

**PRACTICES AND CHALLENGES OF HOUSHOLD SOLID WASTE
MANAGEMENT IN FINOTE-SELAM TOWN, WEST GOJAM ZONE,
AMHARA REGIONAL STATE, ETHIOPIA**

MA THESIS

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Practices and Challenges of Household Solid Waste Management in Finote-Selam Town, West Gojjam Zone, Amhara Regional State, Ethiopia

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DEDICATION

I dedicated this work to my beloved wife, child and families those who were brought me to this success.

STATEMENT OF THE AUTHOR

By my signature below, I declared and affirmed that this Thesis is my own work. I have followed all ethical and technical principles of scholarship in the preparation, data collection, data analysis, and completion of this Thesis. Any scholarly matter that is included in the Thesis has been given recognition through citation.

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BIOGRAPHICAL SKETCH

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ABBREVIATIONS AND ACRONYMS

APC	Amhara Plan Commission
CSA	Central Statistical Agency
EMT	Ecological Modernization Theory
FTMO	Finote-selam Town Municipal Office
GHG	Green House Gas
HHSW	Household Solid Waste
HHSWM	Household Solid Waste Management
ISWA	International Solid Waste Association
MoE	Ministry of Education
MSW	Municipal Solid Waste
SPSS	Statistical Product and Service Solution
SW	Solid Waste
SWG	Solid Waste Generation
SWM	Solid Waste Management
UNDP	United Nation Development Program
UNEP	United Nation Environmental Program
WMT	Waste Management Theory
SWMP	Solid Waste Management Practice

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ABSTRACT

The fast growth of urban populations, high resource consumption, and growth of technologies have caused a dramatic growth in urban solid waste volumes and generation with environmental and public health issues associated with water contamination, emission of poisonous and dangerous gases, soil pollution, and introduction of disease vector populations. The aim of the study was to evaluate the practices and challenges of household solid waste management in Finote Selam town, West Gojjam Zone, Amhara Regional State, Ethiopia. The researcher employed descriptive and triangulation mixed research design for this study. The study tried to test the socio-economic factors influencing the solid waste generation of the respondents in the urban area by using a multiple linear regression model. The researcher employed a simple random sampling technique to select sample respondents. A total of 395 respondents were surveyed. The findings indicated that the sample household respondents were replied that lack of awareness 55%, dumping site problems 26%, high resource consumptions 15%, and lack of containers 4% were the major caused factors for high solid waste generation in the town and aggravated socio-economic and environmental pollutions. Additionally, the results revealed that 40.1% variance in solid waste generated and stored in Kg/day can be accounted for by thirteen predictors collectively: $F(13, 381) = 19.620, p < .001$. Looking at the unique contributions of the predictors and the results showed that sex ($\beta = .228, t = 5.256, p < .001$), age ($\beta = .091, t = 2.266, p = .024$), family size ($\beta = -.108, t = -2.632, p = .009$), marital status ($\beta = -.248, t = -5.491, p < .001$), and shortage of technology ($\beta = .368, t = 7.942, p < .001$), were the major factor for solid waste generation in Finote-selam town. As the findings indicated that inappropriate solid waste management practices and methods of disposal of solid waste caused different health problems.

Keywords: *Awareness, Disposals practice, Household solid waste, Solid Waste, Solid Waste Generation.*

INTRODUCTION

1.1. Background of the Study

Household solid waste refers to the discarded materials that are no longer useful to households such as refuse, garbage, and sludge (Vergara and Tchobanoglous, 2012). Households generate solid waste through sweeping of compounds, food making processing and consumption, building and construction, replacement and disposal of furniture, appliances, and clothing (Bukari et al., 2017). Population growth, industrialization, urbanization, and economic growth trends also have significant factors in the increase of solid waste generation (SWG) worldwide (Hester et al., 2014). Since, household solid waste generation has an affirmative correspondence among economic development at a world scale including rapid industrial growth, high consumption of resources, and movement of people from the countryside to cities (Kaushal et al., 2012). Though, SWGs have become escalating environmental and public health problems everywhere in the world due to technological development and changing lifestyles of the people (Sivakumar, and Sugirtharan, 2012).

Solid waste management is the practice of collect, store, handle, and dumping solid wastes in such a way that they are dangerous to human health, flora and fauna, ecosystem, and the environment in general (Chalam et al. 2009). According to UNEP (2015), 11.2 billion metric tons of solid wastes are presently being collected around the globe each year. The decomposing of an untreated part in this solid waste is contributing to about 5% of the global greenhouse gas emissions. Consequently, most developed countries such as the USA, England France, German, and Sweden are acknowledged that solid waste management is extremely essential for continued existence in addition to secure the safety of the environment, and human health; so, SWM incorporates political, institutional, social, environmental, and economic aspects (Daniel et al., 2017). Due to this, SWM is an essential part of the municipal infrastructure to make sure the protection of the environment, humans' health, and it is directly associated with an urban way of life, resource use pattern, job, and income levels, and other socio-economic and cultural factors (ISWA, 2012).

Access to solid waste collection, awareness and attitude, institution and legislation, family size, and incomes are the most significant factors affecting the amount of solid waste from household consumption (Sivakumar, and Sugirtharan, 2012). In addition to this, inappropriate household solid

waste management is the main contributing factor designed for municipal solid waste generation, mainly in developing countries (Adzawla et al., 2019). The most important challenges of solid waste management in developing countries can be insufficient resource coverage and ineffective services, inadequate operation of recycling activities, insufficient landfill dumping as well as open dumping and un enough management of hazardous and healthcare solid wastes (Zurbrugg, 2013).

Africa is the well-known least developed region in the world with 38% urbanization. Although, this is low compared to many other countries in the globe; African countries are experiencing fast development by the growth rate of four percent per annum and today faced through the massive amount of municipal solid waste (MSW) which have direct problems for human health, and the environment (Muzenda et al., 2011). Urban areas in Africa experiencing an increased rate of ecological worsening as a result of indiscriminate dumping of HHSW and poor SWM capacities particularly in low-income countries like Ethiopia (Solomon, 2011; Amasuomo and Baird, 2016). Hence, the features and lack of effective implementation of reliable household solid waste (HHSW) policies accompanied by altering lifestyles improved fabrication processes and others are major challenges for solid waste management practices (Mmereki, 2016).

Ethiopia is a single low developed country in the globe and it covers only 17% of its population existing in urban centers (UNDP, 2015). Yet, solid waste management is very poor in the country for the reason that now Ethiopia is facing high rural to urban migration and rapid urbanization per annum most important to congestion and expansion of slums and informal settlements with poor solid waste management problems and the urban dwellers are consuming further resources than rural dwellers and so generate huge quantities of household solid waste (Gedefaw, 2015). In addition to this, inappropriate household solid waste removal and management problems causing all types of pollutions such as air, soil, environment, ground, and surface water pollutions (Alam & Ahmade, 2013). Because cities and municipalities cannot manage such an accelerating rate of solid waste generation and compositions in the factors of ineffective technologies, low-income levels of the people, lack of good governance, leadership, low awareness and attitudes of the people, and cultures (Zurbrugg et al., 2014; Modak et al., 2015).

Finote-Selam is one of the Ethiopian town's which is the governmental, cultural, and business center of the west Gojjam zone. Mainly, the town is characterized by rapid population growth

caused by natural increase and migration basically from rural to urban areas after it becomes a zonal town of west Gojjam; in addition to this, the spatial enlargements in urban areas and increases in inhabitants have increased the number of solid wastes (FMO, 2012). As a result, solid waste management is faced with frightening challenges in Finote-Selam town with different factors such as an ever-increasing population, economic growth, and poor administrations, lack of communication and transportations, and public attitudes among others; so, solid waste management is considered as critical problems in most parts of the town (Badgie et al., 2012).

1.2. Statement of the problem

Solid waste management is becoming a major public health, economic and ecological problem in urban areas of developing countries that merely some of the population received solid waste collected works, transportation and landfill dumping services (Kassa, 2010). This solid waste problem comes from incompetent solid waste management and throwing away of household solid waste which is an understandable cause for urban environment pollutions and degradation (Gedefaw, 2015). Ecological impacts such as land degradation, water and air pollution are linked with municipal solid waste generation, economic development, rapid population growth, and level of urbanization with miss solid waste management problems (Khajuria et al., 2008).

On the other hand, solid waste problems influence urban areas of all sizes, from mega-cities to the small towns and large villages, which are residence to the majority of humankind. However, the management practice to some extent is extraordinary that it receives so little awareness or attention when compared to other urban management issues (UN-Habitat, 2010). Hence, solid waste is the problems of the day-to-day activities of human-beings. Due to this, the developmental processes through insufficient household solid waste management practices especially, extensive discarding of solid waste in water bodies, dumping inside the road and uncontrolled dumpsites aggravate the problems of solid waste management levels across the African countries including Ethiopia (Ashenafi, 2011). Mainly in East African capital cities, solid waste management is a severe problem with the deficiency of good management practice. Increasingly more concern is the growing quantities of solid waste that are generated at households' level from informal settlements (Kasala, 2014).

The main problems of Ethiopian cities are agglomerated young population caused by both natural increase and migration from the countryside. Thus, rapid population growth, urbanization, and economic growth contribute to increasing solid waste generation (Gupta et al., 2015). In this case, the country's cities faced problems associated with poor solid waste management practices (Regassa, 2011). Of such problems are high solid waste generation rate, poor solid waste administration, urban slums, ecological degradation, and air pollution (Mor et al., 2016). These solid waste problems are intricate due to various factors such as the amount and composition of waste generated, fast expansion of urban areas, low financial support, and social issues (Moh, 2017). The population in most towns of Ethiopia is often used dangerous household solid waste disposal practices such as open dumping, burning, and burying (Kassahun, 2018). In general, these problems are the consequence of poor municipal solid waste management, inappropriate handling, and discarding practices of household solid waste in Ethiopia which continuously increase solid waste generation annually (Dhokhikah and Trihadiningrum, 2012).

Finote-Selam is one of the fast expanded and populated town in the west Gojjam zone, Amhara regional state of Ethiopia. This rapid increase of populations mutually with the rapid development of the town and informal settlements have been produced a huge quantity of solid waste in the town. In addition to this and lack of disposing areas solid wastes thrown away at every corner of the inhabited areas, business-related areas, water bodies, streets, drainage channels, and the like. Therefore, the study area needs right-solid waste management options, to reduce environmental contamination, and degradation as well as maximize resource recovery (Hossain et al., 2011).

Over past decades, comparable studies were conducted related to solid waste management in different areas. According to Kassahun (2018), findings in Bahir-Dar city, lack of firm punishment, and non-implementation of law are the basic problems for the successful management of solid waste. Zewudu and Mohammedbirhan (2014) were conducted a parallel study and assured that low technical and institutional engagements and low monitoring and enforcement are the problem for solid waste management in Aksum. Asemamaw et al., (2017) were studied the same issues in Debre-Berhan city and they stated that poor on-site solid waste separation and poor on-site solid waste handling are the problems of solid waste management. Nigatu et al., (2011) were studied in Addis Ababa city and described that the lack of financial, institutional limitation, inappropriate choice of technology, transportation systems, and discarding options makes a problem for solid

waste management. Endrias and Solomon, (2017) were also discussed about the decomposing of organic solid waste and recycling would be created job opportunities and reduced municipal solid waste management problems in Woliata Sodo. Whereas, Duguma et al, (2018) were identified that households' low-level of responsiveness towards solid waste management and poor removal systems makes a challenge for SWM in Robe town. However, all the above studies were paid less attention to study environmental and socio-economic impacts of solid waste management practices in Ethiopia. Therefore, this study aimed to fill the gaps of environmental and socio-economic impacts of solid waste management practices through studying of the impacts of poor solid waste management in Finote-Selam town.

1.3. Objectives of the study

1.3.1. General objective

The general objectives of the study was to examine the overall practices and challenges of household solid waste management in the study area

1.3.2. Specific objectives

- To explain the causes and factors affecting on household solid waste generation.
- To examine the consequences of poor solid waste management in the study area.
- To describe the practices and collaborations of household solid waste management activities.
- To point out major challenges in the household solid waste management practices in the study area.

1.4. Research Questions

- ❖ What are the causes and factors affecting household solid waste management in the study area?
- ❖ What are the consequences of solid waste in the study area?
- ❖ What are the practices and collaborations of the society on household solid waste management in the study area?

- ❖ What are the major challenges in the household solid waste management practices in the study area?

1.5. Significance of the Study

The study would be expected to have valuable benefits for communities, urban planners, researchers, municipal authorities and administrators, private information, and policymakers who were concerned in the advertising of household solid waste management practices in the region and at the national level to take measures to decrease the fast solid waste generation rate and its factors for addressing environmental problems and finally contribute to shifting towards a further environmentally sustainable society.

Consequently, the outcomes of this study would mainly assisted the urban residents to propose the reality solid waste management practices, systems and strategies by focusing on resolving their major limiting factors and attitudes. By means of this, the study would be contributed to minimizing socio-economic and environmental problems and the challenges of solid waste in the study area.

1.6. Scope of the study

Geographically this study was delimited in the Finoteselam town west Gojjam zone Amhara regional state of Ethiopia. It is mainly concerned on solid waste management practices and delimited to use of descriptive and inferential statistics.

