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COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

DEPARTMENT OF GOVERNANCE AND DEVELOPMENTAL STUDIES

ASSESSING URBAN SOLID WASTE MANAGEMENT SYSTEMS: A CASE STUDY OF WOLKITE TOWN, CENTERAL ETHIOPIA

A SENIOR RESEARCH SUBMITTED TO DEPARTMENT OF GOVERNANCE AND DEVELOPMENTAL STUDIES, COLLEGE OF SOCIAL SCIENCES AND HUMANITIES, WOLKITE UNIVERSITY IN PARTIAL FULFILMENT OF BA DEGREE IN GOVERNANCE AND DEVELOPMENTAL STUDIES

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ACRONYMS

CSA **Central Statistical Agency**

HH **Household**

MSW **Municipal Solid Waste**

MSWM **Municipal Solid Waste Management**

MASL **Mean Above Sea Level**

DSMS **Disposal solid waste management**

UNEP **United Nations Environmental Program**

SBPDD **Sanitation Beautification Parks and Development Department**

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Abstract

Urban solid waste management has become a pressing challenge in rapidly urbanizing areas of Ethiopia, including Wolkite Town. This study aimed to assess the efficiency, practices, and limitations of the existing municipal solid waste management (MSWM) system in Wolkite. Using a mixed-methods approach, the research combined quantitative data from 94 randomly selected households with qualitative inputs from municipal workers and field observations. The findings indicate that the most common sources of solid waste are roadsides and residential areas, with plastic waste dominating overall waste composition. While 92% of respondents acknowledged the existence of waste management methods, a significant portion of waste continues to be improperly handled, including burning and informal dumping. The study identified key constraints such as low public awareness, inadequate infrastructure, weak institutional coordination, and limited community participation. Despite partial improvements in waste handling and awareness, the current system remains insufficient to meet the town's needs. The study concludes that sustainable urban waste management in Wolkite requires integrated strategies: increasing public awareness, enforcing local regulations, enhancing infrastructure, and promoting community involvement. These recommendations aim to create a cleaner, healthier, and more sustainable urban environment, offering practical implications for policymakers, local authorities, and future researchers.

Key Words: Solid waste, waste disposal, sustainable urban environment, urban solid waste management

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

Management of urban fixed waste was a decisive worldwide problem. Collection, treatment, transport, storage and disposal of garbage have remained an important problem in urban areas according to trends in the field of solid waste management in Africa. As a result, cities have experienced relatively insufficient waste management procedures that have been standardized by careless garbage disposal in distant areas and water bodies. This has deteriorated many African nations that have already been poor sanitary conditions. Africa has witnessed a sharp increase in urbanization, which caused challenges due to poor planning of land use and insufficient infrastructure, especially in slums and ghettos (Daniel H. & Peraza BT, 2012).

The production of solid waste increased due to urbanization and growth of the population, and the municipal organization faced significant challenges in driving this garbage. Many cities in Sub -Saharan Africa struggled to deal with solid waste due to environmental consequences of rapid growth in cities. Cities produced more waste, but their collection and disposal systems have become less effective. Less than half of the solid waste generated in many urban areas has been collected and this trend continued (Alam & Ahmade, 2013).

In Ethiopia, excessive production of urban fixed waste was the result of urbanization and economic development in places such as Addis Abeba, Hawassa, Bahir Dar, Mekelle and Wolkite. This problem was impaired by changes in the consumer habits of the city's population (Kassie, 2016). Serious environmental and public health issues have emerged because most communities, including Wolkite, depend on the methods of disposal of hazardous waste, such as open dumping, combustion and burial (Tirusew & Amare, 2013).

The growing density of Wolkite population and other urban areas has contributed significantly to garbage formation and at the same time reduced the amount of soil for proper waste management (ENGER, 2013). Incorrect disposal of garbage, especially human waste, remained a serious

problem in Ethiopia. Hygiene coverage was very low and health and hygienic problems persisted due to insufficient infrastructure (Arther, 2008).

The government of Wolkite has allocated limited financing the sector of fixed waste management. This funding has proven to be insufficient to ensure the level of services needed to protect the environment and public health. As a result, solid waste problems in the city persisted. Effective management of urban solid waste (MSWM) remained a demanding task that required cooperation from private enterprises, communities and households, even with increased attention of bilateral and multilateral development organizations.

1.2 Statement of the problem

The management of solid waste in the household has remained an important problem in Ethiopia with environmental and public health, especially in metropolitan areas. Only 2% of ethiopanes had access to the services of solid waste collection, while the average daily generation of solid waste production in the country was approximately 0.221 kg per person (Zebenay, 2010).

Wolkite has experienced rapid population growth due to natural increase and migration to rural to urban to urban. This growth in combination with urbanization has led to a significant increase in solid waste formation. The city lacked adequate storage facilities, including designated places for dumping and road garbage bins. As a result, the procedures for handling households in Wolkite remained insufficient, leading to a deterioration in hygienic and environmental conditions that adversely affected the quality of life of the population.

Previous studies of fixed waste management in similar areas have identified several shortcomings. For example, Jole Ahmed (2014) examined the management of solid waste of cities and identified shortcomings in the distribution of material, financial, technical and human resources. Muhammad Nuru (2016) found that the collection of urban solid waste often did not work, resulting in poor public cooperation and unwillingness to pay for waste management services.

This study evaluated the situation in the field of Wolkite Town with a special emphasis on raising public awareness and identification of viable solutions. Research took advantage of mixed methods that combined qualitative and quantitative techniques to solve the research gap and provided valuable knowledge to relevant institutions. Through this investigation, the study was aimed at improving environmental and public health conditions in the study area, while proposing practical strategies for sustainable fixed waste management.

1.3 Objective of the Study

1.3.1. General objective

The aim of the study was to assess the efficiency and challenge of solid waste management in Wolkite with a focus on identifying current procedures, restrictions and potential solutions for sustainable waste management.

1.3.2. Specific objectives

Having the above general objectives the specific objectives of the study are:

- Describe the source and generations of solid wastes in the study area.
- To identify the ways of solid waste management system in the study area.
- Identify the constraints of the current solid waste management mechanisms in the study area.

