WOLKITE UNIVERSITY

COLLEGE OF SOCIAL SCIENCE AND HUMANTIES

DEPARTMENT OF GOVERANCE AND DEVELOPMENT STUDIES

ASSESSMENT ON IMPACT OF SOLID WASTE ON URBAN ENVIRONMENT

A SENIOR ESSAY SUBMITTED TO THE PARTIAL FULFILLMENT OF THE REQUIREMENT FOR BACHEROR OF ARTS (BA) DEGREE IN GOVERNANCE AND DEVELOPMENT STUDIES.

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IMPACT OF SOLID WASTE ON URBAN ENVIRONMENT IN ETHIPIOA

APPROVED BY BOARD OF EXAMINERS

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ABSTRACT

Municipal solid waste (MSW) refers to the collection, transfer, treatment, recycling, resources recovery and disposal of solid waste in urban areas. This study aimed at assessment of impact of solid waste Practices in Ethiopia. In the study researchers questions the existing SW practices look like and factor affecting SW system.

The country has been experiencing very poor solid waste management system. In-adequate solid waste management in the country has resulted in the accumulation of waste on open lands, in drains and in the residential areas, causing a nuisance and foul-smelling pools, environmental pollution through leach ate from piles (water and soil pollution) and burning of waste (air pollution), clogging of drains. This study was, thus, conducted to fill the existing gap.

Waste is defined as eliminated or discarded unwanted or unusable material, substances, or by products produced by individuals, households or organizations. As a result waste is a complex mixture of different substances, only some of which are intrinsically hazardous to health and human activities have always generated waste. Increasing population levels, booming economy, rapid urbanization and the rise in community living standards have greatly accelerated the municipal solid waste generation rate in developing countries.

Acronym

EU= European Union.

ISW= Integrated solid waste.

MDG= Millennium development goal.

MSW= Municipal solid waste

SBPDD= Sanitation Beatification and Parks Development Department.

SW= Solid waste.

UK= United Kingdom.

UNEP = United nation environmental program.

UN HABITAT=United Nations Commission ON Human Right Settlements.

CHAPTER ONE (1)

1 INTRODUCTION

1.1 Background

Solid wastes could be defined as non-liquid and non-gaseous products of human activities, regarded as being useless (Babayemi and Dauda, 2009). Its origin is mainly from households, municipal and construction (Munier, 2005).Solid waste is a major challenge in urban environment areas throughout the world.

Globally**,** Impact Solid waste management is a burning issue in a rapidly urbanizing world. With the accelerated urbanization and industrialization the impact solid waste practices are having a bearing on public health and the environment in urban areas of many developed countries (Kjeldsen et al., 2002; Laner et al., 2012; Mukherjee et al., 2015). Industrialization increases the problem as the volume of urban solid wastes generated per capita also inclines to rise gradually with increasing per capita income (Brennan, 1999; Najam et al., 2015; Han et al., 2016).

Environmentally acceptable management of municipal solid waste has become a global challenge due to limited resources, an exponentially increasing population, rapid urbanization and worldwide industrialization. Waste generation is not rare in urban areas or any part of the world. The only aspect that may differ is the way of managing or handling the wastes. The explosion in world population is changing the nature of solid waste management mainly from a low priority and localized issue to an internationally social problem. The problem of managing solid wastes is growing day by day, which results into a direct threat to the public health and to the environment (Chatterjee, 2010).
The rapid urbanization that has been taking place during the 20th century virtually transformed the world in to communities of cities and towns facing similar challenges on environmental issues in which most of them have to be addressed at international level (Smith, 2010). Among those environmental issues solid waste is a critical one because as long as humans have been living in settled communities, solid waste generation has been an unavoidable and critical issue in developed nations.

In developing countries**,** Urban solid waste is considered as one of the most urgent and serious environmental problems facing municipality authorities in developing countries particularly in Africa. General awareness of our environmental problems has led to the development of pollution control technologies, more rigorous legislation, strategies on waste handling and disposal to minimize the environmental impact associated with solid waste. Waste disposal is an important part of waste management system, which requires much attention to avoid environmental pollution (Md.Mujibor et al, 2008).

Solid waste is a complex mixture of different substances, only some of which are intrinsically danger to health (Rushton, 2018). Human activities have always generated waste (Giusti, 2009). Increasing population levels, booming economy, rapid urbanization and the rise in community

living standards have greatly accelerated the impact urban solid waste generation rate in developing countries (Abarca et al., 2013). It became a serious problem with urbanization and the growth of large population

Like other developing countries, in Ethiopia the increasing the impact of solid waste generation on urban environment is resulted from increasing the rate of urbanization and population increasing time to time (lemma 2007). And also in Ethiopia solid waste is a major problem on one side due to fast growing in economy, expansion of urbanization and industries in the major cities of the country and on the other side the government have not sufficient means to solve the problem owing to lack of finance, skilled manpower and capacity to work in partnership with the community (Edwards, 2012).

In general, the negative impacts on the environment, human and animal health is increasing from time to time. Therefore, the purpose of this study is to assess the impact Solid Waste on the urban environment.

1.2 Statement of the problem

The environment is largely exploited by changing life style, advancement of new technologies and scientific development. The most common problem faced by all the developing countries is the disposal of solid waste Masheke (2011). Besides, one of the commonest characteristics of developing nations has been unbalanced between rapid population growth and sanitation infrastructure provision which is worsened by the challenges of poor waste practices affecting on the deteriorating ecosystem of the fast growing cities of these countries (Elias et.al, 2012).

In African regions of urban centers, less than half of solid waste processed is collected and ninety five percent (95%) of that amount is either throw away at various dumping sites on the periphery of urban centers or at a number of temporary sites which is typically empty lots of scattered throughout the city (Mohammed, 2003; cited in Nigatu Regassa et. Al.,2011).

The solid waste problem is serving in Ethiopia. Like any other countries of the city councils and municipalities have not sufficient means to solve the problems of solid waste. The major causes of the problem are lack of man power, finances and the capacity to work in partnerships with the local communities Edwards (2010). And also In Ethiopia most of the diseases are related to poor environmental sanitation and water contamination. It is obvious that lack of suitable waste disposal site, public toilet and gene sanitary mechanisms in the vicinity can affect the community's economic and social activities directly or indirectly (Tsegaye, 2006).

