matter created by human activity

**Hazardous wastes** are defined as wastes of industrial, institutional or consumer origin that are potentially dangerous

**Incineration** is the controlled oxidation (burning/thermal treatment) of mostly organic compounds at high temperatures to produce thermal energy, CO<sub>2</sub>, and water.

**Waste** is any substance discarded after primary use, or is worthless, defective and of no use.

**Management** is the process of dealing with or controlling things or people.

## **1.8 Organization of the paper**

This study consists of five chapters. The first chapter deals with: introduction part including background of the study, statement of the problem, objectives, research questions, significance of the study, delimitation of the study, limitation of the study, and operational definition. Second chapter include literature review. Chapter three includes description of the study area, research design and methodology. Fourth chapter include data presentation and discussion. Fifth chapter include conclusion and recommendation.

## CHAPTER TWO

### 2. LITERATURE REVIEW

#### 2.1 Definition of solid waste

Solid waste is defined as non- liquid, non-gaseous disposal of matter created by human activity. The term ' solid waste' refers to any unwanted solid materials that can no longer be used. Solid waste generated due to human, commercial, agricultural, and industrial activities. Almost every activity associated with us human leaves behind some waste. Solid waste is not only limited to solid materials. Some solid wastes also contain some gaseous matter them and also include semi-solid matter. (Richard T. Wright, 2013). Solid waste is a total of all materials commonly called trash. Solid waste is most visible form of pollution solid waste to day contains many materials such as plastics, that are not readily degradable and toxic materials, primary various types of chemical waste produced by industry. Similarly the amount of hazardous waste generated has been undergoing dramatic change, in addition to increase the annual discharge of toxic chemicals directly in to the environment (Baritone, 2015).

##### 2.1.1 Characteristics of solid waste

Different solid wastes have different characteristics based on their nature (Harrison, A, 2016).

**Corrosive:** these are wastes that include acids or bases that are capable of corroding mental containers, e.g. tanks

**Ignitability:** this is waste that can create fires under certain condition, e.g. waste oils and solvents

**Reactive:** these are unstable in nature; they cause explosions, toxic fumes when heated.

**Toxicity:** waste which are harmful or fatal when ingested or absorb.

## 2.2 Sources of solid waste

### 2.2.1 Major sources of solid waste

Everything by duration of the time becomes waste through the process of decaying, and then it becomes source of waste (Samar, L, 2015). But the common sources of solid waste are household, industry, commerce, institution, health station, and building and agriculture activities.

The following are major sources of solid waste:

**Residential:** Residences and homes where people live are some of the major sources of solid waste. Garbage from these places include food wastes, plastics, paper, glass, leather, cardboard, metals, yard wastes, ashes and special wastes like bulky household items like electronics, tires, batteries, old mattresses and used oil. Most homes have garbage bins where they can throw away their solid wastes in and later the bin is emptied by a garbage collecting firm or person for treatment.

**Industrial:** Industries are known to be one of the biggest contributors of solid waste. These industries produce solid waste in form of housekeeping wastes, food wastes, packaging wastes, ashes, construction and demolition materials, special wastes, medical wastes as well as other hazardous wastes.

**Commercial:** Commercial facilities and buildings are yet another source of solid waste today. Commercial buildings and facilities in this case refer to hotels, markets, restaurants, go downs, stores and office buildings.

**Institutional:** The institutional centers like schools, colleges, prisons, military barracks and other government centers also produce solid waste.

**Construction and Demolition Areas:** Construction sites and demolition sites also contribute to the solid waste problem. Construction sites include new construction sites for buildings and roads, road repair sites, building renovation sites and building demolition sites

**Agriculture:** Crop farms, orchards, dairies, vineyards and feedlots are also sources of solid wastes. Among the wastes they produce include agricultural wastes, spoiled food, pesticide containers and other hazardous materials.

**Biomedical:** This refers to hospitals and biomedical equipment and chemical manufacturing firms. In hospitals there are different types of solid wastes produced. Some of these solid wastes

include syringes, bandages, used gloves, drugs, paper, plastics, food wastes and chemicals. All these require proper disposal area. Unless effectively managed they will cause a huge problem to the environment and the people in these facilities.

## **2.2.2 Classification of solid waste**

According, to (Dash, 2016) solid wastes are categorized according to their:

**Origin:** The waste has been discarded from home, from a factory, from a construction site, etc.

**Content:** whether the waste contains glass, metals plastics, etc.

**Hazard:** whether the waste is inflammable, toxics, radioactive, and poisonous.

### **2.2.2.1 Types of solid wastes based on origin**

Here the solid waste is characterized on the basis of where it is coming from. According to (Aschuan, 2011) the types of solid wastes based on origin include:

**Municipal solid waste (MSW):** The term municipal solid waste is generally used to describe the most of the non-hazardous wastes from a city or village that requires routine collection and transport to a processing or disposal site. Sources of municipal solid waste: homes, commercial establishments and institutions, as well as industrial facilities.

However, MSW does not include wastes from industrial processes, construction and demolition debris, sewage sludge, mining waste or agricultural wastes. MSW is also called as trash or garbage. In general, domestic waste and MSW are used synonyms.

**Industrial wastes:** Are wastes generated from food processing industries, metallurgical chemical and pharmaceutical unit's breweries, sugar mills, paper and pulp industries, fertilizers and pesticides industries are major ones which discharge toxic wastes. These contain more of toxic and require special treatment.

**Agricultural wastes:** The wastes generated by agriculture include waste from crops and livestock. In developing countries, this waste does not pose a serious problem as most of it is useful e.g., dung is used for manure, straw is used as fodder.

### **2.2.2.2 Types of solid waste based on composition**

**Garbage:** This refers to animal and vegetable wastes resulting from handling, sale and storage, preparation, cooking and serving of food. It comprising these wastes contains putrescible (rotting) organic matter, which produces an obnoxious odor and attracts rats and other vermin. Therefore, it requires special attention in storage, handling and disposal.

**Ashes and residues:** These are substances remaining from the burning of wood, coal, charcoal, coke and other combustible materials for cooking and heating in houses, institutions and small industrial establishments. Ashes consist of fine powdery residue, cinders and clinker often mixed with small pieces of metal and glass. Since ashes and residues are almost entirely inorganic, they are valuable in landfill.

**Bulky waste:** These include large household appliances such as refrigerators, washing machines, furniture, crates, vehicle parts, tires, wood, trees and branches.

**Street wastes:** These refer to wastes that are collected from streets, walkways, alleys, parks and vacant plots, and include paper, cardboard, plastics, dirt, leaves and other vegetable matter.

**Combustible and non-combustible wastes:** Typically, while combustible material consists of paper, cardboard, textile, rubber, garden trimmings, etc., non-combustible material consists of such items as glass, crockery, tin and aluminum cans, ferrous and non-ferrous material and dirt.

### **2.2.2.3 Hazardous wastes**

Hazardous wastes are defined as wastes of industrial, institutional or consumer origin that are potentially dangerous either immediately or over a period of time to human beings and the environment. This is due to their physical, chemical and biological or radioactive characteristics like ignitability, corrosively, reactivity and toxicity. Typical examples of hazardous wastes are empty containers of solvents, paints and pesticides, which are frequently mixed with municipal wastes and become part of the urban waste stream.