1.4. Research Questions

The following research questions have been developed to meet the above planned goals:

1. What were the main sources and generation of solid waste in the research area?
2. What techniques of solid waste management were used in the research area?
3. What was the main restriction of the current systems of fixed waste management?

1.5. Significance of the Study

The significance of this study lies in its multifaceted contributions to waste management in Wolkite. Firstly, it serves as a valuable resource for environmental protection organizations, waste management authorities, and legislators by providing a comprehensive overview of the

current state of fixed waste management in the area. This information is crucial for identifying strengths and weaknesses in existing practices and guiding future improvements.

Additionally, the study lays a foundational framework for future researchers and scientists who are examining waste management issues in Wolkite Town. By offering default data, it enables these scholars to build upon existing knowledge, facilitating further inquiry and innovation in sustainable waste management solutions. Overall, the findings of this study play a vital role in promoting environmental sustainability and improving community health in Wolkite.

1.6. Scope of the Study

The scope of this study is centered on Wolkite Town, which serves as the second administrative center of the regional state of Central Ethiopia and is part of the Gurage Zone. The research specifically focuses on assessing the state of hard waste management within the town, including an analysis of the types, volumes, and disposal methods of hard waste generated by households and other entities. Additionally, the study investigates the institutional capabilities established for waste management, examining the effectiveness of local institutions in managing waste, their available resources, and their capacity to conduct research and implement strategies for effective waste management. Overall, this study aims to identify the challenges and opportunities related to hard waste management in Wolkite Town, providing valuable insights for policy formulation and community practices.

1.7. Limitation of the Study

The study faced several limitations that impacted both its design and execution. Firstly, a significant lack of funding during the data collection phase constrained the scope and depth of the research activities. This financial limitation was compounded by the insufficient availability of accessible data, making it challenging to gather comprehensive insights. In addition, the researcher encountered difficulties when attempting to acquire secondary data, as relevant information from other sources was often not readily available or lacked the necessary specificity. A further complication arose from the consistent refusal of Wolkite officials to provide specific details about the operating costs of the Sanitation Beautification Parks and

Development Department (SBPDD) working process, which hindered analytical capabilities. Time constraints during the study also affected the thoroughness of data collection and analysis. Moreover, despite efforts to access reference materials from public and other libraries, the availability of pertinent resources remained limited. Consequently, the existing materials utilized may have been biased or incomplete, creating challenges in accurately representing urban municipal solid waste management. Finally, the inability to validate the accuracy and reliability of secondary data due to the lack of cooperation from local authorities posed significant difficulties throughout the research process.

1.8. Organization of the Study

The structure of the paper consisted of five chapters. The first chapter, which served as an introduction, included the background of the study, statement of problems, objectives, research questions, importance, scope, restriction and organization. The second chapter included an overview of related literature from various published and unpublished sources. The third chapter introduced the research methodology. The fourth chapter contained results and discussion about findings. The fifth and last chapter provided conclusions and recommendations based on the results of the study.

CHAPTER TWO

2. REVIEW OF RELATED LITERATURE

2.1. Definition of Terms and Concepts

2.1.1. Waste and Solid Waste

"Waste is any substance which constitutes scrap materials, an effluent, or other unwanted surplus arising from the application of any substance or article which requires disposal due to being broken, worn out, contaminated, or otherwise spoiled," states the UK Environmental Protection Act (2009). According to Timly (2011), waste is "anything that may or may not have value, including glass, metal, cigarette butts, paper, fabric, food garden remnants, or other materials that spoil the place's aesthetics or make it unhygienic." Any trash, refuse, sludge, and other discarded solid materials from commercial, industrial, agricultural, and community activities are considered solid waste (Samuel, 2011). This definition excludes dissolved materials.

2.1.2. Solid Waste Management

Solid waste management means the collection, transportation, storage, recycling, or disposal of solid waste or the subsequent use of a disposal site that is no longer operational (Enger, 2013). Solid waste management refers to the process of collecting and treating solid waste. It also offers solutions for recycling items that do not belong in the garbage or trash. Waste management is about how solid waste can be changed and used as a valuable resource. Solid waste management should be embraced by every household and business owner across the world. Industrialization has brought both good and bad things, with one negative impact being the creation of solid waste (Timly, 2011).

2.2. Solid Waste Management System

A planned system efficiently controls the production, storage, collection, transportation, processing, and disposal of solid waste in a sanitary, aesthetic, and conceptual manner. The system includes all administrative, financial, and planning functions, as well as the physical handling of solid waste (William, 2005). Solid waste management involves several techniques

for managing the disposal of specific components of solid waste. These techniques include avoidance, reduction, reuse, recycling, recovery, and disposal. Classifying these activities into different stages and techniques helps identify and understand the problems associated with the system and respond properly to improve the facility and service (Anjeneyulu, 2009).

2.3. Source of Solid Waste

2.3.1. Domestic Solid Waste

Domestic solid waste primarily originates from routine household activities including food preparation (generating significant organic waste), cleaning processes, fuel combustion (producing ash residues), and the disposal of worn-out clothing, furniture, utensils, packaging materials, and garden waste. In developing countries like Ethiopia, studies indicate household waste streams are dominated by perishable organic materials (65% as found in this study) and ash from traditional cooking fuels (Dereje, 2011). These waste characteristics create particular management challenges due to rapid decomposition rates, high moisture content, and the need for frequent collection services to prevent public health hazards.

2.3.2. Commercial Wastes

Commercial establishments, including shops, offices, hotels, restaurants, and especially food markets, generate substantial waste volumes consisting mainly of packaging materials, office supplies, and organic food waste. The concentration of commercial activities in urban centers like Wolkite exacerbates waste management pressures, with food markets being particularly problematic due to the daily generation of large quantities of perishable organic waste (Enger, 2013). This waste stream requires specialized handling and more frequent collection schedules compared to domestic waste, yet often suffers from inadequate service coverage in developing cities.

2.3.3. Institutional Wastes

Institutional facilities such as schools, clinics, government offices, and hospitals produce distinct waste categories including paper waste, food remnants, garden trimmings, and - most critically - potentially infectious biomedical waste. Healthcare facilities, in particular, generate hazardous

materials like used sharps and contaminated items that demand strict segregation, special treatment, and secure disposal (Arthur, 2008). The current lack of proper segregation systems and treatment facilities for institutional waste in many Ethiopian towns, including Wolkite, poses significant environmental and public health risks that require urgent policy attention.