As a consequence of population growth and development activities, high amounts of household and impact municipal solid wastes are generated. The population of a town is growing due to both natural increase and through immigration of people from rural areas to towns. High rate of wastes are facing problem of their disposal and have very high potential effect to pollute environment such as surface water, soil and air. Public health is also highly affected by the uncontrolled solid waste generation and disposal

The disposal method that used is also open dumping type which widely practiced in many developing countries and has hazardous effect on health and the environment.as result municipal solid waste management has not be carried out in the sufficient and good manner. The environmental condition of has become more serious from time to time, and people are suffering from living in such condition. So that critical need of efficient municipal solid waste management on one hand and steady growth of solid waste problem on the other side are still the main features.

Detail study of the overall condition of urban solid waste management service should be the first move required for reducing this gap. Therefore, this study is to investigate the source of solid waste, to examine the negative consequences of solid waste, to examine the existing status and spatial coverage of municipal solid waste in Ethiopia.

1.3 Objective of the study

1. General objective

- In general the researchers aimed at assessing the impact of solid waste on urban environment in Ethiopia.

2. Specific objectives

- To investigate the source of solid waste.
- To examine the negative consequences of solid waste.
- To examine the existing status and spatial coverage of municipal solid waste management service.

1.4 Research Questions

1. What are the impacts of the solid waste management systems on the environment? How do the residents perceive the impacts of solid waste on their environment?

2. What are the health impacts of the solid waste among the residents?

1.5 Significance of the Study

This study would have the following significant role: - raise awareness about the solid waste, it eventually use as input for who interested to carry out similar study in the area of solid waste, another researcher may take this research as reference to conduct further research in similar area, the researchers was get knowledge and experience to conduct such assessment, result of the

study will help different stakeholders in the area in their day to day activities. Because unwanted solid waste may affect the economic, social, environmental and other activities of the people and also one of the beneficiaries of the study may be in which these study undertaken. After conduct of the study, the can use recommended solution and take corrective way to transform its own situation**.**

1.6 Scope of the study

The study has designed to assess the impact of solid waste on urban environment in case of Ethiopia. The term waste is very broad and wide it includes the liquid waste and solid waste. At the last of this study is not representing the impact and its effects on urban environment to the entire world. However, this study is limited on impact of solid waste on urban environment in Ethiopia.

In this research we can studies briefly about the impact of solid waste on urban environment.

1.7 Limitation of the study

The term solid waste is abroad topics. Within this broad topic, we face the pandemic disease covid 19 virus. We cannot gate sufficient data. Because of available data about solid waste the limited available to accomplish the study may restrict the researchers from consulting many books, empirical studies and relevant similar case studies that have been done in least developed countries. In addition lack of helping tools such as personal computer (Laptop) and researcher's limited experience might have impact on the conclusion of the study. Finally, the small amount of fund apportioned undertakes the research had its own drawback on the study.

1.8 Organization of the paper

The study has consisted of three chapters: the first chapter introduce about the problem led to the study. It consists the following sub topics. Backgrounds of the study, statements of the problem objectives of the study, research questions, significance of the study, scope, limitation and organization of the study. Second chapter discuses on the review of the related literature on the concept of solid waste the following are included concept of solid waste, definition, characteristics, emergence and the source of solid waste, findings of previous studies on the research area and implication of the review of previous studies on the area. Finally Chapter three draw conclusions and summery. It contains conclusion/summary and references.

1.9 Research methodology

Data source and data type

Due to international pandemic of covid-19 this research has used only secondary data to reduce the spread of pandemic through physical contact in the time of collection of primary data. In order to achieve the general objective of the study, the researchers used some secondary data Source from sources like books internet website, and other published and unpublished materials and journal Article data which are relates to the impact of solid waste on urban environment.

CHAPTER TWO

2 REVIEW OF LITERATURE

2.1 THEORITICAL AND CONCEPTUAL FRAMEWORK

Waste is anything discarded by an individual, household or organization. As a result waste is a complex mixture of different substances, only some of which are intrinsically hazardous to health (Rushton, 2018). Urban solid waste is defined to include refuse households, non-hazardous solid waste from industrial, commercial and institutional establishments including hospitals, market waste, yard waste, and street swiping (Ch. 2009).

Domestic solid wastes are wide variety produced from household activities such as food preparation and consumption, sweeping, burning, and garden wastes, and used items like clothing, furnishings, and abandoned equipment. Domestic waste includes both solid and liquid and sometimes hazardous wastes generated from residential areas and sometimes referred to as household wastes (Mohammed, et.al, 2017).

Waste - according to UK environmental protection act (1990), “it is any substance which constitutes scrap materials, an effluent or other unwanted surplus arising from application of any substances or article which requires to be disposed of which has broken, worn out, contaminated or otherwise spoiled.”

Solid waste - can be defined as “any garbage, refuse, sludge, and other discarded solid materials resulting from industrial, commercial, agricultural operations, and community activities, but does not include dissolved materials” (U.S. Code of Federal Regulations, 1995 cited in Samuel, 2006,p.5). In short “it is anything that is neither liquid nor gas and is discarded as unwanted” (Federal Negarit Gazeta of Ethiopia, proclamation number 513 of 2007). Municipal solid waste (MSW) - refers to materials discarded in urban areas for which municipalities are usually responsible for collection, transportation, and final disposal.

Wastes are materials that are not prime products (that is products produced for the market) for which the initial user has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose. Wastes may be generated during the extraction of raw materials, the processing of raw materials into intermediate and final products, the consumption of final products, and other human activities. Residuals recycled or reused at the place of generation are excluded" (MacBride, R., Waste, C. & Idaho, C.P. 1953. P.89 as Cited in Alireza and Mahmoud, 2014)

The World Bank (1999) defines Solid waste (SW) as unwanted, thrown away or discarded as useless materials by human. These materials are non-liquid, non-hazardous, non-gaseous and consist of organic matter (that is easily degradable) and inorganic (non-biodegradable, for instance, metals, plastics, bottles and broken glasses). Solid waste, as stated by (Arukwe, 2012; Patwary et al., 2011; Zhang et al., 2010), are materials originate from households, commercial establishments, institutions, markets, and industries. Rouse (2008) also noted that "Solid waste is defined as material which no longer has any value to its original owner, and which is discarded. The main constituents of solid waste, according to this author, in urban areas are organic waste (including kitchen waste and garden trimmings), paper, glass, metals and plastics , Ash, dust and street sweepings can also form a significant portion of the waste.