### 2.3 Effects of solid waste on the environment

Solid waste can pose serious effect on the environment if not properly managed. The proper management of solid waste from the point of generation to the point where it is finally disposed is very important to prevent environmental degradation. Below are some effects of solid waste on the environment: Global warming-change in climate and destruction of ozone layer due to waste biodegradable, air pollution, water pollution, pollution of soil by leaching, and blockage of drainage leading to flood (Moeller, D. W. 2005). Generally, solid waste on improper disposal affects the environment in many different ways such described on the following figure:

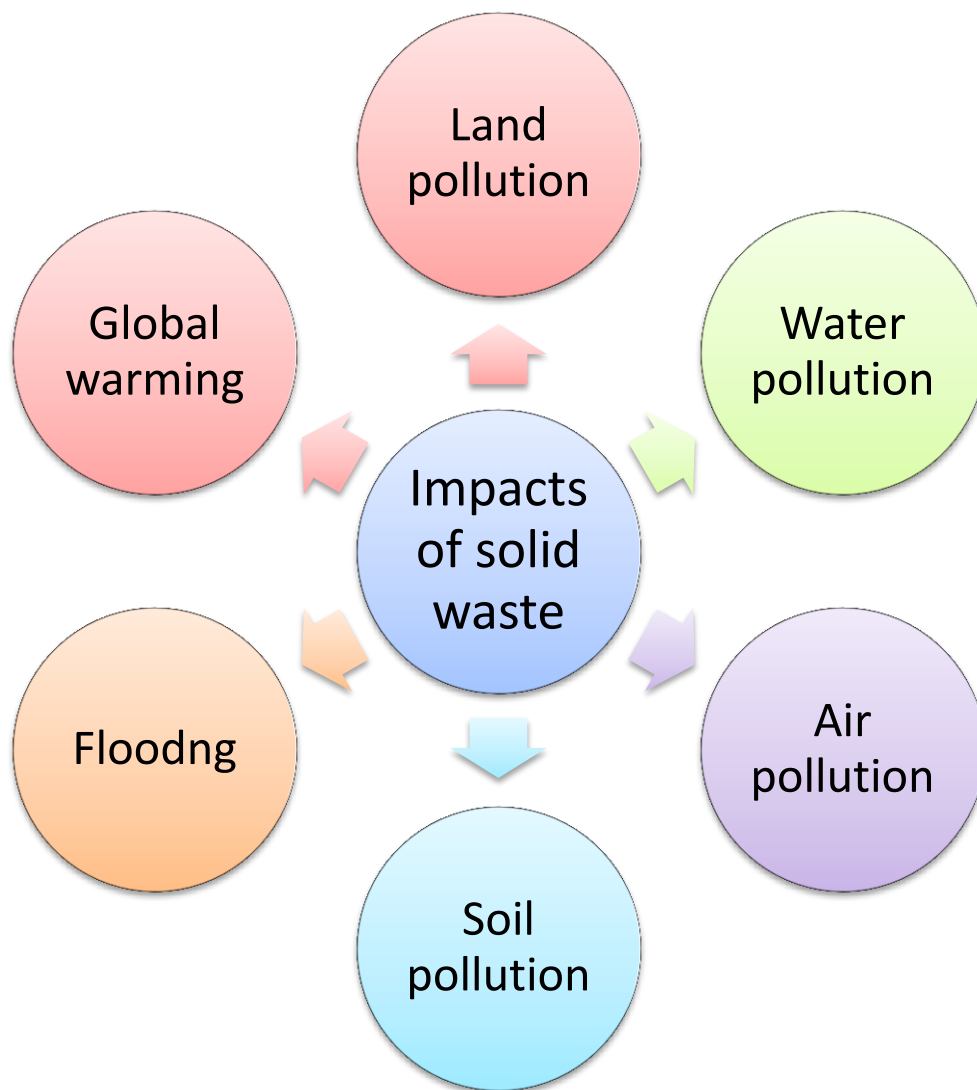


Figure 2.1: Impacts of solid waste on the environment

**Air Pollution:** Gases are generated through anaerobic decomposition of organic solid waste. If a significant amount of methane is present, it may be explosive and greatly lead to greenhouse effect. People who live near those sites may suffer from respiratory disorders occurring with toxic gases, dust, and fumes. When pollutants get mixed with air, this causes acid rain. Acid rain degrades the top soil.

**Water Pollution:** Rain can penetrate and pass through solid waste and can reach out and carry hazardous organic chemicals & inorganic chemicals such as heavy metals into the groundwater as well as nearby surface water sources. People who utilize the ground water or the surface water will absolutely expose to those pollutants and severe health problems may occur. It is contains elements such as N and P leaching to surface water sources will be creating” eutrophication” conditions. This will increase the biological oxygen demand of water sources and reduce the bio-diversity of water source.

**Soil Pollution:** Open dumps of solid waste or landfill pose serious threats to environment. One of the greatest environmental concerns associated with land filling is the generation of leachate. During degradation process, one ton of land filled solid waste generates about 0.2 m<sup>3</sup> of leachate, depending on the type of waste and seasonal climate. This wastewater primarily results from the degradation of the organic portion of the waste in combination with percolating rainwater and moisture that leaches out organic and inorganic constituents through the waste layer in the soil. A landfill site may still produce leachate with a high concentration of ammonia for over 50 years after filling operations have ceased. If not properly treated, leachate seeping from a landfill can enter the underlying groundwater, posing potentially serious hazards to the environment and to public health. For this reason, the generation of leachate has become a worldwide environmental concern in recent years.

**Land Pollution:** Land wasting damages microbial population and other soil fauna by releasing various toxic substances & disturbing their normal habitats. Garbage dumping, especially plastics, reduce the soil fertility as they are non-biodegradable. These waste change the soil texture and prepare artificial environment inside the soil. This will disturbs root movement of trees and habitats of the soil fauna.

**Global Warming:** Methane and carbon dioxide are two major gases produced from the decomposition of the organic fraction of solid waste in the landfill. Methane gas has a 21-fold global warming potential as compared to carbon dioxide. According to the Intergovernmental Panel on Climate Change, such emissions contribute to 18% of the total methane emissions to the atmosphere, ranging from 9 to 70 Tg (Mega Tonnes) annually. Therefore, landfills have been implicated as the largest source of atmospheric methane in the world, leading to a natural phenomenon called “global warming. Due to global warming, changing temperature and rainfall patterns will bring a variety of pressure upon plant and animal life. If temperature rises as projected, one-third of species will be lost from their habitat, either by moving elsewhere or by becoming extinct

**Flooding:** Indiscriminate dumping of solid waste can lead to blockage of drainage thereby causing floods posing serious public health and environmental problems.

## **2.4 Concepts of solid waste management**

Solid waste management is a term that is used to refer to the process of collecting and treating solid wastes. It also offers solutions for recycling items that do not belong to garbage or trash. As long as people have been living in settlements and residential areas, garbage or solid waste has been an issue. Waste management is all about how solid waste can be changed and used as a valuable resource. Solid waste management should be embraced by each and every household, including the business owners across the world. The industrialization has brought a lot of good things and bad things as well. One of the adverse effects of industrialization is the creation of solid waste (Michael 2018).

### 2.4.1 Solid waste management strategies

There are many waste management practices (Basu, R, 2009), from these the most common are:

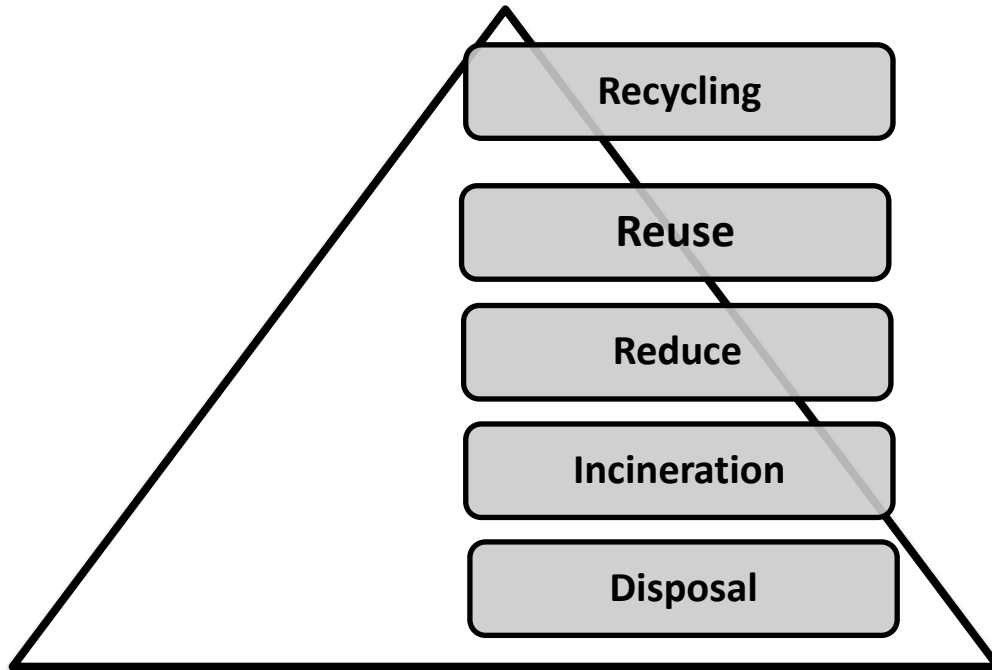


Figure 2.2: Solid waste management strategies

**Reduce:** Reduce is the most important and the most effective of the principles of solid waste management. It involves reducing the waste we generate. This can be done by avoiding the unnecessary use of resources that produce waste.