2.3.4. Industrial Wastes

Industrial waste composition varies significantly by sector, presenting complex management challenges. Food processing industries generate substantial organic waste and packaging materials, while manufacturing units produce metal scraps, plastic byproducts, and chemical residues. Light industries typically yield food waste from staff kitchens, packaging materials, plastics, and metal items (Santosh, 2009). Heavy industries may generate hazardous wastes, including solvents, heavy metals, and toxic sludge. The heterogeneous nature of industrial waste necessitates sector-specific collection, treatment, and disposal strategies, with particular attention to potentially hazardous materials that require special handling to prevent soil and water contamination.

2.3.5. Street Sweeping

Municipal street sweeping collects diverse materials that reflect urban living patterns. In developing countries like Ethiopia, this includes not only natural debris (dust, soil, leaves) but also significant anthropogenic waste: fruit and vegetable residues from informal vendors, household waste improperly disposed along roadways, sediment from drain cleaning operations, animal manure from urban livestock, and plant trimmings (William, 2005). The composition varies seasonally, with increased organic matter during wet seasons and more dust in dry periods. Street waste often contains high levels of pathogens and pollutants, requiring prompt collection to maintain urban hygiene and prevent stormwater contamination.

2.3.6. Construction and Demolition Wastes

The building sector generates substantial waste throughout construction, renovation and

demolition activities. Typical components include inert materials (soil, bricks, concrete, stones), ceramic tiles, wood scraps, insulation materials, and packaging waste (Day, 2003). Demolition sites yield particularly mixed waste streams containing potentially hazardous materials like asbestos, lead-based paints, and chemical residues. In rapidly urbanizing areas like Wolkite, construction waste management is crucial as improper disposal can lead to visual blight, create breeding grounds for pests, and occupy valuable land space. The heavy, bulky nature of these materials presents unique logistical challenges for collection and transportation.

Each waste stream requires tailored management strategies accounting for:

- Physical and chemical characteristics
- Generation patterns and quantities
- Potential health and environmental impacts
- Available infrastructure and technologies
- Local regulatory frameworks

The diversity of these sources underscores the need for an integrated waste management system that addresses each stream's unique requirements while optimizing resource use and minimizing environmental impacts.

2.4. Collection of Household Solid Waste

In municipal solid waste management, collection involves the process of picking up waste from collection points, loading it into vehicles, and transporting it to processing facilities, transfer stations, or disposal sites. In most municipal solid waste management systems, the cost of collection accounts for a significant portion of the total cost. For instance, in industrialized countries, collection accounts for about 60-70% of the total cost, and in developing countries, this is 70-90% (UNEP, 2010). Collection is structurally similar in developing, transition, and industrialized countries. However, in developing countries, collection often involves face-to-face interaction between bin generators and collectors. The level of service is low, and generators often have to bring their waste a long distance and place it in containers. As a result, many collection activities in developing countries are carried out by informal sectors (Ibid).

2.5. Constraints of Municipal Household Solid Waste Management

Typical solid waste management systems in developing countries display a range of problems, including low collection coverage, irregular collection services, and crude open dumping and burning without air and water control. These problems are caused by various factors that constrain the development of effective municipal solid waste management systems. These constraints can be categorized into technical, financial, institutional, social, and awareness-related issues, as well as attitudes towards waste management (Ogawa, 2013).

2.5.1. Human and Technical Constraints

In most developing countries, there is a lack of human resources and technical experts at both national and local levels. Many officers in charge of municipal solid waste management, particularly at the local level, have little technical background or training in management. This lack of expertise is a major reason for the lack of comprehensive waste management planning in these countries. Furthermore, the collection and analysis of solid waste data often receive insufficient attention (Odawa, 2013).

2.5.2. Financial Constraints

Municipal solid waste management is often given low priority in developing countries, resulting in very limited funds being allocated to the sector by governments. This problem is especially acute at the local government level, where local revenue collection systems are underdeveloped, and the financial base for public services, including municipal solid waste management, is weak. In addition to limited funds, many local governments lack good financial management and planning. For instance, in a developing country town, over 90% of the annual budget allocated for solid waste management is spent within the first six months. The lack of financial management, particularly cost accounting, depletes the limited resources available for the sector, leading to interruptions in service delivery (Gebrie, 2009).

2.5.3. Awareness and Attitude Towards Solid Waste

Public awareness and attitude towards waste can significantly impact the effectiveness of municipal solid waste management. All stages of the process, from household waste storage and collection frequency to waste segregation, recycling, willingness to pay for waste management services, and opposition to the siting of waste treatment and disposal facilities, depend on public awareness. Lack of school education on the importance of proper waste management for health and well-being severely restricts the use of community-based approaches in developing countries and contributes to the failure of solid waste management services (Zubrugg, 2011).

2.5.4. Lack of Legislation and Enforcement

The lack of legislation on waste management is cited as a factor responsible for the unclear roles of agencies in the waste sector and the lack of coordination among them (Santosh, 2009). Legislation on waste management in developing countries is often fragmented, with various acts related to public health, local government, and environmental protection, but no cohesive regulatory framework. As a result, the enforcement of regulations is weak, and responsibilities are often duplicated, constraining the development of an effective solid waste management system (Santosh, 2009).

2.6. **Institutional Capacity for Waste Management**

Institutional capacity refers to the ability of institutions to perform functions, solve problems, and achieve objectives in a sustainable manner (Abeje, 2009).

According to Abeje (2009), the capacity of an institution to deliver municipal solid waste management (MSWM) depends on three factors:

- The capacity of individuals to perform their tasks.
- The structural and cultural characteristics of the organization and its leadership.
- The institutional context of the public sector and the expansion of the task network.