1.7. Limitation of the Study

The shortage of sufficient secondary data and unwillingness of some respondents and officials to give response for the required data were some of the limitations of the study. In addition to this, shortage of time and absence of adequate research funds were the other limiting factors of the study. Moreover, the researcher was challenged COVID 19 prevalence to conduct interview and distribute and collect questionnaires. However, necessary precautions were taken to ensure that these limitations did not affect the study outcomes. Due to the researcher was selecting appropriate sample sizes, study designs, and data collection methods to overcome all these limitations.

1.8. Definition of Key Terms

Disposal practice: is the waste disposal, collection, processing, recycling, or deposition of human society's waste materials (Mushtaq, 2017).

Household solid Waste: refers to any waste material derived from households, such as garbage, trash, and refuse. Single and multiple-family homes, hotels and motels, bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds, and day-use recreation areas are all descriptions of households (Moh, and Abdi 2014).

Kebele: is the vicinity of the 'smallest administrative' part of the area which has small groups of people and this governmental area serving as a system of political unit's (Collins dictionary, 2014).

Solid waste generation: solid waste generation refers to the number of resources and products in MSW as they come into the waste flow or solid waste; the production rate is the quantity of waste linked to the waste stream from human activities (Kebede et al., 2017).

Solid waste management factors: refer to the different, human, organizational, ecological, financial, and other problems or factors that can be challenged the solid waste management activities those which need more effort to solve and recover them (McAllister, 2015).

Solid waste management practice: refers to the professional occupied or continual implements of solid waste; so, these activities involve decreasing or removing the volume of solid wastes those which can be polluted to the water body, environments, and roads (Birhanu, and Berisa 2015).

Solid waste management: are the gathering, transporting, processing, and dumping of solid materials to decrease their effect on human health, environment, and aesthetics (Yimer and Sahu, 2014).

Solid waste reduction: is identified as source reduction that the exercise of using a smaller amount of property and energy to cut solid waste generation and conserve natural resources (Reddy, 2011). These also involve any actions that decrease or remove solid waste generation at the source, often inside a process (Bandyopadhyay, 2016).

Solid wastes: are the materials which occur from different human and animal activities and discarded as useless or unwanted such as refuse, garbage, and rubbish (Rana, 2007).

Waste: is unwanted or unusable materials are referred to as waste. Waste is defined as any substance that is discarded after its primary use or that is worthless, defective, or useless (Berisa and Birhanu, 2015).

2. LITERATUR REVIEW

2.1. Theoretical Framework

2.1.1 Concepts of solid waste management

Solid waste management refers to the control of solid waste generation, storage space, collection, transport, processing, and dumping of solid waste from the households and residential areas in a method that is in relationship with the greatest primary public well-being, economic protection, and other ecological contemplation responsive to public feelings (Mushtaq, 2017). It is the one thing now on every city administration provides for its population. Even as service levels, environmental impacts, and expenses differ much, solid waste management is arguably the most significant urban service and serves as a precondition for other public action (Hoornweg et al., 2012). Accomplish this; solid waste management reduces undesirable problems on the environment and human physical conditions through supporting economic development and better quality of life in the urban areas (RoselineJebapriya et al. 2013).

Solid waste has all solid wastes arise from human-beings activities and animal actions that are often solid and discarded as useless or unnecessary. In the same way, solid waste means any garbage, refuse, sludge as well as other unnecessary solid materials mutually with solid waste materials resulting from residential areas, manufacturing, commerce areas, farming operations, and neighborhood activities (Berisa and Birhanu, 2015). The development of a significant increase in solid waste production or generation has been recorded at the international level due to an increasing population, industrialization, and urbanization (Jebapriya et al., 2013). These anthropogenic activities in society produce large quantities of solid waste problems for their disposal that leads to the dispersal of diseases, environmental contamination, and aesthetics (Bowen and Tierobaar, 2014).

Despite, solid waste problems are thought to be the reflection of society; because the condition of the people is directly linked to its financial, chronological, cultural, environmental, and other aspects. These aspects also differ depending on the country, town, or community, so as do solid waste problems. Understanding the state of the people provides away to an understanding of solid waste problems in those people (Guerrero et al., 2013). Though, the main factors of solid waste

problems are in reality associated with the wasteful generation of solid waste and the group production and group utilization of commodities with no consideration for their final discarding. There be able to no explanation to the problems of solid waste until the complete flow of the processes of fabrication, consumption, and dumping are considered as an integrated organization (Sujauddin et al., 2008). Nevertheless, solid waste management is a complex problem in all nations of the earth; predominantly in African countries like Ethiopia as the population is rapidly growing to the radius of cities and towns growing more rapidly, there is also a massive increase of solid waste amount being generated and so solid waste management has to be given proper importance (Karthik, 2018).

2.1.1.1. Theories and concepts of waste management

The concepts of the theory are the analysis of how a concept is structured, acquire, deploy and they also mind illustration that is concerned in numerous human beings' top thought process with diverse forms of analysis and assumption, classification, planning, and decision-making constructing and testing explanations (Gopnik and Wellman, 1994). Due to this, Waste management theory (WMT) is a hypothesis method used to handling and discarding wastes by scheming, collecting, and dumping. The main goals of waste management theory are to decrease the volume of unnecessary waste material and to prevent possible human health and ecological vulnerability (Pongrácz et al., 2004).

2.1.1.1.1. Waste management theory

The theory of waste management (WMT) is a joint stiff of knowledge to waste and waste management to stand for a further in the detailed description of the field and has a theoretical analysis of waste, the activity upon waste, and the holistic outlooks of the result of waste management (Chang et al., 2011; Ciplak and Barton, 2012). WMT is founded on the anticipation that waste management is to protect waste causing damage to human health and surroundings and encourage resources to exploit optimization. Understanding the correct meanings of waste is important to construct a sustainable solid waste program for the study area. It is basically the case that recent legislation attends to existing waste. Conversely, conflict with the results of waste prevention is somewhat that before exists cannot be prevented from arising (Pongrácz et al., 2014). Consequently, the activities intended to improve solid waste management problems particularly

those of developing countries are harmfully affected by resource shortage, socio-economic variation, and excessive urbanization, along with other cultural, social, political and economic aspects (Guerrero et al., 2013; Marshall and Farahbakhsh, 2013).

2.1.1.1. 2. Ecological modernization theory

According to the ideas of ecological modernization theory, the environmental problem comes to be framed as issues that are politically, economically and technologically solvable in the perspective of existing institutions, power structures, and persistent economic growth (Murphy and Gouldson, 2000). EMT also advocates larger public discovery and community involvement in decision makings of the environment. However, at present solid waste management is one of the means areas of public policy; since population growth in cities frequently results in a corresponding increase in solid waste generation. Fundamentally, solid waste generation has always been linked to the economic status of a country and the standard of living of its population and this turning affects solid management practices (Lau, 2003).

2.1.1.1. 3. Application protection motivation theory

According to application protection motivation theory, the population decision to involve in hazard protective behaviors is made based on their inspirations to defend themselves from threats such as natural and human-made problems (Janmaimool, 2017). Due to this, solid waste is an early human-made crisis of the people and on the increase one which is the major concern to all peoples of the globe (Allende, 2009; Genemo and Yohanis, 2015). In the ideas of this theory, solid waste is a critical problem principally saw in urban areas as a consequence of high rush in population growth rate and increase in per capita income thus creating a risk to both nature and human being; means for environmental excellence and human health (Javaheri, 2006). The most common problems related to inappropriate solid waste management include disease diffusion, conflagration hazards, odor problem, atmospheric and water pollution, aesthetic nuisance, and economic victims (Jilani, 2002).

2.2. Major Source and Types of Municipal Solid Waste

Household or urban solid wastes are typically generating from different places where diverse human actions or activities are performed; as different studies reporting, that the municipal or

urban solid wastes are generating in the low-income countries are mostly from households, business centers, or marketing areas (Nabegu, 2010). The other remaining solid wastes are generating from manufacturing, roads, and organizations; in general, solid wastes from such places are extremely mixed in character and they contain different physical and chemical characteristics lying on their usual source (Abdel-Shafy and Mansour, 2018). In all over the developing countries, the main sources of solid waste are residential areas, agricultural areas, commercial areas, construction, and industrial sectors and institutions (Singh et al., 2014). Some of these solid waste source areas and types are explained separately below.

2.2.1. Municipal solid wastes

Urban solid waste is usually recognized as garbage or trash in the United States and rubbish in Britain is a discarded material type which has daily substance those are not needed by the community; thus, MSW is generating from 'households, offices, hotels, shops, schools and other institutions. The main elements of municipal solid wastes are food wastes, paper, cardboard, plastics, textiles, leather, wood, glass, metals, ashes, electronics, white goods, batteries, oil, tires, and household hazardous wastes like electric cables (Karak et al., 2012).

2.2.2. Industrial solid wastes

Industrializations have positive and negative impacts on the environment and human health. The harmful impacts of industrialization are the formation of solid wastes. Manufacturing solid wastes would include solid wastes and this solid waste has its own managing and discarding methods; in general, Industrial solid waste administration or managements deal with every part of solid wastes that connected to industry (Reynolds et al., 2016). Manufacturing solid waste is including the following extensive gathering of solid waste equipment that can be varied ecological poisons. Normally this collection of solid wastes can be composed of 'maintenance wastes, packaging wastes, food wastes, building, or construction and flattening materials, hazardous wastes, ashes, special wastes(Awuchi et al., 2020).'

2.2.3. Commercial solid wastes

Commercial solid waste always creates from property used mostly for the purpose of buy and sell or commerce that involves the transfer of goods and services from one person to another often in

exchange for money; in addition to this commercial solid wastes can be created in the share of 'sport, recreation, education, and entertainment'. In general, the commercial solid waste includes paper, cardboard, plastics, wood, food wastes, glass, metals, special wastes, hazardous wastes' (Yim et al., 2014)'.

2.2.4. Institutional solid wastes

Institutional solid wastes would include all solid wastes generated from institutions such as 'education, nursing homes, laboratories, schools, health care, research facility rooms, hospitals', and other institutions. So, solid waste might create from many sources that have not anything to carry out among a municipality but, the usual responsibility of the municipality in gathering and controlling from these source areas have created special motivations for urban residences (Mbuligwe, 2002).'

2.3. Functional Elements of Solid Waste Management

Solid waste management (SWM) is related to the prevention and control of solid waste creation or generation through storage, processing, collecting, transferring and transporting solid wastes from the generating areas to the final removal sites in a method that is good for excellent values of community health, economic preservation, aesthetics, and other environmental consideration. Though, the functional elements of solid waste management activities include the management of municipal solid wastes from the point of generation to final disposal activities as follows (Ahsan et al., 2014).

2.3.1. Solid waste generations

The creation or generation of solid waste is the usual outcome of every human activity wherever resources are using. Mining of raw material, productions of goods, consumptions, solid waste management's and others can produce solid waste. In addition to this, solid waste creation is also associated with urbanization and international trade; because the rate of materials used now is thus large both in amounts and averages; in general, more use of natural resources and manufacturing production processes produced extremely more solid waste generation which makes problem on the environmental quality and human health at the global level if it is not managed accurately (Adeniran et al., 2017).

The rate of solid waste generation will rise from time to time depending on the individual's income and living style. As the living style of individual's changes the rate of waste generated per day also changed (Melaku, 2008). Solid waste is generated from households, offices, hotels, shops, schools, and other institutions that are composed of food waste, paper, plastic, rags, metal, and glass (Chandrappa and Das, 2012). Due to this, having knowledge of the sources and types of solid wastes together with data on the composition and generation rates is the basic to the design and process of the useful element related through the management of solid wastes. Solid waste generation rates of developed countries are higher than the developing ones and attribute to the difference in technological advances (Tesfaye, 2015). The two main factors causing the rate of waste generation are increasing population and changing consumer behavior (Yukalang et al., 2017).

2.3.2. Solid waste storage

Solid waste storage is one of the fundamental processes of solid waste elimination from highly accumulated areas; On the other hand, Solid waste storage means the temporary control of solid wastes in the standard method after solid waste is generated former gatherings and removals. Therefore, any solid wastes should be stored in the proper storage area or containers. But, to do this activity the containers have to be accessible in adequate numbers and ability to correctly store all types of solid waste at the collection time and behind the collection (Afon, 2016). The principal aim of solid waste administrations is to decreasing and removing difficult problems of solid waste sources on the individual's wellbeing and the surroundings to support financial improvement and better existence. These activities can be made with mainly professional methods likely to keep up expenses little and avoid solid waste increasing (Ohri and Singh, 2010).

2.3.3. Solid waste processing

Most of the time, the Processing of solid waste occurred mostly in the location far from the source of solid waste creation areas. After separating the decomposable and non-decomposable solid wastes the processing activity would be ahead in the material treatments by means of biological technique to convert their compositions and characters of decomposable solid waste materials; but, the non-decomposable solid waste materials need the recycling process that represents the changing of solid waste materials into new raw material products. However, this kind of processing

is not possible in developing countries due to financial and technological constraints (Huang et al., 2010).

2.3.4. Solid waste collection

Solid waste collection is the element of the practice of waste management that used to remove solid wastes from the house and business center places to a gathering site, from where it will set off for more management and dumping. In addition to this, the practical parts of the solid waste collection include not merely the collection of solid wastes and waste equipment, although the transportation of this material following a gathering to the place where the collection the vehicle is dumping in the dumping sites; though, these collection methods are very important to develop and improve the present solid waste management practices. But, the public container and door-to-door solid waste gatherings are not common in developing countries due to low awareness of cities' residents and city administrators for the practice of door-to-door collections either entirely or partly (Al-Maaded et al.,2012).

