

**SOLID WASTE MANAGEMENT PRACTICE:**

**A Case Study of Ilam Municipality -7, Ilam, Nepal**

**A Thesis**

**Submitted to**

The Faculty of Humanities and Social Sciences, Tribhuvan University,

Mahendra Ratna Multiple Campus, Ilam Department of

Rural Development for the Partial Fulfillment of the

Requirement for the Master of Arts (M.A.)

**In**

**Rural Development**

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**September, 2023**

## DECLARATION

I hereby declare that the thesis entitled **Solid Waste Management Practice: A Case Study of Ilam Municipality-7 Ilam, Nepal** submitted to Mahendra Ratna Multiple Campus, Ilam, is entirely my original work prepared under the guidance and supervision of my supervisor. I have made due acknowledgment to all ideas and information borrowed from different sources in the course of preparing this thesis. The result of this thesis has not been presented or submitted anywhere else for award of any degree or for any other purpose. I assure that no part of the content of this thesis has been published in any form before.

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## Letter of Recommendation

The thesis entitled **Solid Waste Management Practice: A Case Study of Ilam Municipality -7 Ilam, Nepal** has been prepared by **Bandana Adhikari** under my guidance and supervision. I, hereby forward this thesis to the evaluation committee for final evaluation and approval.

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## APPROVAL LETTER

The thesis entitled **Solid Waste Management Practice: A Study of Ilam Municipality -7 Ilam District, Nepal** submitted by **Bandana Adhikari** in partial fulfillment of the requirements for the Master's Degree (M.A.) in Rural Development has been approved by the evaluation committee.

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## Abstract

The thesis entitled "Solid Waste Management Practice in Ilam Municipality -7 Ilam District" highlights the situation of solid waste management practices in study area. General objective of this study is to analyze the situation of solid waste management in Ilam municipality ward no 7. Ilam municipality ward no 7, main core area is the sample site of this study. Total population of the wards is 5744 (ward profile, 2079). In the city area there are 202 households among them 25% households (50) were taken as sample household. From each household single individual was taken for interview by using Simple Random sampling method. The present study was based both primary and secondary data.

Solid wastes are a growing environmental problem in the study area. Increase in population along with the rapid upland settlement has led to the increase in waste generation rate in the study area. Furthermore, change in living standard of the people and change in food habit and readymade packing system have increased the rate of inorganic waste. All these have added to the problems in solid waste management which is a global issue. The major sources of solid waste in Ilam municipality are municipal, domestic, commercial and agricultural, which consists of both organic and inorganic. The total waste generated in Study area has been increasing day by day.

The citizen should be encouraged by the authority for the segregation of wastes at household level. They shall promote recycling or reuse of segregated materials. Waste minimization efforts should be motivated at the primary and secondary levels of waste collection. The concerned authorities should adopt suitable technology, a combination of such technologies to make use of wastes so as to minimum burden on landfill. Landfill should be restricted to non-biodegradable and other wastes that are not suitable either for recycling or for biological processing. The concerned authority has to appoint more employees in order to extend their service area. Community participation should be increased and local NGOs as well as *tole bikash satha* should be mobilized in solid waste management. Gap between staffs within the municipality should be omitted so that ongoing event inside the municipality could be easily known and should take responsibility on the people's work inside municipality i.e., institutional strengthen should be equipped and established.

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## Acronyms and Abbreviation

CBOS	: Community Based Organization
CBS	: Central Bureau of Statistics
EIA	: Environmental Impact Assessment
GoN	: Government of Nepal
IEE	: Initial Environmental Examination
NCDC	: Namsaling Community Development Center
NGO	: Non-Government Organization
PPP	: Public Private Partnership
SW	: Solid Waste
SWM	: Solid Waste Management
SWMRMC	: Solid Waste Management and Resource Mobilization Centre

# CHAPTER I

## INTRODUCTION

### 1.1 Background of the Study

Environmental issues are broadly classified into two groups (i) those arising from industrialization and urbanization such as pollution and solid waste ('brown' environmental issue) and (ii) natural resource-based problem such as deforestation, land degradation and bio-diversity loss ('Green' environmental issue). Solid waste belongs to the first category that is "brown" environmental issue, because it arises from industrialization and urbanization.

Solid waste is the combination of two words and has a single meaning. In the past, the waste generated had not been much of a problem, but at present the term solid waste has emerged as a great problem, the problem that has a direct bearing on the environment of any place. The waste has always been there since the existence of human society as the waste arises from the human activities. Solid waste includes the waste resulting from human being and animal activities that are discarded as useless or unwanted or waste is the material which is not considered useful by its owner. It is an unwanted material of an individual and due to this, waste is not of his/her concern. So, it is the major problem in the environmental sanitation. The accumulation of solid waste in the environment is hazardous to health. Not only that, solid waste are the pollutants to soil, air and water with important implication for public health. They are also aesthetic or visual pollutants. They are primarily urban/Semi urban problems of the world. In the past, little was wasted; almost everything was reused, recycled or assimilated into soil. Even today, in small rural communities, nature usually takes care of waste. With a few localized exceptions, the dumping of organic waste around houses in rural communities causes few problems; natural systems are able to absorb it and recycle its nutrients. Concentration of people in Semi/urban areas with very population densities, use of non-biodegradable materials, new sources of waste (shops, institutions and factories) and the maintenance of traditional habits and attitudes, appropriate to rural but not to urban living, have disturbed this balance. In towns, the dumping of waste around houses results in an accumulation of health and environmental problems.

Solid waste includes waste resulting from human activities and animal activities. According to Pandey all living organisms during their live, consume water, food and

other materials. While consuming these things, organisms produce waste. These wastes can be classified as solid waste, liquid waste and gaseous waste” (Pandey 2004). The term solid waste has recently been brought into use in order to differentiate between the present-day broad concept involving waste management and the previous emphasis on garbage and other house hold wastes. Solid waste is now generally taken to include all non-gaseous. Non-liquid wastes resulting from the wide range of community, industrial, commercial and agricultural activities. Basically, solid waste means waste that is solid in form and is regarded as waste in its present condition. It can be a small piece of paper to a thick book or something else.

In the Kathmandu valley, numerous uncontrolled waste dumps developed close proximity to dwellings. These heaps transformed entire urban areas into slums, marred the historical beauty of the towns, and most significant, constituted a massive threat to public health (Thapa, 2008).

Waste management in Nepal has always been considered the responsibility of untouchable castes. Traditionally, people from these castes were hired by town administrations to collect solid wastes, most often equipped with primitive tools such as a buffalo rib to lift waste and a kharpan (basket slung on the shoulder) to carry and dump the collected waste in nearby open field or on river banks (Thapa, 2008)

Solid waste management is a recently developed concept which has been felt by the world's people. Once it was commonly thought of as simple "pick up the waste and go dump it in a hole somewhere". Today, nothing can be farther from the truth. When done well solid waste management successfully blends the diverse interests of a large "stakeholder" community together. Waste management still is a linear system of collection and disposal, creating health and environmental hazards (Gupta, 2012).

