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ASSESSING KNOWLEDGE, ATTITUDES AND PRACTICES ON HOUSEHOLD SOLID WASTE MANAGEMENT AND ASSOCIATED FACTORS: THE CASE OF LAFTO SUB CITY, ADDIS ABABA

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DECLARATION

First, I state unequivocally that this thesis is the result of my own efforts, and that all sources or materials used in this thesis were collected by me. This thesis is submitted in partial fulfillment of the MA Degree requirements at Addis Ababa University in Development Studies (Environment and Sustainable Development). I can confidently state that this thesis was not submitted to any other institution for the award of any academic degree, diploma, or certificate.

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APPROVAL

I undersigned certify that they have read and hereby recommend to Addis Ababa University to accept the thesis submitted by Beamlak Hailu and entitled 'Assessing Knowledge, attitudes and practices on household solid waste management and associated factors: The Case of households in lafto sub city, Addis Ababa'' in partial fulfillment of the requirements for the award of a Master of Arts Degree in Development Studies (Environment and Sustainable Development)

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ACRONYMS AND ABBREVIATIONS

EPA	Environmental Protection Agency
FDRE	Federal Democratic Republic of Ethiopia
HHs	Households
KII	Key Informant Interview
MSWM	Municipal Solid Waste Management
SPSS	Statistical Package for Social Sciences
SWM	Solid Waste Management
WASH	Water, Sanitation, and Hygiene
WHO	World Health Organization

ABSTRACT

This research investigates the factors influencing solid waste management practices among households residing near the Mekanisa River in Addis Ababa, Ethiopia. Inadequate waste management is a growing concern in developing countries, particularly in peri-urban areas, where rapid population growth often outpaces the development of essential infrastructure and services. This study aims to bridge the knowledge gap regarding household waste management behaviors in these communities.

Employing a mixed-method approach, the research utilizes a structured questionnaire to assess the Knowledge, Attitudes, and Practices (KAP) of 200 households surrounding the Mekanisa River. The questionnaire was developed based on existing KAP instruments used in similar studies and adapted to the context of Addis Ababa. Semi-structured interviews were conducted with key informants, including representatives from local government agencies responsible for waste management and waste collection service providers, to gain deeper insights into existing policies, infrastructure challenges, and community engagement initiatives. Additionally, a literature review provided valuable background information on solid waste management practices in Ethiopia and relevant theoretical frameworks.

The data analysis involved descriptive statistics to examine the distribution of KAP scores among households. Chi-square tests were employed to identify statistically significant relationships between KAP variables and socio-demographic factors (education level, family size, years living in the area), behavioral factors (reported knowledge and attitudes), and potential social and economic factors gleaned from the interviews.

The findings of this study are expected to contribute to a more comprehensive understanding of household waste management practices in peri-urban areas of Addis Ababa. By identifying the key factors influencing KAP, the research can inform targeted interventions and policy changes. Improved waste management practices are essential to mitigate environmental and health risks associated with improper waste disposal, particularly in communities residing near waterways.

Key words: Knowledge, Attitude, Practice

CHAPTER ONE

1. INTRODUCTION

1.1 Background

The world is facing a growing challenge: solid waste management. We generate massive amounts of waste – unwanted materials discarded due to human activity (Shewasinad et al., 2017). This problem is particularly acute in deve**loping countries like Ethiopia.**

Globally, cities produce a staggering 2 billion tons of waste annually, projected to rise by 20% per capita by 2100 (World Bank, 2018). This has become a major concern, reflected in the Sustainable Development Goals (SDGs) – specifically goals 11 (sustainable cities and communities) and 12 (responsible consumption and production). Effective waste management also significantly reduces greenhouse gas emissions (Wilson, 2015; Hondo et al., 2020) and protects our environmen**t (Izvercian and Ivascu, 2015).**

Developed countries have embraced waste segregation and recycling as key strategies for managing solid waste. They implement various approaches like the "3Rs" (Reduce, Reuse, Recycle) through policies, legislation, and public awareness campaigns (Falk and McKeever, 2004; Kang and Schoenung, 2005; Kumar et al., 2017). However, developing countries, particularly those in sub-Saharan Africa, lag behind. Kihila et al. (2021) highlight weak enforcement of waste disposal practices at all stages (household, collection, disposal) and a lack of public awareness. This can be attributed to limited resources, weak coordination, and inadequate infrastructure.

Ethiopia, a low-income country, struggles with the consequences of inadequate solid waste management. Rapid urbanization leads to overcrowding, slums, and poor waste management practices, posing serious health, safety, and environmental threats. In 2016, the country generated approximately 7 million metric tons of municipal solid waste (Zhaohua et al., 2011). Traditional waste management practices in Ethiopia do not prioritize public health, environmental protection, or alternative energy sourc**es (Hailemariam & Ajeme, 2014).**

Effective solid waste management requires a two-pronged approach: commitment from local authorities and active community involvement. Positive signs exist: Addis Ababa, the capital, has seen increased public awareness of solid waste management, with over 70% of residents

willing to pay for door-to-door collection services (Dika et al., 2019). This highlights the potential for improvement through collaborative efforts.

1.2 Statement of the Problem

Addis Ababa has encountered significant challenges in relation to the inadequate management of solid waste operations. The primary causes of improper solid waste disposal in urban areas can be attributed to the lack of sufficient and well-functioning infrastructure, non-compliance with existing environmental sanitation laws, haphazard and unplanned dumping of solid waste, population growth resulting from rural-urban migration, insufficient funding for solid waste management processes, and the absence of new waste disposal technologies (Momodu, 2011).

Insufficient coverage of the collection system and methods, absence of institutional arrangements and information resources, inflexible work schedules, and inadequate information on the quantity and composition of waste have been identified as the major issues faced by solid waste management systems in developing cities (Kyessi and Mwakalinga, 2009; Ogwueleka, 2009).

Furthermore, Gelan (2021) revealed that while the city's waste generation has increased, effective practices for solid waste collection and management have been lacking. These problems are influenced by various factors, including institutional, social, and contextual aspects of waste segregation (Zemena, 2016). Additionally, Kassim and Ali (2018) highlighted that a lack of awareness and active involvement of households as key stakeholders in service provision, delays in households paying collection fees to waste management organizations, and strained relationships between households and waste collectors are other factors impeding the proper management of solid waste.

While research has explored various aspects of Addis Ababa's solid waste management challenges, a critical gap exists in the area of Knowledge, Attitudes, and Practices (KAP) regarding household waste segregation and managment in the study area. Here's why this lack of KAP-specific research is concerning:

Limited Understanding of Behavior: Existing studies primarily focus on the operational inefficiencies of waste collection or broader social and institutional factors. KAP studies delve deeper, providing insights into household knowledge levels about waste segregation benefits,

their attitudes towards waste sorting practices, and the actual waste segregation behaviors they implement (Ajayi & Adebowale, 2008; Ayeni et al., 2017).

Targeted Interventions: Without understanding KAP, designing effective interventions to improve waste management practices becomes difficult. KAP studies inform the development of targeted educational campaigns, policy changes, or infrastructure improvements that address the specific knowledge gaps, attitudes, and existing practices within households (Abdullah et al., 2017; Miezah et al., 2015).

A dearth of KAP-specific research on household waste segregation and management at the research area hinders a comprehensive understanding of the problem and the development of targeted solutions. This study aims to address this critical gap by examining KAP (Knowledge, Attitudes, and Practices) regarding waste segregation and management in Lafto sub-city, Addis Ababa. By investigating all three components of KAP, this research will provide a comprehensive understanding of household waste management behaviors in the city.

1.3 Research Questions

Building on the identified gap in KAP research, this study seeks to answer the following specific questions:

1. What is the level of knowledge among Lafto sub-city households regarding proper solid waste management practices, including waste segregation and disposal methods?
2. What are the attitudes of Lafto sub-city households towards waste segregation and solid waste management practices?
3. How do Lafto sub-city households currently manage their solid waste? What waste segregation practices do they implement, if any?
4. What factors influence the solid waste management practices of Lafto sub-city households? This may include factors related to knowledge, attitudes, socio-economic background, access to waste collection services, and infrastructure availability.

1.4 Objectives of the Study

1.4.1 General Objectives

The general objective of the study is to comprehensively assess the Knowledge, Attitudes, and Practices (KAP) of Lafto sub-city households regarding solid waste management. This will

involve investigating their level of knowledge about proper waste management methods, their attitudes towards waste segregation and participation, and their current waste management practices. And also, which factor affects the household's practices of proper solid waste management.

1.4.2 Specific Objectives

The specific objectives of the study are

- To assess the households' knowledge among Lafto sub-city households regarding proper solid waste management practices, including waste segregation and disposal methods,
- To assess Lafto sub-city households' attitude towards waste segregation and solid waste management practices,
- To investigate Lafto sub-city households current solid waste method and What waste segregation practices do they implement, if any,
- To Assessing the determinant factors associated with households' solid waste management practices.

1.5 Conceptual and Operational Definitions of KAP

Knowledge (Conceptual): The theoretical understanding and information that Lafto sub-city households possess regarding solid waste management practices, including the benefits of waste segregation, proper disposal methods, and environmental implications.

Knowledge (Operational): This will be measured through a survey instrument designed to assess household awareness and understanding of key solid waste management concepts.

Attitude (Conceptual): The beliefs, feelings, and evaluations that Lafto sub-city households hold towards waste segregation and their participation in solid waste management initiatives.

Attitude (Operational): This will be measured through survey questions that gauge household perspectives on the importance of waste segregation, their willingness to participate in collection programs, and their perceived value of proper waste management.

Practice (Conceptual): The actual behaviors and actions undertaken by Lafto sub-city households in managing their solid waste. This may include waste segregation at home, proper storage of waste materials, and utilization of available collection services.

Practice (Operational): This will be assessed through survey questions that inquire about household waste segregation practices (separating recyclables, organics, etc.), waste storage methods, and their reported use of waste collection services.

1.6 Significance of the Study

This study is anticipated to provide valuable insights in three key areas. Firstly, it will enhance the theoretical comprehension of the fundamental characteristics of municipal solid waste and the challenges encountered in the management of such waste. Secondly, it will offer guidance to policy makers, public administrators, solid waste managers, municipal leaders, researchers, and environmental protection agencies who are striving to enhance current solid waste management practices and mitigate associated issues, while also providing an understanding of the practices specific to the study area. Additionally, the study holds significance in establishing a baseline understanding of the level of awareness among households residing in proximity to river areas regarding solid waste management.

1.7 Scope of the Study

One of the primary limitations of this study pertains to the sample selection, which was restricted to households in the Lafto sub-city residing in close proximity to the Mekanisa river. As such, the findings derived from this study cannot be confidently extrapolated to the entirety of the Lafto sub-city, nor to Addis Ababa as a whole. To overcome this limitation, future studies should adopt a more comprehensive approach, with larger sample sizes and broader coverage of all sub-cities.

while both liquid and solid waste management are complex subjects that warrant further investigation, this study focused exclusively on solid waste management practices in the Lafto sub-city surrounding the Mekanisa river in the Addis Ababa regional state of Ethiopia. Although this study examined behavioral variables related to SWM, certain additional variables were excluded from the research model specification due to measurement issues. Therefore, future studies could potentially explore a wider range of factors to enhance the generalizability of the results.

It is also worth noting that the scope of this study was limited to a qualitative methodology (i.e., document review and key-informant interview) and quantitative methodology (i.e.,

questionnaire). While these methods are useful in providing insights into the research topic, they may not capture the full complexity of the issue. Therefore, future studies could consider adopting a mixed-methods approach to gain a more comprehensive understanding of the subject matter.