2.3.5. Solid waste transfer

The solid waste transfer is one the efficient practical element which can be involving the transfer of solid wastes from the minor collection means of transportation to the larger transportation types of equipment and always taking place at the transfer stations (Rathore and Sarmah, 2019). Due to this, solid waste transfer or relocation sites have a significant function in the public's full solid waste management schemes using as the connection among the public's solid waste collection working plan and the last solid waste removal capacities or services. Whereas capacity possession, size, and services giving differ extensively among relocate stations, and they provide similar critical functions that consolidate solid wastes from many collection vehicles into bigger; much amount volume transfer or transport vehicles are used for further efficient delivery to far-away dumping site. Here its easiest form, the transfer location is a capacity by selected receiving areas where solid waste gathering vehicles are discharging their loadings (Yadav et al., 2016).

2.3.6. Solid waste transportation

Solid waste administration is able to manage and move solid wastes through different transportation methods; though, transportation of solid waste is moving or carrying of solid wastes

in the exact dumping area by using different vehicles. Transportation of these stored and collected solid wastes to the last disposal locations in the usual interval has a big sign to keep away storage bin overflowing solid wastes on the infrastructure like roads and streets. This functional element of solid waste management typically involves more long-distance to disposal locations (Alam et al., 2008).

2.4. Major Solid Waste Management Practices

Solid waste administration or management is a very important, continuing, and big public service system which desires to be professionally providing to the public to maintain aesthetic and public health standards. Globally, solid waste management is one of the most ecological health problems and continues to overcome local administrators and national governments as urban residents continue to increase expenditure or consumption patterns change (Marshall, and Farahbakhsh, 2013). So, solid waste management practice entails the treatment and later disposal of solid waste in a way that will not cause any health or environmental hazard to both the present and future inhabitants of the locality where solid waste is disposed of; even if solid waste is a predictable product of societies' consumption (Ali and Eyasu, 2017).

Solid waste management practices were primarily developed to avoid the unpleasant effects on public health and environments that were being caused by the increasing amounts of solid waste being discarded without proper collection or disposal (McDougall et al., 2008). To cut health and environmental problems, solid waste management practices engaged decisions at tactical, strategic, and working levels; considerations include the choice of solid waste treatment sites and landfills (Permana, 2015). In the earlier practice of solid waste management by the city dwellers in the country is not evidently documented, because in the earlier there was a small population, low amount of manufacturing activity inside the cities and with abandoned land accessible, the solid waste generated was dumped on the river banks on the outskirts of the urban core or collected, decomposed, and used as organic manure in the agricultural fields (Pokhrel and Viraraghavan, 2005).

However, currently, there are many alternatives available for equipment, technology, and practices throughout the solid waste management sequence from reduction, collection, and transportation to last disposal sites. Successful and professional solid waste management depends on a number of

factors such as financial support, social norms, and policy priority (Pharino, 2017). Presently, the number of inhabitants and human activities rapidly increased due to this, the door to door solid waste collection practice in the urban area is very irrelevant both in spatial treatment and effectiveness. As a result, the only solid waste management practice options of most households are restricted into two choices; the first one is basically burning and discarding of solid waste in their compounds, while the second option is throwing solid waste at roadsides, streets, sewerage channels, open fields, nearby rivers, and bridges (Gedefaw, 2012).

2.5. Empirical Evidence

Numerous studies were assessed on solid waste management practices in many countries of the world to diminish solid waste generation volumes, public health impacts and to recovering environmental qualities. Because an ever-increasing population level, urbanization and increasing living standards have improved solid waste generation at worldwide (Guerrero et al., 2013). Some of those studies were reviewed to find out the general understanding on factors that affecting the acceptance of solid waste management practices. In line with all countries have systems and policies which order how solid waste should be managed (Mgimba, and Sanga, 2016). Though household tasks especially in the areas of health, environmental management and development accepted by law are well spelt out (Kaseva and Mbuligwe, 2005). Do this; presently solid waste management is getting little attentions at global and national levels (Solano et al., 2002).

Longe et al., (2009) were made their studies on the title of people's perception of household solid waste management in OJO local government areas in Nigeria. The researcher has applied both quantitative and qualitative methods predominantly numerical tools through severity index, in order to analyze the survey data gathered from randomly selected 60 respondents. "The study objectives were assessing the existing household solid waste management practices and public perception of the effectiveness of the current system". This study finding was showing that demographic factors have an important problem in people's perception of solid waste management practices in the study area. They establish that sex differences (being male or female) have a significant impact on perception. In addition, educational levels and income of the respondents have an important positive correlation, whereas, age of the respondents has a negative relation with the perception of the people on solid waste collection practices.

Concerning willingness to pay, even though the result has shown a positive relationship between willingness to pay and people's perception till the people are ready to pay for collection facility if it delivered regularly. However, in the study area, there is a lack of accessing the private solid waste collectors' service. As a result, the local authority should give concentrate on the performance monitoring and control of the services of private sectors in order to improve and continue good quality service delivery.

Mandevere and Jerie (2018) carried out studies on household solid waste management in Harare city, Zimbabwe. "The objective of this study was to investigating the effectiveness of the strategies employed by the city of Harare on household solid waste management". The study was conducted in Harare's low, medium, and high average income outer edge. The findings revealed that organic solid waste constituted the largest quantity of solid waste generated in the study area and other forms are also generated yet their collection is very minimal due to a number of factors which include among others lack of economic capacity, practical skill, inadequate environmental education and increased population numbers. Inhabitants option to prohibited night removal, resulting in the environmental and public health-related problems.

Odonkor, et al (2020) was made a study on household solid waste management in a large Ghanaian district. The objective of this study was to assessing household solid waste management problems in the Ghanaian district. Finally, the findings indicated that inappropriate solid waste management and discarding has a ripple effect on the environment and human health. Because the number of waste collection points in the center of the population were few and some of them were far from households. Due to this, the households walked a distance from the center of the community to the final solid waste disposal site. These factors also encourage the household to dispose of their solid waste in every place.

Solomon (2006) was conducted a study on solid waste management in arada sub-city, Addis Ababa, Ethiopia. "The objective of this study was assessing the performance of household solid waste management in the sub-city". The investigator was applying qualitative description to interpret and present the data obtained from randomly selected 400 sample households.

Finally, the researcher found that even though household solid-waste service is given to the population in the sub-city, solid waste collection service is considered poor by the population due

to institutional, socio-cultural, and financial factors such as inadequate facilities for solid waste collection and discarding services, the unhappiness of the employees with incentives, inequitable assignment and inappropriate utilize of solid waste containers, insufficient transfer of budget to the sector, indiscriminate disposing of solid wastes, and insignificant involvement of the community in solid waste management.

2.6. Overview of Solid Waste Management

2.6.1. Solid waste management in the world

Solid waste management problem is increasing all over the world due to an increase of population pressure and movements to the urban areas in every year, economic activities, industrialization, urbanizations, and others. For this reason, solid waste is generated from individuals activities since they considered useless and unnecessary material; however, a number of these solid materials can be recycled and they became the resource for manufacturing production and power generation if managed properly (Kumar et al., 2017). Dramatic increases in human activities with high solid waste productions have an effect on socio-economic and environments worldwide. For instance, at present solid waste is one of the crucial issues associated with the global economic and social development for the important increases in the amount and composition of solid waste which makes intricate solid waste management practices (Ma and Hipel, 2016).

The worldwide yearly increasing rate of municipal solid waste is about 2 billion tons. In the same way, the unpredictable growth in weight, volume, composition, and characteristics of MSW is becoming more complex (UNEP, 2015).furthermore, the viewpoint of solid waste management hierarchy; protection, minimization, resources recovery, burning, and landfill has been adopted by most developed nations as the list of options for developing countries' municipal solid waste management practices. However, the degree to which anyone option used in a country or region is different depending on several factors such as landscape, population density, transportations, socio-economic problems, and environmental regulations (Ma and Hipel, 2016).

According to the World Bank (2018), the world generates 2.01 billion tons of municipal solid waste every twelve months; of this, 33% of solid waste is not managed carefully in an environmentally secure method due to the world generates 0.74 kilogram solid wastes per person

per day on average before. But the range at this time increases from 0.11 to 4.54 kilograms per person per day on average. Hence, 16% of the world's population high-income nations generate about 34% or 683 million tonnes of the world's solid waste. Therefore, the future global solid waste is expecting to raise 3.40 billion tonnes by 2050 (Kaza et al., 2018).

2.6.2. Solid waste management in Africa

Africa is one of the developing and the second populous the continent in the world with the high developmental course of actions, rapid population growth, and urbanization; as a result, solid waste is a critical problem in Africa which is an indivisible effect on human populations and their activities (Ahmed et al., 2016). Currently, the rapid population movement is increase due to urbanization in Africa have caused problems for the country and local environmental prevention in provided that efficient and successful municipal solid waste management practices (Zamorano et al., 2009). Consequently, solid waste management is facing several problems and challenges to develop urban environments, public health, flora, and fauna; since diverse types of solid wastes have been generated over the years in the continent but the management practices implemented in Africa are still inadequate (Kaseva, 2005).

Collecting, handling, transporting, storage, and finally disposing of solid wastes are the main challenges in the African urban centers (Okot-Okmu, 2015). Accordingly, people have seen comparatively poor solid waste management practices characterized by haphazard discarding of garbage on roadsides, water bodies, and inaccessible spaces which more exacerbated the socio-economic and ecological problems in most African countries. The current increase in the level of urbanization in Africa expected to carry on solid wastes in the prospect; however, the main concern is that there are inadequate infrastructural facilities like types of equipment, vehicles, and proper land use planning to equivalent to the demands posed to the urban growth rate, particularly in the slum and congested areas; for instance, solid waste management constitutes one of the most critical health and environmental problems facing African cities. Most cities in Africa expends 20-50% of their yearly budget on solid waste management and only 20-80% of the solid waste is collected due to lack of enough technologies and skilled labor forces (Keser et al., 2012).

2.6.3. Solid waste management in Ethiopia

Ethiopia is one of the developing and the second populous country in Africa next to Nigeria with a 2.73% total annual population growth rate, 4.4% urbanization rate, and a high rate of migration to urban areas which contribute to the urban population growth; nevertheless, Ethiopia is one of the least developed countries in the world and it covers only 17% of its population living in urban areas, solid waste is a series and burning issues in the country which can be created diverse major ecological crisis towards people such as global warming, resource depletion, and ecosystem (Agamuthu and Masaru, 2014). Because solid waste is a predictable product by nature that all human activities can generate a definite amount of solid wastes (Khajuria et al. 2010). For instance, these solid wastes are inclined to increase with an increase in population growth and migrations, urbanization, and consumption patterns of the people (Kasala, 2014). However, resource utilization patterns of the people can be influenced by the socio-economic, environmental, and demographic situation of the country; in the same way, when the countries become further developed the economic activities of the public increase so as do an increasing of lifestyles, and incomes, using up of commodities and services which have matched with the results of solid waste (Bhada-Tata and Hoornweg, 2012).

Solid waste management practice is one of the fundamental activities which is now giving broad attention to many cities and towns of Ethiopia. Meanwhile, in most towns and cities of Ethiopia solid wastes are not properly handling and managed largely due to economic, social, technical, and low community participation challenges (Dagneu et al., 2012). Furthermore, the recent solid waste collection ability and dumping practice is not corresponding with the fast expansion of urban areas (Cheever, 2011). In addition to this, insufficient materials to collect solid wastes have recognized as the major challenges of urban solid waste management in Ethiopian, cities (Kofoworola, 2007). For this reason, at this time Ethiopia faces solid waste management problems related to overgrowth of solid waste due to haphazard and open dumping that leads to overall public nuisances such as pests, diseases, and odor (Mohammed, and Elias, 2017).

2.7. Factors Affecting Solid Waste Management

The number of inhabitants and urbanization is increasing rapidly in the globe with the migration of rural people to urban areas; particularly in developing countries, the recent entire populations

account for more than 70% of the world's population. Solid waste management in these countries is affecting different factors such as social, economic, political, natural, physical, and human factors (Hossain et al., 2013). These factors have settled in both urbanized and least urbanized countries. In addition to this, household characteristics like income, family size, educational level, and others listed as factors influence solid waste management practices, generation rates, and composition (Isa Harir et al., 2015).

Solid waste management is also affecting by different factors including little collection treatment due to the lack of transportation, unequal collection services, fiscal problems, and lack of technology in support of the solid waste collection, illegal open throwing away, and burning with no air and water contamination prevention, institutional deficiency, insufficient official supplies and resource shortages (Saat, 2013). Though, solid waste management in developing nations is about two points of sights. Initially, the process of urbanization and population density that is strongly connected to solid waste management concern is continuing at a pace that is much faster than was constantly skilled by today's developed nations. The ideas of solid waste management in developing countries so have emerged as a significant and attainable catastrophe. Secondly, these countries have often difficulty in reforming the institutional system, organizational bodies, management ability, and human resources that are essential to receive the lead in solving solid waste problems. Therefore, it is very hard for them to reply efficiently to the recently emerging challenge of solid waste management (Sharholy et al., 2007).

2.7.1. Human and technical constraints

2.7.1.1. Labor

All cities in Ethiopia require well-organized and environmentally successful household solid waste management. However, it is acknowledged that the reason for the shortage of finance and low economic levels is lagging back the people's knowledge, educational levels, and understandings which turn affects the laborers that not give high-quality knowledge-based solid waste management practices in the country (Chung and Lo, 2008).