With growing urbanization and higher population densities and changing waste composition and growth in the amounts of solid waste, traditional practices of waste management could not keep pace.

Solid waste management is one of the most serious environmental problems of the semi/urban areas in Nepal. Previously people had never ever given a single attention to it,

neither in its generation nor in its disposal. Human consciousness was so much focused on the rapid growth of urbanization and infrastructural development. One after another people kept themselves busy on making their lives fast and best. In this

pace of movement, they got no time to think about minor things. Hence the proper waste management remained neglected, that resulted into everyone's problem. It has emerged as a problem of the nation too. Every country around the world has once faced with this problem. Specially, developing countries are facing this problem more than the developed one.

The management of solid waste so has become of primary importance. Developing countries like Nepal have a significant problem of solid waste management. Different resources are to be mobilized in the proper way; economic conditions have to be improved; and finally, people have to be educated. There are many techniques of solid waste management. Reduction of solid waste is the simplest way of managing the solid waste. Similarly, compost preparation, sanitary land filling, burial are other ways.

The concept of waste management planning is fairly new to Nepal. Rapid urbanization since 1950 has forced many towns to try and tackle the problem by recognizing the importance of efficient solid waste management. Regarding solid waste management, solid waste act (1988) and municipal act (1990) were established by Solid Waste Management and Resource Mobilization Centre and Municipal Councils. These agencies are engaged in exercising power to instruct prohibit and impose penalty for unhygienic disposal of solid waste in open space, places of public interest streams, etc. both of these institutions have losing efforts to implement the act.

Solid waste management has become a major problem in reference to the rapidly growing population, industrialization and urbanization. In order to improve SWM of Ilam municipality has introduced an integrated solid waste management strategy which is efficient, cost effective and environmentally sound with maximum involvement of local community. Ilam municipality is fast growing urban area of Ilam district where solid waste management is going to be a serious problem. In this study it will analyzes the ways of solid waste management in Ilam municipality ward no 7-market area.

## **1.2 Statement of the Problem**

The rate of urban expansion differs from place to place and from time to time due to different prevailing factors such as infrastructure development, health and education facility, employment opportunities etc. urbanization helps to develop a country on one hand but on the other it brings out the problem like over population and environmental degradation etc. urbanization and waste generation go simultaneously. These things create a problem of solid waste and its management.

Nepal is moving on the track of rapid development, so the problem of solid waste comes in as we go ahead. Previously people had never ever given a single attention to it, neither in its generation nor in its disposal. Human consciousness was so much focused on the rapid growth of urbanization and infrastructural development. One after another people kept themselves busy on making their lives fast and best. In this pace of movement, they got no time to think about minor things. Hence the proper waste management remained neglected, that resulted into everyone's problem. It has emerged as a problem of the nation too.

Urbanization in Nepal has risen to a serious waste problem. According to a study, some 350,000 residents of Kathmandu now produce an estimated 140 tons of waste per day, of which about two thirds by volume is deposited outside the compound. The amount of waste generated will affect all stages of solid waste management, i.e., collection, transport, storage, and disposal (IUCN, 1989).

Waste management in Nepal has always been considered the responsibility of untouchable certain castes. Traditionally people from these castes were hired by town administrations to collect solid wastes, most often equipped with primitive tools. In Nepal, traditional rural habits of throwing waste outside the house still exist in urban areas (Thapa, 2008).

The perception of being and feeling responsible for the waste one produces is sometimes in conflict with traditional beliefs and practices. In traditional Hindu culture, only certain people, within a strict caste system, are responsible for cleaning tasks and waste disposal. For other castes responsibility ceases once waste is placed outside the house (IUCN, 1989).

Although the local municipal bodies were responsible for solid waste collection and disposal, they generally lacked waste handling management. Moreover, information on disposal site is not available for some municipalities. Collected waste is thrown directly



into the surrounding forests without treatment such as burning or covering the waste with soil. Despite the constraints, significant advances have been made since 1988 in management solid in all 33 urban centers of Nepal (IUCN, 1989). People, mostly women, who are responsible for the household duties, dispose of household garbage close to their dwellings where it causes an unsanitary and smelly living environment. So it has become essential to throw light on the necessity for solid waste management aware to every member of a society, whether poor or wealthy, young or old, male or female.

In the context of study area solid management is being a serious problem because unmanaged construction of the market produced solid waste in large scale. Ilam Municipality, S-Men, Winrock International and NCDC did joint effort for the management of waste through its PPP4G project. This was a short term project but it shows some way out for this sector. In this study I have study the situation of solid waste management in Ilam municipality ward no 7 Bazer Area.

- To analyze what is the present situation of solid waste in the study area?
- How the community people response about current solid waste practices?
- What would be the best solution for management of solid waste?
- Who take the overall responsibility for solid waste management?

### **1.3 Objectives of the Study**

The general objective of this study is to analyze the situation of solid waste management in Ilam municipality ward no 7. The specific objectives are as follows:

- (1) To examine the current solid waste management system in the study area.
- (2) To analyze the sources and composition of solid waste.
- (3) To explore the problems and prospects of solid waste management.

### **1.4 Significance of the Study**

At present solid waste management has emerged as a serious urban environmental problem. Currently, some efforts are being made to tackle these problems. However, it does not seem to be sustainable. This study tries to view the overall waste problem and waste management system of the Ilam City. The present study is important as it gives information about how the concerned authorities are dealing with solid waste problem, prepared proper waste management plan, what is the role of private sector to manage them properly using modern and advanced technology. This finding will be

equally impotent to planner and policy maker too.

### **1.5 Limitation of the Study**

Every social research is bounded with the limitations. Time and money are the main constraints of research work. It is on academic research for the partial fulfillment of the requirements for the degree of Master of Arts in Rural Development. As the fresh researcher many hardships have been faced in the study. A micro-level study has been done in research area. The study is not being free from its limitations, which can be shown in terms of some following points:

- **Methodological Limitation:** This research is primarily based on the household survey and participatory tools. The reliability of the data depends upon the local people's memory and perceptions. There could be other possible techniques to quantify and triangulate the results using modern technologies and software.
- **Result Limitation:** The sample and the result analysis are done from certain household which may not be sufficient to draw the result for all. The result may become different if it is represented from more population using the statistical analysis.
- **Area Limitation:** The research is conducted at certain geographical boundary. The study could have been conducted in broader/diverse geography for better result analysis. The generalization from this study may not be always being applicable to other type of geographical areas.

### **1.6 Organization of the Study**

The study Report is organized in five different chapters. Chapter I includes introduction part of the study, statement of the problem, objectives and limitations. Chapter II comprises with the review of literature and Chapter III deals with the methodology of the study. Likewise, Chapter IV describes data presentation and interpretation. Chapter V projects the conclusions and recommendations of the study.