2.7. Municipal Solid Waste Management in Developing Countries

The rapid extent and nature of urbanization in developing countries have made MSWM a major issue of concern. In the next 35 years, the urban population of the world is expected to double to more than five billion people, with 90% of this growth taking place in developing countries. As a result, the existing MSWM systems in these countries fail to keep up with the rapid increase in solid waste production. In many cities in low- and middle-income countries, one-third to one-half of solid waste generated is not collected, leading to illegal dumps on streets, open spaces, and sewerage systems, contributing to the spread of disease. Additionally, MSWM schemes generally serve only part of the urban population, with more affluent areas receiving better services (Gebrie, 2009).

2.8. Disposal Solid Waste Management

Dumping and non-sanitary landfilling are common methods of disposal in solid waste management. Today, disposal by landfilling or land spreading is the ultimate fate of most solid wastes, whether residential or residual materials from material recovery facilities. However, in many developing countries, this method is officially banned, with only sanitary landfills being allowed for final disposal. Sanitary landfills are engineered facilities designed to dispose of solid waste without creating nuisances or hazards to public health or the environment (Techobannigless, 2011). Despite this, open burning and dumping continue to be common disposal methods in some regions (UN).

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. STUDY AREA DESCRIPTION

Wolkite City was a city and a separate Woreda in Central Ethiopia. It served as the second administrative center of the regional state of central Ethiopia and the GUGE zone. The city had a width and length of 8 ° 17 'northern width 37 ° 47 ′ east length / 8.283 ° N 37.783 ° E and height between 1910 and 1935 meters above sea level. The city lay at an altitude of about 1800 meters above sea level, which placed it in a slight climate zone. Wolkite was accessible on the road and was strategically located at the intersection of the main traffic routes in South Ethiopia, which is important for the commercial and administrative center in the region.

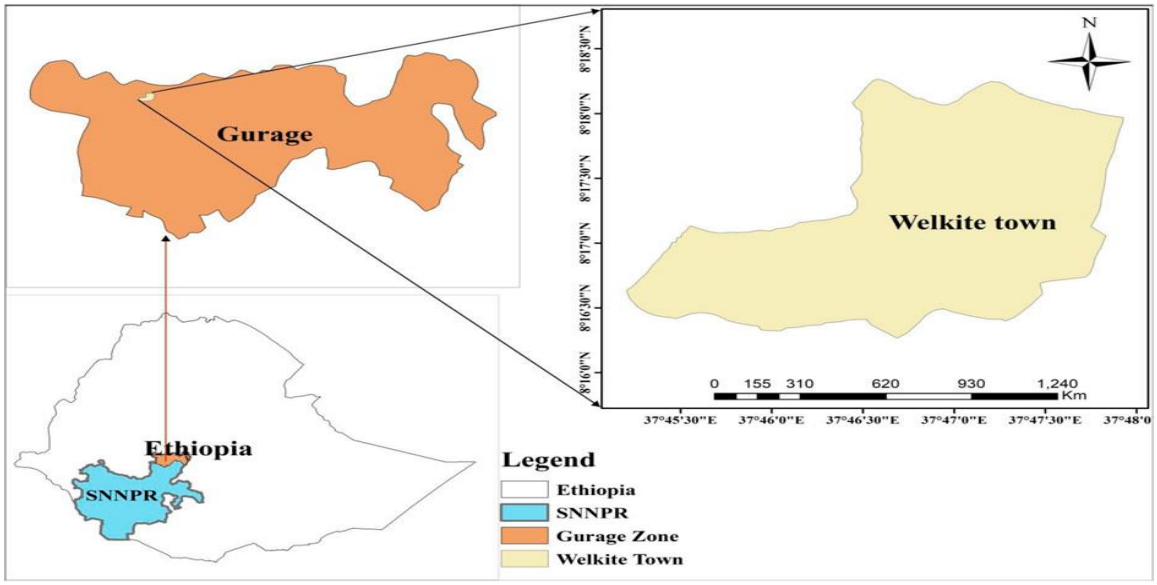


Figure 1 Area Description

3.2. Research Design and Method of Study

3.2.1. Research Design

In order to discover and describe occurrences and to explain the cause-and-effect relationship with regard to the issues being studied, the researcher chose a descriptive research design. It was therefore important to the researcher. A snapshot of the current situation was created using a descriptive research design, which gave a rather comprehensive image of what was happening at a specific moment in time. It was therefore important to the researcher.

3.2.2. Research Approach

Both qualitative and quantitative research methods were the researcher's main areas of interest. The primary justification for using a mixed approach was that data were gathered using both qualitative and quantitative designs. This enabled the data to complement one another in order to improve comprehension of the topic being studied. The researcher used a quantitative strategy to gather data and used statistical procedures to assess it. Tables were used to display the percentage of waste generated in Wolkite.

3.3. Data Sources

The research adopted a two-fold data collection approach, using complementary primary and secondary sources for extensive coverage of research issues. Primary data collection sought direct contact with stakeholders via three main methods. Structured questionnaires were distributed to 94 randomly sampled households, collecting quantitative information on waste generation patterns and disposal. In-depth, semi-structured interviews with city waste management officials and local leaders were used to glean qualitative data on institutional dilemmas and operational impediments. Structured field observations recorded physical waste infrastructure and unofficial disposal habits within varied neighborhoods.

For secondary data, the study utilized a variety of documentary sources to situate primary results. Published materials were peer-reviewed journal articles on solid waste management in similar developing cities, Ethiopian government reports on municipal services, and World Bank

technical notes on solid waste systems. Unpublished materials were Wolkite municipal records, internal service reports from the Sanitation Beautification Parks and Development Department, and Ethiopian university academic theses on the same research themes. This combination of sources enabled triangulation of data, enhancing the study's validity and making up for potential weaknesses through methodological diversity. Their juxtaposition permitted detailed examination of both quantitative variables (waste quantities, levels of service coverage) and qualitative dimensions (institutional issues, community perceptions). Particular care was taken to clarify any disparities between reported practice (interviews) and observed behavior (field observations), with all data coded and analyzed thematically by the three specific research questions. It gave methodological consistency while permitting flexibility for determining emerging themes during the course of the research.

3.4. Methods of Data Collection Instruments

Both primary and secondary sources of data were used in the study by the researcher. Field observations, questionnaires with both open-ended and closed-ended questions, and interviews were all used to gather primary data. Semi-structured interviews were used to gather the data required for managing solid waste in urban areas. Municipal employees from the SBPDD participated in these interviews. Selected families received the questionnaires. To make the questionnaires easily comprehensible for the sample population, they were produced in English initially and then translated into Amharic. The questionnaires were developed, delivered, and collected in ninety-four copies. We employed document analysis for the secondary data.