**Reuse:** The next in the hierarchy of the principles of solid waste management is to reuse the materials we have used before. Materials can be reused for the same or different purposes. Reuse is becoming more and more popular with the surge of up cycling and craft projects all over the web. Reuse is an efficient way to keep waste out of landfills. It gives value to materials that are deemed to be waste. If you reuse something as opposed to throwing it away you keep waste out of landfills and create something new. Reuse is cost-effective as you don't have to buy a new product. It also saves energy and resources that would have been used to make the new product.

**Recycling:** The next in the hierarchy of the principles of solid waste management is recycling. Recycling can be said to be a form of reuse but in this sense, used products are remanufactured it

reprocessed to form either the same product or another product. An example could be recycling plastic bottles to make buckets.

**Incineration:** This is not a sustainable method of solid waste management but it's needed because some materials cannot be reused or recycled and so they need to be burnt off. Incineration is the burning of waste materials. Most times, there is energy recovery after the incineration process.

**Disposal:** This is the final destination of waste. A sanitary landfill is an engineered pit for burying waste. A landfill is a site that has been earmarked for the disposal of solid waste. Landfills should be the last option of solid waste management.

## **2.4.2 Approaches of solid waste management (SWM)**

### **2.4.2.1 Integrated solid waste management (ISWM)**

As the field of solid waste management advances, solutions are being looked at more systematically and holistically. ISWM, for example, is an increasingly important term in the field of waste management. It refers to the selection and use of appropriate management programs, technologies, and techniques to achieve particular waste management goals and objectives (Dettol, 2017).

### **2.4.3 Advantages of effective waste management**

According to (Card. 2021) effective management practice of waste is highly lucrative: There are only a few people who sincerely consider this as an industry into various facets of waste management like recycling and reusing and reap the benefits. Now many companies are looking forward to associating themselves with this industry and are ready for a long-term investment.

- ❖ Keeps the environment clean and fresh
- ❖ Saves the Earth and conserves energy
- ❖ Reduces environmental pollution:
- ❖ Waste management help in earning money:
- ❖ Creates employment:

## 2.4.4 Impacts of poor solid waste management

According to (Magetry, 2018) impacts of poor solid waste management are:

**Environmental effects:** One of the biggest consequences of improper waste management is the impact on the environment. Piles of rubbish can block waterways and drainage, which creates stagnant pools of water which is an ideal breeding ground for undesirable critters. Waste can also infect local soil and water supplies which pose a particular risk to human health. The dangers of non-biodegradables such as plastic bags are that they take hundreds or even thousands of years to decay.

**Risks to human health:** Unpleasant creatures such as rats, flies, cockroaches and mosquitos can make their home in domestic and commercial waste. They often carry diseases like malaria, dengue fever, hepatitis and typhus. Rats are known to carry Salmonellosis and Weil's disease and when their germs nestle in piles of rubbish can lead to health difficulties like cholera, scabies, tetanus and other skin and eye infections.

**Fire risks:** Improper waste management including poor disposal of packaging, wrappers, newspapers, flyers, wood, insulating materials are dangerous they are all flammable. Car tyres are one of the most common causes of large fires, which is the reason their storage is so well regulated. Like other waste components, tyres also have the double-whammy of adding dangerous chemicals to the mix, which are released into the atmosphere when burned.

**Horrible smells and visual pollution:** Nobody likes to see huge amounts of rubbish piled everywhere. The smell, especially on warm summer days can be even worse. Poor hygiene has a serious impact on your community, as no one wants to move somewhere unsanitary. There is also the impact on local businesses and the economy, as waste issues will keep people away from these area.

The service of collection, transfer and disposal of solid waste in the town area of developing countries are either spores or ineffective or the wastes are often improperly disposed of. About 30 to 50 percent of solid waste produced in lower income countries in urban areas as well as poorest part of middle income countries had caused the death of millions of people. Besides, the

uncollected solid waste that has been dumped in drainage canals created many problems, such as releasing of odors & toxic gases, blocking of drains and spreading of diseases (Techno, B, 2017).

## **2.5 Role of municipality for solid waste disposal and management**

Municipality play very significant role regarding to waste management, by generating and applying the principles of the solid waste management (Javadeka, T, 2019). The following tasks and activities have to be taken up by municipalities:

- ❖ Each municipality needs to elaborate a municipal waste management plan.
- ❖ Continuous communication activities are necessary in order to inform, educate and involve citizens in waste separation at source.
- ❖ The real costs for waste collection need to be calculated and efficient waste tariff collection systems need to be put in place.

Municipality educate, inform, and recognise the following principles for the society to apply. They are 3Rs (Reduce, Reuse and Recycle), incineration and disposal. They are known as the solid waste management hierarchy and help in waste minimisation.

## 2.6 Factors affecting solid waste management system

Following are the factors affecting solid waste management system, its design, development, and operation (Barr, S, 2007).

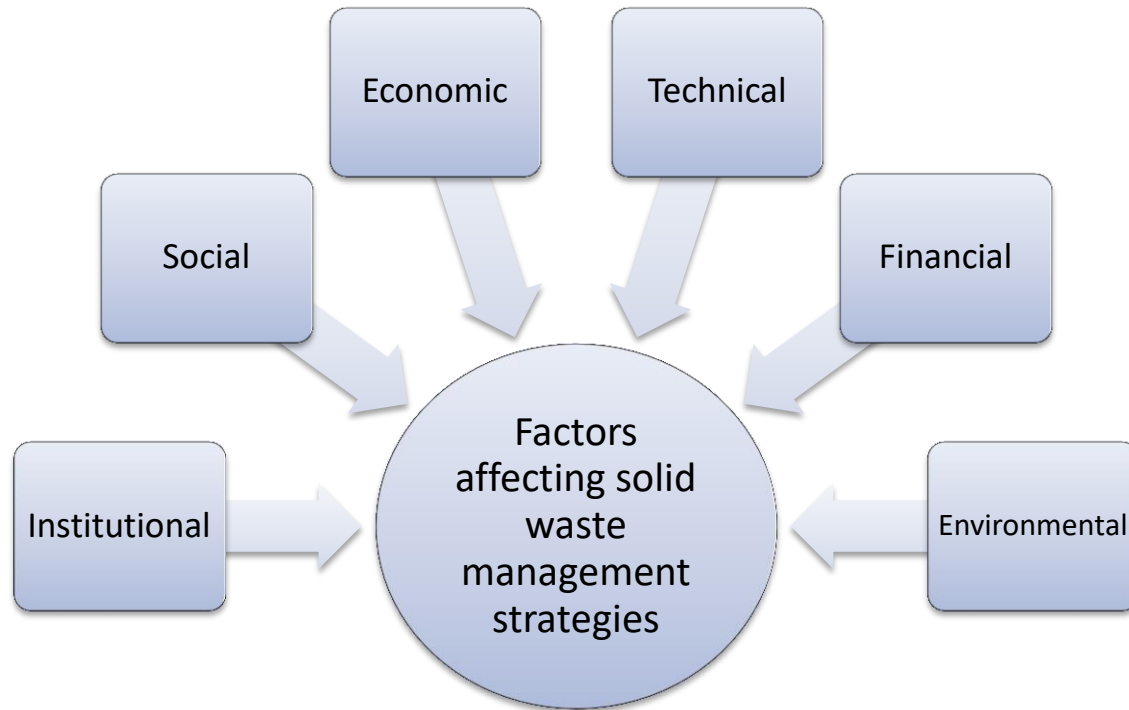


Figure2.3: Factors affecting solid waste management system

**Institutional Factors:** Institutional factors affecting solid waste management system involve law and policies that allow the government to effectively implement an Integrated Solid Waste Management.