## **CHAPTER II**

### **LITERATURE REVIEW**

#### **2.1 Theoretical Review**

Economic growth and the increased pace of urbanization and industrialization in many countries have confronted cities throughout the world with the increasingly complex task of managing tons of solid wastes that are being generated daily. Generation of waste also depends on income and consumption habit of the people. Increasing urban migration and high density of population also adds to the generation of waste and all ' these factors will make waste management a difficult issue to handle in the near future, if a new paradigm for approaching it is not created (Gupta, 2012). Since waste generation is continuous and everlasting process, its solution must be found out in right time and thereby to provide healthy environment and hygienic living condition. Attention to such problem has been attracted a number of scientific researches, empirical studies and reports. This study consists of solid waste and its generation, sources and composition and its management. In this light, review of literature has been reviewed through journals, articles, reports, academic researches and published books.

In less developed countries, the amount of waste generated also varies according to the income group from which it originates. The richer the citizen the moiré waste is generated. In the situation the higher income groups are concentrated mainly in Kathmandu valley therefore there is an increase in the volume of waste.

Cointreau (1991), analyzed the effectiveness of waste collection in the developing countries. He concluded that waste collection differs rather strongly and priority is usually given to commercial areas, main streets and more prosperous neighbors. In addition, many of urban poor live in unplanned and unauthorized areas and are, therefore, not eligible for municipal service. Most municipal solid waste management schemes spend 90% of their budget on collection and transportation of waste, but only 50% to 70% of the waste the generated is collected and less than 50% of the population is served.

Spreen (1995), analyzed that the waste production is the result of urbanization and Industrialization. Migration from rural to urban areas and improved medical care,

Combined with birth rates, led to an enormous growth of urban population a development, which of course, increased waste volume greatly. Industrial development has led to the manufacture of many new inorganic substances. He concluded that, since, these substances cannot decompose; the natural process of waste transformation does not absorb these substances.

Becker (1997), made a study on community organization and assessed that change in quality and composition of municipal solid waste in south Asian cities is directly related to political- economic and social factors. He assessed that the composition of waste in Nepal has shifted toward more inorganic and non- biodegradable waste since 1950s. Besides, the major reasons for the change in composition can be traced to rising standard of living and change in public taste.

Miller (1998), has discussed about the 3 major ways to deal with solid waste: throw away output approaches, resource recovery output approaches and input approaches. He said that the throw away output approaches on which we primarily rely should be shifted to a sustainable earth or low-waste approach. With this approach most of what we throw away would not be viewed as solid waste but as wasted solids, which should be reused, recycled or burned to provide energy. He further adds, this resource recovery output approach can be coupled with input approaches designed to produce less solid waste.

Jumelet (1999), mentioned solid waste management-as an essential urban service, which intends to achieve the objectives such as protection of public health, promotion of hygiene, recycling of materials, and reduction of emissions and residuals. According to him, healthy city must have a planned program for collection and proper handling and disposal of solid so as to create a safe and pleasant urban environment.

Asnani (2000), has made a study on solid waste management in the city of Ahmedabad in which he describes about the beauty of the historic city being marked by Garbage sites all over the city. His paper draws attentions to the World Bank assistance to tackle the problems and modernization plan for better understanding. Besides, the paper also hopes that the system' introduced by municipal cooperation of Ahmedabad would be able to provide a much healthier environment to the citizens by keeping the city clean.

Palnitkar (2000), has defined solid waste as a term specially used to describe non-liquid waste material that arises from domestic trade, commercial, agricultural and industrial activities.

Booth (2001), has stated that solid waste includes the whole range of rubbish, garbage, sludge and other discarded solid materials, including those from industrial, commercial and agricultural operations and from community activities that are no longer wanted or needed by their users

Garg et. al. (2002), studied about the Management and Handling of solid waste in India. Further, they have mentioned about the Municipal solid wastes (Management and Handling) Rules, 2000 notified by Ministry of Environment and Forest (India) on 27th September, 2000 to regulate the management and handling of the municipal solid waste. This is an attempt to provide a set of rules and responsibilities for all the municipal solid waste in a scientific manner.

UNDP., (2007) shows that appropriate solid waste management could not be always functioned well because of lack of common consciousness, frequent communication and technical knowledge and skill in addition to the existence of a kind of the territorial imperative. However, through the study, it can be set a high valuation on the fact the all concerned especially Technical Working Group (TWG) and Task Force (T/F) members could stand up and work together for proper management of solid waste.

Divan and Rosencranz (2011), carried out the study on the Environmental law and Policy in India in which they discussed about the report prepared for the Planning Commission in 1995 in India. This report acknowledges the progressive decline in the standard of services with respect to the collection and disposal of waste.

Thapa and Devkota (2013), carried out the study of Waste Management System in Kathmandu and have categorized management system of solid waste into three categories primary or household, secondary and tertiary level of management. They assessed that if these three levels of waste management go systematically then obviously there will be appropriate solid waste management. But there is dissatisfaction in each and every level of management due to which the service has been inadequate and ineffective and urban people are facing problems.

Sinha (2014), presented a paper about solid waste management in urban areas in Malaysia. In this paper, she mentioned that the proper storage, collection, transportation and disposal of urban solid waste were essential to protect public health. She emphasized that the disposal of municipal's solid waste was an obligatory and function of the local authorities under the existing urban legislation

## **2.2 Policies Review**

*The Constitution of Nepal, 2072 (2015):*

*The Constitution of Nepal, 2072* has made a notable provision in the field of environmental protection. Article 30. Rights regarding clean environment: (1) Each person shall have the right to live in a healthy and clean environment. (2) The victim of environmental pollution and degradation shall have the right to be compensated by the pollutant as provided for by law. (3) Provided that this Article shall not be deemed to obstruct the making of required legal provisions to strike a balance between environment and development for the use of national development works. (4). Imposes substantial political obligations upon the State in the sense that environmentally concerned citizens and interest groups can utilize this provision to command public attention on the environmental performance of the national government. Article, 51 (4) Making proper utilization of land through proper regulation and management on the basis of productivity of land, its nature, and also by maintaining environmental balance. (g) Policy regarding the conservation, management and use of natural resources: (1) The State shall pursue a policy of conserving the natural resources available in the country by imbibing the norms of inter-generation judicious use of it and for the national interest. It shall also be about its sustainable use in an environmentally friendly way. The policy shall ensure the fair distribution of the benefits generated by it by giving local people the priority and preferential rights. (5) The State shall pursue a policy of making a sustainable use of biodiversity through the conservation and management o forests, fauna and flora, and by minimizing the negative impacts of industrialization and physical development by promoting public awareness on environmental cleanliness and protection. (6) The State shall pursue a policy of keeping necessary landmass as forest area in order to strike an environmental balance.

The strategy adopted by the policy for achieving its objectives is the promotion of the public participation, technology, resource mobilization and privatization. The policy points out national and local level institutions responsible for the management of solid waste and describes the responsibilities and legal authority of these institutions. According to the policy, a national level institution should be formed by Government of Nepal for the management of solid waste. In the case of local Governance, the policy mentions the Mahanagarपालिका, Nagarपालिका and Rural Municipality (RM) as responsible for the management of solid waste and related activities.