2.7.1.2. Disposal methods

Solid wastes is a burning issue and big difficulty in every nation of the world since human beings and activities exist on the planet earth; solid waste creation by itself is a usual occurrence and the quantity of solid waste produced is directly proportional with population growth (Singh, et al., 2011). However, SWS generate from human activities are transporting directly to dump on the roadside, streets, and near to water bodies. This wrong discarding of solid waste also affects human beings' physical condition and the environment (Babayemi and Dauda, 2009).

2.7.2. Economic constraints

2.7.2.1. Financial

The distribution of extensive urban wealth to a solid waste management capacity is reasonably assured in high earning communities due to both traditional measures and to sustained communities' attention and willingness to pay. Hence, in low-income nations like Ethiopia, urban solid waste management, and other services are often poor partially due to low population awareness and interest and partly to inability to pay for improved quality service with low incomes (Lohri et al., 2014).

2.7.2.2. Technology

Technology or machinery is the function of understanding the realistic aims of human life; altering and manipulating the human environment. In addition to this, technology includes the employ of materials, types of equipment, and techniques that make it easier and more enjoyable for solid waste management. Therefore, the availability of such type of technology is important to effective and efficient solid waste management practices. However, this technology is not easy to get at a complete level in Ethiopia for the household's solid waste management purposes such as solid waste discarding, collection, and handling (Schott et al., 2013).

2.7.3. Institutional constraints

2.7.3.1. Conflicts

The rivalry ideas among ecological security and contradictory interests affect international environmental politics. Most of the time political beliefs give particular interests to the fundamentals of environmental argument together with the core economic and social factors that make resource depletion and environmental poverty; however, in Ethiopia, this condition is not widespread to accept it. While the conflict increase and exacerbate, the people will not give more emphasis on solid waste management practices and continuous environmental excellence. Then, the existed environmental laws of the state becoming disobey and the amount of solid waste also becomes high (Chasek et al., 2009).

2.7.3.2. Policies

Environmental policies exist in Ethiopia; but most Ethiopians have not more awareness about their environment to protect, keeping, and cleaning due to lack of knowledge, poverty, and good governance (Ruffeis et al., 2010). Due to the above factors, the policy has an implementation and low enforcement Problems. This implementation gap makes environmental and human health problems related to improper solid waste management in urban areas. In addition to this, the informal sectors like NGOs have not involved in solid waste management programs in Ethiopia due to the laws, the population's low level of knowledge, awareness, and attitudes toward their environment and health care. Therefore solid waste problems aggravated easily in the town (Kefauver, 2011).

2.7.4. Social constraints

2.7.4.1. Sex

In developing countries like Ethiopia, women give a low social status. Hence, men and women cannot get the same exercise and available information about solid waste management practices. These furthermore makes mutually women and men be inclined to have different social networks and different administrative power in the home, which can control the capacity of both women and men to have unequal participation and decision-making on household solid waste management or

community solid waste management and make a little different needs in this admiration (Maclaren and Nguyễn, 2003).

2.7.4.2. Age

In Ethiopia, there is a high population growth rate that the children's age is below 20. This age composition of people could contain much impact on solid waste production. Age is one of largely often analyze demographic features; aged people indicating better environmental solid waste management behaviors and attitudes than groups of the younger age group. This means that aged people generate a smaller amount of household solid waste than younger people. As a result, younger people have a direct problem with the solid waste production rate which in turn influences solid waste management practices and dumping activities (Soukopova et al., 2017).

2.7.4.3. Family size

The household's family size is the most important significant means that have an effect on the number of solid wastes from household consumption; hence, large families in the household consume a lot of goods in the daytime. Mostly, in a large number of families through affluent economic conditions, daily solid waste production rates are higher than the poorer economic family sizes (Sivakumar and Sugirtharan, 2010).

2.7.4.4. Educational levels

In order to decrease household solid waste generation, understanding society's conduct and activities are necessary. However, the method that humans reply and collaborate on solid waste management issues is affected by their educational levels. Not have good knowledge among the community and social customs and values regularly the major problems that harmfully affect solid waste management practices. As a result, the public's education is an important component for the accomplishment of solid waste management services (Samsudin and Don, 2013).

2.7.4.5 Awareness and attitudes

The people's awareness and attitudes in the direction of solid waste management can affect the population's motivation to collaborate and involve in satisfactory solid waste management practices and find the determinant factor of solid waste management. Low level of environmental

responsiveness and in sequence on health problems due to incompetent solid waste management is a significant factor that affects household solid waste management that requests always contact and communication with all sectors of the population. These low awareness and attitudes of the society with low integration and low contribution of the population in solid waste management increase environmental contamination and degradation in relation to solid waste (Zurbrugg, 2002).

2.7.5. Natural constraints

2.7.5.1. Temperatures and humidity

Climate alterations cause the difference in solid waste types and their management practices. Since the ground is below pressure is quickly shifting different excessive weather events such as high temperature and humidity. Due to this, solid waste can play its function in climate change which might discharge or release GHGs, and climate change can also have its result in solid waste management (Gichamo, 2019). Consequently, high temperature and humidity cause solid wastes to putrefy more quickly than they do in colder climates. While the occurrence of solid waste collected works in high temperature and humid climates should, consequently, be higher than in cold climates (Al-Khateeb et al., 2017).

2.8. Conceptual Framework

According to (Bogdan 2003), a theoretical framework is a fundamental organization that consists of a definite conceptual block that corresponds to the observational, the experiential, and the systematic or synthetically an aspect of a process or system is conceived. Based on this thought and the above review of related literature, the researcher was developed the following conceptual framework for analysis.

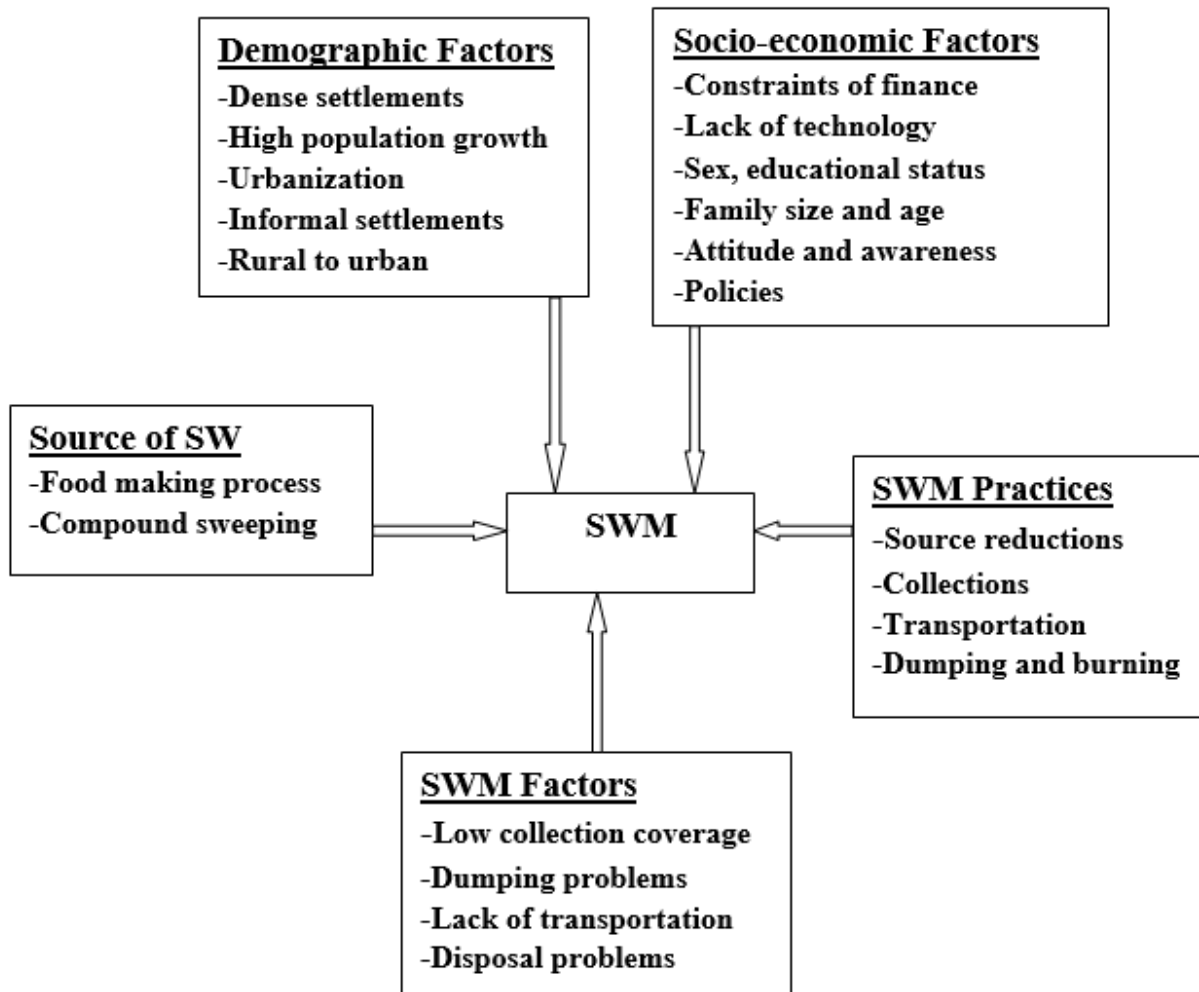


Figure 1: Conceptual Framework

Source: Own formulation, (2020)

3. RESEARCH METHODOLOGY

3.1. Description of the Study Area

3.1.1. Location and size

The study was conducted in the Finote-Selam town west Gojjam zone Amhara regional state. Astronomically the study area lies within the coordinates between $37^{\circ} 16' 0.12''$ - $37^{\circ} 9' 36''$ N latitudes and $10^{\circ} 42' 0''$ - $10^{\circ} 24' 57.6''$ E longitudes. The Vicinal location of the study area is also situated to the north-west direction of Addis Ababa at a distance of 387 km and 176 km from the south of Bahir-Dar the capital city of the Amhara regional state. The total area of the town is 4,247.9 hectares and the study area is mainly located to the southeast of Dembecha town, southwest of Bure town, North West of Sekela district, northeast of Kuarit district, and the east of Dega-Damot district,(CSA,2007).

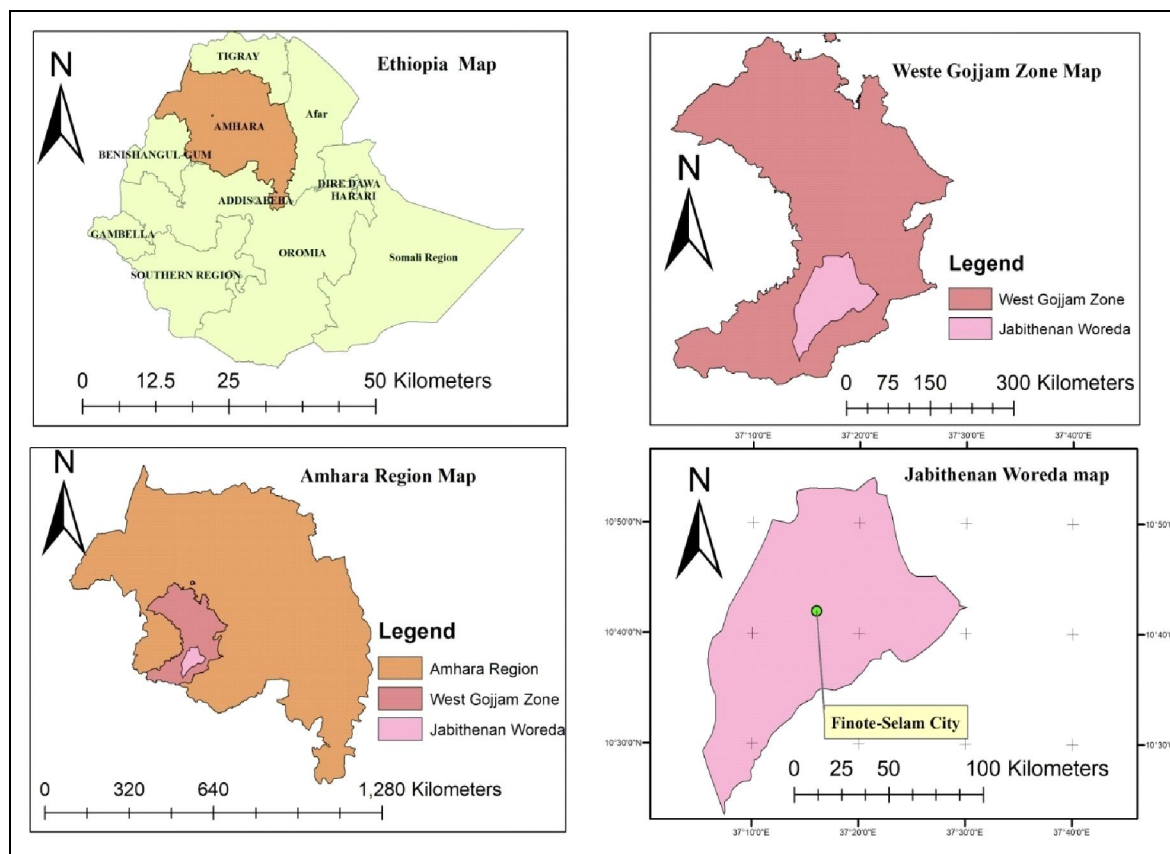


Figure 2: Map of the Study Area

Source: Own survey by using arc GIS (2021)

3.1.2. Relief and soils

The relief shows the patterns of the land features of the area. The relief of Finote-Selam town is characterized by a plain surface with an altitude of 1917 m above sea level. The town has an elongated shape that extends from east to west. The elevation is the decisive factor that showed the relief of the area. The most significant soil types found in the study area are Luvisols, Vertisols, and Leptosols (Shumet, and Yihune, 2017).