1.8 Limitation of the Study

The problem of solid waste management has become a significant issue that has garnered attention from research and development institutions globally. This concern is particularly pronounced in developing countries like Ethiopia, where research has identified inadequate and inefficient management systems for household waste. However, due to constraints in terms of time and financial resources, this thesis concentrates exclusively on one sub-city. As a result, the conclusions drawn from this study cannot be applied to the solid waste management systems of other sub-cities. This limitation is primarily due to logistical and time limitations, which hindered the expansion of the research to other sub-city administrations and regions.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Solid Waste Definition

There are many definitions of solid waste, but generally speaking, it is understood to include any garbage, refuse, or sludge as well as any items that have been discarded—whether they are solid, semisolid, liquid, or containing gaseous elements.2020 (Zhang et al.) Animal waste from a farm or stockyard is not considered to be solid waste, nor is substances that are (a) hazardous waste, (b) radioactive waste, or (c) sewage sludge that are used or disposed of in compliance with current law. In addition to residential, commercial, institutional, and agricultural operations, waste can also be produced by a wide range of other activities (Elem et al., 2020).

For instance, whereas some definitions do not mention solid materials, others do. Additionally, other definitions do not include the collection of solid trash from open spaces like streets or "non-airborne" solid waste, which cannot be a liquid or a gas.

According to a 2008 Rouse research, Solid waste is defined as material that has been dumped after losing all value to its original owner. In metropolitan settings, organic trash (such as kitchen scraps and yard trimmings), paper, glass, metals, and lattice are the main components of solid garbage. Ash, dust, and street sweeping are three examples of how human activity on a daily basis affects the amount of garbage produced. As a result, street sweepings can contribute significantly to waste.

2.2 household solid waste

The definition of home solid waste is frequently one of interest. Household solid waste, which comprises trash from homes, businesses, institutions, and industries, is often made up of domestic waste produced by city dwellers. Municipal solid waste (MSW) is another name for household waste that is frequently used (Golder & Alamgir, 2018). Hazardous materials are typically not included in household solid waste, which consists of both recyclable and non-recyclable materials. Municipal solid waste (MSW), which is typically handled and disposed of locally, excludes industrial and agricultural trash. In some instances, a distinction is drawn between solid trash produced by households, enterprises, and industries, as well as solid garbage produced from other sources including markets and institutions.

2.3 Knowledge, Attitudes, and Practices (KAP) of Households in Solid Waste Management

Understanding household knowledge, attitudes, and practices (KAP) towards solid waste management (SWM) is crucial for designing effective interventions. Several studies conducted in Ethiopia have explored KAP, revealing both positive aspects and areas for improvement.

2.3.1 Knowledge

Ethiopian households exhibit a general understanding of what constitutes solid waste (Gebremedhin et al., 2020). However, their grasp of specific waste categories and proper sorting procedures may be limited (Abebaw et al., 2017). For instance, households might not be aware of the distinction between biodegradable and non-biodegradable waste, hindering effective source separation at the household level (Zergaw et al., 2019).

knowledge about the environmental impacts of improper waste disposal appears to be variable. While Tadele & Zeleke (2019) report a positive correlation between knowledge and environmentally responsible practices in some studies, others by Adane et al. (2020) suggest a gap between knowledge and behavior. This highlights the need for educational campaigns that not only raise awareness but also bridge the knowledge-action gap by emphasizing the environmental and health consequences of improper waste disposal, such as air and water pollution, and the spread of diseases.

2.3.2 Attitudes

Studies by Geleta et al. (2019) have shown that many Ethiopian households express positive attitudes towards proper SWM. Residents often acknowledge the importance of waste management for public health and environmental well-being (Abebaw et al., 2017). Additionally, willingness to pay for improved collection services has been observed in some studies (Dika et al., 2019), indicating a potential for community co-financing of SWM initiatives. This positive sentiment can be leveraged to encourage participation in waste management programs.

However, negative attitudes can also be a barrier. Skepticism about the effectiveness of waste collection systems or a lack of trust in authorities can hinder participation in waste management programs, as reported by Abebaw et al. (2017). Addressing these concerns through transparent communication and improved service delivery is essential to build trust and encourage

participation. For instance, residents are more likely to participate in waste sorting programs if they are confident that the collected waste will be managed properly.

2.3.3 Practices

Despite positive knowledge and attitudes, studies often reveal a disconnect between these and actual waste management practices in Ethiopian households (Adane et al., 2020). Open burning, improper disposal in rivers or streets, and inadequate waste segregation remain prevalent practices (Gebremedhin et al., 2020). Limited access to collection services, lack of proper disposal facilities, and socio-economic factors can contribute to these practices (Zergaw et al., 2019).

For instance, households in peri-urban areas or those with lower income levels might have limited access to collection services, forcing them to resort to open burning or improper disposal due to a lack of alternatives. Additionally, a lack of knowledge about composting techniques or the absence of composting facilities can discourage households from diverting organic waste streams.

Bridging the KAP Gap

KAP studies in Ethiopia paint a complex picture of household waste management behavior. While knowledge and attitudes are generally positive, significant gaps exist between knowledge and action. Addressing these KAP issues requires a multifaceted approach that combines education, improved infrastructure, and community engagement.

Educational campaigns can raise awareness about proper waste sorting, composting techniques, and the environmental hazards of improper disposal. These campaigns can be delivered through various channels, such as community meetings, radio announcements, or informational flyers. Educational interventions should be tailored to the specific needs and context of the target audience, using culturally appropriate language and examples.

Investments in infrastructure development, such as expanding waste collection services and building proper disposal facilities, are crucial to provide residents with practical means to implement their positive attitudes. Reliable collection services with convenient schedules and drop-off locations are essential to encourage households to properly dispose of their waste.

Improved infrastructure also includes the development of composting facilities or promoting small-scale composting techniques at the household level.

Finally, fostering community engagement through initiatives like recycling programs or waste management committees can empower residents and encourage them to take ownership of SWM in their communities. Community engagement can involve residents in decision-making processes, such as planning waste collection routes or designing awareness campaigns. This sense of ownership can lead to increased participation and a more sustainable waste management system.

By employing a comprehensive strategy that tackles KAP simultaneously, Ethiopia can move towards more sustainable solid waste management practices. Such an approach will not only improve environmental sanitation but also contribute to public health and community well-being.

2.3.4 Integrating KAP Theories and Influencing Factors

Understanding household waste management behavior necessitates going beyond a siloed analysis of knowledge, attitudes, and practices (KAP). Several theories offer frameworks to explore the intricate web connecting these factors.

Theories of KAP

Theory of Planned Behavior (TPB): Ajzen (1991) posits that TPB proposes a person's intention to perform a specific behavior hinges on three key factors: attitude towards the behavior, subjective norm (perceived social pressure), and perceived behavioral control (belief in one's ability to perform the behavior). In the context of waste management, a household's decision to sort waste might be influenced by their positive attitude towards environmental protection (attitude), the perception that their neighbors also sort waste (subjective norm), and their confidence in having access to designated recycling bins (perceived behavioral control).

Health Belief Model (HBM): Developed by Rosenstock et al. (1974), HBM suggests that individual health behaviors are shaped by perceived susceptibility to a health threat, perceived severity of the threat, and perceived benefits of taking action. Applied to waste management, a household's decision to properly dispose of waste might be influenced by their perceived risk of illness from improper waste disposal (susceptibility and severity), and their belief that proper disposal protects their health and the environment (benefits).

These theories provide valuable insights into the decision-making processes behind household waste management practices. By understanding the factors influencing intentions, policymakers and waste management practitioners can design interventions that target specific barriers and encourage more sustainable behaviors.

2.4 Socioeconomic, Cultural, and Political Influences on KAP

In addition to KAP theories, a multitude of social, economic, and political factors significantly influence household waste management practices in Ethiopia, particularly:

Income levels play a crucial role. Lower-income households might prioritize immediate needs over environmental concerns or lack the resources to participate in waste management programs with associated costs, such as user fees for collection services (Abebaw et al., 2017). This highlights the need for economic empowerment programs or subsidized waste management services to ensure inclusivity.

The availability and reliability of waste collection services significantly impact household practices. Inconvenient collection schedules, long distances to disposal sites, or limited service coverage can lead to improper disposal methods like open burning or dumping (Zergaw et al., 2019). Investing in infrastructure development, expanding collection services to peri-urban areas, and establishing buy-back centers for recyclable materials can bridge this gap.

Government policies can incentivize responsible waste management practices. Extended producer responsibility schemes hold manufacturers accountable for the end-of-life management of their products, while regulations promoting waste separation and recycling can encourage more sustainable practices. Additionally, policies that subsidize composting bins or user fees for collection services can make participation more accessible for low-income households (Dika et al., 2019).

Social norms within communities can significantly influence behavior. If waste sorting and recycling are seen as positive behaviors within a community, residents are more likely to participate. Community leaders, religious institutions, and local NGOs can play a vital role in promoting positive social norms around waste management through awareness campaigns and community-based initiatives (Geleta et al., 2019).

Cultural beliefs and practices can also influence waste disposal habits. For instance, some cultures might have reservations about composting due to religious beliefs or misconceptions about hygiene. Culturally sensitive educational campaigns that address these concerns and promote alternative waste management practices, such as vermicomposting, are crucial for fostering behavior change that resonates with local contexts.

By considering KAP theories alongside these social, economic, cultural, and political factors, a more nuanced understanding of household waste management behavior in Ethiopia can be achieved. This understanding is essential for developing effective interventions that promote sustainable waste management practices. Such interventions should encompass educational campaigns, infrastructural development, policy measures, and community engagement. By working collaboratively across these areas, Ethiopia can move towards a future with improved environmental sanitation, public health, and a more sustainable waste management system.

2.5 Waste Generation and Characteristics

Each location has its own unique solid waste characteristics and volume. The average income level, the sources, the population, social behavior, the climate, industrial production, and the market for waste products are all factors that affect the quantity and composition (Late and Mule, 2013). Sujauddine et al. (2008) assert that factors such as family size, educational attainment, and monthly income have an impact on waste production. The active involvement and investment of a real estate corporation, community residential committee participation for public participation, and charge for collection service based on trash volume or weight all have an impact on household views regarding garbage separation.

Economic productivity and consumption lead to the creation of solid waste (Sandra, 2006). Solid waste is produced by a variety of human activities, which are key contributors to environmental problems in homes, streets, public spaces, businesses, and healthcare facilities (Abhimanyu et al., 2014). Solid waste can come from a variety of sources, including institutional areas, schools and colleges, hospitals, prisons, single- and multi-family homes, hotels, and recreation areas (U.S. Environmental Protection Agency, 2014). Commercial sources include markets, stores, offices, restaurants, and other non-manufacturing activities. Developed nations with higher affluence generate more garbage per person, with larger percentages of recyclable waste and packaging

materials. Because there is less institutional activity, commercial and industrial activity, and both, in low-income countries, there is a higher rate of trash generation. (2006) Sandra

2.6 Solid waste Composition

Urban solid wastes can be divided into biodegradable and non-biodegradable materials, which are the two main categories. Organic wastes like food scraps, yard garbage, and agricultural waste make up the biodegradable portion of urban solid waste. Under controlled conditions, these wastes undergo biological decomposition and can be converted into compost or organic fertilizer.