#### *Local Government Operation Act, 2074*

The Local Government Operation Act in the section 3 subsection 11 (I) under the heading of Functions Duties and Power of Municipality and Relating to Water Resources, Environment and Sanitation authorities and makes the municipality responsible to carry out or cause to be carried out and manage the acts of collection, transportation and disposal of garbage and solid wastes.

### **2.3 Empirical Review**

Udash, (2004) discussed the public health hazards in Kathmandu city and found out that though the city has urbanized and modernized, water supplied for public sewage disposal system and the public sanitation are not actively constructed.

Thapa (2008) Ringel taube, in the article, 'The need for a system to Solid Waste Disposal and Collection' mentions that the waste management system needs active co-operation and participation of all citizens. It describes that the method of collection of waste from streets and its transfer to community bins and from there to vehicles need to be modified so that the waste is carried out more effectively and the chances of adversely affecting the health of workers reduced. Equipment will have to be designed which satisfy the typical local problems and give economical operations.

Spren (2009), in the article 'Solid Waste Management with people's participation' describes the urban SWM project in Katmandu valley and shows the appropriate approaches that can provide successful solution. The article concludes that urban waste management has the crucial task to provide the urban poor with proper sanitary living conditions. The financial and technical resources generally available in the third

world are totally inadequate to cope with this issue. Lastly it focuses that, urban change must not mean copying modern life style from the so-called developed world. Traditional ways of life should be enhanced. They proved to be sustainable for centuries and should be given proper consideration in urban programming.

Pradhan, (2011) in a report on solid waste management practice in Kathmandu cited the problem in locating landfill site at Gokarna with the increase in urbanization and population. The study on Gokarna landfill site mention that the local people opposed for land filling when they realized that they were not involved when their locality was selected for the purpose of land filling. The detailed study on Gokarna landfill site indicates that the frequent opposition from the local people was also because SWMRMC/KMC were unable to provide them the total amount of money that was to be provided for as per the agreement made for the village development works.

Sharma (2012) has made study on the impact of domestic and industrial wastes on river pollution in Kathmandu. The study was based on the two-year monitoring exercise. According to the study, the daily per capita waste generation in the Kathmandu valley is 400 gm. The density of waste was estimated to be 350-400gm/cm<sup>3</sup>.the domestic sewage and industrial effluents are discharged directly into the Bagmati and Bhanumati rivers and other streams in Kathmandu. The major industries discharging into rivers in Katmandu are Banswari Tannery, The Balaju Industrial District, a number of carpet factories, The Jawalakhel Distillery and The Patan Industrial District. The bacteriological study of the sample showed the total number of coliform bacteria per 100 ml of effluents on Bagmati river was more than 4800.A chemical study of the effluent and the river water showed high conductivity of 9.73  $\mu$ s/cm, BOD was 420mg/l and chloride 396 mg/l which indicates the maximum bacterial activities and it also indicates the presence of large amount of organic substance.

Gautam, (2015), “Solid Waste Management System in Kathmandu Metropolitan City” presented the solid waste management situation in ward 27 of Kathmandu Valley. He has also mentioned the involvement of NGOs at that area and conflict arose between local people, kuchikars and ward representatives. He also describes that the solid waste in the study area is residential and commercial which consists of both organic and inorganic. The daily waste production in the study area ranges from



0.17 kg/head /day in Toyoda to 0.25 kg in Ason. 58.3percent of the households use plastic bag to collect solid waste which has retarded for effective SWM. So, he suggests adopting alternative tools such as basket for collecting the wastes.

Kathmandu Metropolitan city (2016) According to research launched on Kathmandu by KMC, the book “*Chikitsajanya Phohar Byawasthapan Nirdeshika*” mentions that, from the hospitals of Kathmandu, of the waste produced average 1.72 kg/patient /day, only 26percent is found to be harmful. Simply 80percent of waste produced from houses and hospitals or offices were equivalent to simple wastes. Only 20percent are harmful but if we do not separate them properly, the whole waste will be a harmful one. So, it suggests separating the waste at the source before managing.

The Katmandu Post April 9, 2017 published the article that 1,000 cubic meters waste produced in Katmandu in bulk. If this bulk volume is stored, we can get 67percent of organic materials, 11percent of plastics, 5percent of construction scraps, 4percent of fibers, 2 percent of glass and 1percent of metals. Analyses revealed that about 70 percent waste could be composted.

## **CHAPTER III**

### **CHAPTER III RESEARCH METHODOLOGY**

#### **3.1 Selection of the Study Area**

The survey for this study was conducted at Ilam municipality ward no. 7 areas. This is a pioneer study area for this purpose. The selected area is facing a great problem of solid waste management with the development of infrastructure. The area is getting drastic change with the increment in the solid waste and pollution creating negative impact in the study area.

The study area was selected basically to know the public perception regarding the subject matter and to view the overall condition of the waste and its management system.

#### **3.2 Research Design**

Both analytical and descriptive research design has been used to complete of this study. Quantitative data were analyzed by using analytical research design because such types of data indicate perception of the respondents in quantitative mode and qualitative data were analyzed by using descriptive research design by using paragraph description and find out the situation of solid waste management situation of the study area.

#### **3.3 Sampling Size and Sampling Procedure**

Ilam municipality ward no 7 is the sample site of this study. According to ward profile report 2023, the total household is 1193 and population of the wards is 5744. There are 202 households are in the study area, among them 25% households (50HH) were taken as sample household. From each household single individual has been taken for interview by using random sampling method. Because of the large study area, the study cannot be generalized with the same other areas.

#### **3.4 Nature and Sources of Data**

The present study was based both primary and secondary data. Secondary data were used in literature review and that were collected through library study method and books, article, journal, previous thesis is used as the main sources of secondary data.

Primary data were collected from the field by using various data collection techniques such as questionnaires and observation check lists.

### **3.5 Data Collection Tools and Techniques**

Following tools and techniques were used to collect primary data from the field

#### **A. Questionnaire Survey**

A set of structured questionnaires were prepared to generate the realistic and accurate data from the field through the objective based questionnaires. The questions were asked to the respondents and answers were filled up to collect the required data. Questions were related to waste production and management situation of the study area and their perception about the waste management.

#### **B. Observation Checklist**

During the time of data collection, field visit was done frequently and necessary data were collection by observation. Similarly observed the Khalde landfill site, waste segregation plant and collection center. Necessary information was also collected from by observation check list.

#### **C. Key Informant Interview**

In order to make this study result-oriented, a brief interview was also conducted in the study area, related stockholder, service users and municipal office officials. In particular, the employees of the Ilam Municipality Environment Section and waste collectors have been discussed on the basis of the checklist.