**Social Factors:** Social factors affecting solid waste management system involve local customs and cultural/religious practices which can generally be affected or altered by sustained public education campaigns. The knowledge of these factors can determine how the waste is generated and disposed. The local government must ensure citizen participation in all phases of management planning to help gain community awareness, input and acceptance.

**Financial Factors:** This the most important factor to consider while implementing an ISWM plans. The source(s) of funds must be identified and/or created to help finance the SWM plan. In this regard, the local government should identify the sources that can provide funding for SWM,

including general revenues or user fees, the private sector, and government and international agency grants and loans etc.

**Economic Factors:** Economic factors affecting solid waste management system should be differentiated from the above, as these include the financial (more precisely, economical) output of the ISWM plans, for example, the jobs creation, enhancement of public trade and tourism, and political mileage etc. In order to evaluate these factors, the local government must calculate the initial capital investment requirements and long term operating and maintenance costs associated with the various waste management activities. In addition, they must evaluate the public's ability and willingness to pay for the services and evaluate activities based on effectiveness in handling waste potential for job creation.

**Technical Factors:** These factors include determination of equipment and facilities required for the implementation of the ISWM plan and more importantly, the locations where these equipment and facilities will be kept. The determination of these factors will depend on geological factors, transport distances and projected waste generation, which will then become basis for siting and design of various equipment and facilities.

**Environmental Factors:** Every ISWM plan has a deep impact on the natural resources, human health and the environment in general. All SWM activities such as landfilling or combustion must take into account the environmental cost of these activities and strive to minimize their effects on human health and natural resources of the area.

## 2.7 Conceptual framework of the study

Currently planet Earth is degrading in different circumstances due to many reasons'. One is solid wastes generated from different sectors. Every person is a potential producer of waste. Everyday tones of solid waste were disposed of at various landfill sites. Theses wastes come from various sources have various characteristics.

Now Day, solid waste management is the serious problem due to different factors like financial, social, economic environmental, technical, and institutional problems. This indicates that there is no enough solid waste management in the study area.

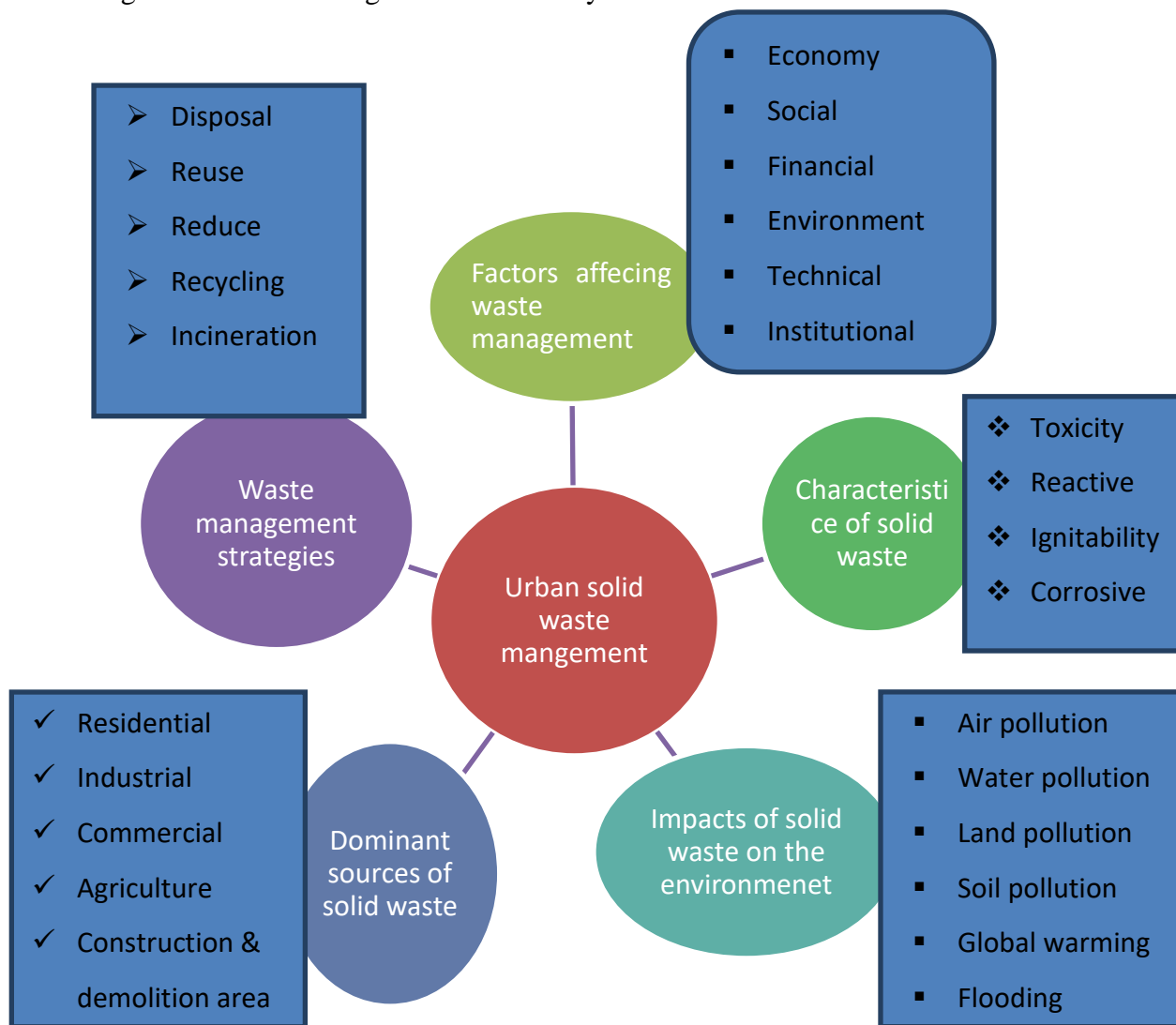


Figure2.4: Conceptual framework of the study

# CHAPTER THREE

## 3. RESEARCH METHODOLOGY

### 3.1 Description of the study area

#### 3.1.1 Location

Bensa Daye is one of the town is located in the Sidama region of Ethiopia, which extends in to Oromia region like a Peninsula. By relative location, Bensa is borderd on the South and North by the Oromia region, with Bona Zuriya on the West, Arbegona on the North West, Chire on the East, and Aroresa on the south East. By absolute location, Latitude: 6.52259 Longitude: 38.827922. The major town in Bensa is called Daye.