3.1.3. Climate and drainage

The climatic condition of the study area is characterized by sub-humid with hot winter and cold summer; moderately it is much warmer when compared to other many towns of Amhara regional state. The area has two distinct rain seasons; the main wet season extends from June to August, which is locally known as Keremt. The Belg season which extends from March to May has little rain. Generally, in the traditional climate zone classification Finote-Selam town is grouped under the Woina-Dega climate zone (Berhanu et al., 2007). When contrasted to winter, the summer has much more precipitation. The average annual temperature and rainfall of Finote-Selam town are 24⁰c and 1,250 mm respectively (Mellie, 2016). However, the study area has two important rivers in the east and south parts of the town which is called Lahe and Arera rivers respectively that originated from the highlands of the West Gojjam zone, like Sekela, Asewa, and Agut. These rivers also flow from north to south direction (Sener et al., 2011).

3.1.4. Vegetation and wildlife

Depending on the climate and temperature conditions, the district enabled to have large varieties of vegetation. The original vegetation covers found in the study area like bushes, wanza (*Cordia-Africana*) eucalyptus, bisana (*Croton-macrostachyusn*), and warika (*Ficus-vasta*). The same to vegetation, different animals also inhabited the study area such as arboreal and common animals are inhabited the study area. Arboreal animals include Apes, monkeys, and Colobus monkeys. In addition to this, the common animals also found in the area like hyena and foxes (Ahmed et al., 2017).

3.1.5. Population

Based on the Amhara regional plan commission population data the investigation, Finote-Selam the town has a total population of 51,579 of whom 23,607 are men and 27,972 also women. The size of the population increased by about 25 % from 2007 to 2012 is representing an annual growth rate of 1.75 percent (APC, 2019).

3.1.6. Socio-economic features

The main socio-economic activities practiced in the study area are mixing cultivation both agriculture and dairy-farming including trade. Mainly, the town is well-known for the production of teff, maize, peppers, beans and chickpeas, fruit, and vegetables. Next to agriculture, dairy farming is the major employment and source of income for households among those who occupied in agriculture. Because the land is suitable for the cultivation of almost all types of crops and surrounding areas of the town leaves for grazing purposes. Due to this, both agricultural activity and dairy farming are the most important sub-sector in terms of employment, food security, income earnings, and overall contribution to the socio-economic well-being of urban people (Motbainor et al., 2016).

3.2. Research Design

This study was applied cross-sectional research design to analyze the data from representative samples at specific times (Mukui, 2013). In addition, to achieve the objectives of the research, a triangulation mixed design was used in the research to allow the simultaneous collection of quantitative and qualitative data in multiple methods. This method is more popular than other methods because it has the advantage of combining qualitative and quantitative data. The use of qualitative research methods involves the dynamic process of collecting, thinking, evaluating, analyzing, and modifying the content, intensity, and nature of household solid waste management in the study area (Ritchie et al., 2013). When these situations are encountered, they can properly manage and find the determinants of household solid waste management factors, and they can develop their poor solid waste management practices and reduce the amount of solid waste. Quantitative research methods used to collect data.

3.3. Data Types and Source

The researcher was used both primary and secondary data sources to meet the objectives of the study. The primary data sources were obtained from households through questionnaires, key informant interviews focus group discussions, and field observations. Similarly, secondary data sources were used official documents from governmental and non-governmental organizations. In addition to this, the study used published and unpublished documents such as journals, books, reports, magazines, and articles as a source of secondary data.

3.3.1. Sampling technique and sampling size

3.3.1.1. Sampling technique

This research was conducted in the Finote-Selam town, west Gojjam zone. First, Finote-Selam town was selected from the west Gojjam zone in the Amhara regional state purposely for the high accumulation of solid waste and accessibility of data about the surrounding population and area (APC, 2019). The town had 6 kebeles (two rural and four urban kebeles). Out of them, four administrative kebeles (01, 02, 03, and Kebele 04) were selected from the total 6 kebeles of the study area. The selection was carried out by considering accessibility to transport and to collect data. Then the researcher employed a simple random sampling technique to select sample respondents. This technique provides an unbiased and better estimation of the parameters if the population is homogeneous (Singh and Masuku, 2014). The sampling process was occupied to draw a sample from the purposeful areas of Kebele 01, 02, 03, and Kebele 04. For this, 395 households were selected by using a simple random sampling technique among the total population of 38,878 from the targeted administrative kebeles. A total of 395 selected sample households were divided into four administrative Kebeles considering the number of households in each Kebeles.

3.3.1.2. Sampling size

Since there was no previous survey conducted related to solid waste management practices in the study area; the sample size was determined based on the expecting prevalence rate of 50% and the absolute desired precision of 5% at the confidence level of 95%. The sample size could be 395 households by using Yamane's (1967) formula. This formula is important when the population size is finite, known, and it is also easy to calculate and figure sample size.

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

$$n = \frac{38878}{1 + 38878(0.05)^2}$$

$$n = \frac{38878}{1 + 38878(0.0025)} = 395 \text{ households}$$

Where:

n = sample size

N = population size

e = the level of precision

Based on the above formula the investigator was selected 395 sample sizes

Table 1: Sample distribution of the selected households

No.	Kebele names	No. Of households from each kebele	Sample households	Proportions in %
1	01	7749	78	20
2	02	15514	158	40
3	03	7842	80	20
4	04	7773	79	20
Total	4	38878	395	100

Source: Finote selam town municipality

3.4. Data collection instruments

3.4.1. Questionnaire

This method of data collection is simple and quick to get information from the sample households and it is also an appropriate and less expensive method of data collection. Thus, the study was conducted questionnaires in the selected sample Kebeles for collecting and recording information about the respondents' household solid waste management practices, determinant factors, and challenges in the study area. The questionnaires were designed to understand the current status and characteristics of SWM, the socio-economic and environmental factors in the household solid waste management, the problems and challenges of SWM in the four sample selected Kebeles. The survey instrument was used structured open-ended and close-ended questionnaires. The

questionnaire was prepared in English language and then translated into the Amharic language to take part in both literate and illiterate residents in the study area. Besides this, the communities of the area speak the Amharic language.

3.4.2. Key informant interview

Interviewing is questioning characterized because it uses oral questioning as it's the principal technique of data collection (Reinharz, 1992). This had an advantage of the flexibility to adapt, and changing the questions that the researcher precedes with the interview (Sekaran and Bougie, 2009). So, the researcher was used semi-structured interview questions to get information from elders, Kebele administration officers, religious leaders, model households, and the municipal administration waste management officers and experts. The researcher was interviewed the people from each sample Kebele about solid waste and factors of solid waste management problems, and solid waste management practices in the study area. The number of participant of the interview were 10

3.4.3. Focused group discussion (FGD)

Focus group discussion (FGD) from each targeting kebeles were contain 6 members totally of 24 members could be selected from the four targeted areas. The selected members were knowledgeable and experienced households, city administrators, experts, and religious leaders to know the views of the society about solid waste and factors of household solid waste management practices and how they managed it in the study area.

3.4.4. Field observation

The field observation was collected by direct observations on the study area by the researcher, together with municipal administration waste management officers and experts and kebele administrator to observe directly the study area. The observed and collected essential information with the help of camera captured shown the current status, generation rate characteristics, and factors of household solid waste management problems, and its effect on the local environment and households solid waste management activities with visual photographs and pictures.

3.5. Methods of Data Analysis

3.5.1. Descriptive and Inferential statistics

Descriptive analyzes focus primarily on descriptive statistics of survey data generated from the sample of respondents. In this study, the data were analyzed using descriptive statistics. Descriptive statistics such as mean, standard deviation, percentages, bar graphs, and pictures are used to display the analyzed and interpreted survey data. Consequently, the results obtained are used as an indicator of the relationship between the dependent variable and the descriptive variables.

Inferential statistics is an analytical tool used to analyze sample data to make inferences about the entire population. In this study, inferential statistics like multiple linear regression model was used to compare and test the statistical significance of household solid waste management practices and the factors that affect household solid waste management from the perspective of different explanatory variables.

The qualitative data obtained from the sample of households interviewed and the group discussions are analyzed explaining ideas and opinions. Then use SPSS 20 to code and enter the data for data analysis. The collected quantitative data were analyzed by using descriptive statics such as simple frequency, percentages, and graphs. Then quantitative data, especially close-ended questionnaire household survey data, filed supervisor checks, managed and analyzed by using the Statistical Product and Service Solution (SPSS) version 20 software and Micro-soft excel program. In the quantitative data, the independent variables such as age, sex, family size, income, and educational status, Socio-economic, institutional, natural, human factors, awareness, and attitudes on the effects of household solid waste management practice on their environments could be analyzed through descriptive statistics, mainly percentages and graphs. The gained household solid waste statistics data was presented and analyzed by using tables, and chi-square test. The qualitative data was also presented and analyzed through narrative descriptions, interpretation, and conceptual generalization. In this method, secondary data was analyzed the dependent variables such as households, environments, solid waste status, and challenges.

3.6. Model Specification

Multiple regression could be a statistical technique that examines how multiple independent variables are associated with one variable. Once each of the independent factors has been determined to predict the variable quantity, the data on the multiple variables is wont to create an accurate prediction on the extent of the effect they need on the result variable. The model creates a relationship within the type of a line that best approximates all the individual data points. Thus, the study employed multiple liner regression model to show and determine the relationships between the listed dependent and independent factor variables on solid waste management practices in the study area. The model is illustrated as follows.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \varepsilon.$$

Y is Waste volume/ waste generated and stored per day, β_0 is regression constant, $\beta_1 - \beta_{13}$ regression coefficients.

X_1 is sex, X_2 is age, X_3 is monthly income, X_4 is family size, X_5 is educational level, X_6 is occupations, X_7 is marital status, X_8 is house type, X_9 is location of the house, X_{10} is awareness, X_{11} is attitudes, X_{12} is technologies, X_{13} is administrators

3.7. Validity and Reliability

Validity is the degree to which the score starts assessing represent the inconsistent or variable that is proposed to make judgments and then measured the cause that takes into the explanation. Reliability is the uniformity or consistency of a value while the researchers determine and construct that the assumptions to be reliable across time and followed by the score that could be achieved must also be consistent or reliable across time; though, validity and reliability in this research was used to determine the clarity and relevance of the data collection instrument structure that used in the study (Garnacho-Castaño, 2015). The reliability was tested by using cronbach's alpha test.

Table 2: Reliability Statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
.728	37

Source: field survey, 2021

Table 2 showed that the reliability statistics. Then the Cronbach's alpha reliability statistics ranges are between 0 and 1. If Cronbach's alpha result is greater than .70. It implies that the reliability is strong. Hence from the above result, Cronbach's alpha result was .728 with 37 items and it is possible to say that the result is reliable.

3.8. Ethical Consideration

One aspect of the research process which must get the greatest recognition was its ethical considerations concerning research subjects and general conduct. This social research thesis needs a vivid account for informed consent, beneficence, respect for people, and anonymity. Therefore, the researcher would be taken a letter from Haramaya University; so that the legality was assured which would enable the researcher to obtain factual data as well as increase the confidence of the respondents since the purpose of the study is clear. Without the permission of the concerned body, the investigator does not perform any activity including sound recording, taking videos, and photographs. In addition, the research participants' or their family's personal identities were not publicized to the public or not transferred to other parties other than the researcher itself.

4. RESULTS AND DISCUSSION

This part of the study presents and discusses the key research results found in the sample survey through questionnaire, key informant interviews, focus group discussions, and field observations. The researcher distributed 395 questionnaires to respondents of which 395 questionnaires were properly filled and returned, the response rate was 100%. Moreover, this part of the research is divided into four parts. The first part introduces the socio-demographic characteristics; the second part deals with the causes and factors affecting household solid waste generation; the third part deals with the consequences of solid waste; the fourth part discussed the respondents' practices and collaborations in household solid waste management and the remaining part pointed out the challenges in the household solid waste management practices.

4.1. Socio-demographic characteristics of the respondents

The socio-demographic characteristics which were treated in this section were sex, marital status, educational level, occupation, house ownership, and location of the house from the town.