3.4.1. Questionnaires

Both open-ended and closed-ended questions were included in the surveys in order to get primary data from the garbage collectors, administration, and families. The goal was to compile generic data regarding Wolkite's solid waste management.

3.4.2. Interviews

In order to get pertinent information through in-person engagement, interviews were also utilized. Semi-structured interviews were used to gather the data required for solid waste management.

3.4.3. Field Observations

Cross-checking the responses from the sample households and supplementing the basic data was greatly aided by field observations. The researcher looked at various solid waste kinds, including biodegradable garbage (such as onion scraps) and non-biodegradable waste (like metals, cans, and glass). Direct observation was used to gather pertinent data.

3.4.4 Sampling Technique

For the purpose of this study, Edget Chora Kebele was selected through a simple random sampling technique. This method was employed to ensure each kebele had an equal chance of being selected, thereby minimizing selection bias and enhancing the representativeness of the data. The random selection of Edget Chora Kebele provided a neutral and fair basis for gathering reliable information on solid waste management practices at the community level.

3.4.5 Population and Sample Size

Wolkite Town is composed of five kebeles and has a total population of approximately 105,000 residents. Edget Chora Kebele, the selected study area, has a total population of 11,000 individuals, consisting of approximately 5,200 men and 5,800 women. out of the 11000 households in this kebele, the researchers selected 386 respondents randomly the sample size(degree of precision or sample error). The researchers choses 386 households since 90% of the response were accepted and 10% were adjusted for mistakes. To reduce bias and streamline the result analysis, simple random sampling was employed granting more acerated data from the participants. The balanced yet slightly female-dominated demographic composition in this kebele provides a valuable opportunity to assess solid waste management behaviors and responsibilities across genders. This is important because gender dynamics can influence household roles in waste generation, disposal, and recycling practices.

The study targeted households, solid waste collectors, and municipal officials operating in or around Edget Chora Kebele. From the total population of the kebele, a relevant and manageable sample was drawn to gather both quantitative and qualitative data. The sample was designed to reflect the perspectives of various actors directly involved in or impacted by the management of urban solid waste. By focusing on this kebele, the research aimed to analyze the challenges, practices, and effectiveness of the current solid waste management system in a typical urban setting within Wolkite Town.

The sample size was calculated using Yemene's (1967) formula:

Where n= sample size

N=total household heads

e= error tolerance

$n=N/1+N\ (e)^2$

N= 1

$e= (0.05)^2$

n=11000/1+11000(0.05)2

n=11000/1+11000*0.0025

n=11000/1+27.5

n=11000/28.5

n=386 is the sample size.

3.5 Method of Data Analysis

Both quantitative and qualitative methods were used to organize the information gathered from the surveys and interviews. Personal opinions and attitudes regarding the evaluation of solid waste management in the community, along with spoken explanations of the source data, were included in the qualitative approaches. Data tabulation and the calculation of frequencies, percentages, and numerical values for data analysis were part of the quantitative methods using Statistical Package Software for Social Science (SPSS V. 20).

CHAPTER FOUR

4. PRESENTATION AND ANALYSIS OF DATA

4.1. Introduction

This chapter presents the data obtained from the household and SBPDD through questionnaires, interviews, and field observations. HSWM is a necessary urban service in Wolkite town. The chapter briefly discusses the existing condition of MSWM service in general and household solid waste management practice in particular.

4.2. Demographic Characteristics

The study involved 386 respondents from Wolkite town selected through simple random sampling

4.2.1. Sex Distribution

Table 1: Sex distribution of the respondents

Sex	**Percent**	**Frequency**
Female	58.29%	225 respondents
Male	41.71%	161 respondents

The above table shows that solid waste generation and its handling show a great variation related to differences in the background characteristics of households. in this study, the researchers tried to constitute different sample households with different demographic characteristics. In this study, the questionnaire survey was conducted among 386 households. Among this sample, more than half of the respondents were female. This was because most of the time, females stay and work inside their homes rather than working outside. Since women have better experience than men regarding their residential solid waste property and its handling. This is because most of such activities are routinely done by women and children.

4.2.2. Age Distribution of Respondents

Table 2. Age distribution of respondents

Age	Number of respondents	Percentage
10-20	78	20.21%
21-30	114	29.53%
31-40	128	33.16%
41-50	40	10.36%
Above 50	26	6.74%
Total	386	100%

Source: Field survey, 2025

As the above table depicts, from the total sample population about,20(21%) were found in the age group between (10-20 years old), 29(53 %) were found in the age group between (21-30 years old), 33 (16 %) were found in the age group between (31-40 years old), 10(36) were found in the age group of (41-50 years old), 6(6.74 %) were found in the age of above 50 years old. From this the researcher concludes that the more than half of the respondents were found in the age group of (21-30 and 31-40) years old.

4.2.3. Marital Status of Respondents

Table 3 Marital status respondents

Marital status	**Percentage**	**Frequency**
Married;	70.47%	272 respondants
Single;	14.25%	55 resppondants
Divorced;	9.07%	35 respondants
Widowed;	6.21%	24 respondants

Source: Field survey, 2025

Regarding the marital status of respondents, 14.25%(55) were single, 70.47% (272) were married, we divorce 9.07%(35)and 6.21% (24) were widowed. In general, the data indicate that most of the respondents were married and had more generated in solid waste management.

4.2.4. Educational Status of Respondents

Educational level makes its contribution to the study. The following table describes

Table 4. Educational level of respondents

Educational level	respondents	Percentage
Illiterate	20	5.18 %
Grade 1-8	51	13.21 %
Grade 9-12	105	27.20 %
Diploma, Degree and above	210	54.41%
Total	386	100 %

Source: Field survey, 2025

Regarding the educational level, those with a higher level of education are more aware than those at a lower level. In general, the data indicate that most of the respondents who have diploma, degree and above have generated more generated of solid waste management.