### **3.6 Method of Data Processing and Analyzing**

After the data was collected from the field survey, data was checked thoroughly and edited wherever needed. Simple statistical tools like tables, graph, bar diagrams, were used to analyze the collected statistical data and other qualitative data were analyzed by using paragraph description.

## CHAPTER IV

### DATA PRESENTATION AND INTERPRETATION

In this study data were taken from Ilam municipality ward no. 7, which is located in Ilam district, Koshi Province. In the first section of the chapter and in second section it analyzes the primary data that has been collected from the study area.

#### 4.1 Introduction of the Study Area

Ilam extends, in the 'Oriental Realm', between the north parallels of 26° 40' and 27° 08' latitude and 87° 10' and 87° 40' longitude and having the total area of the district about 1703 sq. km. Situated in the eastern position in the country. It is bounded by Jhapa in the South, Paththar districts in the North and west Bengal India in the east. The average length of this district from east-west is 50 km and breadth 38 km. Ilam is the largest tea producer of orthodox tea in Nepal and these tea gardens are the major tourist attraction of this region.

According to the National Population Census B.S. 2078, the total population of Ilam municipality is 50085. The population growth rate was 0.30%. Almost all parts of the municipality have not good all-weather access of roads, communication and transportation. Maximum part of the municipality has rural area with large number of populations. Ilam Municipality now was established after the merging of Barbote, Sumbek, Shakhejung, Soyak, Gaodak and Sangrumba VDC's. The Ilam bazer is also known as the "Green city".

There are altogether 25 Government institutions in Ilam Municipality ward number 7. There are 10 schools and 1 collage in ward 7. According to the 2078 census report, the literacy rate of this wad is 86.73 percent. According to ward profile 2079, altogether there are 6 health institutions of which there are 1 hospital, 5 clinics run by private ownership. In the commercial sector there are 607 shops.

Solid waste processing facilities Under this section in order to maintain sanitation and community development; there is solid waste processing modality with PPP model but it is not enough. Also, there is one master plan in the municipality for the waste processing in the coming future but implementation rate is very slow. The controlled purpose dumping site of Ilam Municipality was located inside the Khalde Community Forest area 6 km away from the main city (municipality office assumed), with dumping about 2 ton

of waste each day by one tractor. There is one waste composting plant function with public private partnership model. The waste is collected in single shift weekly routine base.

The waste of urban especially of city area is collected and in day shift waste of rural area is collected. In the dumping site area, scavenger/waste pickers came to collect the recycle able wastes. Lacking of testing facility of pollutant contaminate in near river body through leachate there creates gap to understand the impact on near biodiversity of this sensitive area.

## 4.2 Socio Economic Characteristics of the Respondents

Socio economic and cultural status of the respondents' play significant role to produce solid waste and its management. So, in this sub section it analyses the socio-economic status of the respondents such as sex, caste, education.

### 4.2.1 Respondents by Caste and Ethnicity

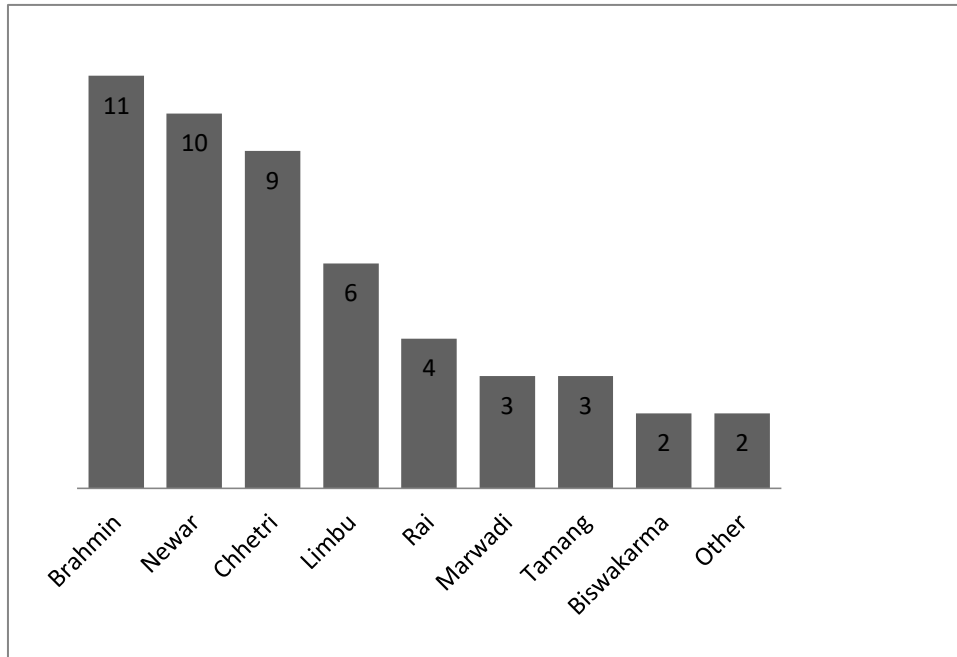
In Ilam municipality ward no 7 there found diverse caste and ethnic people. The following the table 4.1 shows the caste and ethnicity composition among the sample borrowers.

**Table: 4.1 Respondents by Caste and Ethnicity**

S.N.	Castes/ethnicity	No of Respondents	Percentage
1	Brahmin	11	22
2	Newar	10	20
3	Chhetri	9	18
4	Limbu	6	12
5	Rai	4	8
6	Marwadi	3	6
7	Tamang	3	6
8	Biswakarma	2	4
9	Other	2	4
	Total	50	100

Source: Field Survey, 2023

Figure: 4.1 Respondents by Caste and Ethnicity



The table and figure 4.1 shows, 22 % of total are Brahmin. 20 % were Newar, 18 % Chhetri, 12 % Limbu, 8 % Rai, 6 % Marwari, 6% Tamang, 4% Bishwakarma 4 % and other 4%.