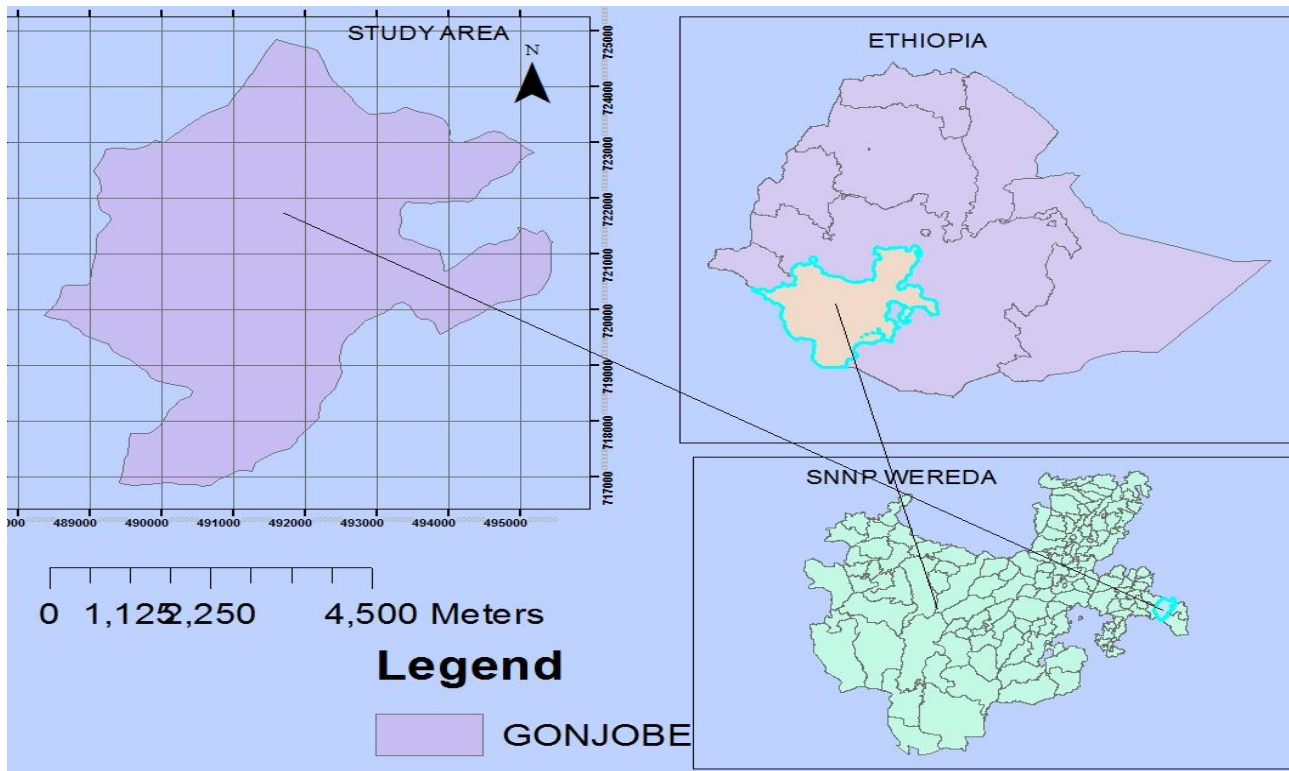


Figure3.1: Map of the study area

Source: Ethio GIS Lab, 2023

### **3.1.2 Topography**

The highest elevation of the Bensa town is 1891m above mean sea level and lowest elevation is 1859m. It has mountain topographic feature in all direction. The town has attractive landscape. Due to its diverse topographic features, like valley, hill, mountain, plateaus, and etc. Generally 65% of total area is lowland and remaining part is highland and respectively (Bensa Woreda Agricultural Office, 2023).

### **3.1.3 Climate and vegetation**

According to Agro-ecological zone of Ethiopia, the town is found within “Woina Dega” agro-ecological zone (1500-2300m), daily Maximum temperature is 34<sup>0</sup>c and daily minimum temperature is 18<sup>0</sup>c. In the study area maximum temperature occurred in January, February, whereas lowest temperature occurred June, July and august. The average amount of annual rainfall is more than 100-850mm. The types of vegetation in own are dominate by large trees and small trees, but Shola and warka are dominant one (Bensa Woreda Agricultural Office, 2023).

### **3.1.4 Natural resources**

There is presence of favorable climatic condition due to availability of large trees in the center of town. There are also different beautiful mountains, and pure drinking water received from these mountains is important natural resources of the town.

### **3.1.5 Soil type and characteristic**

Soil type of the study area is brown in color and rich humans and organic matter content. Due to its high the dark brown soil type is most performed for agriculture and coffee, maize and inset, another cash crops production in the study area (Bensa Woreda Agricultural Office 2023).

### **3.1.6 Economic activity**

The dominant economic activity of Daye town mainly categorized in to two; first one is trade, like whole sole, retail, hotel etc. By trade Bensa Daye is the famous town in the Sidama, Ethiopia and also across international boundaries. Its dominant export item is coffee. Second; due to its favorable climatic condition, every farming activities are practised. Peoples of the Bensa town

are engaged in different economic activities mostly dominated by commercial activities, handcraft, civil servant, manufacturing enterprise. The local urban rural interaction in town and its surrounding has contribute to for business activities and industrial activities (Daye Town Administrative Office, 2023)

### **3.1.7 Basic demographic characteristic**

**Population:** Based on 2007 census conducted by the CSA, the whole population of the town is 13588, from this 7980 are men and remain 5608 are women and about 8.64% live in the Gongobe kebele (Bensa Municipality, 2023).

**Religion:** A town has a number of believers to each religion as majority of inhabitants. About 77.76% are Protestants, 7.59% are traditional religions, 5.58% are Muslims, 3.21% are orthodox, and 2. 51% are Catholics (Bansa Woreda Cultural and Tourism Office 2023).

**Ethnic groups:** In terms of ethnic composition Daye has inhabited by Sidama ethnic group most dominantly, Hadiya ethnic group, Guraghe ethnic group and Alabba ethnic group, Silte, Amhara, Tigray (Bensa Woreda Culture and Touring Office, 2023).

## **3.2 Research design**

In this study, mixed research approaches (both qualitative and quantitative research approach) were employed. Qualitative data a type is used to gather detain information from the interviews and from other written documents. Quantitative data a type is used to collect numerically data through the use of questioners and observation.

## **3.3 Sampling techniques and sampling size**

### **3.3.1 Sampling techniques**

To conduct this study, researchers were employed simple random sampling technique. The use of this simple random sampling technique is that it provides equal chance of being included in sample to each population. In general, this sampling technique was preferred from other sampling systems in order to avoid bias, to take good sample from representative of the whole population and to save time and money.

### 3.3.2 Sampling size

In the town of study area, there are many kebeles. But based on the level of problems which waste leads on the environment and the society, due to lack of effective waste management practice, Gengobe kebele was selected from whole town kebeles, because due to high solid waste management problems. Total number of household is only 780, because it is slightly far from the center of town. From the total number of household, the sample size is determined proportion by using percentile method that means 10% percent of total study (dividing total household in to representatives of the each households), because of shortage of tome, money and the problem of data is collection from house to house. Therefore sample size of study is 78 house hold and techniques used to collect data is simple random sampling in order to minimize biases, save money and time, and another resource, from every ten individual one was selected. From whole household, 78 individuals were selected as a sample, by using Yamane (1967)

Proper sample size determination formula ( $n = \frac{N}{1 + N e^2}$ ).

Where; n = number of sample size

N = number of total household (780)

e = confidential error (10.7%)

l = constant

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

$$78 = \frac{780}{1 + 780(0.10745)^2}$$

$$78 = \frac{780}{1 + 780(0.01154)}$$

$$78 = \frac{780}{1 + 9.00}$$

$$78 = \frac{780}{10.00}$$

$$78 = 78$$

Therefore, from the whole 78 households were selected randomly.

## **3.4 Data sources**

This study uses both primary and secondary data sources, but primary data sources were employed for collection of data through questionnaire, interview and observation.

### **3.4.1 Primary data source**

Primary data sources were employed to (gather) first-hand information about the urban waste management from town administrative office, kebele administrators, and environmental protection agency.

### **3.4.2 Secondary data source**

The researchers were collect information from different secondary data sources. This includes published and unpublished books, magazines, journals, and other documents and books related to the study.

### **3.4.3 Data collection tools**

#### **3.4.3.1 Questionnaire**

In this study, the researchers were employed questionnaire to collect relevant information about sources and effects of solid waste on the environment, waste management practices, and factors that affects effective waste management system, for the study. In order to collect valuable information for the study, questionnaire survey has been employing as a vital data acquisition method. The questionnaire include both close end and open end question which enables the researchers to capture relevant information relate to the his/her study. The closed ended question enables respondents to choose from the given choices whereas; the open-ended questions them to respond in their own way of perspectives and to explain the questions in detailed manner.

#### **3.4.3.2 Interview**

In primary data collection method, interview was undertaken a face to face situation to collect information for further investigation on the bases of the information gain from respondents.

Interview was taken in order to become free to arrange the form, order and timing of questions. Researchers were conducted interview to get relevant information for his study.

### **3.4.3.3 Observation**

The researchers were conducted a transect walk throughout the study area to complete an observation checklist. The main advantage of this method are eliminate subjective biases and information obtains under this method is relevant and currently happening. Researchers were employed to observe truth and current data in the study area. It is not what people said, and what they do, but it is what are the problems and sources of the solid waste, role of municipality, waste management practice, and effects of it.