4.2.5. Occupational Status of Respondent

Table 5 occupational status respondents

Marchants;	33.16%	128 respondents
Daily labors;	31.61%	122 respondents
Civil servants;	23.83%	92 respondents
Students;	18.39	71 respondents
Farmers	3.11%	12

Source: Field survey, 2025

Just looking at table out of 386 sample households, 23.83% of the respondents were civil servants, 33.16% of the respondents were merchants, 31.61% were daily laborer's, 18.39% were students and 3.11 farmers of household respondents respectively.

4.3. Questions related to households about solid waste in the study area

Table 6 For households about solid waste

How do you rate solid waste in the study area?	Number of respondents	Percentage
High	130	33.68%
Medium	95	24.61%
Low	75	19.43%
Very low	86	22.28%
Total	386	100%

Source: Field survey, 2025

From the above table 33.68% respondents confirmed that the rate of solid waste in the town is high. This implies that in Wolkite town there is high rate of solid waste and 24.61 % of respondents said that there is medium rate of solid waste in the the study area. While 19.43% of respondents believed that the rate of solid waste is low and finally 22.28 of respondents said that the rate of solid waste is very low in the study area.

4.4. Types of Solid Wastes

Table 7 types of waste

Which type of solid waste is widely present in the study area?	Number of respondents	Percentage
Food wastes	80	20.73%
Paper wastes	96	24.87%
Gass wastes	12	3.11%
Plastic wastes	163	42.23%
Vegetable wast	35	9.07%
Total	386	100%

Source: Field survey, 2025

The result from the above table 42.23 % of respondents confirmed that the waste that is mostly present in the study area is plastics. This shows that the coverage of plastic waste in the study area is very high as compared with other solid waste in the town. While 20.73%of respondents believed that food wastes are mostly found in the town, and 24.87% of respondents said that paper waste is found, 3.11% of respondents believed that glass waste is
wastes, and 9.07% is said that vegetable waste is present in the study area.

4.5. Areas of Source of Solid Waste

4.6 Handling of Solid Wastes

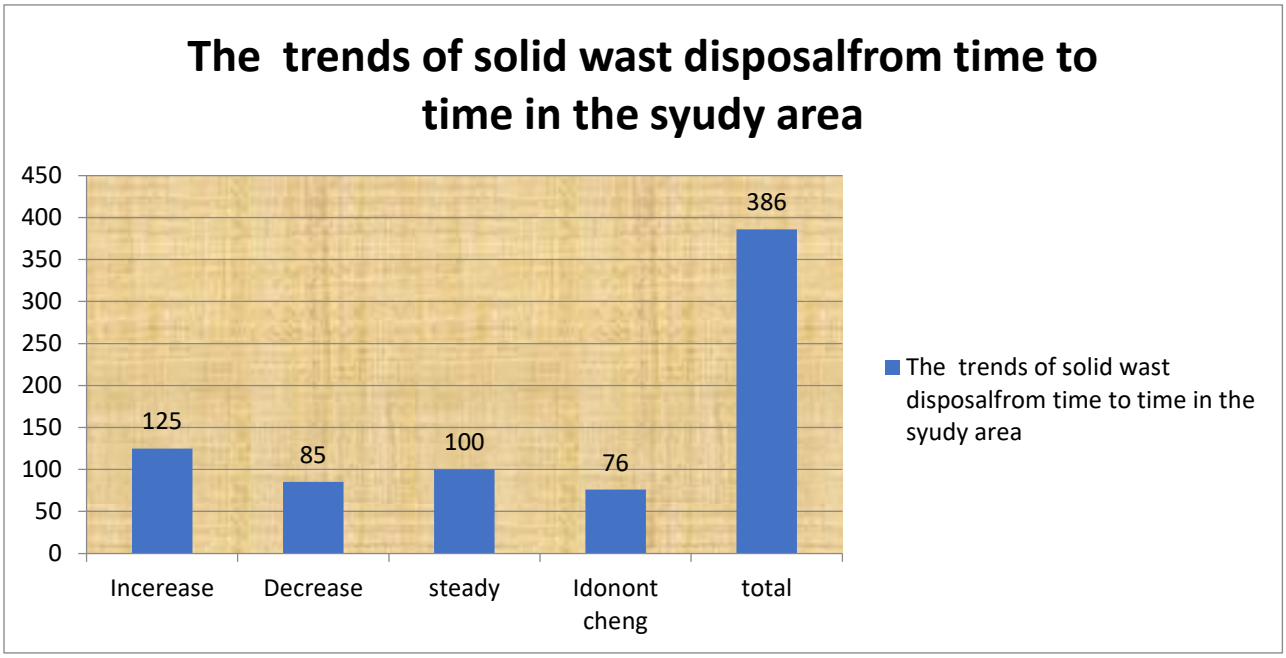
Table 8 Solid waste handling

How do you explain the handling of solid waste in Wolkite Town?	Number of respondents	percentage
High	171	44.30%
Very nice	89	23.06%
Medium	76	19.69%
Low	50	12.95%
Total	386	100%

Source: Field survey, 2025

The result obtained from table indicates that 171(44.30%) high, 89 (23.06%), very nice, 76(19.69%) medium, 50(12.95) are low so this implies that the handling of solid waste in Wolkite town is very low or poor solid waste handling system.

4.7. Trends of Solid Waste Generation and Disposal



Trends of solid waste generation and disposal (Source: Field survey, 2025**)**

we can understand that respondents 125 said that the level of proper solid waste disposal practice from time to time increased in the study area. Even though it increases from time to time, there is a problem with the effective management of solid waste in the town. And 100 of respondents said that there is a steady level of proper solid waste management change from time to time. While 85 of respondents believe that the level of proper solid waste management from time to time is decreased, and finally, 76 of respondents said that they cannot know the level of proper solid waste disposal practice in the study area.

4.8. Methods of managing solid waste

Table 9 Methods of managing solid waste

Are there any methods of solid waste management in the study area?	Number of respondents	Percentage
Yes	350	92.25%
No	36	7.45%
Total	386	100%

Source: Field survey, 2025

As we can see from the above table 350 respondents (92.25%) and 36 respondents (7.44%) confirmed the presence and absence of different methods for managing solid wastes in the town, respectively.