In Ethiopia, according to the Federal Democratic Republic of Ethiopia Proclamation No. 513/2007, Solid Waste Management Proclamation, "Solid Waste" means anything that is neither liquid not gas and is discarded as unwanted. The ever increasing amount of solid waste generated which is exacerbated by lack of proper waste management system is of growing environmental and public health concern worldwide and in major towns and cities of Ethiopia (Endrias & Solomon , 2017)

Solid wastes generated are different from country to country or region to region which means the management system also varies. Solid waste is generated due to a lot of factors which includes the abundance and type of natural resource available, the lifestyle of citizens as well as their living standards. Solid waste is embarrassing and difficult to discuss with reason that policymaking and political discussions must deal with taboos in various locality which affects the process of arriving at achievable goals (UN-HABITAT, 2010). Solid Waste Management (SWM) could be defined as the art of managing garbage in a specific location which may include; waste collection, recycling, treating and disposing in accordance with the agreed national or international standards (Nathanson, 2000).

EU Waste Directive 2008, also defines waste management as "the collection, transport, recovery and disposal of waste, including the supervision of such operations and the after-care of disposal sites, and including actions taken as a dealer or broker"

The human activities which take place in this world create waste. The wastes could be both solid and liquid types; and the way they are going to be handled, stored, and disposed can expose the environment and public health to risks (Zhu et al, 2008). SWM includes all activities that seek to minimize health, environmental and aesthetics impacts of solid waste.

Management of increasing amounts of solid waste has become a major challenge in many cities in developing countries. If solid waste is properly used, it can be a valuable resource, but if it is not effectively managed, it can result in serious adverse impacts on environment and public health. Solid waste management is therefore a critical component within urban sanitation and it is also one of the most important and resource intensive services provided by municipalities (ENPHO, 2008).

According to Rouse (2008), the basic concept of SWM involves the "collection, storage, transportation, processing, treatment, recycling, and final disposal of waste". He also noted that, the management system should be simple, affordable, sustainable, economical, efficient, environmentally sound and socially acceptable, and providing the service for both the poor and wealthy households.

Solid waste (SW) also called trash or garbage is defined at the national level as wastes consisting of everyday items such as product packaging, grass clippings, furniture, clothing, bottles and cans, food scraps, newspapers, appliances, consumer electronics, and batteries. These wastes come from homes, institutions, etc. such as schools and hospitals; and commercial sources such as restaurants and small businesses (U.S. EPA, 2016). Municipal solid waste, according to Solomon (2011), refers to "materials discarded in urban areas for which municipalities are usually responsible for collection, transportation, and final disposal."

Municipal solid waste (MSW) - refers to materials discarded in urban areas for which municipalities are usually responsible for collection, transportation, and final disposal. Municipal solid waste management - is an activity of planning and implementation of solid waste management components such as collection, transfer and transportation, recycling, resource recovery, and disposal MSW under jurisdiction of local government.

2.2 Waste management

Waste management is the collection, transport, processing, recycling or disposal, managing and monitoring of waste materials. The term usually relates to materials produced by human activity, and is generally undertaken to reduce their effect on health, the environment or aesthetics. Waste management is also carried out to recover resources from it. Waste management can involve solid, liquid gaseous or radioactive substances, with different methods and field's expertise for each. Waste management practices differ for developed and developing nations, for urban and rural areas, and residential and industrial producers. Management for non-hazardous waste residential and institutional waste in metropolitan areas is usually the responsibility of local government authorities, while management for non-hazardous commercial and industrial waste is usually the responsibility of the generators

2.3 Integrated Solid Waste

Integrated Solid Waste (ISW) is a comprehensive waste prevention, recycling, composting, and disposal program. An effective ISW system considers how to prevent, recycle, and manage solid waste in ways that most effectively protect human health and the environment. ISWM involves

evaluating local needs and conditions, and then selecting and combining the most appropriate waste management activities for those conditions (Shaukat & Sajjad, 2016). It is also recognized at the international level, and they incorporate all the policies, programs, and technologies that are necessary to manage the waste stream. The mix and emphasis of approaches that are taken generally varies from region-to-region and from country to-country, and depends on local conditions (UNEP, 2005).

The "Waste Management Hierarchy" is an internationally recognized strategy for management of municipal solid wastes and it is a key element of integrated solid waste management. It also places greatest emphasis on strategies and programs for avoiding and reducing waste, with treatment and disposal being the least favored options. The purpose of the waste management hierarchy is to make waste management practices as environmentally sound as possible. It has been adopted in various forms by most industrialized countries. Its principal elements are also included in international conventions and protocols, particularly those dealing with the management of toxic or hazardous wastes, and in regional attempts to develop a coordinated policy on the reuse of various byproducts of waste management processes. The hierarchy is a useful policy tool for conserving resources, for dealing with landfill shortages, for minimizing air and water pollution, and for protecting public health and safety. In many developing countries, some aspects of this hierarchy are already in place, since traditional practices revolving around waste prevention reuse, and recycling are prevalent (UNEP, 2005)

According to (Shaukat & Sajjad, 2016) this solid waste management hierarchy includes:

Waste Reduction

The highest priority option in ISW hierarchy is to avoid or reduce the solid waste generation at the source. It involves reducing the amount and/or toxicity of the waste generated. Waste reduction may occur through the designing, manufacturing, and packaging of products with minimum toxic content, minimum volume of material, or a longer useful life. Waste reduction may also occur at the household, commercial, or industrial facility through selective buying patterns and the reuse of products and materials.