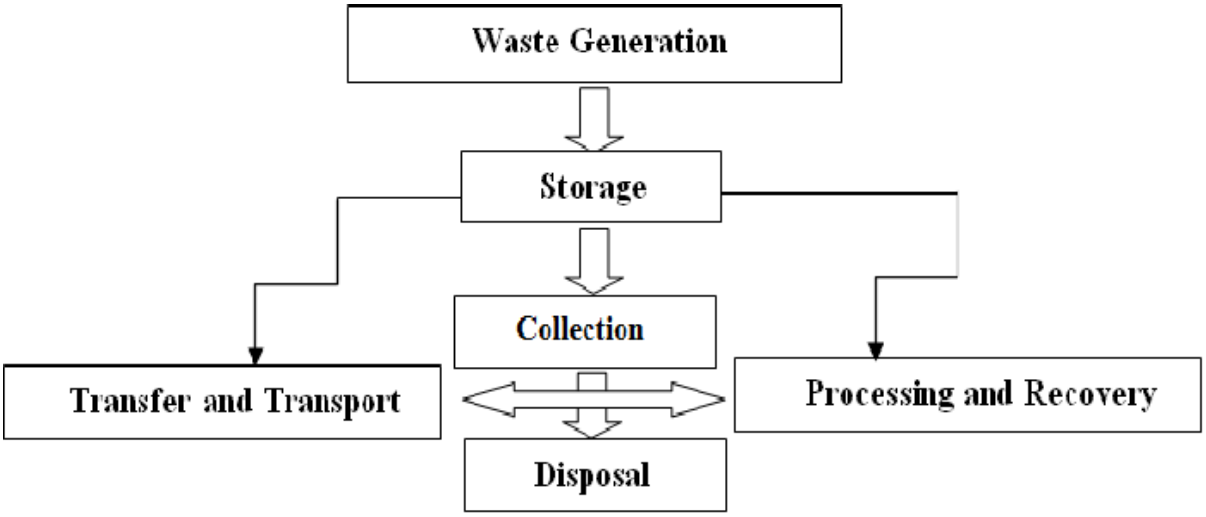
While inorganic compounds that cannot dissolve or degrade are included in non-biodegradable wastes (Solomon Cheru, 2011). Both the rate and the amount of garbage generation have accelerated recently. The variety of garbage also grows as the volume of wastes does (Vergara and Tchobanoglous, 2012).

2.7 Solid waste management

The waste that is produced by human activity in this world. The handling, storage, and disposal of the wastes—which may be both solid and liquid in nature could put the environment and the general public at danger (Zhu et al., 2008). SWM refers to all actions taken to reduce the negative effects of solid waste on human health, the environment, and aesthetics.

SWM is a solid waste management system that includes all waste-related operations, from generation through disposal. Rouse (2008) asserts that the "collection, storage, transportation, processing, treatment, recycling, and final disposal of waste" constitute the fundamental principles of SWM. Additionally, he stated that the management system must be straightforward, affordable, sustainable-economically efficient, environmentally sound, and socially acceptable, and it must be able to serve households of all income levels.

Figure 2.1: Proper Solid Waste Management



Source: www.google.com/http://scialert.net/abstract/?doi=jest.2018.107.122

Although waste management practices may vary between nations, Vergara and Tchobanoglous (2012) determined that trash management must adhere to a few fundamental procedures or guidelines. The waste is picked up by the municipal authorities or their representatives and transported to places for processing or disposal from the point of storage. When waste is collected for recycling by the recycling businesses, the waste generators in some cases segregate the waste into different materials.

The damaging effects of trash on the ecosystem must be avoided by careful planning and management (Vergara and Tchobanoglous, 2012). According to Ghiani et al. (2014), managing solid waste properly has become crucial to maintaining environmental protection.

If solid waste is handled appropriately, it can be a useful resource, but if it is not managed properly, it can have major negative effects on the environment and public health. In light of this, solid waste management is a vital part of urban sanitation and one of the most significant and resource-intensive services offered by local governments (ENPHO, 2008: 1). Waste management, according to Demirbas (2011), is the process of gathering, transporting, and processing wastes before disposing of any leftover residues.

Municipal wastewater treatment sludge, industrial process wastes, automobile bodies, combustion ash, and construction and demolition debris are not considered to be part of municipal solid waste (also known as trash or garbage), which is defined by the United States

Environmental Protection Agency (EPA) as wastes made up of items that are commonly found in homes and communities, such as product packaging, grass clippings, furniture, clothing, bottles and cans, food scraps, newspapers, appliances, consumer electronics, and batteries. What a trash: A Global Review of Solid Waste Management, one of the World Bank's urban development series-knowledge papers, claimed that the amount of solid trash created increased with income level and urbanization rate. The natural alternatives to throwing away waste should include recycling, composting, and reusing because they have less of an influence on the environment. (M. M. Veiga, 2013).

As a result of the rapidly rising output of solid waste, which exceeds the capacity of cities and municipalities, UNDESA (2012) claims that wastes are not properly managed in developing nations. According to reports, low-income nations frequently have waste collection rates below 70%, and more than 50% of the debris that is gathered is frequently disposed of through unregulated land filling.

Ethiopia is among the low-income nations that must deal with the effects of poor solid waste management. According to a survey by MPv D (2014), just 20 to 30 percent of the waste produced in Addis Abeba, the country's capital, is being collected. The town municipality's dedication and the active participation of the locals are necessary for proper solid waste management. In Ethiopia, numerous measures are being undertaken to enhance environmental health, particularly in the capital city. More than 70% of the residents of the community in Addis Abeba were willing to pay for door-to-door solid waste collection service, which is one of the initiatives presented by the government (Dika G et al., 2019). This indicates that the community members' understanding of solid waste management has increased.

2.8 Solid waste management practices

Solid waste management practices vary from region to region, from country to country, and even within a single country. Modern waste management practices typically support reusing, recycling, composting, and disposing of waste through landfills, which motivates households to reduce waste generation. However, in developing nations, recycling and composting are not used to reduce the majority of solid waste, hence this trend is not present there. The majority of solid waste produced in these nations is dumped in open landfills or burned because sorting is extremely uncommon, making it difficult to recycle or reuse compost trash. The presence and

degree of enforcement of waste management laws, policies, and regulations, the type and quality of waste produced, and the availability of money are the main factors influencing differences in waste management practices. The management of solid waste is a municipal and private responsibility in the majority of developing nations. In these nations, waste is typically collected at the source or at a temporary dumpsite, and it is then typically disposed of at an open dumpsite close to the city's edge. Dumping sites are typically large, open spaces where truckloads of waste are dumped.

To reduce the amount of solid trash, dumped debris is then examined for useable components and recyclable elements before being burned. Since there is little waste sorting done at any step, the waste has a complicated composition. Depending on the situation, it may contain medical, electronic, industrial, commercial, plastic, or even home waste that is thrown out in the same open field as the rest of the city's trash.

To lessen the risk to the environment, there is a need to manage trash. While recycling, composting, reuse, and safe disposal through landfills are all encouraged by contemporary waste management systems, they are frequently not followed. In underdeveloped nations, a significant part of garbage is not recycled (Abdhalahet al., 2016). The government organization's attempts at proper solid waste management have failed, and the situation in this urban area is not great. There are two obvious possibilities for effective solid waste management among the potential scenarios: centralized management or decentralized management. However, in order to achieve financial solid waste management, it is necessary to systematically analyze the strengths and weaknesses of the community as well as the municipal corporation. From this analysis, a decentralized system that is both efficient and inclusive of all stakeholders can be developed in Bishoftu town.

The generation, collection, transportation, treatment, and disposal of garbage constitute the right solid waste management practices. These procedures are described in full as being carried out.

2.8.1 Generation

Solid waste generation is the total amount of waste disposed of over a specific time period, and its magnitude is determined using a variety of techniques, including measurements made at the point of generation, vehicle surveys, and records examinations at the disposal facility (UNEP 2009; cited in Zebenay 2010). The rate of solid waste generation in a particular town is mostly

influenced by demographic change, It is crucial to quickly consider the urbanization issue since, according to Abdullah et al. (2016), solid waste creation and urbanization are closely associated. In 1950, metropolitan regions were home to around 30% of the world's population. According to current projections, 66% of the world's population will reside in cities by the year 2050. Greater than anywhere else in the globe, Sub-Saharan Africa is urbanizing quickly.

According to UNEP (2013) cities pose a hazard to the environment since they produce between 1.7 and 1.9 billion metric tons of municipal solid waste (MSW) annually. By 2025, it is anticipated to rise to almost 2.2 billion metric tons annually. According to a 2004 study by the World Bank and the Environmental Protection Authority (EPA), the quantity of garbage produced per capital in Ethiopia ranges from 0.17 to 0.48 kilograms per person per day in urban regions to roughly 0.11 to 0.35 kilograms per person per day in rural areas. For rural areas, the total amount of municipal solid trash generated in Ethiopia in 2003 is estimated to be 8.8 million pounds per capital per day, depending on a number of variables like season and income.

2.8.2 Collection

Getting waste from collecting locations, loading it into a car, and driving it to processing plants, transfer stations, or disposal sites is the process of collection. The majority of municipal solid waste management systems attribute a sizeable amount of their overall costs to the cost of collection. As an illustration, "collection accounts about 60–70% of total cost in industrialized countries, and 70–90% in developing and transition countries" (UNEP, 1996). Developing, transitional, and industrialized nations all share a structurally similar approach to collection, but there are significant institutional and technical variances in how it is carried out. In terms of their method to collection, the function of local governments, the involvement of the private sector, and demographic and sociological characteristics pertinent to collecting, industrialized nations are typically more efficient and effective than developing ones. In poor nations, collection frequently entails a face-to-face exchange between the generator and the collector. Generators frequently have to transport their trash over long distances and put it in containers due to the poor quality of service. As a result, the informal sector handles a large portion of the collection efforts in developing nations (UNEP, 1996).

The majority of official solid waste collection in Ethiopia's urban regions is carried out by micro and small businesses that go door to door to collect waste and then transport it to facilities and

disposal sites (Ferede, Z.M., 2018). In many of Ethiopia's urban regions, informal teams known as "street boys" and "scavengers" also gather solid debris (Cheru, M., 2016). Additionally, they gather recyclable solid waste from homes, transient waste bins, and by going to open dumps. 88% of households use bags to collect solid garbage, according to a prior study evaluating solid waste management in 28 Ethiopian cities and villages (USAID, 2015). This demonstrates that the vast majority of homes keep solid waste in bins that do not adhere to municipal regulations. Additionally, low-income nations like Ethiopia still confront significant difficulties in providing services for the collection of solid trash, doing away with open burning of solid garbage, and implementing sustainable management practices for all solid waste (UNEP, 2015). Due to the likelihood of a population rise over the coming years and the subsequent need to prioritize waste concerns in these areas, this may become even more challenging in the future in large cities of low-income countries.

2.8.3 Transportation

According to Mohammed A. and Elias E. (2017), waste transfer stations are intermediate locations where solid waste is dumped and kept before being transferred to processing and disposal facilities. As a result, the activities involved in moving municipal solid waste from collecting regions to interim storage facilities and from there to facilities for processing and final disposal are included in the term "transfer and transport activities." According to a prior study on MSWM in Addis Abeba, the municipality is in charge of transporting municipal solid waste to waste-to-energy plants and final disposal sites, and the contribution of micro and small enterprises to solid waste transportation is minimal (Tassie.K et al., 2019). The transfer and transportation facilities for solid waste are inadequate in the towns and cities of emerging nations. Similar to this, in many towns and cities in Ethiopia, the collected garbage is kept out in the open, exposed to rain and sun, and this attracts pests and gives off an unpleasant odor. Around the solid waste transfer stations, this has a direct impact on the environment's quality and public health.

2.8.4 Processing and Recovery

The separation and processing of wastes at the source was the first step in the processing and recovery of solid waste. However, mixed waste separations typically take place in materials recovery plants, transfer stations, combustion facilities, and disposal sites. Bulky objects are

frequently separated, waste components are manually separated, waste components are separated by size using screens, and ferrous and non-ferrous metals are separated. Then they engage in small- and large-scale industries for activities related to recuperation. For instance, a number of biological and thermal activities can modify the MSW's organic component. Aerobic composting is the most used biological transformation method, whereas incineration is the most popular thermal transformation method (web page accessed, August 27, 2010).