### **3.4.4 Methods of data analysis**

The data obtained from different respondents by questionnaire, interview and observation were rearranged according to their types. Then, population, economic, and level of waste data were analyzed by using different statistical techniques like descriptive methods and in narrative ways.

## **3.5 Ethical considerations**

During the study considering all ethical consideration is very important especially; during data collection from different respondents. So the researcher was apply various ethical considerations, among thus are; respecting respondents rights, protect their privacy and keep up their consent to collaborate as well as the confidentiality of these responses were prioritized.

## CHAPTER FOUR

### 4. DATA ANALYSIS AND PRESENTATION

This chapter is concerned with data analysis and interpretation. It contains data analysis about demographic characteristics (sex, age, education level, regions, family size, and marital status) of the respondent, sources of solid waste, waste management practices, responsible body to reduce waste, effects of solid waste on the environment, and the factors affecting waste management practices.

#### 4.1. Personal characteristics (background) of the respondents

There are many personal characteristics of the respondents. They are age distribution, sex distribution, marital status, educational status, family size, occupational distribution, and religion status.

##### 4.1.1 Sex distribution of respondents

Sex structure is one of the demographic factors which affect social, economic and political aspects. As a result, this study identified the sex structure of respondents as follows.

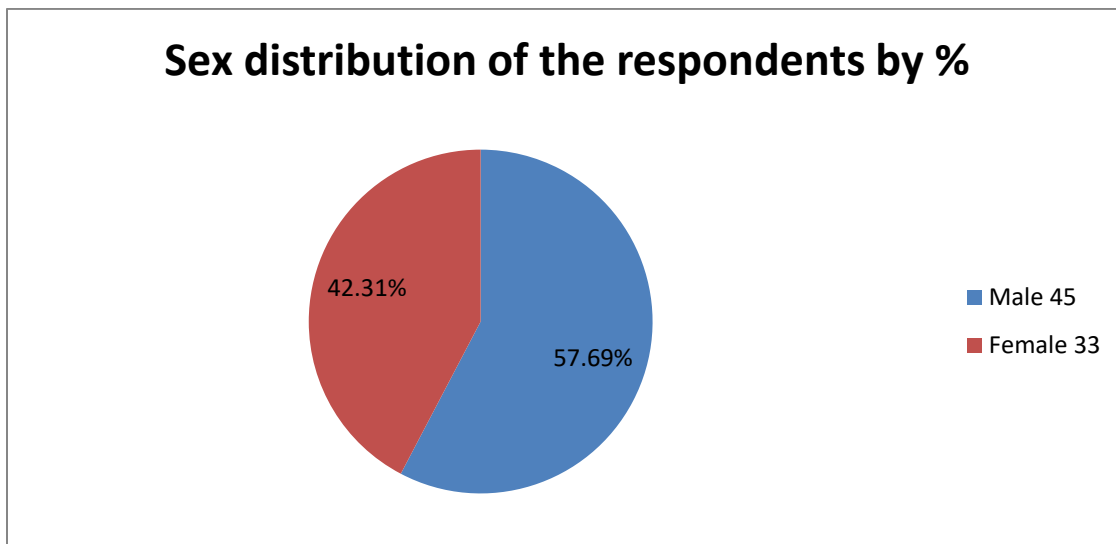


Figure 4.1: Sex distribution of the respondents

Source: field survey (2015)

As, discussed in above Figure 4.1, both male and female respondents were participated in this study. Majority of respondents were males (57.69%) and the remaining (42.31%) were females.

### 4.1.2 Age information of the respondents

Age is an important demographic character of respondent that influence the participation of respondent to give clear information to solve waste management problem.

Table 4.1: Age group of the respondents

Age group	Gongobe kebel	
	Number of respondents	Percentage (%)
10-19	8	10.25
20-29	19	24.36
30-39	17	21.79
40-49	13	16.67
50-59	11	14.1
60-69	6	7.69
above 70	4	5.12
Total	78	100

Source: field survey (2015)

As the above table 4.1, shows that, majority of respondents were lay between age 14-64 and accounts about 82.33% both male and female. This age group is well known by its “productivity” and more powerful to perform any activities. The remaining 4.833% and 12.833% of respondents were ranging 10-14 and above 64 respectively.

### 4.1.3 Marital status

Marital status is another demographic factor of respondent which influence degree of waste generation, management, and participation on different activities. Most of the time, a single individuals generate less waste when we compare with the married one.

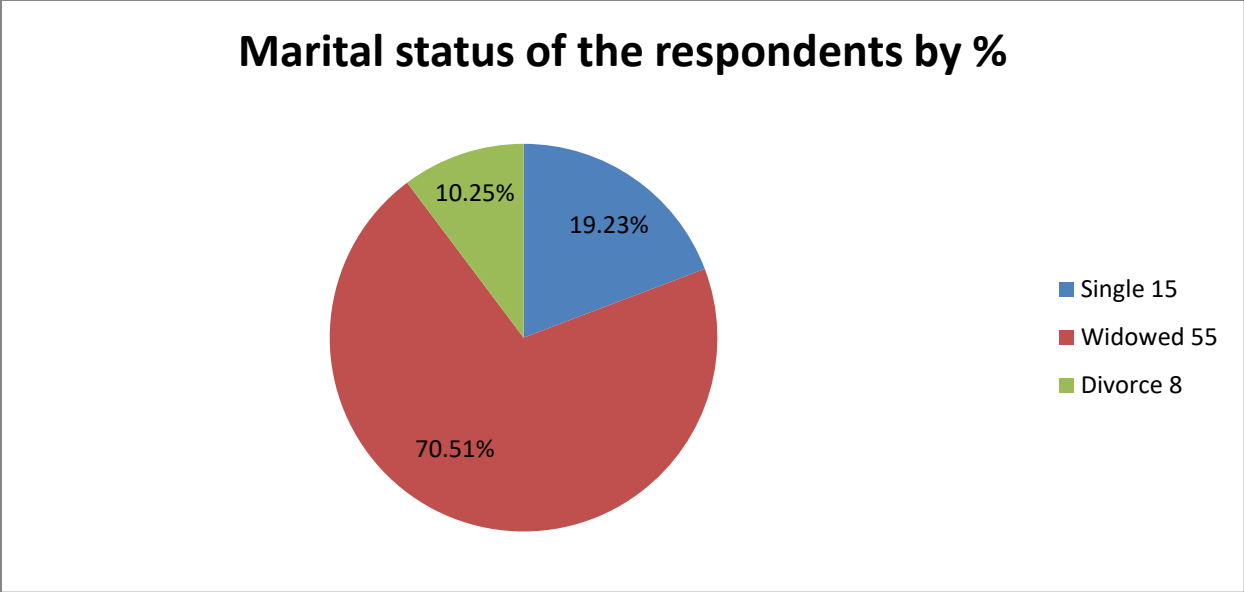


Figure 4.2: Marital status of the respondents (Source: field survey 2015).

From figure 4.2, about 70.51% of the respondents are widowed while (19.23%) of the respondents are single and the remaining (10.25%) are divorce. From this table we had concluded that the majority of the respondents were widowed.

**4.1.4 Education status**

Education is the formal processes by which society deliberately transmit its accumulated knowledge skills customs and beliefs from one generation to another. Education status is another factor which influences proper management of waste as well as other natural resources. As a country has greater educated people, it plays a great role for its resource conservation, putting alternative to the existed problem as well as rehabilitation the degraded resource. On the other hand, country has high illiteracy rate their contribution for such activity is relatively less.

Table 4.2: Educational status of the respondents

Education status	Gongobe kebele	
	Number of respondents	Percentage (%)
Unable to read and write	13	16.67
Primary school	23	29.49
Secondary school	17	21.79
First degree and above	25	32.05
Total	78	100

Majority of respondents in this study have degree and above (32%) and the rest primary, secondary school, degree and above and unable to read and write contains are 29.48% 21.97% and 16. 65% respectively.

#### 4.1.5 Family size

The level of family size can affect waste management practice. That means family with greatest size produce much amount of wastes and family with less family size produce less.