Reusing

Municipal solid waste generation could be reduced through reusing the items that are no longer required by someone. Most of our daily use products are reusable. For example, plastic bags obtained from the market are often used to pack the household waste and transport it from the house to the waste bin. Newspapers are rolled up to make fireplace logs, and coffee cans are used to hold bolts and screws. All of these are examples of reuse. Reusing is thus about extending the life or giving a second life to something that we previously considered as "garbage". In this way, the garbage we are sending to the landfill sites will be reduced and the operational life span of the landfill site will extend. .

Recycling

The third option in the ISW hierarchy is recycling, which involves (1) the separation and collection of waste materials; (2) the preparation of these materials for reuse, reprocessing, and re manufacture; and (3) the reuse, reprocessing, and remanufacture of these materials. Recycling is an important factor in helping to reduce the demand of resources and the amount of waste requiring disposal by landfill

Resource Recovery

The fourth option in the ISW hierarchy, resource recovery (waste transformation), involves the physical, chemical, or biological alteration of waste. The transformation of waste materials usually results in the reduced use of landfill capacity. The reduction in waste volume through combustion is a well-known example.

Landfilling

Landfilling is the last and least preferred option of the ISW hierarchy. It involves the controlled disposal of waste on or in the earth's mantle, and it is by far the most common method of ultimate disposal for waste residuals.

2.4 Solid waste characterization

According to Gerald, 1997 four methods for estimating waste quantities and composition are identified: direct sampling (also referred to as waste stream analysis and waste audits), material flow, surveying waste generators, and literature sources.

2.4.1Direct sampling

Direct sampling involves sampling, sorting, and weighing materials from the waste stream of a specific generator. This method has been used to estimate the composition of municipal waste streams. Representative sampling methods must be employed to achieve accurate results. When using the direct sampling method, the following questions must be addressed: How will representative samples of waste be obtained; and how many samples should be selected to achieve the desired level of accuracy in the results? The responses to these questions will influence the cost of conducting the study as well as the usefulness of the data.

2.4.2Waste stream analysis

Waste stream analysis is another term used for characterizing the waste stream of a specific operation for a designated time period. Waste stream analysis is defined as a method for collecting, sorting, and measuring the amount and type of waste generated by an operation.

Results of a waste stream analysis provide data about the amount and type of waste/residues in the waste stream. Data should be collected for a minimum of one week; the length of time depends on how the data are to be used and the accuracy required. The results are averaged to estimate the amount of waste that the facility generates for a period of time.

2.4.3 Waste audit

The basic objectives of a waste audit are similar to a waste stream analysis. A waste audit involves a more detailed assessment of waste. The waste audit assesses not only the output (waste), but also the input, such as food products, packaging materials, office supplies, mail, or any process that results in materials that must be discarded. The detailed and complicated analysis of material flow through an institution will enable the facility to find the amount purchased, used, recycled, and disposed of for different materials. A waste audit can involve all materials or focus on a specific material, such as cardboard or office paper that is generated by a facility or department.

2.4.4 Material flow

The material flow method applies the concept of conservation of mass to track quantities of materials as they move through a defined system or region. The material flow methodology in this instance is based on the production weight data for materials and products. Generation data are the result of making specific adjustments for imports, exports, and diversions to the production data by each material and product category. The method also considers the useful life of products. One of the problems with the material flow approach is that it is difficult to quantify product residues, such as food left in the container and detergent remaining in the package.

2.4.5 Literature sources

Data on waste/residues quantities and composition are available from a variety of sources including public agency documents, engineering reports, trade publications, and professional journals. These data may be helpful in assisting managers in identifying the type of residues/waste generated by a specific industry or activity. However, caution should be exercised when operational decisions are made based on data from the secondary sources. Waste characterization and generation rate studies are recommended for operational uses rather than relying on published data since each study site is unique.

2.4.6 Surveying waste

Surveying industrial generators, such as food processors can provide useful data in quantifying waste generation. More accurate data can be obtained if the waste/residues are measured at the disposal site.

2.5 Composition of Municipal Solid Waste

Urban solid wastes can be segmented into two major components called biodegradable and non-biodegradable. The biodegradable component of urban solid waste constitutes organic wastes such as food waste, garden waste, and agricultural waste which undergo biological degradation under controlled conditions and can be turned into compost or organic fertilizer. While non-

biodegradable wastes includes inorganic materials which can't be decomposed and degraded (cited by Solomon cheru, 2011). From our own observations in disposal site, illegally dumping areas and in residential areas, Gondar town physical composition of municipal solid waste is also composed from both biodegradable and non-degradable components. The construction and demolition waste that is generated during the course of repair, construction, and destruction activities constituting sands, soil stones, nails, cement concrete and wood are also observed in the town. This is due to high construction activities of the town and such wastes are not stored by waste generator within their compound rather they deposited just outside in streets and open areas. Different types of medical waste such as syringes, gloves, glucose materials etc. from hospitals, clinics, and other health care establishments are also detected in different disposal areas of the town. But such wastes should be managed carefully and separately from the above types of solid wastes because of its hazardous health impacts (Source: field survey, 2014).

2.6 Impact of poor solid waste on the Environment

Improper management of solid waste is one of the main reasons for environmental pollution and degradation in towns and cities, of the third world especially (Selin, 2013a). Open dumping, open burning and un-engineered sanitary landfills are common practice throughout the country. Due to improper solid waste disposal and collection systems dwellers are facing serious negative environmental impacts in developing countries.

Poor solid waste management systems in cities of developing countries results in many negative environmental impacts (Ejaz et al., 1996; Luang, 2001). Poor solid waste disposal system is creating a number of negative environmental impacts. Blockages of the drains and sewers ultimately are creating flooding and unhygienic conditions in the city which again suitable for mosquito breeding and causes for Malaria. Flies breeding are directly linked with open solid waste dumps which are very effectual vectors that spread disease in the community. Uncollected solid wastes from few locations in the city are degrading the urban environment and discouraging efforts to keep streets and open spaces clean. During transportation of the wastes, open body trucks are being used for the collection of solid wastes in most of cities of developing countries without covers which is totally unhygienic (Abarca et al., 2013; Pokhrel & Viraraghavan, 2005).