2.8.5 Disposal

To safeguard the environment and people from the effects of solid waste, trash disposal is the last step in municipal solid waste management (Birhanu. Y, 2015). The quality of the waste disposal facility may be influenced by each nation's access to technology, availability of skilled labor, and financial resources. The most frequent method of disposing of waste in Africa is open dumping (unintentional disposal of rubbish without regard for environmental protection or public health; Sandra & Weghmann, 2019). Open burning is a close second. As a result, improperly planned and managed solid waste disposal procedures have a negative impact on the environment, public health, and future generations by increasing greenhouse gases that cause climate change (UNEP, 2018). The two primary ways of waste disposal in Ethiopia are landfills (including waste burial pits and communal open dumping) and thermal processing, which includes burning and incineration of solid waste, according to the Open WASH report (UNICEF, 2016). For the majority of Ethiopian towns and cities, there aren't any standardized places to dispose of waste. Mohammed (2016) also noted that the majority of metropolitan regions in Ethiopia dispose of waste by open dumping, which degrades the soil, groundwater, and overall natural ecosystem. Less consideration has been given in underdeveloped nations to waste minimization measures that send waste to dumpsites for disposal in the end (De Medina-Salas et al., 2020). While incineration is typically utilized in Ethiopia to manage medical waste, open burning of solid waste is another frequent practice. In Ethiopian cities, the final trash disposal methods are not ecologically friendly because more than 50% of the urban population engages in open burning (African Development Bank Report, 2019; Teshome, 2020). This suggests that the adoption of solid waste management systems in Ethiopia is hampered by a number of issues.

2.9 Environmentally sustainable Solid waste management

2.9.1 Incineration

One method for managing solid waste sustainably is incineration. It is described as the procedure of reducing the weight and volume of solid waste under controlled circumstances, frequently with the goal of producing energy. Instead of disposal, this process might be referred to as waste minimization. However, ash from the incineration process needs to be disposed of. It is acknowledged as a practical way to get rid of some hazardous waste (like medical waste). Incineration can be done on a small or large scale by both individuals and businesses.

2.9.2 Composting

In order to convert huge amounts of organic material into compost (materials that resemble humus), solid organic waste is biologically broken down by fungus, bacteria, microorganisms, insects, and other organisms throughout the composting process. These organic compounds are created as a result of this process and are supplied to the soil to provide plant nutrients including potassium, phosphorus, nitrogen, sulfur, calcium, and iron. They also assist reduce soil erosion and increase the water-holding capacity of sandy soils or make clay soils more porous. in Enger and Smith (2008)

2.9.3 Reuse and Recycle

Reuse entails repeatedly cleaning and utilizing items. In other terms, it refers to using a product for the same or a different purpose more than once in its original form. Materials that can be utilized repeatedly are employed in this manner. It contributes significantly to the preservation of energy resources, the reduction of material usage, the creation of local jobs, the reduction of pollution, and cost savings (Miller, 2007). Reusing materials is thought to be more successful than recycling and composting procedures because doing so prevents the need to spend money and energy on having to make new ones.(2008) Cunningham et al

2.10 Solid waste management in Ethiopia

In Ethiopian towns and cities over the past few decades, SWM has been the subject of numerous research. According to Hailemaryam and Ajeme (2014), since 2001, the majority of Ethiopian towns have learned about the detrimental effects of poor solid waste management on the environment, public health, and municipal services. SWM techniques have resulted as a result in

numerous Ethiopian cities and towns. However, several research have revealed that MSWM practices differ throughout all Ethiopian metropolitan areas, depending on the municipalities' awareness of and capacity for managing solid waste (Kelly, 2012). In addition, a study from Zimbabwe (Jerie, 2014) found that SWM practices could vary for household and industrial producers, urban and rural areas, and developed and developing countries. In particular, many developing nations are characterized by poor solid waste management because of unbalanced systems. Ethiopia is one of many sub-Saharan African nations with weak and inconsistent solid waste management systems, with a notably low level of waste prevention, reduction, reuse, recycling, and energy recovery.

The current MSWM in Ethiopia is primarily concerned with the collection, transportation, and disposal of solid waste; nevertheless, the functional elements are still not being implemented to their full potential (Teshome, 2020). According to research done in Bangladesh (Ahsan et al., 2014), Mozambique (Sallwey, 2017), and Nigeria (Orhorhoro & Oghoghorie, 2019), waste is collected from generation sources and transported to final disposal sites, just like in the majority of developing nations. This shows that the government needs to pay attention to sustainable solid waste management strategies like prevention, reduction, reuse, recycling, and final disposal in many Ethiopian towns and cities because the country's solid waste handling, recycling, and disposal system performance is still very low (Edward, 2010). In short, Ethiopia has a deficient implementation of the fundamental functional components of a solid waste management system (Teshome, 2020). As a result, Ethiopia's entire MSWM system needs to be modified and replaced with a sustainable one; nevertheless, the government must give open burning and dumping, waste collecting, and final disposal serious consideration. Figure 2 shows the flow of MSWM practices in many urban areas of Ethiopia.

2.10.1 Understanding Household Solid Waste Management Practices in Ethiopia: A KAP Perspective

Solid waste management (SWM) remains a significant challenge in Ethiopia, particularly within the realm of household waste disposal. This review explores household waste management practices through the lens of the Knowledge, Attitudes, and Practices (KAP) framework.

Studies reveal that Ethiopian households possess a general understanding of solid waste but may lack knowledge about specific waste categories and proper sorting procedures (Abebaw et al.,

2017). Furthermore, knowledge gaps exist regarding the environmental repercussions of improper disposal, highlighting the need for educational campaigns that bridge the knowledge-action gap (Tadele & Zeleke, 2019). For instance, some households might not distinguish between biodegradable and non-biodegradable waste, hindering effective source separation at the household level (Zergaw et al., 2019).

While many households express positive attitudes towards SWM, acknowledging its importance for public health and the environment (Abebaw et al., 2017), a disconnect between attitudes and practices persists (Adane et al., 2020). Skepticism about the effectiveness of collection services or a lack of trust in authorities can hinder participation in waste management programs (Abebaw et al., 2017). Residents are more likely to participate in waste sorting programs if they are confident that the collected waste will be managed properly.

Despite positive KAP indicators, studies consistently report the prevalence of open burning, improper disposal in waterways and streets, and inadequate waste segregation (Gebremedhin et al., 2020). Limited access to collection services, lack of proper disposal facilities, and socio-economic factors all contribute to these practices (Zergaw et al., 2019). For instance, households in peri-urban areas or those with lower income levels might have limited access to collection services, forcing them to resort to open burning or improper disposal due to a lack of alternatives. Additionally, a lack of knowledge about composting techniques or the absence of composting facilities can discourage households from diverting organic waste streams.

Theories like the Theory of Planned Behavior (Ajzen, 1991) and the Health Belief Model (Rosenstock et al., 1974) offer valuable insights into the decision-making processes behind household waste management behaviors. The Theory of Planned Behavior suggests a resident's intention to sort waste might be influenced by their positive attitude towards environmental protection, the perception that their neighbors also sort waste, and their confidence in having access to designated recycling bins. The Health Belief Model highlights that a household's decision to properly dispose of waste might be influenced by their perceived risk of illness from improper waste disposal and their belief that proper disposal protects their health and the environment.

A nuanced understanding of household SWM in Ethiopia necessitates examining KAP alongside social, economic, cultural, and political factors. Lower-income households might prioritize

immediate needs over environmental concerns or lack the resources to participate in waste management programs with associated costs (Abebaw et al., 2017). This highlights the need for economic empowerment programs or subsidized waste management services to ensure inclusivity.

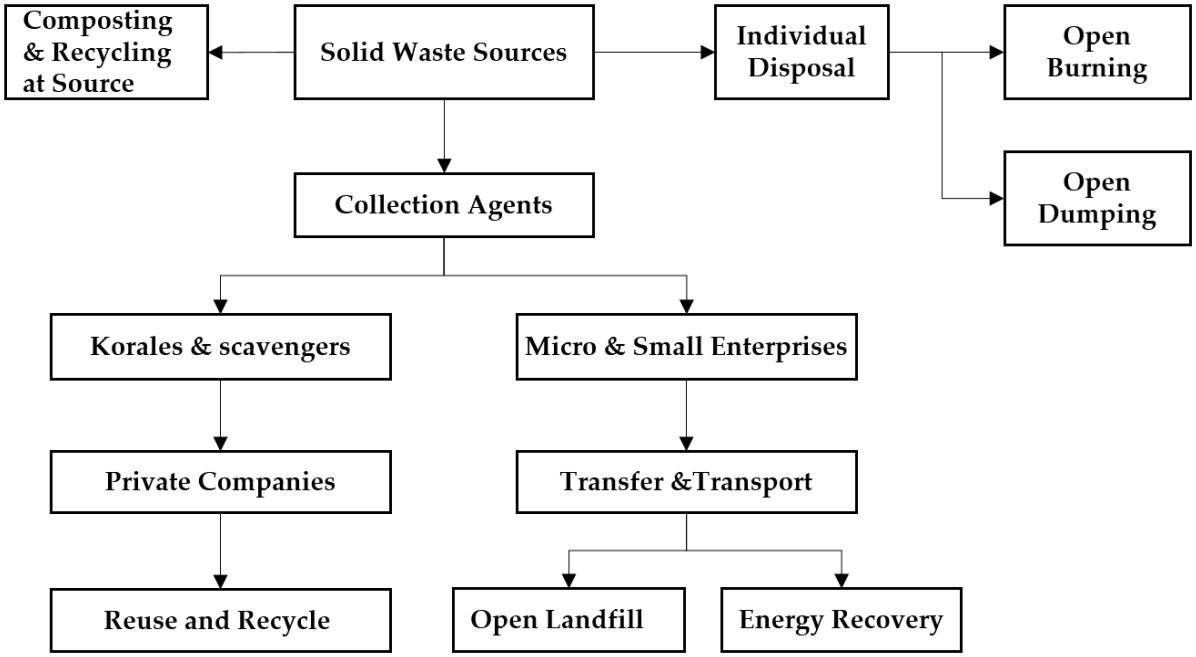
The availability and reliability of waste collection services significantly impact household practices. Inconvenient collection schedules, long distances to disposal sites, or limited service coverage can lead to improper disposal methods like open burning or dumping (Zergaw et al., 2019). Investing in infrastructure development, expanding collection services to peri-urban areas, and establishing buy-back centers for recyclable materials can bridge this gap.

Government policies can incentivize responsible waste management practices. Extended producer responsibility schemes hold manufacturers accountable for the end-of-life management of their products, while regulations promoting waste separation and recycling can encourage more sustainable practices. Additionally, policies that subsidize composting bins or user fees for collection services can make participation more accessible for low-income households (Dika et al., 2019).

Social norms within communities can significantly influence behavior. If waste sorting and recycling are seen as positive behaviors within a community, residents are more likely to participate. Community leaders, religious institutions, and local NGOs can play a vital role in promoting positive social norms around waste management through awareness campaigns and community-based initiatives (Geleta et al., 2019).

Cultural beliefs and practices can also influence waste disposal habits. For instance, some cultures might have reservations about composting due to religious beliefs or misconceptions about hygiene. Culturally sensitive educational campaigns that address these concerns and promote alternative waste management practices, such as vermicomposting, are crucial for fostering behavior

Figure 2.2: The flow of solid waste management practice in Ethiopia



Source: Lemesa Hirpe and chunho yeom (2021)

- ✓ Solid Waste Management Proclamation No. 513/2007: Its principal goal is to increase the capacity to prevent negative effects of solid waste at all societal levels while generating economically and socially advantageous assets from solid waste (FDRE, 2007). This proclamation is Ethiopia's first national policy on solid waste management. The primary topics covered by this policy are the general responsibilities of urban administration, planning for solid waste management, interregional movement of solid waste, managing household solid waste, waste collection and storage, transportation, recycling, incineration, disposal, and auditing of solid waste disposal sites. It also touches on the value of community involvement in achieving its goals. Community involvement is supported by the solid waste management action plans created by and put into effect at local urban administration levels. Lack of supporting guidelines, which are crucial for putting solid waste management laws and proclamations into practice, is this policy's fundamental drawback. Additionally, techniques for managing solid waste that are environmentally friendly, such as trash reduction and prevention, source-based solid waste segregation, and waste collection charge schemes, have not received much attention.