Table 4.3: Family size of the respondents

Family size	Gongobe kebele	
	Number of respondents	Percentage (%)
2	15	19.23
5	17	21.79
7	21	26.92
Above 7	25	32.05
Total	78	100

Source field survey2015

When we see family size of respondents on the above table 5 , majority of the respondents (32.05%) have 4 children, and those who have one, five and more than five are (26.92%), (21.97%) and (19.23%) respectively.

#### 4.1.6 Religion of the respondents

Table 4.4: Religions of the respondents

Religious	Gongobe kebele	
	Number of respondents	Percentage (%)
Protestant	31	39.74
Orthodox	18	23.07
Catholic	16	20.51
Muslim	13	16.67
Total	78	100

Source: field survey2015

In the study area majority of the respondents were protestant (39.73), remaining orthodox, catholic and Muslim are 23.1%, 20.51% and, 16.66% respectively.

#### 4.2 Sources of the solid waste by respondents

Table 4.5: Sources of waste by respondents

Sources of solid waste by respondents	Gongobe kebele	
	Number of respondents	Percentage (%)
Household	25	32.05
Factory	5	6.41
Commercial	45	57.69
Health station	3	3.85
Total	78	100

Source: field survey (2015)

In the table 4.5, large respondents said that (53.75%) the major source of solid waste is generated from commercial activities. The remaining (33.25%, 8%, and 5%) said that it is generated from household, factory, and health station respectively.

### 4.3 Effects of solid waste on the environment by respondents

Solid waste affect environment in different ways and it can be considered as the cause for environmental problem such as air pollution, water pollution, global warming, soil pollution, land pollution, and flooding.

Table 4.6: The effects solid wastes on the environment by respondents.

Effects of solid wastes on the environment by respondents.	Gongebe kebele	
	Number of respondents	Percentage (%)
Air pollution	20	25.64
Water pollution	20	25.64
Soil pollution	13	16.67
Land pollution	5	6.41
Global warming	15	19.23
Flooding	5	6.41
Total	78	100

Source: field survey (2015)

As table 4.6 indicate that, effects of solid waste on the environment. The majority (23.5%) of respondents responded that dominant problem of solid waste is water pollution and air pollution. The remaining 19.75%, 17.75%, 7.75%, 7.75% said that solid waste leads global warming, soil pollution, land pollution and flooding respectively.

### 4.4 Solid waste management practice by respondents

As, analyzed the following table 9: There are many solid waste management practices obtained from respondents. They are reuse (13.25%), reduce (13.25%), incineration (13.25%), recycling (25%), and disposal (35.25%).

Table 4.7: Solid waste management strategies

Solid waste management practices by respondents	Gongobe kebele	
	Number of the respondents	Percentage (%)
Reuse principle	11	14.1
Reduce principle	11	14.1`
Incineration principle	11	14.1`
Recycling principle	19	24.36
Disposal principle	26	33.34
Total	78	100

Source: field survey (2015)

#### 4.5 The responsible body to reduce solid waste by respondents

Table 4.8: Responsible body to minimize solid waste disposal by respondents

Responsible body to reduce solid waste by respondents	Gongobe kebele	
	Number of respondents	Percentage (%)
Municipality	35	44.88
NGO	3	3.8
Household	27	34.61
All	13	16.67
Total	78	100

Source: field survey (2015)

As, indicated in the above table 4.8 , from total respondents about (42%) of respondents said that every house hold is responsible body to minimize the problem, (36%) of respondents responded that municipality are responsible body to minimize solid waste, (4.75%) of respondents said that NGO is responsible body to minimize the problem, but remaining (17.25%) of respondents said that all that are house hold, municipality, government and non-government organization are responsible to minimize solid waste.

#### 4.6 Level of the contribution of community to reduce solid waste by respondents

To reduce generation of solid waste, the contribution of community plays very essential role. It is indicated in the figure 4.3 below.

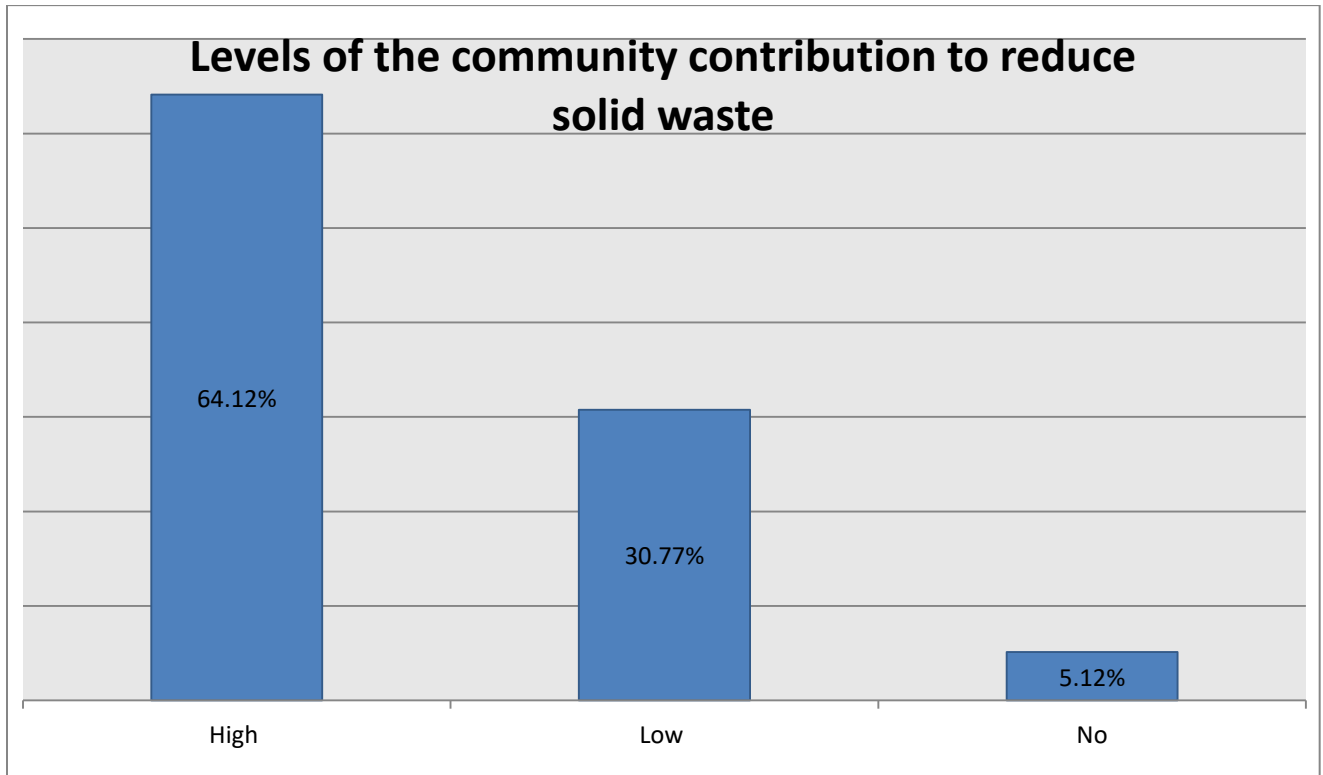


Figure 4.3: Levels of community contribution to reduce solid waste

As described in the figure 4.3, from total respondents 62% and 29% said that, the communities have high, low contribution to reduce solid waste. But the remaining (9%) said that there is no contribution of community to reduce solid waste by preparing and collecting solid waste in small ponds burning of the waste, except dumping off landfill site.

#### 4.7 Factors affecting waste management system by respondents

As, discussed in the table 4.9 below, from the whole respondents 42% said that the dominant factors that affect waste management is social, then technical, environmental institutional, financial and, economic factors respectively.