Dealing with the environmental costs in rapidly growing economic development, urbanization and improving living standards in cities have led to an increase in the quantity and complexity of generated waste, representing a phenomenal challenge (Sharholy & Ahmad, 2008; Regassa, et. al., 2011). This is particularly true in the area of solid waste management. While cities are generating an ever-increasing volume of waste, the effectiveness of their solid waste collection and disposal systems are declining. In urban centers throughout African regions, less than half of the solid waste produced is collected, and 95 percent of that amount is either indiscriminately thrown away at various dumping sites on the periphery of urban centers, or at a number of so-called temporary sites, typically empty lots scattered throughout the city (Selin, 2013b).

2.7 Impact of solid waste disposal system on the health of the community

The potential health effects of both waste itself and the consequences of managing it have been the subject of a vast body of research (Henry et al., 2006; Rushton, 2018). The safety and acceptability of many widely used solid waste management practices are of serious concern from the public health point of view (Hamer, 2003). The generation of waste and the collection, processing, transport and disposal of waste, the process of „waste management", is important for both the health of the public and aesthetic and environmental reasons (Rushton, 2018). Sites are found on the outskirts of urban areas.

Many countries in developing countries face serious environmental degradation and health risks. These areas become children's sources of contamination due to the incubation and proliferation of flies, mosquitoes, and rodents. They, in turn, are disease transmitters that affect population's health, which has its organic defenses in a formative and creative state. The said situation produces gastrointestinal, dermatological, respiratory, genetic, and several other kind of infectious diseases

Poorly managed solid wastes are potentially hazardous to the health of the community. Wastes from different sources (industrial, agricultural, hospitals and/or households) can inter human bodies through different routes. These toxicants can be found in air, water and soil and could find their way into the human body through inhalation, ingestion absorption (Selin, 2013a; Li et al., 2011). Skin Disorders, Respiratory Abnormalities, Abdominal and Intestinal Problems, Dental Disorders, Ear Infections, Skeletal Muscular Systems problems, Central Nervous System impairment, Eye Infections, Blood Disorders, malaria, chicken pox, septic wounds and congenital abnormalities, cardiovascular diseases and lung cancer are among health related problems due to improper solid waste management system in urban areas (Selin, 2013a; Mazhindu, et al., 2012).

The United States public health service has published the result of the study tracing the relationship of 22 diseases to improper solid waste. Waste water is the cause of enteric communicable diseases. Human excreta contain disease causing organisms, thus it is the source of many infections (UNICEF and WHO, 2010; Hutton G., Bartram J. 2008).

In Sub- Saharan Africa, 69 percent of the population does not have access to improved sanitation facilities. At the current rate of progress, the sanitation Millennium Development Goals (MDG) will not be met for a long time (WHO, 2003). Waste management is a growing public concern in

Ethiopia. In many cities of the country, waste management is poor and solid wastes are dumped along roadsides and into open areas, endangering health and attracting vermin. Access to sanitation is also among the lowest in the world. Sixty percent of the population still practices open field defecation. Only12 percent (8%in the rural and 29% in the urban), of the population use improved sanitation facilities (Tefera W., 2008).

2.8 Source and Types of Municipal Solid waste

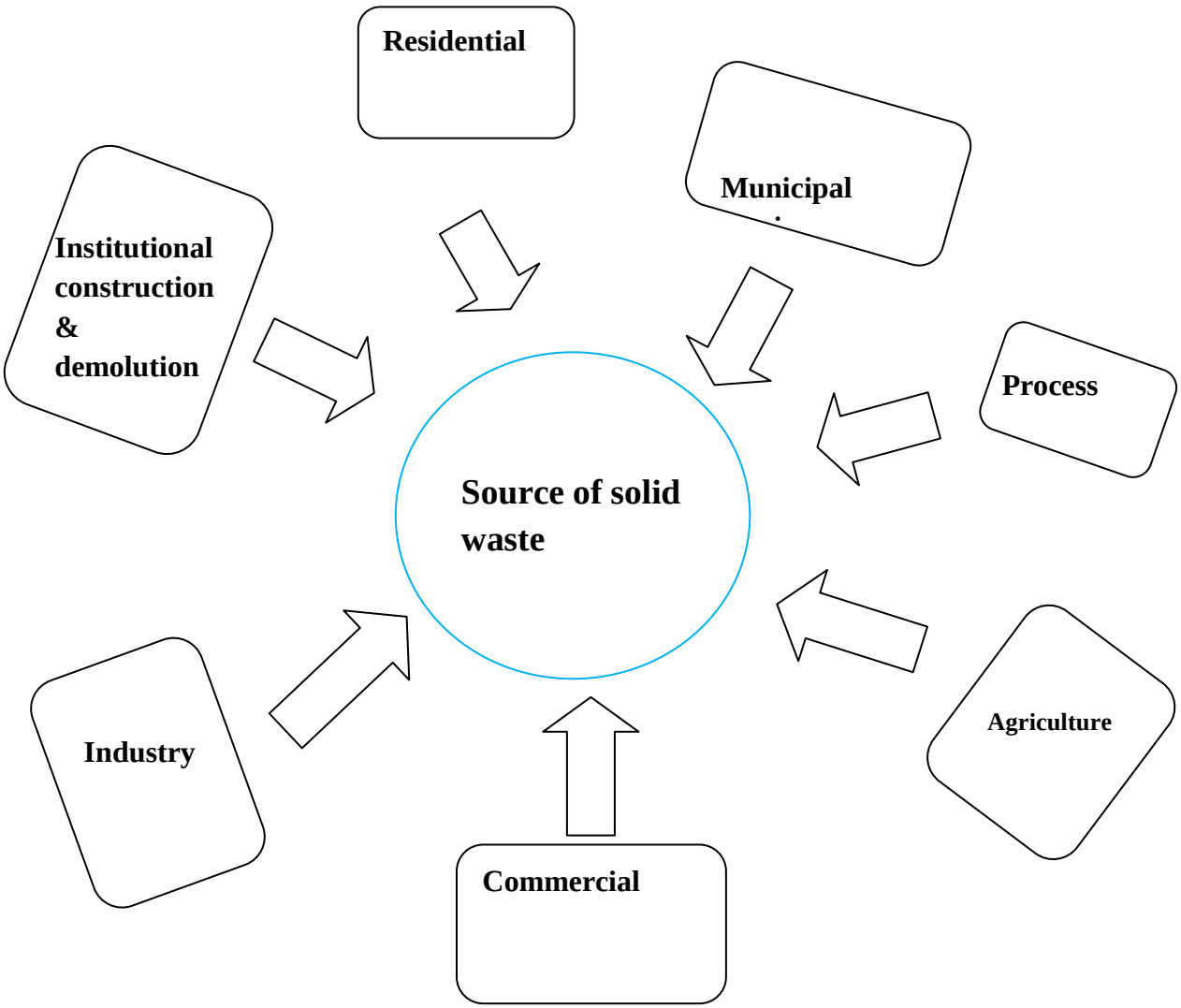
Solid waste classified based on its origin, risk potential, or characteristics. Based on origin, solid waste can be classified in to food waste, rubbish, ashes and residues, agricultural waste, municipal service, industrial process waste, and demolition and construction wastes. With regards to characteristics, it is also classify as biodegradable and non – biodegradable. In addition, based on its risk potential, is again it can be categorized in to hazardous and nonhazardous wastes (CED, 2003).