2.11 Conceptual frame work

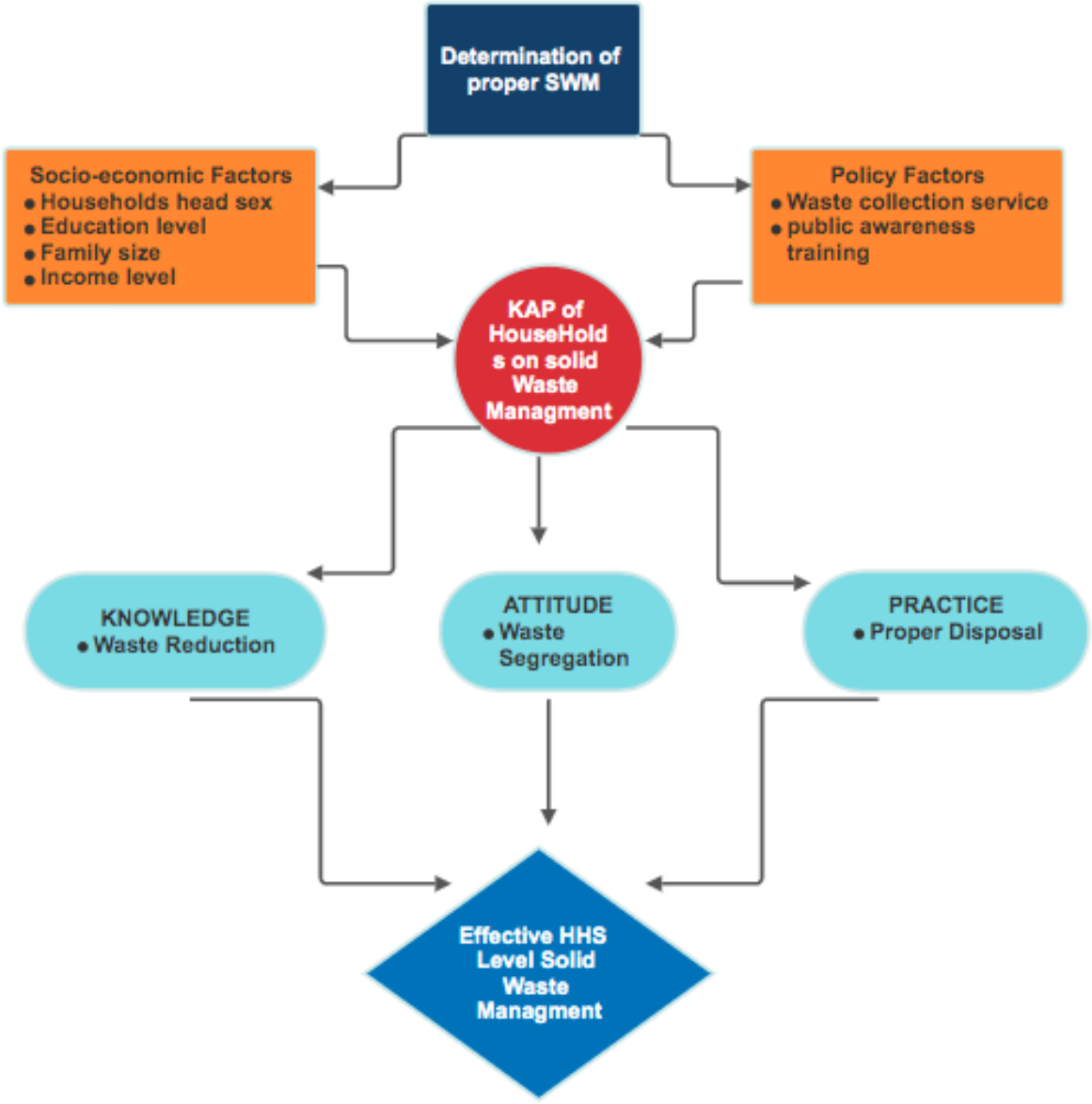


Figure 2.3: Conceptual framework of the Determinant Factors associated with Practice towards the hhs solid waste management practice.

CHAPTER THREE

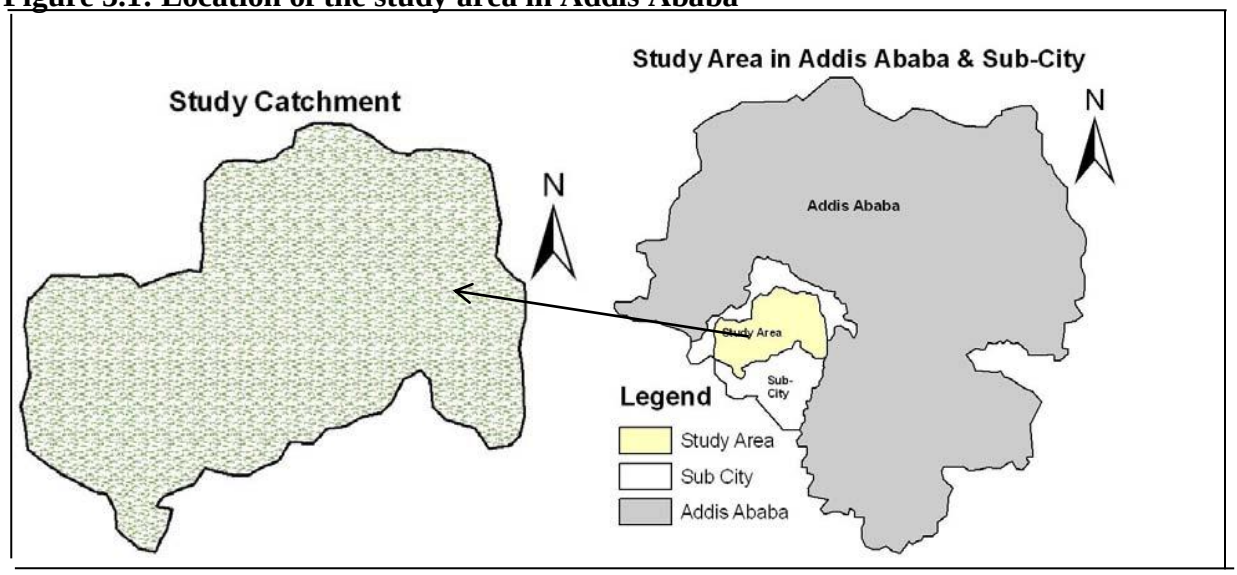
3. METHODOLOGY OF THE STUDY

In this chapter, the methods which were applied in the study were discussed. That were description of the study area, research design, sampling method, data collecting methods, and data analysis methods were explained.

3.1. Description of the Study Area

Addis Ababa, the capital city of Ethiopia, is inhabited by a population of approximately 2,739,551 million individuals, as reported by the 2007 Housing and Population Census. The city encompasses a total area of 540 square kilometers (54,000 hectares), with an initial allocation of 22,000 hectares for green spaces. However, it is currently estimated that only 7,900 hectares of land have been designated for this purpose. Addis Ababa boasts an average elevation of approximately 2,500 meters above sea level (m.a.s.l), positioning it as one of the highest cities globally in terms of altitude. In terms of governance, the city operates under a three-tier system, with the City Government serving as the highest level, followed by 10 sub-city administrations, and 116 Woredas, which function as the smallest unit of government within the hierarchical structure (Abrham Kassa, 2012).

Figure 3.1: Location of the study area in Addis Ababa

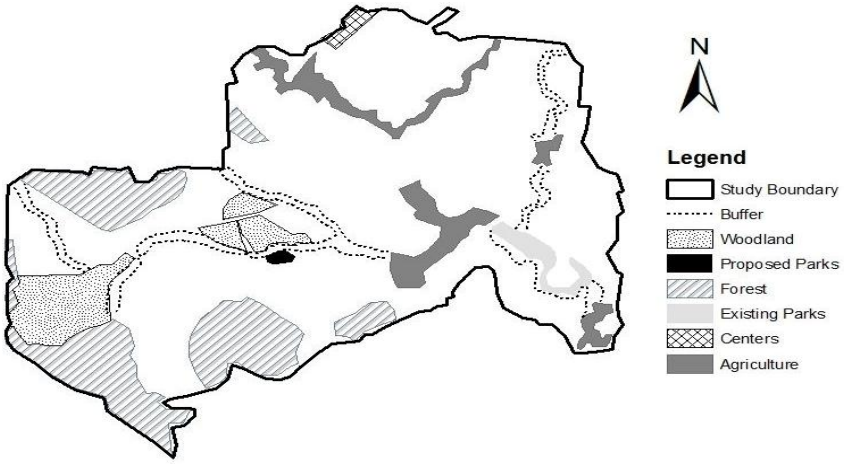


Source: *ORAMP, 2012*

The present study is focused on a specific geographic area within the city of Addis Ababa, which is delimited by the longitudinal coordinates of 380 40’37’’E -380 45’40’’E and the latitudinal coordinates of 80 55’20’’N-80 59’40N’’. This area is situated in the southwestern part of the city and exhibits an elevation ranging from 2147 m.a.s.l. to 2485 m.a.s.l. (refer to Figure 4.4 on the subsequent page). Notably, this elevation is lower than the average elevation of the city, which is approximately 2500 m.a.s.l. Consequently, the study area experiences relatively warmer temperatures, which are conducive to the growth of vegetables. It is worth mentioning that elevations exceeding 2300 m.a.s.l. are observed in the two mountain peaks located in the western and southwestern regions of the study area (Abrham Kassa, 2012).

The extant environmental map of the city indicates that 97.9 hectares of land are occupied by 15 parks, 7,175 hectares by agriculture, and 12,176 hectares by forest land. Additionally, 1403 hectares have been designated for riverbank parks, 341.63 hectares for proposed parks, and the remaining area has been reserved for woodland and protected lands. Concerning the study area, the forest is planned to cover 650.81 hectares, but only 10% of the plan has been implemented, amounting to 69.37 hectares. The next largest land use category is forest woodland, which is planned to cover 255.59 hectares, followed by agriculture at 224 hectares, river buffer at 116 hectares, which is expected to serve as a riverbank recreation area, existing parks at 16.53 hectares, and proposed parks at 8.2 hectares, as depicted in the environmental map of the study area (Abrham Kassa, 2012).

Figure 3.2: Existing Environmental Map of the study area



Source: ORAMP, 2012

3.2 Research design

The present study employed a descriptive research study design, utilizing a mixed research approach that incorporates both qualitative and quantitative methods. This approach involves the simultaneous collection and analysis of qualitative and quantitative data to provide a comprehensive description of the current situation, terms, or their relation to problems in a particular context. The use of this descriptive approach was deemed appropriate as it is expected to yield primary data and facts pertaining to the habits, feelings, attitudes, and opinions of the respondents (Kombo, 2017). This design offers ample opportunity for the description of activities, persons, and objects, as well as the prediction of relationships among the variables under investigation. Moreover, the descriptive survey design facilitates accurate assessment, relationship of phenomenon, event/issues, and conclusion (Kasomo, 2016).

3.3 Research approach

The present study employed a mixed research approach, utilizing both qualitative and quantitative methods, to address identified gaps, achieve stated general and specific objectives, and provide a more comprehensive understanding of the research problem than either method in isolation. The research was guided by the principle of utilizing diverse sources and acknowledging the information gathered through various data collection tools and quantitative and qualitative data analysis techniques.

The research necessitated the collection of numerical (statistical) data-based information through the use of quantitative methods as the primary approach to present descriptive statistical findings. Additionally, the study incorporated a qualitative approach, which involved the narration of conclusions based on data obtained from respondents, integrating data obtained from Key Informant Interviews (KII) through the application of open-ended questions to examine the selected sites.

3.4 Target population

The target population of this study comprised the hhs, government institutions at the local level, and private sectors, selected based on their respective responsibilities and contributions to household solid waste management (SWM).

3.5. Sampling procedure

The research also revealed that the utilization of sampling techniques proved to be significantly more efficient than surveying methods in terms of expeditiously gathering information. This approach not only resulted in cost savings and the prevention of additional expenses, but also facilitated the acquisition of results with a quantifiable level of accuracy that could be readily calculated through mathematical means. Consequently, meticulously devised sampling techniques, as elaborated upon subsequently, are employed to enhance the overall quality of research endeavors.

3.5.1 Sampling technic

The study populations comprise all households residing within the two woredas which are found in Nifas-Selk Lafto Sub-city.