#### 4.2.2 Age Distribution of Respondents

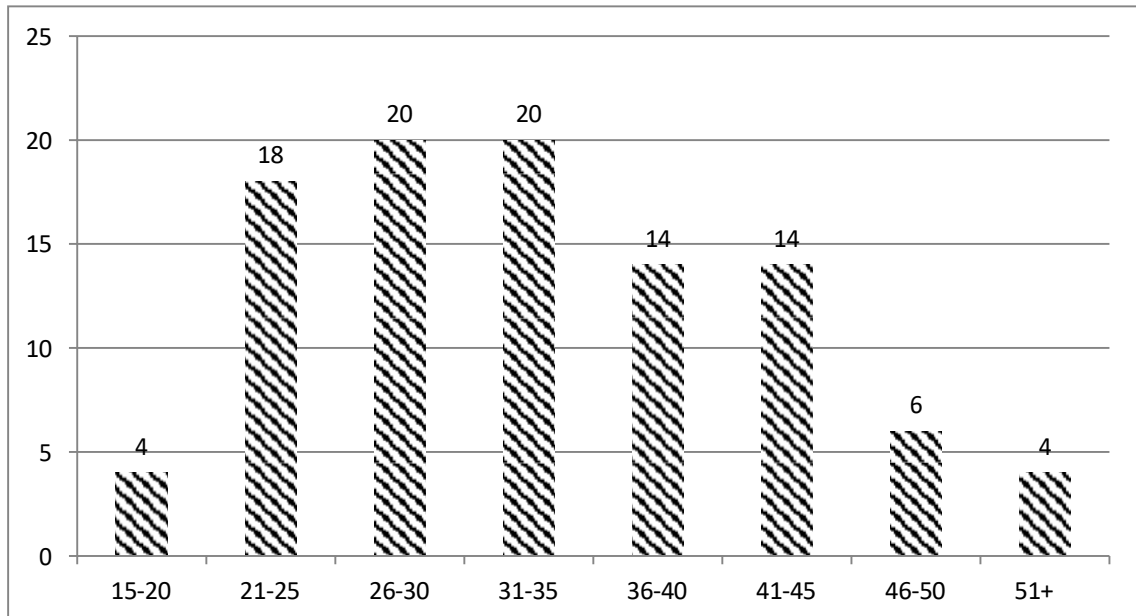
The age structure over the total sampled respondents of the study area is analyzed in the below table.

Table: 4.2: Age Distribution of Respondents

S.N.	Age Group	No of Respondents	Percentage
1	15-20	2	4
2	21-25	9	18
3	26-30	10	20
4	31-35	10	20
5	36-40	7	14
6	41-45	7	14
7	46-50	3	6
8	51 Above	2	4
	Total	50	100

Source: Field Survey, 2023

**Figure: 4.2 Age Distribution of Respondents**



The table and figure show that most of the member is adult. Out of the total there are 58 percentages is 21-35 age group. More than 50 years are only 4 percentages of the total. It is found that the of age 21-35 are more active in income generating activities, because they are more responsible to their family's economic betterment.

### 4.2.3 Distribution of Respondents by Sex

In this study both male and female are participated in the personal interview. The following table shows the sex composition of the respondents.

Table: 4.3 Distribution of the Respondents by Sex

S.N.	Sex	No of Respondents	Percentage
1	Males	26	52
2	Females	24	48
<b>Total</b>		<b>50</b>	<b>100</b>

Source: Field Survey, 2023

Above table and figure indicate the sex composition of the respondents. Data shows that 52% respondents are males and 48% respondents are females.

#### 4.2.4 Marital Status of Respondents

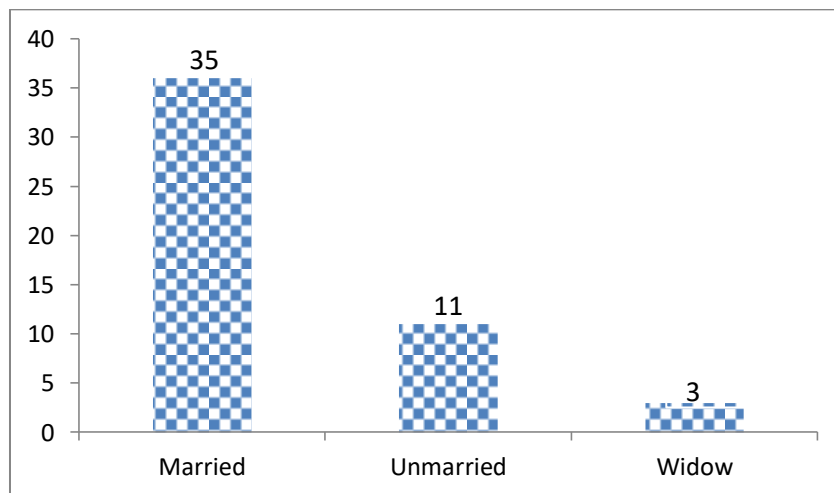
The marital status over the sample respondents in the study area is analyzed in the table.

**Table: 4.4 Distributions of Respondents by Marital Status**

S. N	Marital Status	No. of Respondents	Percentage
1	Married	36	72
2	Unmarried	11	22
3	Widow	3	6
Total		50	100

*Source: Field Survey, 2023*

Figure: 4.4 Distributions of Respondents by Marital Status



The table and figure 4.4 show that most of the members are married. Of the total sample member there are 72 % are married, 22 % are unmarried and 6 % of are widows.

#### 4.2.5 Distribution of Respondents by Religion

Respondents' have different social composition of various religions. There is diversity of religion, among them Hindu, Buddhist, and other are available. The percentage of various religions is shown in the table below.

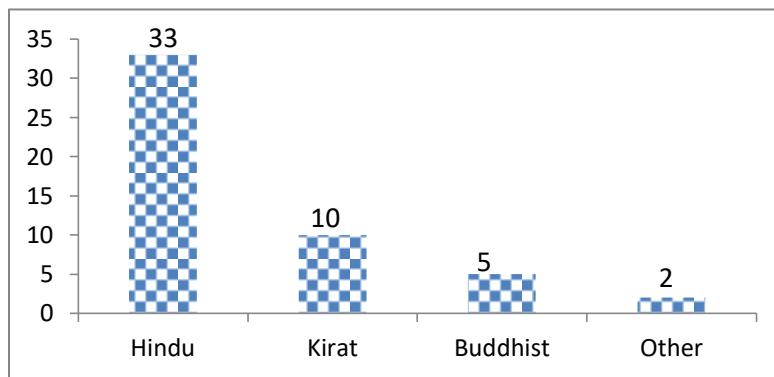


**Table: 4.5 Distributions of Respondents by Religion**

S.N.	Religion	No of Respondents	Percentage
1	Hindu	33	66
2	Kirat	10	20
3	Buddhist	5	10
4	Other	2	4
<b>Total</b>		50	100

*Source: Field Survey, 2023*

**Figure: 4.5 Distribution of Respondents by Religion**



The table and figure 4.5 show that Hindu is the highest among the borrowers which is 66 percentage, similarly, Karats are 20 percent, Buddhist are 10 percentage and others are 2 percentage. This table shows that multi religious people live in the study area.