However, solid wastes are usually classified based on their sources (from which they emanate). Based on this bench mark, it can be categorized in to domestic or household, commercial, institutional, industrial, municipal services, construction and demolition, agricultural wastes (Hoornweg & Bhada-Tata, 2012). The explanation of each type of waste summarized as follows:

Source	Typical waste generators	Types of solid wastes
Residential	Single and multifamily dwellings	Food wastes, paper, cardboard, plastics, textiles, leather, yard wastes, wood, glass, metals, ashes, special wastes (e.g. bulky items, consumer electronics, white goods, batteries, oil, tires), and household hazardous wastes
Industrial	Light and heavy manufacturing, fabrication, construction sites, power and chemical plant	Housekeeping wastes, packaging, food wastes, construction and demolition materials, hazardous wastes, ashes, special wastes
Commercial	Stores, hotels, restaurants, markets, office buildings, etc.	Paper, cardboard, plastics, wood, food wastes, glass, metals, special wastes, hazardous wastes
Institutional **Construction and demolition**	Schools, hospitals, prisons New construction sites, road repair, renovation sites, demolition of buildings	Same as commercial Wood, steel, concrete, dirt, etc.
Municipal Services	Street cleaning, landscaping, parks, beaches, other recreational areas, water and wastewater treatment plants	Street sweepings, landscape and tree trimmings, general wastes from parks, beaches, and other recreational area, sludge
Process	Heavy and light manufacturing, refineries, chemical plants, power plants, mineral extraction and processing	Industrial process wastes, scrap materials, off specification products, slag, tailings
Agriculture	Crops, orchards, vineyards, dairies,	Spoiled food wastes, agricultural

	feedlots, farms	wastes, hazardous wastes (e.g. pesticides)

Source: (Hoornweg & Bhada-Tata, 2012).



Source: (Hoornweg & Bhada-Tata, 2012).

2.9 Constraints of Municipal Solid Waste Management in Developing Countries

As it is noted earlier a typical solid waste management system in a developing country displays an array of problems including low collection coverage and irregular collection services, and crude open dumping and burning without air and water pollution control. These problems are caused by various factors which constrain development of effective municipal solid waste management systems. They can be categorized into technical, financial, institutional, social constraints, and awareness and attitudes (Ogawa, 2002). Each of these constraints

2.9.1 Human and Technical Constraints

In most developing countries, there is lack of human resources and technical expertise both at national and local levels. Many officers in charge of municipal solid waste management, particularly at the local level, have little or no technical background or training in engineering or management (Ogawa, 2002). This is a main reason for lack of comprehensive waste management planning in developing countries. Furthermore, collection and analysis of solid waste data are generally not given sufficient attention.

Moreover, research and development activities in municipal solid waste management have often low priority in developing countries. This lack of research and development activities in developing countries leads to selection of inappropriate technology in terms of local climatic and physical conditions, financial and human resource capabilities, and social or cultural acceptability. “Several guides or manuals on appropriate solid waste management technologies in developing countries are available in the literature, and selection of technology could be made sometimes based on these guides. However, in most cases these guides must be modified to local conditions prevailing in the country, and therefore local studies are normally still needed” (Ogawa, 2002).

2.9.2 Financial Constraints

Municipal solid waste is given low priority in developing countries; as a result, very limited funds are allocated to the sector by government. This problem is acute at the local government level where local revenue collection system is inadequately developed and financial base for public service including MSWM is weak. In addition to limited funds, many local governments in developing countries lack good financial management and planning. For instance, “in a developing country town over 90% of annual budget provided for solid waste management was

used up within first six months. Lack of financial management and planning, particularly cost accounting depletes limited resources available for the sector even more quickly and causes solid waste management services to halt for some periods, thus losing trust of service users" Zurbrugg (2003) in Gebrie (2009,p.22).

2.9.3 Social Constraints

Social status of solid waste management workers is generally low both in developed and developing countries, but more severe in developing countries than developed countries. Such people's perception leads workers to disrespect their work and in turn produces poor quality of their work. At dump sites, transfer stations, and street refuse bins, waste picking or scavenging activities are common scenes in developing countries. People involved have not received school education and vocational training to obtain knowledge and skills required for other jobs. They are also affected by limited employment opportunity available in formal sector. The existence of waste pickers (scavengers) creates often an obstacle to the operation of solid waste collection and disposal services. However, if organized properly their activities can be effective in waste management system. Such an opportunistic approach is required for sustainable development of solid waste management programs in developing countries (Ogawa, 2002).

2.10 Composition of solid waste

Composition is the term used to describe the individual components that make up a solid waste stream and their relative distribution, usually based on percent by weight (Gerald, 1997). Information on the composition of solid waste is important in evaluating equipment needs, systems, and management programs and plans (Gerald, 1997). Addis Ababa sanitation, beautification and park development agency (AASBPDA), 2004 stated that, the source of solid waste in Addis is assumed 76% from household, 18% from institution and 6% from street sweeping.