Table 10 Methods of solid waste disposal

How do you manage solid waste management in the Study area?	Number of respondents	percentage
Burn it	120	31.09%
Prepare for compost	90	23.32%
Collected by a clearer	95	24.61%
Simply dumping improperly	60	15.54%
On container	21	5.44%
Total	386	100%

Source: Field survey, 2025

As we can see from the above table from respondents 120(31.09%) of respondents said that solid waste in the study area collected by municipal city workers but there is the problem of effectiveness of disposal system,90(23.32%) of respondents said that the waste is burn it around road side. While 95(4.61%) of respondents believe that solid waste in the study area is prepared for compost and 60 (15.54%) of respondents confirmed that solid wastes are illegally dumped in the study area, and 21 (5.44%) others specify. Even though our respondents said that the waste disposed of by municipal city workers their service is not a concern in all parts of the study area.

4.9. Responsible community on solid waste management

Table 11 Responsible for solid waste management

Which community is the most responsible for the proper management of solid waste in the study area?	Number of respondents	percentage
Clearers	95	25.53%
Officials	86	21.28%
Whole community	125	40.43%
Female	80	17.02%
Total	386	100%

Source: Field survey, 2025

The result from the above table respondents125 (40.43%) of the household said that the responsible body for the existence of proper management of solid waste is the whole community. So this shows that the responsibility of every community is important for the proper management of solid waste in the study area. 95(25.53%) of respondents replied that the responsible body for proper management of waste is the cleaner, and 86 (21.28%) of respondents said that the responsible body is for proper management of solid waste are the officials.

4.10. households' knowledge about solid waste management

Table 12 Solid waste management

Do you think awareness creation about SWM should be done by stakeholders?	Number of respondents	percentage
Yes	295	76.42%
No	81	20.98%
Total	386	100%

Source: Field survey, 2025

According to Table 295(76.42%) of the respondents said that they have got enough information about solid waste management provided by stakeholders in Wolkite town. However, most respondents commented that there is a problem of implementation by the communities and the stakeholders in the town and 81(20.98%) of respondents confirmed that they can’t got enough information about solid waste practice by any stake holder in the town.

4.11. Mechanisms of solid waste handling by municipality workers

Table 13 Solid waste handling

1. Waste handling mechanisms	Number of respondents	Percentage
Collecting in the sack (kasha)	110	28.50%
on basket	100	25.91%
Put on an open space	95	24.61%
On pit	81	20.98%
Total	386	100%

Source: Field survey, 2025

From the above table from the first question 110(28.50%) of respondents handle solid waste until municipal city workers come and take out the waste on local material "kiesha and accumulate around road sides. This indicated that the handling of waste in the town lacks quality of handling.

Table 14 Amount of solid waste generated from households per day

Amount of solid waste generated per day	Number of respondents	percentage
1 kuntal	123	31.87%
2 kantal	86	22.28%
I don't remember	82	21.24%
Half kuntal	95	24.61%
Total	386	100%

Source: Field survey, 2025

From the above table 123(31.87%) of respondents said that approximately 1kuntal of solid waste is generated per day. So this implies that the amount of solid waste generated from households per day from waste plastic is the dominant one. 86(22.28%) of respondents replied that 2kuntals of wastes generated especially around cafeteria. 8221.24 %) of respondents confirmed that they don't remember the amount of waste that is generated per day, and 95(24.61%) of respondents put their measurement as ¼ of 1kuntal, ½ of one quintal per day.

4.12. Result Discussion

The findings presented in provide a comprehensive understanding of the urban solid waste management (SWM) system in Wolkite Town, addressing the three specific objectives of the study: sources and generation of solid waste, current waste management practices, and constraints of the existing system. The data reveal critical insights into the challenges and opportunities for improving SWM in the town.

4.12.1. Sources and Generation of Solid Waste

The study identified roadsides (45.74%) and residential areas (19.14%) as the primary sources of solid waste in Wolkite Town. Plastic waste dominated the waste composition (42.23%), followed by paper (24.87%) and food waste (20.73%). This aligns with global trends in developing urban areas, where rapid urbanization and changing consumption patterns lead to increased non-biodegradable waste. The prevalence of plastic waste underscores the urgent need for recycling initiatives, which are currently absent in the town's waste management system. The high proportion of waste from roadsides also highlights improper disposal practices, such as nighttime dumping, which exacerbates environmental and health risks.

4.12. 2. Current Waste Management Practices

Despite 92.25% of respondents acknowledging the existence of waste management methods, the practices remain unsustainable. Key findings include:

4.12.3. Municipal Collection

Only 24.61% of households relied on municipal services, which were inconsistent and failed to cover all areas. Burning and Open Dumping: A significant portion of respondents (31.09%) burned waste, while 15.54% disposed of it improperly, contributing to pollution and public health hazards.

4.12.4. Composting

A mere 23.32% practiced composting, indicating untapped potential for organic waste recycling. These practices reflect the inefficiencies in the current system, as discussed in Chapter 2, where financial and technical constraints hinder effective waste management. The reliance on burning and dumping mirrors challenges faced in other developing cities, as noted by Tchobanglous (2002).

4.13. Constraints of the Existing System

The study identified multiple barriers to effective SWM:

Awareness Gaps: 76.42% of respondents emphasized the need for stakeholder-led awareness campaigns, yet implementation remains weak. Institutional Weaknesses: Limited coordination, inadequate infrastructure, and insufficient funding were cited as major hurdles, corroborating Chapter 2's framework on institutional capacity (Abeje, 2009).

Community Involvement: While 40.43% believed the entire community should be responsible for SWM, only 25.53% attributed accountability to municipal workers, revealing a disconnect between policy and practice.

3.1. Demographic Influences

Gender Roles: Women (58.29% of respondents) were primarily responsible for household waste management, yet their perspectives were rarely incorporated into municipal planning.

Education: Higher education levels (54.41% had diplomas or degrees) correlated with better waste segregation practices, supporting the need for targeted education programs.

Progress and Challenges

Although 39.36% reported improvements in waste disposal over time, 34.04% still rated the system as ineffective. This paradox highlights the need for systemic reforms, including better funding, stricter enforcement of regulations, and community engagement.