3.5.2 Inclusion and Exclusion Criteria

- ✓ **Inclusion Criteria:**

The study focused on interviewing household heads (HHs) who were at least 18 years old, residing within the designated study area, and available during the data collection period.

- ✓ **Exclusion criteria:**

The present study excluded households that were unavailable during the designated study period, as well as those residing outside the study area. Additionally, households with health issues that impeded their ability to respond to the questionnaire were also excluded from the study.

3.5.3 Sampling size

The subsequent step after selecting the sample location was to ascertain the sample size of the study households. The determination of the total number of sample households was based on secondary data obtained from the Woredas office, specifically the number of household heads residing within the buffer zone along the river. In Lafto Sub City, Woreda 6, there were 264 households, while in Woreda 09, there were 176 households, resulting in a total of 440 households.

Due to time limitations, the total number of households was sampled using a 95% confidence level and a 5% margin of error. To identify valid samples for the study, the scientific sampling method outlined by Yamane (1967) was employed. Utilizing this calculation, a total of 200 sample households were selected and subsequently interviewed from the 440 households residing within the buffer zone in the study area.

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

n - Sample population

N- Total number of households in buffer zone along the river

∂ - Error (%)

∂=1-95% of confidence interval

$\partial = 0.05$

$$n = \frac{440}{1+(440)*(0.05)^2}$$

n=200

The present study involved the selection of 200 households through the utilization of the random walk technique, whereby every second household within each settlement was chosen. In cases where a consenting adult was not available during the visit, the nearest household was selected as a substitute. Subsequently, the determination of the sample size for the four selected locations was conducted in accordance with the proportional representation of the respective populations.

Table 3.1: Distribution of Lafto sub city sample respondents proportional to the size

	worda 6	worda 09	Total
Total HHS	264	176	440
Proportion of Sample HHS	120	80	200

Source: own

3.6 Data Collecting Method

This study utilized a combination of qualitative and quantitative data, incorporating both primary and secondary sources. Primary data was gathered through the administration of questionnaires, conducting interviews, and making observations. Secondary data, on the other hand, was obtained through an extensive review of relevant literature, magazines, and internet websites.

3.6.1 Questionnaire

A structured questionnaire specifically designed to assess KAP (Knowledge, Attitudes, and Practices) related to household solid waste management (SWM) was developed. The questionnaire was based on existing validated KAP instruments used in similar studies and adapted to the context of Addis Ababa. While there are established standardized KAP instruments, adapting an existing tool allowed for the inclusion of context-specific questions that addressed the unique waste management challenges and practices prevalent in the city. This ensured the questionnaire's relevance and effectiveness in capturing data pertinent to the study's objectives within the Ethiopian context. The questionnaire was originally developed in English and then rigorously translated into Amharic by a professional translator to ensure accuracy and cultural appropriateness.

3.6.2 Interviews

Semi-structured interviews were conducted with key informants to gain deeper insights into household SWM practices, attitudes, challenges, and potential solutions. Key informants included 2 representatives from local government agencies responsible for waste management and waste collection service providers. The interview guide covered topics such as existing waste management policies, infrastructure, and community engagement initiatives.

3.6.3 Related literature review

Information about some concepts and facts was obtained from different related literatures.

3.7 Data Analysis Method

Data were analyzed quantitatively and qualitatively (mixed research approach) .Quantitative way of analysis was applied for the data which were collected from the hhs through structured questionnaire. The quantitative data were analyzed using descriptive statistics like frequency, percentages, table, and the statistical analysis is chi-square test.

The qualitative method of analysis was applied for the data that were collected through questionnaires, interview, observation, and related documents. All the data were processed and analyzed using appropriate statistical tools to fulfill the Objectives of the study.

3.8 Working Hypothesis and Variable Specification

3.8.1 Dependent variable

- ✓ Practice

3.8.2 Independent variables

- ✓ **Socio demographic factors**: - Education, Sex of hhs head, Family size, Years living along the area,
- ✓ **Behavioral factors**:- Knowledge and Attitude
- ✓ **Social Factors:** Community values and norms regarding environmental cleanliness can significantly influence household waste management behavior. If data permits, incorporating social factors into the analysis could provide a more comprehensive understanding of the issue.
- ✓ **Economic Factors:** Economic considerations, such as household income and affordability of waste collection services, can also play a role in waste management practices. Investigating this aspect could further enrich the analysis.

Reflection on KAP as Dependent vs. Independent Variables

Traditionally, Knowledge, Attitude, and Practice (KAP) are considered dependent variables, meaning they are the outcomes influenced by independent variables. In this study, however, we adopted a slightly different approach. We were primarily interested in understanding the factors that influence household solid waste management practices (SWM practices). While we did assess KAP related to SWM, we used this information to gain insights into the potential reasons behind observed practices, treating KAP scores as intermediary variables. This approach allowed us to explore the interplay between KAP and SWM practices.

3.9 Reliability and validity

Through repeated, critical evaluation of this instrument for data collection by academicians, when required alterations and additions were made, the validity of the questionnaires utilized in the study was ensured. However, to ensure validity, questionnaires were created based on those from prior research, and the methodology was refined before the final data collection was administered by reviewing pertinent literature and objective facts about the study location.

3.10 Ethical consideration

A clear purpose of the study was presented when the enumerators questioning, to inform and investigate whether the respondent was willing to participate in providing data. In this regard, investigators were trained and well-informed to take ethical considerations into account during the investigation. During this process, researcher validated the conduct of the study according to ethical consideration protocols. Therefore, 200 respondents were interviewed and fully agreed. During interviews, respondents were informed that codes would be used in lieu of names and other characteristics that could lead to the identification of each respondent and that the analysis would be conducted accordingly. Respondents were also informed that all records will be used for research purposes only and will be kept strictly confidential at all.

CHAPTER FOUR

4. RESULTS AND DISCUSSION

4.1 Results of descriptive statistics

The determination of statistical power in a test is facilitated by the response rate of a study. A greater response rate leads to an increase in the test statistic, thereby enhancing the precision of the test. In the present study, a total of 200 questionnaires were distributed, all of which were successfully completed and returned. This indicates a response rate of 100%, which is deemed sufficient for drawing conclusions from the gathered data. Consequently, the subsequent section provides a concise discussion on the characteristics of the households surveyed.

4.2 Demographic characteristics of sampled households

The results obtained from the descriptive statistics presented in the table below reveal that the average family size of the respondents was 5 members. This finding suggests that the majority of the participants in the study belong to nuclear families, as indicated by the mean value of family size and its average variation. Furthermore, when considering the variation in family size, it is evident that the respondents exhibit a reasonable range, with the minimum family size being members and the maximum family size reported as 18 members. This significant disparity in family size among the sampled respondents provides valuable insights into the household practices in the context of solid waste management (SWM) in the studied areas.

Moreover, across all the surveyed households in the selected woredas, it was found that the average number of years spent living along the river was 10 years within the buffer zone. The maximum duration reported was 50 years, while the minimum duration was 1 year..

Table 4.1: Distribution of respondent's family size, numbers of year living lafto sub city Statistics

Variable	Observation	Min	Mean	Max
Family size	200	1	4.8	18
Living years	200	1	10.6	50

The table presented below provides data on the gender distribution of the respondents, indicating that 46% of the participants are male and 54% are female. It is evident that the majority of the respondents are male. Additionally, the table displays the average age of the participants. Specifically, 28.67% of the respondents have an average age of 34.63 years, while 71.33% have an average age of 41.43 years. It is noteworthy that the majority of the respondents have an average age of 41.43 years.

The survey also aimed to investigate the influence of education on behavior, practices, and technology adoption. To this end, the education status of the respondents was included in the survey. The findings revealed that 47% of the sampled respondents fell into the category of illiterate individuals with no years of schooling, while 9.5% possessed a higher education degree, diploma, or certificates. Consequently, it can be inferred that the overall education status of the surveyed individuals, particularly the head of the household, was at a significantly low level.

Previous studies have indicated a direct correlation between the educational level of respondents and their solid waste management (SWM) practices within their households. As individuals' understanding and educational level increase, their commitment to proper SWM practices and prevention of further pollution also increases. This, in turn, influences others to adopt similar practices in order to protect the river from additional pollution and mitigate its impact on human health and the environment.

Table 4.2: Household's Socio demographic Characteristics

Variables	Category	Frequency	Percent
Sex of Household head	Male	92	46
	Female	108	54
Education of hhs heads	No read and write	94	47
	Primary(1-4)	51	25.5
	Secondary(9-12)	36	18
	Higher Education	19	9.5

4.3 Government institution

- **Data Collection Consistency:**

It's important to clarify that data on KAP and sociodemographic factors (including education level, sex of household head, and family size) were collected from the household head, acting as a representative for the entire household. For the variable regarding living near water bodies, we specifically asked about "years living along the river" to understand the potential influence of proximity to the river on waste management practices. We acknowledge that "duration of residence along the area" might be a broader term, and future studies could explore the impact of living near different types of water bodies.

- ✓ Training

According to below table More than half (79.5%) HHs did not got training by any means regarding HHS Solid waste management. However 20.5% respond they got HHs Solid waste management training

Table 4.2.2

Variables	Response	Frequency	percentage
Getting Training/Lesson	Yes	41	20.5
	No	159	79.5

- **Importance of Training Findings:**

The finding that a significant portion (79.5%) of households lacked training on household solid waste management (SWM) is crucial because it highlights a potential gap in the existing SWM strategy. Limited access to training on proper waste disposal methods and recycling opportunities could be contributing to the observed challenges in waste management practices. This finding aligns with our objective to identify factors influencing household SWM practices.

4.3 hhs' knowledge towards the SWM of HHs in lafto sub city

Approximately 56% of households provided accurate responses regarding solid waste as a source of environmental pollutants, with 83.5% of these households associating such pollutants with

diarrhea, typhoid, and cholera. Similarly, 36% of households demonstrated knowledge of recyclable items within solid waste, with a comparable proportion of households sorting and selling these items to recycling companies. Nearly 72% of respondents were aware that improper solid waste management can lead to pollution of rivers and lakes, while a smaller proportion of households (16.4%) reported knowledge of sorting solid waste at the household level for effective management. Additionally, close to 38% of households believed that waste papers, plastic bags, metal, wood, and cloth are recyclable. However, a relatively low level of knowledge (40.5%) was observed regarding the potential for reducing solid waste through household-level reuse.

Table 4.3: knowledge of hhs towards the Solid hhs waste management

Questions	Frequency		Total	Percentage (%)		Total
	Yes	No		Yes	No	
Is solid waste source of pollution for the environment?	112	88	200	56	44	100
HHs SW were associated with diarrhea, typhoid, and cholera	167	33	200	83.5	16.5	100
Can solid waste be sorted and sold for recycling companies.	72	128		36	64	200
Improper dumping of solid wastes can eventually lead to pollution of rivers, lakes and wells.	145	55	200	72.5	27.5	100
Sorting of solid waste at home level helps for SWM.	33	166		16.4	82.6	200
Waste papers, plastic bags, a piece of metal, wood and cloths are recyclable?	76	124		38	62	200
The amount of solid waste can be reduced by reusing at household level.	81	119	200	40.5	59.5	100

Following the evaluation of seven knowledge questions pertaining to the specified section, with a maximum achievable score of 7, each accurate response (affirmative) was attributed a score of 1, while incorrect responses (negative) were assigned a score of 0. The participants' comprehensive knowledge score was then classified by employing the mean as a threshold. Consequently, 132 individuals exhibited a deficiency in knowledge, whereas 68 individuals demonstrated a commendable level of knowledge.

4.4.4 hhs' attitude towards the SWM of HHs in lafto sub city

The attitudes of households in the Lafto sub city community towards solid waste management (SWM) were evaluated and summarized in the table provided. The findings revealed that a less than half proportion (43.5%) of households strongly agreed that solid waste is a pressing environmental issue in the city that necessitates immediate attention from the city government. Additionally, over 49.5% of households accepted the principle that solid waste can be reduced, reused, and recycled, indicating a favorable disposition towards sustainable waste management practices. Similarly 45.5% of households strongly agreed or agreed that solid waste holds no value. Furthermore, around 13.5% of households strongly agreed that the city government has not adequately raised awareness about SWM and enforced regulations against illegal solid waste disposal within the city.