2.11 Solid waste components

Collection and transport

Transport of waste from households, factories, and other generation sites is a growing problem. The rapid urbanization of much of the developing world leaves little time for adequate layout

And planning; many of the most rapidly growing parts of cities are at the periphery of existing settlement. Garbage dumps, with their associated disease, odor and frequent fires (in some cases) would ideally be located on suitable land away from the most densely populated areas. These areas are becoming harder to find as population urbanize and municipal traffic increases; the transport of waste becomes longer and more time-consuming, and therefore more expensive and less efficient. Many cities employ neighborhood-level collection points, where households are responsible for transport to the transfer point and the municipal or private enterprise transports the waste from there to the ultimate disposal location. Transport also relies on operational vehicles, and frequent breakdowns coupled with parts shortages can immobilize collection vehicles for extended periods of time. UNEP (1996) estimates that in cities in West Africa, up to 70% of collection/transfer vehicles may be out of action at any one time.

In areas where there exist collection services which remove waste from individual households or Streets, often there are no standardized containers used to store waste prior to pick up. Headley (1998) states that in Barbados, there are no containers designated by municipalities or collection companies to "set out" waste for collection; it is up to individual residences to designate some sort of collection container. Frequently, these are plastic barrels or discarded oil drums, however the majority of households simply place grocery bags full of waste on the street to await collection. There may be physical dangers to waste workers in dealing with the former; weather, animals, and other disturbances prior to collection threaten the integrity of the latter. In an examination of current problems in Kenya, Mungai (1998) agreed that the first step in "sanitary and efficient" waste management must be to ensure that all households use some form of corrosion-resistant container with lids in order to facilitate collection. Lidded containers would exclude most animal pests, reduce the amount of rainfall soaking into garbage and help to reduce trash blowing about on the street.

A major problem is that of development at or on top of landfills; many shantytowns are built From disposed-of waste and in some cases entire neighborhoods are sited on top of existing Landfills. For example, the Smoky Mountain dump in Manila, Philippines had as many as 10,000 Families living in shacks on or adjacent to the dump site (UNEP 1996).

Aside from the obvious health implications, these concentrations of people further complicate transport and unloading Procedures and present numerous safety and logistical concerns (Blight and Mbande 1996). UNEP estimates that approximately 100,000 people currently scavenge

wastes at dump sites in the Latin American region alone. Further, many people, not only those residing near landfills, make their living from scavenging on solid waste before it enters the municipal waste stream. Street-level waste picking often removes recyclables and other 'high-value' waste items from items set out for collection; although these practices serve to reduce the overall quantity entering the waste stream, these practices often scatter waste about, compounding problems for pickup and transfer operators (Pfammatter and Schertenleib 1996). Although it takes only 510 seconds to empty a 45-gallon container of waste into a collection truck, but 1-2 minutes to shovel the equivalent amount of waste (Gage 1998). Any potential change to the waste disposal framework must take into account the urban poor, many of whom may be dependent on waste scavenging for their entire subsistence. In one study at the Bisasar Road landfill in Durban, South Africa, scavenging on waste supported 200 families, "earning" the equivalent of $15,500 per month, or $77 per family per month (Johannessen 1999).

2.12 Municipal Solid Waste in Ethiopia

Solid waste is becoming a major public health and environmental concern in urban areas of Ethiopia. In Ethiopia, like developing countries, increase of solid waste generation is resulted from rapid urbanization and population booming. "The average solid waste generation rate is about 0.221kg per person per day and it is also estimated that only 2% of the population received solid waste collection services" (Zebenay, 2010, p.39). The involvement of private sectors are also very limited, but currently a number of micro and small scale enterprises are emerging to participate in primary solid waste collection i.e. collect garbage at source from households and transport it to the municipal waste containers and transfer points. To sum up the real situation of SW in Ethiopia indicates that the problem of solid waste cannot be solved only by mere effort of municipal government, there should be large involvement of the private sectors in general and participation of micro enterprises and community in particular (Abebe,2006)

Municipal solid waste (MSW) is one of the basic services that are currently receiving wide attention in many towns of Ethiopia. This is mainly because SWs that are generated in most towns of Ethiopia are not appropriately handled and managed (Solomon, 2011). According to Abebe et.al (2009), Ethiopia is still struggling to deal with the problem of proper management of solid wastes. With the current rate of urbanization municipal solid waste collection, transportation and disposal have been a major problem of municipalities in most of the Ethiopian

cities. Collection of municipal solid waste in most of the cities is difficult and complex because the generation of residential, commercial and industrial waste is a diffuse process that takes place in every house, every building and every commercial and industrial facility as well as in the streets, parks and even in the vacant areas available within the community. In addition to this, as stated by (Abebe et.al 2009; Yukalang, 2017), many cities face problems such as lack of manpower and equipment and financial constraints. The solid waste problem is serving in Ethiopia. Like any other countries of the city councils and municipalities have not sufficient means to solve the problems of solid waste. The major causes of the problem are lack of man power, finances and the capacity to work in partnerships with the local communities Edwards (2010). And also In Ethiopia most of the diseases are related to poor environmental sanitation and water contamination. It is obvious that lack of suitable waste disposal site, public toilet and gene sanitary mechanisms in the vicinity can affect the community's economic and social activities directly or indirectly (Tsegaye, 2006).

As a consequence of population growth and development activities, high amounts of household and impact municipal solid wastes are generated. The population of a town is growing due to both natural increase and through immigration of people from rural areas to towns. High rate of wastes are facing problem of their disposal and have very high potential effect to pollute environment such as surface water, soil and air. Public health is also highly affected by the uncontrolled solid waste generation and disposal

The disposal method that used is also open dumping type which widely practiced in many developing countries and has hazardous effect on health and the environment.as result municipal solid waste management has not be carried out in the sufficient and good manner.

In Sub- Saharan Africa, 69 percent of the population does not have access to improved sanitation facilities. At the current rate of progress, the sanitation Millennium Development Goals (MDG) will not be met for a long time (WHO, 2003). Waste management is a growing public concern in Ethiopia. In many cities of the country, waste management is poor and solid wastes are dumped along roadsides and into open areas, endangering health and attracting vermin. Access to sanitation is also among the lowest in the world. Sixty percent of the population still practices open field defecation. Only12 percent (8%in the rural and 29% in the urban), of the population use improved sanitation facilities (Tefera W., 2008).