CHAPTER FIV

5. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

This paper has attempted to assess the status and coverage of the municipal solid waste management service of Wolkite town, in general. In particular, the study explored households' solid waste management practices, institutional structure, and capacity of the sanitation, beautification, and parks development department (SBPDD) of the town. These investigations were addressed by employing questionnaires, field observation, semi-structured and unstructured interviews with the head and workers of sanitation beautification parks and the development department (SBPDD). Finally, based on qualitative and quantitative analysis of data, the findings of this study are as follows.

Based on my findings, we conclude as follows: -

- The main source of solid waste in the study area is roadsides, and most people were disposing of their waste into the road at the time of night.
- Reducing solid waste from its source was the most common method of managing solid waste in the study area.
- The types of solid waste that were widely found in the study area were plastic waste.
- Regarding the trends of solid waste generation and disposal, the level of proper waste disposal is increasing from time to time. But still now there was the problem of proper disposal practice of waste.
- Most waste handling of solid waste in the town uses sacks. But it is not collected on time, and the municipality does not include all parts of the town.
- The awareness of the community is low on solid waste management practices.
- According to the study, it was highly recognized that the existing practice of solid waste management services is inadequate both in terms of coverage and sanitary treatment of the waste. The solid waste collection service coverage was very low, which means the major portion of the solid waste generated within the city was uncontrolled and improperly disposed of which creating an unhealthy environment to live and work in the study area. No condition was available for community and private sector involvement in waste source

reduction and composting of the waste. But it can create job opportunities for the unemployed citizens of the study area.

5.2. RECOMMENDATIONS

Based on the findings of this study, the following measures were very important to bring SWM to Wolkite town:

- The residents of Wolkite town have low awareness and knowledge about solid waste management issues. This indicates the need for wider public awareness creation activities. So that the municipal city, as well as health offices and other stakeholders of the town, should deliver adequate training and awareness creation to residents about the side effects of solid waste, and the application of sustainable beautification and solid waste management practices.
- Improve solid waste collection by preparing permanent programs, by employing other methods of collection like block and curb side collections, control and supervision field workers, increase the number and strength of cooperatives of the society .
- Prepare specified rules and regulations that focused on local problems such as institutional issues about the towns SWM service responsible body, stakeholder's participation and sustainable solid waste management options, and strictly enforce this rules and regulation under close supervision and inter organizational linkage.
- Based on the trends of solid wast in the study area was integrated solid waste management system which combines a range of solid waste treatment options like source reduction, composting, re use for other benefit was recommended.
- The municipal city should adopt sharing experience from other town that have a good sanitation like the town of Bahir dar and Awassa etc.
- The municipal city should give priority to fulfilling public infrastructure facilities and ensure supervision in each part of the study area.
- In general, if the town administration improves its effort on the municipal waste management system and gives equal attention to all corners of the Town.

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APPENDIX 1: questionnaire prepared for sample households in Wolkite town

WOLKITE UNIVERSITY

COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

DEPARTMENT OF GOVERNANCE AND DEVELOPMENTAL STUDIES

QUESTIONNAIRE PREPARED FOR SAMPLE HOUSEHOLDS IN WOLKITE TOWN

This questionnaire is prepared for academic purposes for the fulfillment of a BA degree in Governance and Developmental Studies. Your response is very important for the success of the study because all the information that you provide will determine the analysis and conclusion of the research. Hence, you are kindly requested to respond by selecting (circling) your answer from the given choices or describing your opinion. Please be informed that your response will be kept confidential, and you will not be required to write your name. We want to thank you for your cooperation.

Part One: Background Information About the Respondents

Instruction: To answer the following questions, please select (circle) your answer from the given alternatives.

1. Sex A. Male B. Female
2. Age A, 10 -20 B, 21 -30 C, 31-40
   D, 41-50 E, Above 50
3. Marital status A, Single B. Married C. Divorced D, widowed
4. Educational status A, illiterate B, grade (1-4) C grade (5-8) C. grade 9-10
   D diploma E, 10 -12 grade F, degree and above
5. Occupational status A, Agriculture B, Civil servant C, Labour
   D, Other specify

Part two: questionnaire prepared for investigating household solid waste management awareness, and practice together with their attitude regarding municipal solid waste management of the study area Please choose the correct answer based on your point of view.

1. How do you rate solid waste in the study area?

   A, high C, low

   B, medium D, very high

2. What types of solid waste are widely present in the study area?

   A, food waste C, glass

   B, paper D, Plastic --

3. Which area is the most source of solid waste in the study area?

   A, residential area D, roads

   B, gov't office

4. How do you explain the handling of solid waste in your town?

   A, high C, medium

   B, very nice D, low

5. The level of proper solid waste disposal from time to time in the study area?

   A, increase C, medium

   B, decrease D, I do not remember

6. Is there any methods of managing solid waste in the study area?

   A, yes B, no

7. Which community is the most responsible for the proper management of solid waste in the study area? A, clearer C, whole community

   B, officials D, (Female)----------

8. How do you dispose of solid waste in your town?

   A, burn it C, collect by clearer D, not collected

   B, preparing for composting E, other (specify) ----------

C, there is no choice E, pit ----------

9. Do you think that is there enough knowledge provided by the stakeholders in the study area on solid waste management?

A, yes B, no

10. How do you handle the solid waste until municipal city workers come and take it?

A, on Keisha C, put on open space

B, on basket D, on container ----------

11. What types of solid waste are frequently generated from your house?

A, food waste C, plastic

B, paper D, vegetable waste)----------

12. How much solid waste drop per day from your house?

A, 1 kuntal C, don't remember

B, 2 kuntal D, half ----------

13. What kind of social constraints in solid waste management in the study area?

A poor coordination B lack of awareness C lack of Technical

14, What kind of administrative problem in solid waste management in the study area?

A. no rule and regulation

B. can't submit enough container

C. can't create awareness about SWM

D. Shortage of worker

15. What are the sources of solid waste in your area?

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16. What are the reasons for the improper disposal of municipal solid waste in Wolkite Town?

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17. List the places that generate the most solid waste in your area

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18. What is the major contribution of the community, beyond government efforts, toward sanitation, beautification, and park development?

THANK YOU!