#### **4.2.6 Distribution of Respondents by Education**

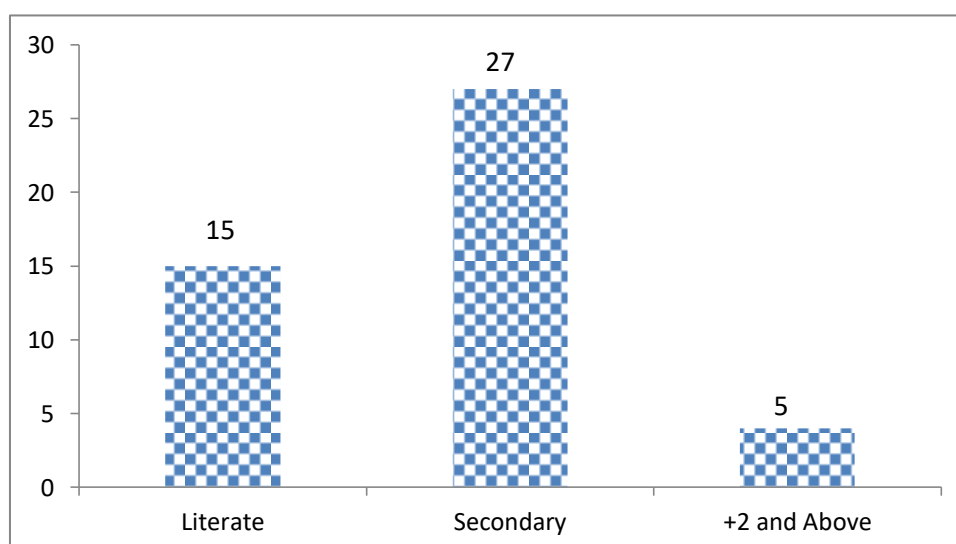
Education is one of the major factors for social as well as economic development. It affects all sectors of the society. The educational status of the borrowers is shown table below.

**Table: 4.6 Distributions of Respondents by Education**

S. N	Educational Status	No of Respondents	Percentage
1	Literate	15	30
2	Secondary	27	54
3	+2 and above	8	16
	Total	50	100

*Source: Field Survey, 2023*

**Figure: 4. 6 Distributions of Respondents by Education**



The table and figure 4.6 show the education status of the respondents. It is found that 30% are literate and 54% passed secondary level and 16% passed +2 above.

#### **4.2.7 Respondents by Family Size**

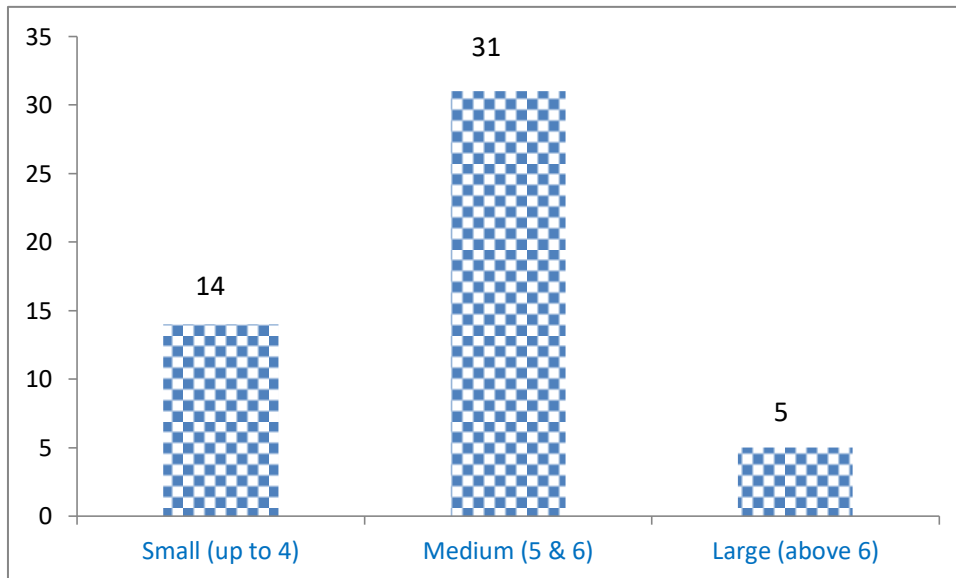
The size of a family is determined by the number of the family members in the household. This shows that the size of a family determines the women’s awareness about having children. The following table shows the family size of the borrowers.

**Table: 4. 7: Respondents by Family Size**

S. N	Family Size	No of Households	ercentage
1	Small (up to 4)	14	28
2	Medium (5 and 6)	31	62
3	Large (above 6)	5	10
	Total	50	100

*Source: Field Survey, 2023*

**Figure: 4.7 Respondents by Family Size**



Out of the total borrowers, 62 percentages have medium size of family (5 and 6) and 28 percentages of has small size family (up to). It has been noted that there is only 10 percentage who have large size (above 6) family.

#### **4.2.8 Occupation of the Respondents**

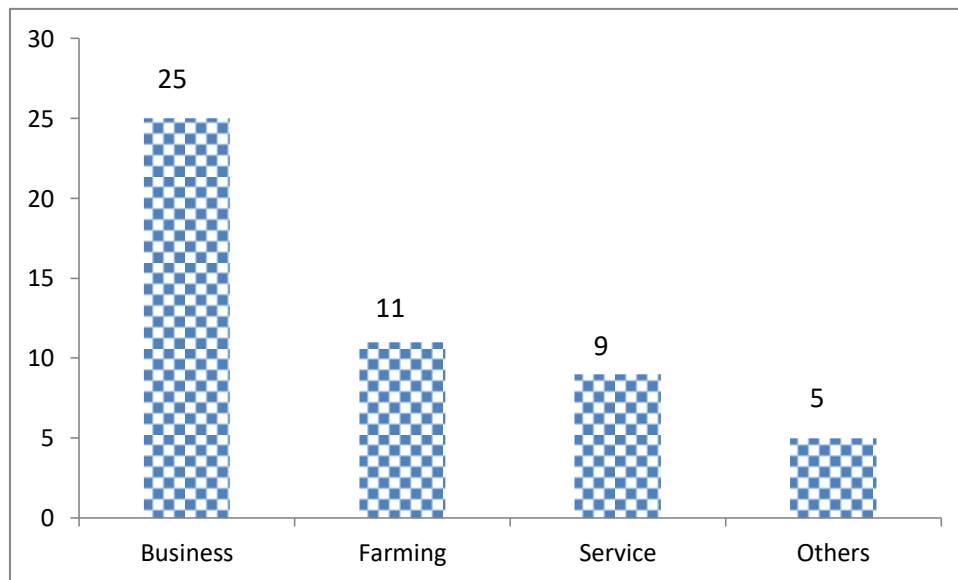
In my study are there have been living people with different occupation. The following table highlights the caste composition of the respondents.

**Table: 4.8: Distribution of the Respondents by Occupation**

S. N	Occupations	No of Respondents	Percentage
1	Business	25	50
2	Farming	11	22
3	Service	9	18
4	Others	5	10
	Total	50	100

Source: Field Survey 2023

**Figure: 4.8: Distribution of the Respondents by Occupation**



The table and figure show the occupation status of the respondents. Data shows that 50% of the respondents are involving in business and 22% are farmer. In the same way, 18% involved in service and 10 % follow the other occupations like foreign job, labor etc.

#### **4.2.9 Respondent's Knowledge about Solid Waste Management**

In the study area different types of people have been living. Some people have not concrete idea about the solid waste. The following table indicates the situation of respondents by having knowledge about solid waste.