2.13 EMPERICAL RESEARCH

Findings of previous studies on the solid waste in Ethiopia

Numbers of researchers who conducted researches on the area of solid waste in Ethiopia has been developed number of findings.

According to (zebenay, 2010, p. 39) solid waste is become the major challenge on public health and environmental concern in urban areas of Ethiopia, like developing countries, increase solid waste generation is resulted from rapid urbanization and population becoming "the average solid waste generation is about 0.221kg per person per day and it's also estimated that only 2% of population received solid waste collection service 2008

Similarly, the current condition of municipal solid waste management service in different towns of Ethiopia is also becoming a challenge for municipalities. For instance, according to Birke's (1999) cited in Degnet (2003) study of municipal solid waste management practices of 15 regional cities of Ethiopia, a controlled solid waste disposal system was practiced in only two of them. That means small proportions of the urban dwellers are served and a large quantity of solid waste left uncollected. In addition, a study conducted by (MoH, 1996) cited in Gebrie (2009) revealed percentage of solid wastes which are left uncollected and disposed anywhere without due attention regarding their consequences in different towns of Ethiopia.

According to melaku tegegn 2008 researched jima town in adequate solid waste in the town has resulted in the accumulation of waste on open lands , in drins and in the residential areas, causing a nuisance and foul smelling pools, environmental pollution through leachate from piles (water and soil pollution) and burning of waste (air pollution) clogging of drains. This situation is believed to result in poor environmental conditions, which turns present a formidable threat on health and the other impact.

Like developing countries, in Ethiopia the increase of solid waste generation is resulted from rapid urbanization and population booming (Lemma, 2007). According to Dawit and Alebel

(2003) the amount of solid waste in Addis Ababa and other fast growing areas in the country has been increasing over time, largely attributed to rapid population growth rate. The same authors indicated that from the total solid waste released by the population in the City, about 50-60 % was collected and the rest was unattended.

According to (Solomon 2011) urban solid waste (USW) is one of the basic services that are currently receiving wide attention in many towns of Ethiopia. This is mainly because SWs that are generated in most towns of Ethiopia are not appropriately handled and managed.

2.14 IMPLICATION OF THE REVIEW

While conducting the study the Researchers asses some findings done before by different expert. In Ethiopia the researchers found researches done previously on the impact of solid waste on urban environment. “Solid Waste” means anything that is neither liquid not gas and is discarded as unwanted. The ever increasing amount of solid waste generated which is exacerbated by lack of proper waste management system is of growing environmental and public health concern worldwide and in major towns and cities of Ethiopia (Endrias & Solomon , 2017)

Waste is anything discarded by an individual, household or organization. As a result waste is a complex mixture of different substances, only some of which are intrinsically hazardous to health (Rushton, 2018). Municipal solid waste (MSW) is defined to include refuse households, nonhazardous solid waste from industrial, commercial and institutional establishments including hospitals, market waste, yard waste, and street swiping (Ch, 2009) depending on this explanation solid waste has many impact on health as well as on urban environment therefore in order to prevent this problems the federal government as well as urban municipal and also urban residents must take corrective action.

Improper management of solid waste is one of the main reasons for environmental pollution and degradation in towns and cities, of the third world especially (Selin, 2013a). Open dumping, open burning and un-engineered sanitary landfills are common practice throughout the country. Due to improper solid waste disposal and collection systems dwellers are facing serious negative environmental impacts in developing countries. So as we understand from this implication solid waste faces many challenges on urban residents and also on urban environment therefore in order

to reduce those problems government have to participate the residents to clean their environment through successive program.

CHAPTER THREE (3)

Conclusion and summery

Based on the findings, the following conclusions are drawn:

Solid waste disposal system in a country is an open dumping system. As a result there are environmental and social problems resulted from the dumping site. Some of the sources of solid wastes are from household, market, agriculture and commercial area and dumped in an open dumping site, which may contain leachable toxic compounds that are harmful to the environment and human health, at the site without any treatment and separation.

Solid waste (SW) also called trash or garbage is defined at the national level as wastes consisting of everyday items such as product packaging, grass clippings, furniture, clothing, bottles and cans, food scraps, newspapers, appliances, consumer electronics, and batteries. These wastes come from homes, institutions, etc. such as schools and hospitals; and commercial sources such as restaurants and small businesses.

Ethiopia is still struggling to deal with the problem of proper management of solid wastes. With the current rate of urbanization municipal solid waste collection, transportation and disposal have been a major problem of municipalities in most of the Ethiopian cities.

SW in general and waste handling, in particular, is weak. The result of the study revealed that SW was at infant stage.

- Disposing wastes by digging a hole around the house and burns it; throw it on an open space, in sewerage or on street and disposing on the backyards of their house are other means of disposing methods used by the respondents.
- Poorly managed solid wastes are potentially hazardous to the health of the community. Wastes from different sources (industrial, agricultural, hospitals and/or households) can inter human bodies through different routes.
- Households, who used unauthorized (illegal) site, mostly preferred to dispose their wastes at the time of early night and early morning. Besides, sample respondent replied that sometimes the municipality also collected wastes, which are disposed by the households on free space, and removed through open burning. Thus, all the above

discussions can be witnessed that solid waste in the country is very poor and in need of a solution.

- Waste is anything discarded by an individual, household or organization so government takes corrective measure to handle the waste.
- There is a problem of solid waste reduction strategy (segregation, reuse, recycling, and resource recovery).
- Improper management of solid waste is one of the main reasons for environment pollution and degradation in towns and cities in a country.
- The general awareness and participation of households in the SW are very low. Assessment results revealed that very few of the households have the awareness of Solid waste and its management. The participation of households in the SW activity Very is insignificant.
- Solid waste is becoming a major public health and environmental concern in urban areas of Ethiopia
- Very weak enforcement of rules and regulations are some of institutional factors that hindering the performance of the city MSWM.
- The disposal site and its management also found inadequate. This is because the site is surrounded by mountain ridges at distant location, but there are settlement areas, a church

  and agricultural fields (crops, animal grazing, children play ground) just adjacent to the disposed waste, all types of Waste nature is indiscriminately disposed with no further treatment.

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