In terms of individual responsibility, slightly over 13.5% of households strongly agreed that proper solid waste collection and disposal is the responsibility of each household, while 23% agreed with this notion. Moreover, a majority of households (14%) strongly agreed that selling plastic waste for recycling is the most effective approach to managing solid waste, with an additional 9% expressing agreement with this perspective.

Table 4.4: Attitude of hhs towards the Solid hhs waste management

Questions	Stronglyagree		Agree		Neither		Disagree		Strongly disagree	
	F	%	F	%	F	%	F	%	F	%
Solid waste is one of the environmental problem that need an immediate attention	18	9	84	43.5	0	0	51	25.5	44	22

Solid waste can be reused, reduced and recycled	4	2	95	47.5	7	3.5	74	37	20	10
Solid waste is anything without value	91	45.5	40	20	4	2	28	14	37	18.5
the city government did not create enough awareness on SWM and control on illegal solid waste disposal in the city	42	21.5	29	14.5	25	12.5	65	32.5	39	19.5
Every HHs should have responsibility of proper collection and disposal of solid wastes	27	13.5	46	23	27	13.5	76	38	24	12
selling plastic waste for recycling is the best way to manage solid wastes	16	8	22	11	30	15	88	44	44	22

Source: Own

Upon conducting an evaluation of six perception inquiries regarding solid waste management within the HHS, with a rating scale ranging from Strongly Agree (5) to Strongly Disagree (1), it was determined that 125 respondents exhibited an unfavorable attitude towards the subject matter, while 75 respondents displayed a favorable attitude. The mean was utilized as a threshold for this determination.

4.4.5 Practice of hhs towards the hhs Solid waste management

A total of 11.4% of households engaged in the practice of segregating their solid waste at the household level prior to disposal. However, it was found that 50% of households improperly collected and stored their solid waste, either in their backyard or along roadsides and in gullies. Furthermore, a significant majority (96%) of households did not implement the 3Rs strategies (reduce, reuse, recycle) in their waste management practices. The remaining households did adopt these strategies to some extent. It is worth noting that a majority (41.3%) of households reported a lack of adequate solid waste services or proper dumping sites in their sub city. Consequently, these households resorted to improper solid waste management practices.

In addition to the absence of a solid waste management service or facility, it is noted that 71.6% of households have access to door-to-door solid waste collection services, as indicated in Table 11. The predominant method of solid waste disposal is through transportation to the nearest container or private waste collectors.

According to a study conducted by Gebre (2019), the current facility and services for solid waste management are severely inadequate. Despite the efforts made by the city municipality to implement solid waste management strategies such as door-to-door collection and the provision of containers at certain distances, various challenges hinder the effective utilization of these services. These challenges include the poor condition of roads, the presence of illegal housing settlements along river banks, and the distance of households from the designated waste containers. Consequently, residents are unable to access the solid waste management facility or service, leading them to resort to the improper disposal of waste into rivers.

Table 4.5: Practice of SWM from hhs wastes

Description	F	%
Do you separate solid waste before disposal?		
Yes	23	11.4
No	177	88.1
Are their adequate SW disposal site/service in the sub city		
Yes	83	41.3
No	117	58.2
Do you have access to door to door SWM service		
Yes	56	71.6
No	144	27.9
Do you recycling, reused, and reduced your solid waste?		
Yes	7	3.5
No	153	96
Do you collect and stored solid waste properly, either in the backyard or along the road sides and in gully.		
Yes	100	50
No	100	50

Source: Own

After evaluating five questions regarding SWM Practice from the hhs, a score of 1 was assigned to each Good practice (indicating proper management of SW), while a score of 0 was assigned to

Poor Practice (indicating improper SWM practice). The participants' overall SWM practice score was then categorized using the mean as the cut-off point, with a score of 130 indicating poor practice and a score of 70 indicating good practice.

4.5 Factors that affect practices of hhs

In this section, the researcher employed a range of statistical methodologies to examine the correlation between independent variables and the dependent variable. Chi-square tests were conducted to ascertain the associations between the dependent variable and categorical independent variables, namely household head sex, educational level, number of years residing along the river, training, knowledge, and attitude.

4.5.1 Demographic factors

The demographic factor is a significant determinant of the practices of household solid waste management (SWM). This factor encompasses household head sex, educational status, and the duration of residence along the river. This section presents the fundamental characteristics of the sample household heads and their SWM practices.

The sex of the household head is a crucial individual or demographic characteristic that influences household SWM practices. The majority of the sample household heads (55.5%) were female-headed households, while the remaining (44.5%) were male-headed households. The results indicate that the sex of the household head has a significant impact on the ability of the household to practice SWM. Male-headed households are less likely to practice poor SWM than female-headed households. The poor SWM practice index by the sex of the household head revealed that 41.5% of all household heads with poor practices belonged to female-headed households, while the remaining 23.5% were male-headed. Conversely, among all good practice households, 21% were male-headed, while the remaining 14% were female-headed households. Furthermore, the chi-square test demonstrated a significant systematic association between the sex of the household head and SWM practices.

Previous research by Tamiru (2014) has shown that household head sex has an impact on environmental pollution in poor nations through differences in the adoption of solid waste management services and methods, as well as the accessibility and affordability of infrastructure. According to the Plus report (2017), female-headed households in the ONEWASH Plus project

areas were found to be not only more likely to have an income below the minimum wage but also less likely to have access to improved SWM facilities compared to male-headed households.

The findings of the survey indicate that 47% of the household heads in the sample were illiterate, while the remaining respondents had achieved a level of literacy. Additionally, the results revealed that a higher proportion of households (34.5%) with poor waste management practices fell into the illiterate category. The Pearson chi-square test demonstrated a significant association between the educational status of the household heads and their waste management practices in the SWM area. Educated households were found to be more proficient in utilizing modern technologies, implementing improved solid waste management practices, and generally exhibiting less vulnerability to environmental risks and pollution caused by waste disposal (Mekelit, 2016).

Furthermore, the study uncovered that 54% of respondents from households with poor waste management practices had resided in areas adjacent to rivers for more than five years, compared to only 23% of respondents from households with good waste management practices. This suggests a correlation between the duration of residence along the river and waste management practices. Moreover, the chi-square test confirmed a significant systematic relationship between the length of time households had lived along the river and their waste management practices.

Table 4.6: Demographic Characteristics by SWM practice

Variables	Practice				Total (frequency & %)		Chi Square
	Poor Practice		Good Practice				
	N	%	N	%			
Sex of the household head							
Male	47	23.5	42	21	89	44.5	10.476***
Female	83	41.5	28	14	11	55.5	
Educational level of the respondent household							
Illiterate	69	34.5	25	12.5	94	47	13.8**

Primary	36	18.0	15	7.5	51	25.5	
Secondary	18	9	18	9	36	18	
Diploma and above	7	3.5	12	6	19	9.5	
Living along the area							
0-5	22	11	24	12	46	23	7.745**
Above 5	108	54	46	23	154	77	

4.5.2 Training/Lesson

In this section, the researcher investigated the influence of institutional factors on practice of HHs Solid waste management; particularly, it includes training or information for HHs.

On the case of training/lesson associated with practice below indicates that the significant number of the respondents didn‟t take any training/lesson associated with practice. From the total respondents 113(56.5%) of them didn‟t take any lesson or training related to poor practice but 24(12%) of the respondents took training/lesson related to good practice.

The finding from HHS survey is further strengthened by Pearson chi-square test demonstrating a significant positive relation at 1% on lesson/training with practice on HHS Solid waste management.

On table 4.2.2, we presented the finding that a large portion of households (79.5%) lacked training on SWM. This section (4.5.2) delves deeper into the reasons behind this lack of training from the perspective of woreda 06 sub-city officials. Here, we highlight the challenges faced by the woreda in providing effective SWM management, including limitations in training programs. This section complements the initial finding by providing context for the observed low training rates among households.

Variables	Practice		Total (frequency &	Chi Square
	Poor Practice	Good Practice		

	N	%	N	%	%)		value
Training/lesson							
No	113	56.5	46	23	159	79.5	12.55***
Yes	17	8.5	24	12	41	20.5	

4.5.3 Behaviors by SWM factors

In the assessment of knowledge, it was found that 66% of the respondents had poor knowledge, with 48.5% of them also exhibiting poor practice. Conversely, 17.5% of those with poor knowledge demonstrated good practice. On the other hand, 34% of the respondents had good knowledge, with 17.5% of them also displaying good practice. The chi-square test indicated a significant relationship between knowledge and practice in solid waste management (SWM) at a 1% level of significance.

Workine (2020) emphasized in his study that the lack of information on behaviors among various stakeholders in SWM is a significant issue in SWM practice. He further suggested that it is crucial to thoroughly study the knowledge, attitude, and practice of stakeholders to fully comprehend the magnitude of the problem and develop effective solutions. Therefore, understanding the perspectives of community members who are stakeholders in SWM is an important step in implementing both short-term and long-term mitigation and adaptation measures.

Regarding attitude, 62.5% of the sampled respondents were found to have an unfavorable attitude, while the remaining 37.5% had a favorable attitude. Among households with an unfavorable attitude, 46% exhibited poor practice, while 16.5% demonstrated good practice in SWM. The chi-square test also indicated a significant relationship between attitude and practice of households in SWM at a 1% level of significance.

The study conducted by Stringer (2009) highlights the importance of understanding the attitudes of different stakeholders in effectively managing SWM. Additionally, a study by Siwakoti

(2009) revealed a strong positive relationship between environmental awareness, environmental attitude, and their practice in SWM among communities.

Table 4.7 behaviors factors by SWM index

Variables	Practice				Total (frequency &		Chi Square
	Poor Practice		%)Good Practice				
	N	%	N	%	N	%	
Knowledge							
No	97	48.5	35	17.5	132	66	12.286***
Yes	33	16.5	35	17.5	68	34	
Attitude							
Unfavorable	92	46	33	16.5	125	62.5	10.83***
Favorable	38	19	37	18.5	75	37.5	

Source: Own

4.6 Interview with government stakeholders officials

In Ethiopia, the management of solid waste management (SWM) is entrusted to a range of entities with varying levels of jurisdiction, from the federal to the local level. These organizations assume different roles and responsibilities based on their respective interests and objectives. Some focus on the development and improvement of SWM services, while others function as regulatory bodies, and yet others operate as service providers. To assess the appropriateness and efficacy of these institutions in the context of SWM management, key informant interviews have been conducted.

4.6.1 Key stakeholders Governments role and responsibility on SWM

From the woreda 06 sub city officials On the interviewee from the official of lafto woredas 06 solid waste management bureau.

Based on the information obtained from the personnel at the woreda 06 solid waste management bureau, the woreda is facing numerous challenges in effectively managing its solid waste. The lack of awareness and community involvement has led to an increase in illegal dumping, which not only poses a threat to the environment but also undermines the efforts of the city's development plan.

"*One of the main issues is the insufficient SWM awareness among the residents. Many people are not aware of the proper methods of waste disposal and the importance of recycling and composting. This lack of knowledge leads to improper waste management practices, such as throwing recyclable materials in regular trash bins or disposing of organic waste in landfills instead of composting.*

Furthermore, the low community involvement in regulating and controlling illegal dumping exacerbates the problem. Without active participation from the residents, it becomes challenging for the city to enforce regulations and prevent illegal dumping effectively. This lack of community engagement also hinders the implementation of waste reduction initiatives and source segregation programs."

while discussing about the major constituents of solid wastes in your sub city the woreda solid waste management official, he clearly stated that The principal method employed for solid waste management involves Micro and Small Enterprises (MSEs) taking on the responsibility of collecting waste from households through a door-to-door collection system. This approach is widely used as it ensures that waste is properly disposed of and reduces the burden on local authorities.