Table 3: The Distribution of Demographic Characteristics of the Respondents (N=395)

Demographic characteristics	Category	No	%
Sex	Male	237	60
	Female	158	40
Marital Status	Married	46	84
	Single	333	12
	Divorced	16	4
Educational Level	Read and write	21	5
	Secondary School	115	29
	College and University	259	66
Occupation	Farmer	14	4
	Business runner	154	39
	Daily Laborer	13	3
	Government Service	214	54
Houses type	Rental	141	36
	Personal	246	62
	Condominium	8	2
House location from town	Center of the town	194	49
	Periphery of the town	201	51

Source: Field Survey, 2021

4.1.1. Sex and marital status

As indicated in Table 3, out of 395 respondents 60% of respondents were male and 40% of them were also females. According to (Bizatu and Nagga, 2010), the accountability and responsibility of solid waste management were left to women. In the household, the female memberships of the family are responsible to handle the household cleaning and separating solid waste than males. Thus, the sex of respondents had an influence on the process of household solid waste management and disposal practice with respect to labor division. Furthermost of the time females were involved in the practice of household solid waste collection and dumping than males. This finding indicated that women have more duty and responsibility than men about their dwelling solid wastes and its handling process. This implies that, the cultural oppression of females and work divisions at the home was made difficult on solid waste management practices in Finote- Selam town and aggravated solid waste management practices and disposal methods due to most solid waste managements were left for females (Muhammad et.al, 2013). In line with this, the finding is like the previous findings (Woroniuk, and Schalkwyk, 2011) reported that concerning waste and waste dumping; given females primary obligation for cleaning household solid waste, food preparation, family health, washing clothes, and domestic solid waste disposals females and men might view domestic wastes and its disposal differently. They may have also different perceptions about waste to manage it differently and put different priorities at their disposal.

Households are the crucial center for profit repairing, economic strength, and social modifications. Consequently, marital statics had financial and social consequences. As confirmed in Table 3, out of 395 pattern family respondents 84% of the respondents have been married, at the same time as 12% of the respondents being unmarried and the last 4% of the respondents have been divorced. The results indicated that after the person or the lady comes from unmarried lifestyles to mutual or married lifestyles, the useful resource intake additionally will become multiplied differently from the individual lifestyles and influenced the extent of strong solid wastes inside the town (Al-Khatib et.al, 2009).

4.1.2. Educational level and occupation

As observed in the study, the sample households' respondents were one of the foremost significant factors that affected the household's solid waste management practices and status. Educational

level is the most significant variable in the given analysis, and it is always considered as a fundamental factor to attain higher degree of awareness. Consistent with the household's respondent surveyed data; the people that had low educational level background were exercised ineffectual solid waste management practices than those that were educated well. As was illustrated in Table 3, the greater percentage of the sample households in Finote-Selam town were educated. Thus, the respondents who were engaged in colleges and universities cover 66%, 29% of the respondents also had middle school education level and the other 5% of the sample household respondents could be ready to read and write. According to the results found, good educational level positively affects solid waste managements. This implies that the academic background level of the respondents influenced household solid waste management because those who not ever go through formal education had no idea about solid waste management and its impact on the environment (Marshall and Farahbakhsh, 2013).

As indicated in table 3, the households in the surveyed sample are involved in different occupations and jobs according to their professions. These include agricultural, commercial activities, day-to-day workers, and government officials. Although among the 395 households surveyed in the sample, 54% of the respondents provided governance services, 39% were business runners, 4% were farmers, and 3% of the respondents were also performed daily tasks. This result indicates that compared to unemployed households, respondents with higher or lower daily, monthly, and annual income generate more solid waste (Khan et .al, 2016).

4.1.3. House type and locations of the house

As shown in Table 3, housing or dwelling is the basic need for all human beings to protect themselves from natural and man-made influences. In this sense, among the 395 households surveyed in the sample, 62% of the respondents live in their own private homes, while 36% of the surveyed households live in rental housing and the remaining 2% of the respondents live in apartment houses. However, compared to renters, people living in private homes are expected to be more active in joining and participating in solid waste management programs. This is because the house is suitable for the owner, if the house is cleaned, the owner can offer a higher price for his or her house. The findings indicated that the people living in private houses were more encouraged to involve in solid waste management practice to make suitable and cleaned

environment for renters and offer higher prices for their houses and get higher income from their renting houses.

The location (nearness and farness) of the residential area of the city center has an impact on the generation of substantial amounts of solid waste due to the unavailability and difficulty of the transport and travel capacities of the client and the non-proximity of industrial products packaged. As shown in table 3, the survey results show that among the sample of 395 households surveyed, 51% of the respondents live on the outskirts of cities and towns. These people cannot get the products they need in the closest area, and they produce less solid waste. Although 49% of the surveyed households live in the city center and can buy any product they want and use, because the product is available there, the amount of solid waste in their surroundings can easily increase. The results indicated that the residential area in the city center had a profound influence on the amount of solid waste generated due to the easy accessing of packed and unpacked product resources (Bernardes, and Gunther, 2014).

4.2. Descriptive Analysis of other Socio-Demographic Variables

Table 4 Descriptive analysis of demographic variables (N= 395)

Demographic characteristics	Mean	Standard Deviation
Age	34.76	7.528
Family Size	4.39	1.801
Monthly Income	4617.21	1494.667

Source: Field Survey, 2021

Table 4 above, showed a descriptive analysis of other socio-demographic variables. Regarding age distribution of the surveyed households is very important, it can be concluded that those who actively participate in the household solid waste management practices maintain and protect the environment and create beautiful economically sustainable towns. Therefore, in Finote-Selam town, most of the respondents were in the productive age group. However, most illiterate adults throw solid wastes everywhere after using different resources and products, such as sugar cane, bananas, chewing gum, cookies, bottle plastics, and other products, because they do not give more emphasis to urban quality. But the older respondents used packaged and unpackaged products, it is not as easy to throw solid materials anywhere as adults and children, because these people have

relatively more attitudes about how environmental pollution affects human health and economic activities. As the results are shown in table 4, the mean age and standard deviation of the sample respondents were 34.76 and 7.528, respectively. This implies that, the mean age of the respondents was about 35 years, and the standard deviation differs from the average by 27,232.

Family size refers to one or more people who live in the same house and share a place of living, cooking, and other things. The main function of a family is to ensure the continuity of society biologically; it is socialized through socialization and the production and consumption of goods and services (Dermott, and Fowler, 2020). However, as shown in table 4, households with more than 4 people were consumed many resources and industrial products, and these resources and industrial products contributed to increasing solid wastes. In relative terms, due to the high consumption of resources and products, it is more difficult for large families to manage solid waste than for small families. As a result, many family members in the family led to produce and accumulate much amount of solid waste in the village. Therefore, the mean family size and standard deviation of the sample respondents were 4.39 and the standard deviation was 1.801. This implies that, the average household size of the respondents was approximately 4 and the standard deviation differs from the average by 2.6 (Suthar and Singh, 2015).

Income is the consumption and savings opportunities that an individual obtains within a specific period, especially within a month, and is generally expressed in financial terms. As shown in table 4, monthly income is one of the socioeconomic factors that influence the increase in the amount and characteristics of solid waste and the growing problem of solid waste management. Therefore, the monthly income of the households in the surveyed sample has an infinite impact on the real and effective management of solid waste in the municipality of Finote-Salam. The findings indicated that respondents with high monthly income would be generated a large amount of solid waste and vice versa; because when the income of the individuals increase the demand and consumption of individual resource also increase (Ozcan et. al, 2016). Therefore, the mean and standard deviation of the monthly income of the interviewed households were 4617.21 birr and the standard deviation was 1494.667. This indicated that the average monthly income of the respondents was about 4617 ETB, and the standard deviation differs from the average by 3123.

4.3. Causes and Factors Affecting Household Solid Waste Generation

This section of the study deals with the causes and factors affecting household solid waste generation. Thus, the respondents were asked about the major cause factors for high SW generation and the findings indicated that 55%, 26%, 15%, and the remaining 4% of the sample household respondents were replied that lack of awareness, dumping site problems, high resource consumptions and lack of containers were the major caused factors for high solid waste generation in the town and aggravated socio-economic and environmental pollutions respectively. The other causes and factors of solid waste generating were the extraction of materials, manufacture of products, and consumption of resources, urbanization, worldwide trade and population growth. As observed and indicated in the findings of the study, most solid waste pollution in Finoteselam is caused mainly through urbanization, overpopulation and growing technology are among the few reasons for solid waste pollutions and various methods are practiced controlling solid waste pollutions such as burning, disposing of, storing recycling burying, and reusing (Lee et.al, 2016). However, insufficient management, inappropriate disposal of municipal solid waste, and the lack of awareness of the people for solid wastes were the cause of the high volume of SW in the Finote-Selam town. The below Table 5, showed that lack of awareness was the major cause factor that affected solid waste generation in the town. This implies that in Finote-Selam town, the low degree of awareness is a significant factor for the increase of high solid waste generation including dumping site problems, high resource consumption, and lack of containers.

Table 5: Major factors for high solid waste generation

Variables	Categories	N_o	%
The major factors for high SW generating	Lack of awareness	218	55
	Dumping site problems	102	26
	High resource consumption	59	15
	Lack of containers	16	4
Total		395	100

Source: field survey, 2021

Regarding factors affecting household solid waste generation, the study sought to establish how dependent variables would influence the independent variables using multiple linear regression analysis. The regression model was illustrated as following.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \varepsilon$$

Whereby Y is Waste volume/ waste generated and stored per day, β_0 is regression constant, $\beta_1 - \beta_{13}$ regression coefficients, X_1 is sex, X_2 is age, X_3 is monthly income, X_4 is family size, X_5 is educational level, X_6 is occupations, X_7 is marital status, X_8 is house type, X_9 is the location of the house, X_{10} is awareness, X_{11} is attitudes, X_{12} is technologies, X_{13} is administrators and ε is model's error term.

Table 6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.633 ^a	.401	.381	.767

a. Predictors: (Constant), Administrators, Age, Sex, House type, Monthly income, Family size, Occupation, Marital status, the location of house, Educational level, Awareness, technologies, the attitude

Table 6 above showed the explanatory power of the regression model used in this research. The dependent variable of the model is a factor and the independent variables (predictors) such as age, sex, house type, monthly income, family size, occupation, marital status, the location of the house, educational level, awareness, technologies, the attitude, and administrators were taken as a set of the predictors. As indicated by the R square, .401, taken as a set of the predictors are account for 40.1 % of the variance in the solid waste generated and stored in kilograms per day.

Table 7: ANOVA Analysis

ANOVA ^a						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	150.133	13	11.549	19.620	.000 ^b
	Residual	224.262	381	.589		
	Total	374.395	394			

Source: field survey, 2021

a. dependent variable: SW generated and stored in Kg/day

b. predictors: (constant), the administrators, age, sex, house type, monthly income, family size, occupations, marital status, the location of the house, educational level, awareness, technologies and the attitudes

Table 7 above indicates the overall significance of the model, which suggests that the regression model is statistically significant as the p-value is less than 0.05.

Table 8: the correlations of dependent and independent variables in the regression Analysis

		Coefficients ^a				
		Unstandardized		Standardized		
		Coefficients		Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	.673	.467		1.440	.151
	Sex	.454	.086	.228	5.256	.000
	Age	.084	.037	.091	2.266	.024
	Monthly income	.002	.037	.002	.050	.960
	Family size	-.079	.030	-.108	-2.632	.009
	Educational level	.063	.071	.040	.891	.373
	Occupations	.081	.043	.086	1.866	.063
	Marital status	-.622	.113	-.248	-5.491	.000
	House type	.112	.080	.059	1.404	.161
	Location of the house	.026	.085	.013	.308	.758
	Awareness	-.318	.187	-.158	-1.701	.090
	The attitudes	.149	.190	.075	.786	.432
	The technologies	.270	.034	.368	7.942	.000
	The administrators	.195	.114	.087	1.707	.089

a. Dependent Variable: SW generated and stored in Kg/day

Source: field survey, 2021

The above Table 8 indicated that the study was employed multiple linear regression to establish and determine how dependent variable would influence the independent variables in the individuals' response to solid waste management practices when confronted with relationship problems. It was hypothesized that Sex, age, monthly income, family size, educational level, occupations, marital status, house type, location of the house, awareness, attitude, technology, and administrators were positively predicted the practices and challenges of solid waste management. The result revealed that 40.1% variation in solid waste generated and stored in Kg/day can be

accounted for by thirteen predictors collectively: $F(13, 381) = 19.620, p < .001$). Looking at the unique contributions of the predictors and the results showed that for sex ($\beta = .228, t = 5.256, p < .001$), for age ($\beta = .091, t = 2.266, p = .024$), for family size ($\beta = -.108, t = -2.632, p = .009$), for marital status ($\beta = -.248, t = -5.491, p < .001$), for shortage of technology ($\beta = .368, t = 7.942, p < .001$), positively predicted solid waste generated and stored in Kg/day.

Other terms showed from the findings in table 8, the multiple linear regression equation becomes:

$$Y = .673 + .454 X_1 + .084 X_2 + .002 X_3 + -.079 X_4 + .063 X_5 + .081 X_6 + -.622 X_7 + .112 X_8 + .026 X_9 + -.318 X_{10} + .149 X_{11} + .270 X_{12} + .195 X_{13}$$

From the model, when other independent variable (sex, age, monthly income family size, educational level, occupations, marital status, house type, location of the house, awareness, attitudes, technologies, administrators) at constant becomes 673. Holding other independent variables (sex, age, monthly income family size, educational level, occupations, marital status house type, location of the house, awareness, attitudes, technologies, and administrators) are constant, a unit increase in sex would lead to .454 increases in solid waste generated and stored in Kg/day. A unit increase of age would lead to .084 increases in waste generated and stored in Kg/day. A unit increase of monthly income would lead to .002 increases in waste generated and stored in Kg/day. A unit increase of family size would lead to -.079 decrease in waste generated and stored in Kg/day. A unit increase of educational level would lead to .063 increases in waste generated and stored in Kg/day. A unit increase of occupation would lead to .081 increases in waste generated and stored in Kg/day. A unit increase of marital status would lead to -.622 decrease in waste generated and stored in Kg/day. A unit increase of house type would lead to .112 increases in waste generated and stored in Kg/day. A unit increase of the location of the house would lead to .026 increases in waste generated and stored in Kg/day. A unit increase of attitudes would lead to .149 increases in waste generated and stored in Kg/day. A unit increase of the technologies would lead to .270 increases in waste generated and stored in Kg/day. A unit increase of the administrators would lead to .195 increases in waste generated and stored in Kg/day.