Table 4.9: Factors affecting solid waste management

Factors affecting waste management system by respondents	Gongebe kebel	
	Number of respondents	Percentage (%)
Institutional	7	8.97
Environmental	5	6.41
Economic	4	5.14
Technical	20	25.64
Financial	7	8.97
Social	35	44.87
Total	78	100

Source: field survey (2015)

## **CHAPTER FIVE**

### **5. CONCLUSION AND RECOMMENDATION**

#### **5.1 Conclusion**

These study primaries concerned with the issue of assess urban solid waste management Bensa Daye town specifically in Gongebe kebele. This issue is the dynamic and most wide that almost every sectors of government made it a big agenda. Because of poor town solid waste management have great impact directly and indirectly on the quality of environment as well as health of the community. In general, from this research finding researchers concludes that regarding to the source, problem, magnitude, and management practices of solid waste is very high. Also information of respondents indicates that there is high source, problem, and poor waste management practices. Every day each and every individual consume and use certain things either food or other material. As they consume level generate waste, unless these wastes properly managed causes for different contemporary issues, like pollution, flooding, global warming, and distinction of species.

As finding of the respondents consider the dominant sources source of solid waste is households. In addition to this majority of respondents said that, solid waste disposal have diversified impacts on the environment like it causes water pollution, air pollution, soil pollution, land pollution, global warming, flooding and so on. The living conditions of the town have influence on generation of solid waste. Still now, there are variant of problems, which affecting both human and his environment directly and indirectly, due to different technical, social, natural, and economic factors to effectively manage solid waste, Generally, concerning these finding the responsible body to minimize the generation of solid waste is individual.

## 5.2. Recommendation

Researchers were set the following recommendations, based on their study:

- Adopting the Integrated Solid Waste Management strategy is necessary to ensure effective solid waste management.
- Relatively using landfill site is important to properly manage and avoid heaping of waste and burning.
- Using modern technology and establishing industry that recycle and use solid waste as input.
- Laws and regulation should be improved for proper waste management practices at local levels and at national levels as the community would be more willing to practice proper waste dumping, waste separation and recycling once such a regulation is in place.
- Awareness programmes about the proper waste management practices at local levels and at national levels is crucial, because most of the people practices improper waste disposal due to lack of knowledge and awareness about its impact on the wellbeing of the society. Therefore, the authorities should focus on community awareness programmes in the first place. The awareness programme should give knowledge and information about the importance of environmental conservation and SWM impact on the sound environmental development.
- Integrating the waste management with development strategies is important. There should be ISWM in each every development policy in order to fulfill their ecofriendly strategies.
- The SW is one of the major issues affecting the natural environment. Therefore, the responsible authorities should be concerned about reducing the environmental impact of SW with their development strategies. For that, the integrated solid waste management strategy should be applied as recommended before. Especially the waste disposal process should be developed with adequate public waste collection.
- In order to develop waste management options toward waste reduction, reuse and recycling, there should be accurate information about SWM practices in the area. Therefore, more scientific research is required.

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## APPENDIX

### WOLKITE UNIVERSITY

#### COLLEGE OF SOCIAL SCIENCE AND HUMANITIES

#### DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

#### Questionnaire to the respondents

Dear respondent this questionnaire is designed to get relevant data for the study to partial fulfillment of art in geography and environmental studies that intended to assess the urban solid waste management in the Gongebe kebele. To this study your contribution plays a major role. Each and every point which listed below is very important. Therefore, I am requesting you kindly to fill these questionnaires with honestly and accurately. For the people who cannot speak and listen both Amharic and English, it will be translated in to Sidamic language. Use the tick mark (✓) for close ended questions and give appropriate answer for the open ended questions.

**Instruction:** No need to the write your name.

#### Part one: Background information of respondent

1. Familial 1  2.  3.  4.
2. Sex male  Female
3. Age 15-20  21-30  31-40  above 40
4. Marital status single  widowed  divorce
5. Education status 1-8  9-12  above 12
6. Religion orthodox  catholic  Muslim  protestant

## Part two: Questionnaire

### Questions regarding solid waste problem and management intervention

#### 1. Sources of urban solid waste

Sources of solid waste	Very high	High	medium	low	Very low
2. Food wastes, plastics, paper, glass, ashes from residences					
3. Construction and industrial sites releasing packaging wastes, ashes, construction leftover and demolition materials					
4. Commercial facilities and buildings such as hotels, markets, restaurants, stores and office buildings.					
5. Agricultural areas releasing pesticide containers and other hazardous materials.					
6. Biomedical infrastructures dumping syringes, bandages, used gloves, drugs, and chemicals.					

#### 2. Hazardous tendency of solid wastes in the city

Hazardous tendency of waste	Very high	Very low	High	Moderate	Low
Ignitability					
Reactivity					
Toxicity					
Corrosivity					

3. Adverse impacts of solid waste on the environment

Impacts of waste on the environment	Very high	high	medium	low	Very low
Air pollution					
Water pollution					
[Pollution of soil					
Blockage of drainage Leading to flood					
Hindering road ways					

4. Role of the municipality for solid waste disposal and management in the town.

	Very high	high	medium	Low	Very low
The municipality elaborate the municipal waste management plan.					
The municipality continuously communicate with the community on the necessary activities					
The municipality inform, educate and involve citizens in waste separation at source.					
The municipality recognise the principles 3Rs (Reduce, Reuse and Recycle) waste management hierarchies					

5. Implementation of Solid waste management strategies.

Solid waste management strategies	Very high	high	medium	low	Very low
Reuse					
Recycle					
Incineration					
Disposal and landfill.					

6. Is there any solid waste problems in Daye town especially Gongeb kebele?

Yes  No

If you say yes, what are they? .....

.....

7. The whole magnitude of the solid waste problem is

Very low <input type="checkbox"/>	Low <input type="checkbox"/>	medium <input type="checkbox"/>	High <input type="checkbox"/>	Very high <input type="checkbox"/>
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8. What is the level of solid waste generation compared with last year?

Decreased <input type="checkbox"/>	Increased <input type="checkbox"/>	Steady <input type="checkbox"/>
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9. Identify the dominant characteristics of solid waste in your locality?

Toxicity <input type="checkbox"/>	Reactive <input type="checkbox"/>	Corrosive <input type="checkbox"/>	Ignitability <input type="checkbox"/>
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10. Is there any environmental problem which is caused by solid waste in your kebele?

Yes  No

If you say yes, what are the .....

.....

11. Identify the common problems of solid waste lead on your environment.

Water pollution <input type="checkbox"/>	Global warming <input type="checkbox"/>	Land pollution <input type="checkbox"/>
Air pollution <input type="checkbox"/>	Flooding <input type="checkbox"/>	Soil pollution <input type="checkbox"/>

12. Do you believe that the living condition of the society is affected by solid waste?

Yes  No

If you say yes/no,

1) Why? .....

2) By what? .....

13. Who is the responsible body to reduce solid waste management problems?

Municipality <input type="checkbox"/>	NGOs <input type="checkbox"/>
Household <input type="checkbox"/>	All(community) <input type="checkbox"/>

14. Is there any contribution of you and community to reduce solid waste in your kebele?

Yes  little  No

If you say yes, what are they.....?

.....

15. Do you know the place of landfill site which is prepared by the municipality?

Yes  No

If you said that yes, where it is .....

16. Identify the factors that affect to apply effective solid waste management.

Economy <input type="checkbox"/>	Financial <input type="checkbox"/>	Education <input type="checkbox"/>
Environment <input type="checkbox"/>	Institution <input type="checkbox"/>	Dispute <input type="checkbox"/>
Social <input type="checkbox"/>	Technical <input type="checkbox"/>	Politics <input type="checkbox"/>

17. From the following alternatives, select waste management strategies in your locality

Incineration  Disposal  Reduce

Reuse  Recycling  Composting

**Part three: Interview**

1. What are main sources of the solid waste in your locality?

.....  
.....

2. What are the characteristics of solid waste?

.....  
.....

3. What are the impacts of solid waste on the environment?

.....  
.....

4. Who are the responsible body to minimize the solid waste impacts on the surrounding?

.....  
.....

5. What are the approaches of solid waste management practice?

.....  
.....

6. What looks like the perception of society towards urban solid waste management practices?

.....  
.....

7. What is the role of municipality towards urban solid waste disposal and management practices?

.....  
.....

8. What are the advantages of the waste management?

.....

9. What are the Impacts of poor waste management practice?

.....  
.....

10. What are the factors affecting urban solid waste management system?

.....