However, one major obstacle that the community faces in implementing this method is the inadequate condition of the road infrastructure. The roads in the area are often poorly maintained, with potholes, cracks, and uneven surfaces making it difficult for waste collection to navigate through the community.

"*The inadequate road infrastructure also poses a significant inconvenience for residents, as it hampers the timely and efficient removal of waste from their homes. This can lead to the accumulation of waste in households, causing unpleasant odors, attracting pests, and posing health hazards to the community."*

He also mentioned that, the challenges posed by the poor road infrastructure also affect the overall efficiency of the solid waste management system. The delay in waste collection can result in overflowing bins and an increase in illegal dumping, further exacerbating the waste management problem."*To address this issue, it is crucial for the local authorities to prioritize the improvement of the road infrastructure in the community. This could involve repairing and maintaining existing roads, constructing new roads, and implementing measures to ensure regular upkeep*."

additionally, the official from woreda 06 of solid waste management has described the fact that the scarcity of containers posed a significant challenge in the solid waste collection system. Without enough containers, it became difficult for individuals to properly dispose of their waste. This led to a buildup of waste in households and public areas, exacerbating the problem.

"*Limited accessibility to certain areas within the city also presented a major hurdle. Some neighborhoods or regions were not easily reachable by waste collection trucks, making it challenging to implement an efficient waste management system. As a result, residents in these areas had no choice but to resort to improper waste disposal methods.*

Furthermore, the dearth of appropriate vacant land for container placement further complicated the solid waste collection system. Without designated areas for waste containers, it became increasingly difficult to establish a systematic waste management process. This lack of space hindered the proper storage and collection of waste, contributing to the overall problem.

Consequently, individuals were forced to find alternative ways to dispose of their waste. Riverbanks, vacant lots, drains, and roadsides became common dumping grounds for many people. This behavior not only posed environmental hazards but also created an unsightly and unhygienic living environment for the community."

According to the personnel of solid waste management bureau in woreda 09, sustained campaigns aimed at raising awareness should be developed and implemented. These campaigns should be ongoing and targeted towards different segments of the population, including schools, businesses, and residential areas. By consistently promoting the importance of waste reduction, source segregation, recycling, reuse, and composting, the city can foster a culture of sustainable waste management practices.

"The major contributing factor to the ineffective implementation of SWM processes is the absence of sustained campaigns aimed at raising awareness among the city's population. While there may have been initial efforts to promote waste reduction, source segregation, recycling, reuse, and composting, these activities have not been consistently executed. As a result, the impact of these campaigns is limited, and the desired behavioral changes among the residents are not achieved.

To address these challenges, it is crucial for the city to prioritize raising public awareness and increasing community involvement in SWM processes. This can be done through various means, such as educational campaigns, workshops, and community outreach programs. By providing information and resources to the residents, the city can empower them to actively participate in waste management and make informed decisions regarding waste disposal.

Additionally, the city should strengthen its enforcement mechanisms to deter illegal dumping. This can involve increasing penalties for offenders, implementing surveillance systems in vulnerable areas, and encouraging residents to report any instances of illegal dumping they witness. By creating a sensof accountability and responsibility, the city can discourage illegal dumping and promote a culture of proper waste management."

Also, this individual stated that "*The primary drivers behind this improper waste disposal behavior were a lack of environmental consciousness and awareness. Many individuals were not fully aware of the negative impacts of their actions on the environment and public health. Additionally, the absence of convenient and appealing alternatives played a role in this behavior. If individuals did not have access to proper waste disposal facilities or services, they were more likely to resort to the easiest and most accessible options available to them.*

Deficiencies in the waste collection and transportation system also contributed to the problem. Inefficient waste collection schedules, inadequate infrastructure, and a lack of resources hindered the proper management of solid waste. Despite the general awareness among the populace that improper waste disposal was unlawful, the shortcomings in the waste management system made it difficult for individuals to comply with the regulations.

In conclusion, the primary challenges encountered in the solid waste collection system included a scarcity of containers, limited accessibility to certain areas within the city, and a dearth of appropriate vacant land for container placement. These challenges led to individuals resorting

to improper waste disposal methods, driven by a lack of environmental consciousness, absence of convenient alternatives, and deficiencies in the waste collection and transportation system. Despite the general awareness among the populace that such actions were unlawful, the existing shortcomings in the waste management system hindered proper waste disposal practices."

Both woredas claimed that he improper disposal of solid waste has become a major issue in the woredas , posing a threat to the river and land environment. The official responsible for solid waste management has stated that the lack of community engagement is a significant factor contributing to this problem. Many residents are not aware of the proper methods of disposing of their waste, and as a result, they often dump it in open spaces or the river, leading to environmental degradation.

In addition, the enforcement of policies aimed at penalizing individuals for their transgressions has been inadequate. Many people continue to dispose of their waste improperly without fear of being punished. This lack of enforcement has emboldened individuals to continue with their harmful practices, leading to a worsening of the situation.

Furthermore, there is a dearth of feedback from the public regarding the impact of household solid waste on the environment. Many residents are not aware of the negative effects of their actions on the environment, and as a result, they do not take the necessary steps to reduce their waste or dispose of it properly.

To address these challenges, the officials responsible for solid waste management has called for increased community engagement and awareness campaigns to educate residents on the proper methods of waste disposal. Additionally, there is a need for stricter enforcement of policies aimed at penalizing individuals who dispose of their waste improperly. Finally, there is a need for increased feedback from the public regarding the impact of household solid waste on the environment, which can help to inform policies and strategies aimed at mitigating the negative effects of improper waste disposal.

Also, both woreda official stated the fact that because lack of budget for activities, which is a common issue at the city administration and woreda level to deliver sufficient SWM facility and problem of budget allocation, they were not able to take a significant measures to solve solid waste management challenges rather to report this issues for the high level.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

Our research has highlighted the significant negative consequences of improper solid waste management (SWM) practices in Lafto Sub City. The observed prevalence of littering, open burning, and improper waste disposal in waterways aligns with the concerns raised by residents regarding environmental pollution. Furthermore, the lack of knowledge and negative attitudes towards waste sorting and recycling suggest potential barriers to adopting more sustainable practices. These findings underscore the urgency of addressing these issues to protect public health and the environment.

The study also revealed a connection between KAP and household SWM practices. Residents with higher knowledge scores regarding proper waste disposal methods were more likely to engage in practices like waste sorting and composting. However, positive attitudes alone did not necessarily translate into better practices, suggesting the need for interventions that address both knowledge and behavioral change.

Our analysis identified several factors that influence household SWM practices. Limited access to waste collection services, lack of training on proper waste disposal, and negative perceptions of the effectiveness of waste management systems all emerged as significant barriers. Addressing these factors through improved infrastructure, educational programs, and increased community engagement will be crucial for promoting more sustainable SWM practices.

5.2 Recommendation

Based on the study findings, it is recommended that the local government prioritize public awareness campaigns to educate residents about the importance of proper SWM practices and the environmental and health benefits of waste reduction, reuse, and recycling (3R). These campaigns should utilize diverse communication channels, such as community meetings, local media outlets, and social media platforms, to ensure a wide reach.

The study suggests a need for interventions that go beyond simply raising awareness. Developing educational programs that address negative attitudes and encourage behavior change could be highly effective. These programs could involve workshops, demonstrations, and incentive schemes to motivate residents to adopt sustainable SWM practices.

The research underscores the importance of addressing practical barriers that hinder residents from engaging in proper waste management. This could involve expanding access to waste collection services, particularly in underserved areas, and exploring alternative solutions such as composting initiatives. Investing in improved waste management infrastructure, such as designated drop-off points for recyclable materials, would also be beneficial.

The success of any SWM intervention strategy hinges on active community participation. The local government should work collaboratively with community leaders and residents to develop and implement solutions that are tailored to the specific needs and context of Lafto Sub City. This could involve establishing community-based waste management committees and promoting resident involvement in monitoring and evaluation efforts.

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APPENDIX'S

Dear respondents, the aim of this questionnaire is prepared to gather relevant information about the **knowledge, attitude and practice on household solid waste management in Addis Ababa lafto sub city, Ethiopia**. So your genuine and correct responses will contribute for my effective work. Your information will be kept confidential and not used for other purpose and hence you are personally not affected. For this reason you are kindly provide the correct information for the following questions.

GENERAL INFORMATION

- Do not write your name.
- Please put"√" mark in boxes.
- Circle the correct letter from each questions.
- Provide relevant information for open ended questions on space provide.

SECTION I. QUESTIONNAIRES FOR HOUSEHOLDS' RESPONDENTS

the information obtained through this questionnaire will be used only for academic Purpose and could not have any effect on the respondents' privacy.

Part I. Respondents' of Personal Information

1. woreda; A, 09 ☐ B, 06 ☐

2. Sex: A, Male ☐ B, Female ☐

3. Age in year: _____

4. Education level: A, No formal education (illiterate) ☐ B, Primary school ☐

C, Secondary school D Diploma ☐ F, Bachelor 'degree and above ☐

5. Living years in Lfto sub city: A, < 2 years ☐ B, 2-5years' ☐ C, 6-10 Years ☐ D, Above 10 years ☐

6. Family size: A, 1-3 B, 4-6 C, 7-9 D, above 10

7. Average household's monthly income in birr: A, Less than 1000 ☐ B, 1000-1500 ☐ C, 1501-3000 ☐ D, 3001-5000 ☐ E, above 500O ☐

8. Occupation: A, Government employee ☐ B, NGO ☐ C, Self-employed☐ D, employed in Private sectors ☐ E, Other (specify) _____

Part II. Knowledge of Households towards Solid Waste Management.

Please, choose one of the alternatives by put "√" in the given tables.

No	Questions	Alternatives	
		A	B
1	Is solid waste source of pollution for the environment?		
2	can HHs SW associate with diarrhea, typhoid, and cholera?		
3	Can solid waste be sorted and sold for recycling companies?		
4	Can improper dumping of solid wastes eventually lead to pollution of rivers, lakes and wells?		
5	will sorting of solid waste at home level helps for SWM?		
6	Waste papers, plastic bags, a piece of metal, wood and cloths are recyclable?		
7	can the amount of solid waste can be reduced by reusing at household level?		

Alternatives: A= Yes B= No

Part III. Attitude of Households towards Solid Waste management

Please, choose one of the alternative scales by put "√" in the given tables.

No	Statements	Alternative			
		A	B	C	D
1	Solid waste is one of the environmental problem that need an immediate attention				
2	Solid waste can be reused, reduced and recycled				
3	Solid waste is anything without value				
4	the city government did not create enough awareness on SWM and control on illegal solid waste disposal in the city				
5	Every HHs should have responsibility of proper collection and disposal of solid wastes				
6	selling plastic waste for recycling is the best way to manage solid wastes				

Alternative Scales: A=Strongly Agree B=Agree C=Disagree D=Strongly Disagree

Part **IV. Households' Practice in Solid Waste Management.**

Please, answer by circling one of the alternatives for the following questions:

No	Statement	Yes	No
1	Do you separate solid waste before disposal?		
2	Is their adequate SW disposal site/service in the sub city?		
3	Do you have access to door to door SWM service?		
4	Do you recycling, reused, and reduced your solid waste?		

5	Do you collect and stored solid waste properly?		

SECTION II. KII

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Dear members of the key informant, the aim of this interview is prepared to gather relevant information about the "**knowledge, attitude and practice on household solid waste management in lafto sub city, Ethiopia"**. So your genuine interview will contribute a great value for my effective work. Our interview will be kept confidential and not used for other purpose and hence you are personally not affected. For this reason you are kindly provide the correct information for the following questions.

1.Do you agree that the municipality has done enough public awareness on solid waste management?_____

_____

2.What are the major constituents of solid wastes in your sub city?

_____

_____

3. Are there adequate solid waste service and sites in the sub city?

_____

4.Do you have a plan to encourage the households to reuse and recycle of solid wastes in your sub city?

_____

_____

5. What are some of the challenges in dealing with solid waste management?

_____

_____

6. What measures your office has taken to solve solid waste management challenges?

_____

_____