4.4. The Consequences of Solid Waste Generation

This section of the study deals with the consequences of solid wastes generation. Solid waste contains different socio-economic and environmental consequences in the town. One of the

consequences of solid waste generation was socio-economic consequences. With this regard, Finote-Selam town is the financial, monetary, and cultural center of the West Gojjam zone after it became a zoned city in 2005. This continued economic growth, population growth, and illegal settlements had brought a new impact on local administrators in tackling the problem of landfilling municipal solid waste, particularly municipal household solid wastes (FMO, 2018). Therefore, the surveyed sample households were asked about the socio-economic impact of solid waste in the city, and the results are shown in the Table 9, 45% of respondents answered that inappropriate solid waste management practices and methods of disposal of solid waste caused health problems such as widespread infectious diseases, cholera, diarrhea, typhoid, leading to high treatment costs, 33% of respondents said that the indiscriminate disposal of household solid waste exposes people to unpleasant odors and environmental damages such as flooding, drainage obstructions, and blockade waterways, and the rest of the respondents said that inappropriate practices for disposing of solid household waste were the spread of insects such as mosquitoes, flies, ants and other animals such as mice. As indicated in this surveyed data inappropriate solid waste management practices and methods of disposal of solid waste were the major consequence of socio-economic problems in the study area.

In addition to socio-economic consequences, solid waste generation had environmental consequences. In this regard, improper disposal and handling of municipal solid waste cause all types of contaminations such as air, soil, ground, and surface water. The breakdown of degradable solid waste into vital chemicals is a common source of local pollution. One of the most important environmental problems is gas emissions. decompose the garbage is the source of methane which is a by-product of bacteria anaerobic respiration, and these bacteria thrive in open fields that give off SW with high humidity; The other problem with these gases is their contribution to amplifying the effects of greenhouse gases and climate change (Alam and Ahmade, 2013). Solid waste management practice mainly begins with the need to protect the environment and society from the negative effects of alternative solid waste disposal methods such as open incineration, landfill on roads, and discharge into rivers (Maiti et al., 2016). As shown in Table 9, respondents were asked about the environmental impact of solid waste in the city of Finote-Selam and the results showed that 48% of respondents answered that improper disposal of household solid waste polluted streets, 24% of respondents said that mismanagement and disposal of household waste were polluted rivers

and led to drinking water shortages in the study area, while 23% and 5% of respondents responded that the improper dumping of native SW contaminated open fields and the city which were used for the recreational purposes of the people. In line with this, the result has a relationship with the findings of (Sridevi et.al, 2012) which was reported that Solid waste dumps have adverse effects on the environment and public health. Open dumps release methane from the decomposition of the decomposable solid waste under anaerobic conditions. Methane causes fires and explosions and is a major contributor to global warming. These implies that, the indiscriminate dumping of HHSW and improper management practices in the city increased the environmental problems such as fires and explosions, vegetation damage, odor nuisance, air pollution, soil, and surface water pollution. Solid waste must be made, and it must be ensured that all organic and inorganic substances are kept in a suitable place in the landfill in order to eliminate the above-mentioned environmental effects. The data obtained from the field survey are presented as follows.

Table 9: consequences of Solid waste generation

Variables	Categories	N_o	%
Socio-economic consequence of SW	Health problem	178	45
	Unpleasant odour	132	33
	Insect spreading	85	22
Total		395	100
Environmental consequence of SW	Polluting the road	190	48
	Polluting the river	94	24
	Polluting the town	21	5
	Polluting open fields	90	23
Total		395	100

Source: field survey, 2021

4.5. Practices and Collaborations of Household Solid Waste Management

This part of the study deals with solid waste management practices and collaborations of the study area. The section is mainly focused on types of solid waste generated high, practices of temporary waste storage areas, technologies used to collect and transport solid wastes, the effectiveness of

the municipality to manage solid waste, schedule of solid waste management, and types of waste generated. The data obtained from the field are presented as follows.

Table 10: Distribution of Solid Waste Management Practices (N₀ = 395)

Variables	Categories	N₀	%
Highly generated solid wastes	Food waste	213	54
	Plastics	143	36
	Ash	39	10
Total		395	100
Temporary solid waste storage areas in the compound	Yes	56	14
	No	339	86
Total		395	100
Technologies that used to collected and transported SW to dumping sites	Yes	150	38
	No	245	62
Total		395	100
Effectiveness of the administrators of finoteselem town/municipality	Effectively managed	99	25
	Not effectively managed	296	75
Total		395	100
The participants SWM schedule	Once a week	84	21
	Once every two weeks	73	19
	Once a month	144	36
	Not at all	94	24
Total		395	100
Types of solid wastes generated at the respondents' home	Organic	116	29
	Decomposable	173	44
	Non-decomposable	106	27
Total		395	100
Solid waste disposal methods of participants	Dumping in the river	40	10
	Dumping on the road	123	31
	In dumping site	120	30

	Dumping in an open field	112	28
Total		395	100
What Kind of actions taken to solid waste fractions	Recycling	7	2
	Reusing	42	11
	Storing	39	10
	Disposing	136	34
	Burning	171	43
Total		395	100
Techniques of solid waste monitoring	Collecting and burning	205	52
	Disposing	66	17
	Burying	26	7
	Storing	62	16
	Reusing	36	9
Total		395	100
Frequency of waste collectors come and collect SW at the respondents' home	Daily	15	4
	Once a week	196	50
	Once every two weeks	24	6
	Once a month	140	35
	Twice a week	6	2
	Not at all	14	4
Total		395	100
How is the HHS collaboration on SWM the town	Strongly collaborated	69	17.5
	Less collaboration	150	38
	No collaborations	176	44.6
	Strongly collaborated	69	17.5
Total		395	100

Source: field survey, 2021

Table 10 showed that solid waste management practices. Regarding this, the first item was a high solid waste generation. Solid waste management has become a global issue, especially in developing countries in the world. Due to improper use of energy and resources, most human activities certainly lead to waste generation (Adzawla et.al, 2019). According to Ali Mohammed

(2019), improper practices in the collection, lack of storage and preservation, transportation, markets, and consumer waste are the main causes of food waste. Ethiopia is losing billions of dollars due to food waste. In this way, plastic items such as plastic bottles and bottle caps, and paper wastes also accumulated due to printing errors, junk mail, accounts, and packaging products and they are the main pollutants of the environment. Although a total of 395 household respondents in the sample were asked about the solid waste management factors in the selected area, and the survey results are shown in table 10, 54% of the respondents replied that food waste is caused by the short duration of certain foods and fruits due to lack of fresh-keeping materials such as refrigerators, and energy shortages. While 36.2% of the respondents produced plastic waste and these interviewees said that plastic materials are easy to handle and move long distances in addition to this, they are not fragile easily. In addition, the temperature in Finote-Selam is high from February to May, and some interviewees used bottled water and they prefer to provide it for school children. These activities led to the production of large amounts of plastic materials in the area. However, 10% of respondents have also produced ashes. The result of a research represented that food and plastic wastes were the main factors that increase the amount of solid waste in this area and make it difficult to manage solid waste in the Finote-Selam town.

Regarding unavailability of storage area and technology to manage solid waste. The interviewee was also asked about the temporary solid waste storage area in the interviewee's residence, the results are shown in table 10, 86% of the interviewees said no and 14% of the interviewees also said yes. This shows that the highest percentage of respondents did not have a solid waste storage area in their places due to the shortage of lands, low degree of awareness and limited knowledge's and dumped household solid wastes on open land or roadsides. This indicated that, the lack of storage areas affected and challenged solid waste management practices by increasing the number of solid wastes volumes in Finote-Selam town. Similarly, respondents were asked about the availability and use of the technology used by households to collect and transport SW to the discharge site. Accordingly, the result revealed that most of the respondents (62%) replied there are no appropriate storage facilities to dispose of solid waste. "None" due to lack of funds with limited knowledge, technology can't be acquired and used in cities and their homes. Although 38% of those surveyed said "yes", there are technologies available for the collection and transportation of solid waste. However, most interviewees did not use technology to collect and transport solid

waste to landfills. This implied that the lack of funds and limited knowledge towards using technology intensified the increase in the amount of municipal solid waste and indicated that respondents who did not use solid waste collection and transportation technology are more affected in the region than those who used technology bigger.

Concerning administrative capacity and the characteristics of HHSW as shown in table 10, 395 surveyed households were asked about the administrative/municipal capacity of Finote-Selam town. The results of the survey showed that 75% of the respondents replied that the city's administrative department did not manage, control, and apply effective solid waste management practices, and 25% of the households also responded that the municipal manager effectively managed the solid waste. As a result, the solid waste management of Finote-Selam city managers is inadequate and disorderly, leading to an increase in the amount of solid waste in the city. As shown in table 10, 67% of the respondents believed that the characteristics of household solid waste that may be generated in the participants' homes affect the management of municipal solid waste and increase the amount of solid waste in cities and towns; and 33% of respondents believed that the characteristics of HHSW are not a factor in solid waste management issues in the town. With regards to types of solid waste and SWM schedules as indicated in table 10, in terms of the types of solid waste generated in the households of the respondents, 44% of the respondents generated decomposable solid waste, 29% of the respondents generated organic solid waste and the remaining 27% of the respondents generated non-decomposable solid waste. Decomposable solid waste materials are easily degraded and broken by microorganisms. However, 27% of the solid waste generated in the participants' homes didn't biodegradable and couldn't be decomposed by microorganisms or natural organisms (such as plastic and plastic-related materials, metals, and glass), which is a key factor in pollution and solid waste management practices. In addition, in the participants' SWM schedule, 36%, 24%, 21%, and 19% of the respondents scheduled their solid waste management once a month, not at all, once a week, and once every two weeks respectively. This indicated that, the interviewee's long-term solid waste collection frequency and SWM's schedule have had a negative impact on the solid waste accumulation in the study area.

Regarding to solid waste disposal methods, solid waste management practice is the selection and use of appropriate management programs, techniques to achieve particular solid waste management goals and objectives to eliminated socio-economic and environmental hazards (Aliu

et.al, 2014). Hence, the solid waste management practices and disposal methods in Finote-Selam town were dependent on different techniques. As the results revealed in table 10, the respondents were asked about the practices on solid waste disposal methods in the town and the findings indicated that 31% of the respondents were used dumping on the road, 30% of them were used to dump in dumping site, 28% of them were also used to dump in open fields and the other 10% of the respondents were used to dump solid wastes in the river. However, the highest percentage of the respondents were dumped their household solid waste on the roadside and polluted the environment and the economic activities of the town. This indicated that inappropriate solid waste management programs, indiscriminate disposal methods, and techniques of solid waste were aggravated socio-economic, environmental, and surface and groundwater pollutions in the town. Concerning to kind of actions taken for solid waste fractions, moreover, as the results indicated in the same table 10, and the results showed that among the kind of actions taken to solid waste fractions, 43% of the respondents were used to burnt solid waste, 34% of the respondents were used to dispose solid wastes to the nearby dumping sites or open fields, 11%, of the respondents, were reused solid wastes for different purpose especially plastic bottles used for onion and tomato growing, 10% of the respondents were practiced to store solid wastes by using different materials like a sack and plastic bags, and the other 2% of respondents were used to practiced recycling solid wastes in the town respectively.

Regarding the techniques and frequency of solid waste collections, solid waste collection is a fundamental element of municipal solid waste management practices. The main goal of solid waste collection practice is to collect solid waste in a timely and financial manner as correctly source separate solid waste as possible, to ease the subsequent SW sorting and treatment stage with the aim to minimize solid waste generation (Oloruntade,2013). Similarly, the selected households were asked about the techniques and the frequencies that solid waste collectors come and collect SW at the respondents' homes and the findings indicated that 50% of the respondents were collected solid waste once a week, 35% of the respondents were collected once a month and 15% of the respondents were collected in other times as shown in table 10 above.

In addition to this, as indicated in the same table 10, the Finote-Selam municipal administrator stated that the collaborations of the households in solid waste control exercise and disposal techniques had been additionally affected the volumes of solid waste in the study area. As the

results indicated, 44.6% of the respondents have now no longer collaborated on SWM, 38% of the respondents had been not often collaborated to control and dump their household solid wastes in the town, however, the last 17.5% of the respondents had been collaborated strongly on stable waste control and disposal practices to maintain and easy their environments. However, because the administrator; the right control of SW isn't simply a central authority assignment, however, is a shared duty that consists of the citizen and families of Finote-Selam who're the principal end-customers of solid waste control centers and services. This implied that the low collaborations of the society on solid waste control practices, knowledge of the function of families, their attitudes, their waste handling practices, and their interactions with different actors in the solid waste control exercise were vital problems for solid waste management practices to keep away such terrible solid waste dumping activities in the town.

4.6. Challenges in the Household Solid Waste Management Practices

This part of the study deals with the challenges and rules of solid waste management in the study area. The challenges which are treated in this section were socio-economic challenges, solid waste collection challenges, challenges of access and cleaning materials. The data obtained from the field are presented as follows.

Table 11: Challenges of Solid Waste Management

Variables	Categories	No	%
Socio economic challenges	Financial problem	98	25
	Administrative problem	28	7
	Cleaning materials problem	73	19
	Low attitude for solid waste	52	13
	Transportation problem	119	30
	Dumping site problem	25	6
Total		395	100
Solid waste collection challenges	Financial	39	10
	Administrative	189	48
	Awareness	72	18
	Attitude	95	24
Total		395	100

	Lack of materials	117	30
	Shortage of containers	153	39
Challenges of access to cleaning materials	Lack of vehicles	103	26
	Lack of financial	22	6
Total		395	100
	Highly restricted	55	13.9
SWM rules in the selected kebeles	Not restricted	99	25.1
	No SWM rules	241	61
Total		395	100

Source: field survey, 2021

As illustrated in table 11 above, the respondents were asked about the challenges facing solid waste management in Finote-Selam town. The results showed that 30%, 25%, 19%, 13%, 7%, and 6% of the respondents said: transportation problems, financing problems, cleaning material problems, the low level of solid waste management practices in the society, administrative problems and dumping problems are the main challenges for the city's solid waste management practices. In addition, the respondents were asked about the factors of solid waste collection, the results showed that 48%, 24%, 18%, and 10% of the respondents answered that the administrative, attitude, awareness, and financial aspects were the main factors for solid waste management practices in the Finote-Selam.

Regarding inadequate access to cleaning materials. The most important motivation for collecting solid waste is to protect the environment and the health of the population. Garbage and solid waste can pollute the air and water. As we all know, rotten garbage produces dangerous gases that mix with the air and can make people breathe hard (Vergara, and Tchobanoglous, 2012). However, solid waste cleaning materials can reduce this hazard and can safely remove solid waste from interviewees' homes and towns. As indicated in table 11 above, selected households were asked about the availability of cleaning materials and their advantages in solid waste management. In view of this, 39% of the respondents answered that the lack of containers was the main problem for local cleaning of solid waste, and 30% of the respondents said that the lack of necessary cleaning materials, such as brooms, nail compactors, and cars, were the main problem for local

SWM in the town, and 26% of the respondents also said that lack of vehicles was the main factor that affecting to transport the collected SW, and the remaining 6% of the respondents said that financial questions were another solid waste management factor in the study area. As most interviewees believed, insufficient access to cleaning materials was the main challenging factor for solid waste management in Finote-Salam.

As an interviewee, the municipal management of Finote-Selam city, approximately solid waste control regulations and the collaborations of pattern family respondents in the city and the pattern decided on kebeles and the findings indicated in table 11, 61% of the pattern family respondents did now no longer have solid waste control regulations of their villages, and casting off solid wastes anywhere from out of the house, 25.1% of the respondents have been had solid waste control regulations however they did now no longer appreciate it and casting off their family strong wastes in the roadside and drainage channels, at the same time as 13.9 % of the respondents have had the regulations and respecting it however the majority of the respondents had now no longer nicely controlled and disposed of solid wastes after which the city turn out to be extra polluted currently. This indicated that the major problems facing the challenges of household solid waste management practices in the Finote-Selam city were inefficiency of the transportation system due to frequent vehicle breakdowns, the inadequacy of collection vehicles, and inaccessibility of financial, cleaning materials, dumping sites, containers, and low municipal administrative, low attitudes, awareness, and low regulations. These problems were aggravated the illegal dumping practices, typically in close proximity to the source, e.g. dumping at the roadside, in open spaces in drainage areas, near to the river and valleys.



Figure 3: the household solid waste disposal of finote-selam town

In order to understand the municipality's responsiveness and inspiration to implement solid waste management practices, focus group discussion was presented for the elder and model peoples about highly affected kebele and its causes, and their idea was described in the following way. Kebele 03 become the primary and the oldest kebele, while in comparison to from different decided on sample kebeles that's aged peoples, old houses, the large and small marketing activities, and rural peoples have been determined and settled there with excessive solid waste generations and inappropriate disposal methods. Besides the focus group discussant also asked about the presence of sanitary landfills and replied that there is no landfill that is prepared for solid waste disposal in the town. They said that the residents do not want to move away a long distance to dump their solid wastes from the town and they disposed of solid wastes in open spaces and on the roadside.

The focus group discussant also replied the question like the presence of any governmental or private solid waste collectors in the town and they replied that there are no organizations who worked on solid waste collection and its disposal methods. They stated that they were planning to start micro and small enterprises but because of the budget problems and the integrity of their staff, they could not employ workers on collection and disposal of solid waste. As the effects surveyed from focused group discussions (FGD), and the findings indicated in the below figure 4.2, kebele 03 become stricken by 46.6% of solid waste generation, while, kebele 02 become affected by 21%

of solid waste generation, kebele 04 also become stricken by 18.2% of solid waste volume, and the final kebele 01 become additionally affected by 14.2% of solid wastes generation.

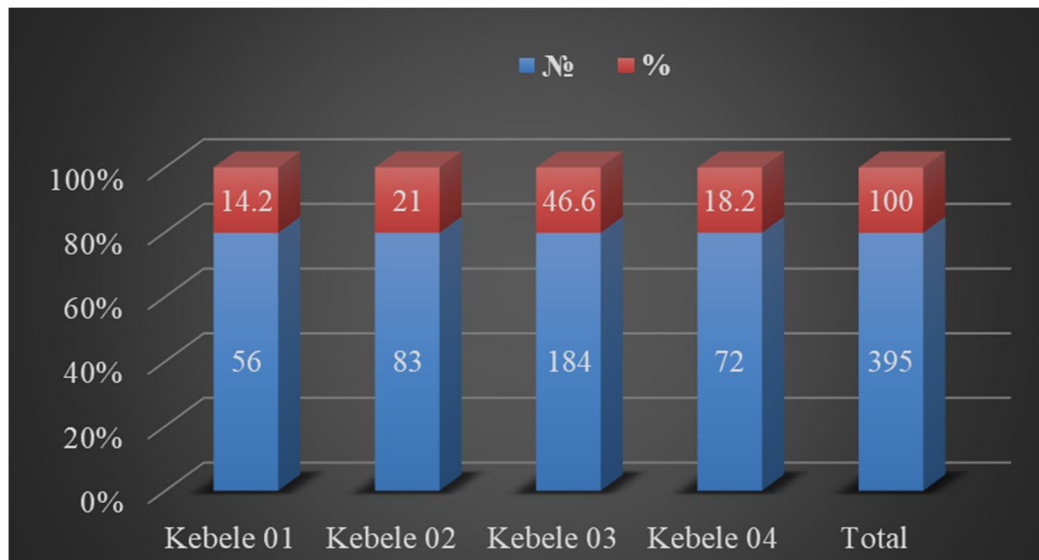


Figure 4. Highly polluted areas from selected sample kebeles

5. SUMMARY AND CONCLUSION

5.1. Summary and Conclusions

The study was conducted to evaluate solid waste management practices and challenges of households' waste management in Finote-Selam town, west Gojjam zone, Amhara regional state, Ethiopia. Solid waste management has become a global issue, especially in developing countries in the world. Due to improper use of energy and resources, most human activities certainly lead to waste generation. Thus, Solid waste management is the practice of collecting, storing, handling, and dumping solid wastes in such a way that they are dangerous to human health, flora and fauna, ecosystem, and the environment in general. As the findings revealed that solid waste management practice needs the selection and use of appropriate management programs, techniques to achieve particular solid waste management goals and objectives to eliminate socio-economic and environmental hazards because indiscriminate dumping of HHSW and improper management practices in the city increased the environmental impact such as fires and explosions, vegetation damage, unpleasant odour nuisance, air pollution, soil, and surface water pollution. In addition to this, Solid waste management practice mainly begins with the need to protect the environment and society from the negative effects of alternative solid waste disposal methods such as open incineration, landfill on roads, and discharge into rivers. As indicated in the finding, all the environmental and socio-economic problems have been created due to the following factors and challenges in the study area; these were, high solid waste generation, unavailability of storage area, low technology, and ineffective administrative capacity, the characteristics of HHSW, types of solid waste, SWM schedules, socio-economic factors, inadequate access of cleaning materials, inappropriate disposal methods, and low actions are taken for solid waste fractions, low techniques, and frequency of solid waste collections. The study applied cross-sectional research design method. The study used both primary and secondary data. The primary data sources were obtained from households through questionnaires, key informant interviews focus group discussions and field observations. Similarly, secondary data sources were used official documents from governmental and non-governmental organizations. In addition to this, the thesis was used simple random sampling techniques.

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7. APPENDIX

7.1. Appendix 1 Questionnaire Sheet Tables

Questionnaires for MA thesis titled practices and factors affecting household solid waste management in Finote-Selam town west Gojjam zone, Amhara Regional State, Ethiopia.

Dear respondent, I want to inform you that this questionnaire is prepared for academic purposes that used to collect information for MA. Thesis of Haramaya University Graduate School of Geography and Environmental Studies. The results of this study can help the responsible agencies work hard to find ways to improve municipal solid waste management in the town.

Therefore, your answer is very important to the success of the research, because all the information you provide determines the analysis and conclusions of the survey. Therefore, you need to give your answer by choosing your answer from the given alternatives, circling or describing your opinion in the designated spaces. Please note that your response is confidential. So please complete this questionnaire without any hesitation.

I would like to thank you in advance for all your corporation and dedication.

N.B

You are asked to respond all the questions included in the questionnaire paper and return back the questionnaire after you completed.

You are not required to write your name

Table 1. Socio-economic characteristics of the households

1	What is your sex?	
2	What is your age?	
3	What is your family Size?	
4	What is your monthly income?	
5	What is your marital Status	1. Marred 2. Single
		3. Divorced 4.Widowed

6	What is your educational Level?	1. Able to read and write
		2. Secondary School
		3. College and University
		4. Unable to read and write
7	What is your occupation?	1. Farmer
		2. Business runner
		3. Daily Laborer
		4. Government Service
8	What is your residential dwelling type?	1. Rental
		2. Personal
		3. Condominium
9	What is the location of your house from the town?	Center of the town
		Periphery of the town
		Out of the town

Table 2. Factors and challenges of solid waste management activities

1	Which solid waste is highly generated at your home?	1. Food waste 2. Plastics
		3. Ash 4. Woods
2	Do you have a temporary solid waste storage area in your compound?	1. Yes
		2. No
3	Is there available technology in the town that used for SW collection and transportation to dump in dumping site?	1. Yes
		2. No
4	What is the capacity of Finote-Selam town administrates/ municipality on solid waste management?	1. Effectively managed
		2. Not effectively Managed
5	Does your household solid waste have different characteristics?	1. Yes
		2. No
6		1. Once a week

	How often you scheduled solid waste management programs in your household?	2 Once every two weeks
		3. Once a month
		4. Not at all
7	What are the types of solid waste that you generate at your home?	1. Organic
		2. Decomposable
		3. Non-decomposable
8	What are the challenges of solid waste management in Finote-Selam town?	1. Financial problem
		2. Administrative problem
		3. Cleaning materials problem
		4. Low attitude for solid waste
		5. Transportation problem
9	What are the major factors for solid waste management practices in your town?	1. Financial
		2. Administrative
		3. Awareness
		4. Attitude
10	What are the problems of solid waste management in your home?	1. Lack of materials
		2. Shortage of containers
		3. Lack of vehicles
		4. Lack of financial

Table 3. Solid waste management and disposal activities

1	Where do you dispose your household solid wastes?	1. Dumping in the river
		2. Dumping on the road
		3. dumping in dumping site
		4. Dumping in an open field
2	What kind of actions do you take for your household solid waste fractions?	1. Recycling
		2. Reusing
		3. Storing
		4. Disposing
		5. Burning

3	What are the techniques used in your home to monitoring solid waste?	1. Collecting and burning
		2. Disposing
		3. Burying
		4. Storing
		5. Reusing
4	How often waste collectors come and collect SW at your home?	1. Daily 2. Once a week
		3. Once every two weeks
		4. Once a month 5. Twice a week
		6. Not at all

Table 4. Socio-economic and environmental impacts of solid waste

1	What are the socio-economic problems of solid waste in your household?	1. Health problem
		2. Unpleasant odour
		3. Insect spreading
2	What are the environmental impact of solid waste in your town?	1. Polluting the road
		2. Polluting the river
		3. Polluting the town
		4. Polluting open fields
3	What are the major causing factors for high SW generation in your town?	1. Lack of awareness
		2. Dumping site problems
		3. High resource consumption
		Lack of containers

7.2. Appendix II Interview of Institutional Rules, Regulations and Collaborations

Interviews were prepared for members of the municipality and administrators for the institutional policies and collaborations of the household in the town.

Dear Interviewee: I want to inform you that this interview is for academic purposes only which is to collect information for the master's thesis on the major practices and factors affecting household solid waste management in Finote-Selam town. The results of this study can help responsible agencies find ways to improve the management of municipal solid waste. As a stakeholder, your

opinions and ideas are very important to the success of this research. If you take a moment to answer these questions, they will be greatly appreciated.

1. How the rules of SWM in the town and the selected sample kebeles of household?
2. What are the collaborations of households for solid waste management?
3. How you support the household to manage solid wastes in the town?

7.3. Appendix III Focused Group Discussions

Focused group discussions for elder and model peoples about highly affected kebele, and its cause

1. Which kebele is highly affected by solid waste from the selected sample kebeles?
2. Are there sanitary land fill in your kebele?
3. Are there any governmental or private solid waste collector in your kebele?