**Table: 4.9 Respondent's Knowledge about Solid Waste Management**

<b>Knowledge</b>	<b>No of Respondents</b>	<b>Percentage</b>
Yes	41	82
No	9	18
Total	50	100

*Source:* Field Survey, 2023

The table 4.9 shows the situation of the respondents by having knowledge about sold waste management. Data shows that only 82% respondents have knowledge about solid waste management and rest of 18% have no idea about sold waste management. It needs to give training about solid waste management.

### **4.3 Solid waste Management Source and Composition in Ilam Municipality**

In Ilam Municipality there is no any provision for the special wastes such as hospital wastes, waste generated from slaughter houses, toxic and hazardous waste, etc. The inhabitants were found to throw such wastes haphazardly and then the waste is collected by the municipality are taken direct to the controlled dumping site without any treatment. The negligence and lack of awareness among the peoples of special waste generator along with no laws of conduct from the municipality level is the main reason for insufficient management towards special waste. The pros and cons of current practices are;

The rapid growth of urbanization and high density of population give rise to many problems like solid waste management. Like in many urban areas, Ilam municipality is also facing the problem of solid waste management. The increasing amount of municipal solid waste being generated has become a serious problem to urban managers due to its impact on public health and sanitary condition. Moreover, municipal solid waste management effects the local, regional and global environments. Therefore, it is essential to treat municipal solid waste properly in order to decrease the negative effects on human health and ecosystem. However, in developing cities, there are barriers, to proper municipal solid waste management, such as the lack of management capacity, financial resources, expertise and knowledge.

The local people dump their household / commercial waste in the evening and

morning into permanent community bins or mobile garbage provided by the government. If anyone is found dumping their solid waste in the afternoon, he/she have to pay fine for it. Garbage littered outside are collected by Municipality and deposited into these bins. In bazaar area, the Municipality has distributed two types of bins and is given below: -

**I. (a) Green Color Dustbin**

The green color dustbin is for the wet waste such as organic waste.

**i. (b) Blue Color Dustbin**

The blue color dustbin is for dry waste such as paper, plastic, rags, metal and other inorganic waste.

Every day with Routine system in the morning the waste collection Tractor come for waste collection. The collected wastes are loaded on the vehicle by Municipality office. The wastes collection vehicles make a round of all the streets for waste collection. Waste collection from core area is a challenging and tough job. There is no regular door to door collection system in Study area. Therefore, households are requested to dump solid waste on roadside community bins.

**4.3.1 Dumping Place of Household Waste by the Respondents**

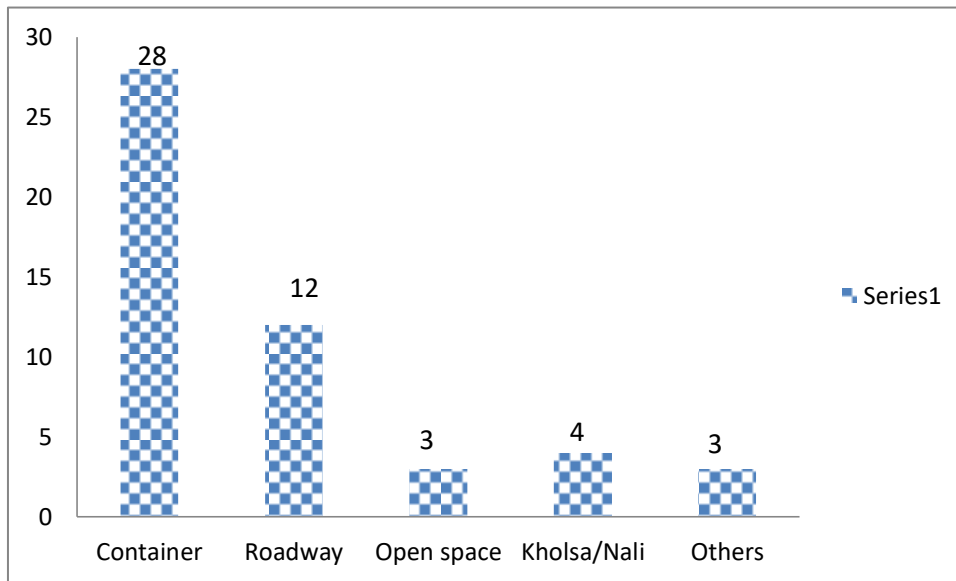
In the study area people dump solid waste in different places. The following table highlights the place where people usually dump the solid waste that produce from their home.

**Table: 4.10 Dumping Place of Household Waste by the Respondents**

S. N	Places	No of Respondents	Percentage
1	Container	28	56
2	Roadway	12	24
3	Open space	3	6
4	Khosla/Nali	4	8
5	Others	3	6
	Total	50	100

*Source:* Field Survey, 2023

**Figure: 4.10 Dumping Place of Household waste by the Respondents**



The table and figure 4.10 indicate the situation of place dumping household waste. Data shows that 28% put in container and, 12% throw in road way, 3% throw in open space. In the same way, 4% collect in Kholsa /Nali of the near house and other 3% throw whatever they like.

#### 4.3.2 Opinion of the Respondents on Increasing solid waste

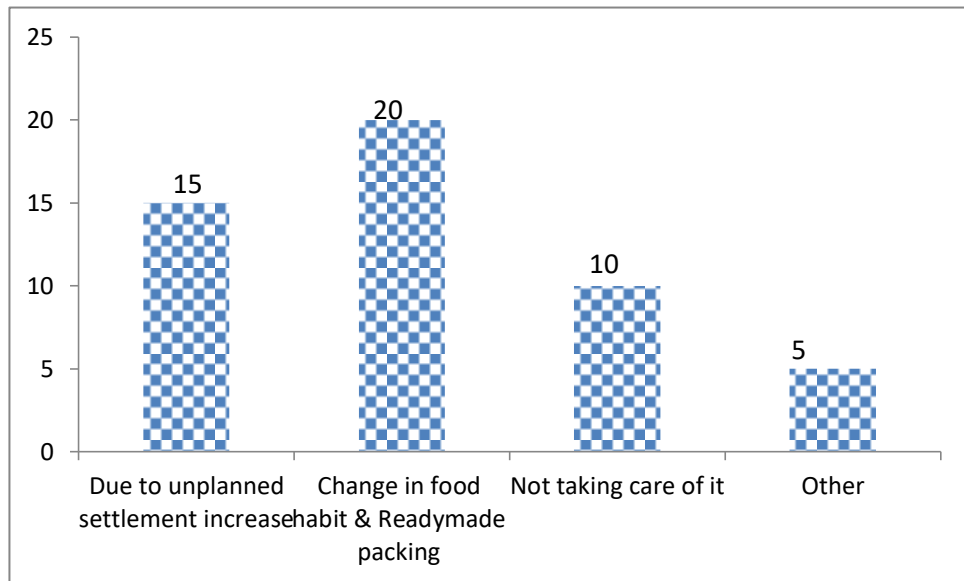
All the respondents are argued that the quantity of solid waste is increasing day by day in municipality. They have given various reasons. The following table indicates the respondents' opinion about the causes of increasing solid waste in municipality.

**Table: 4.11 Opinions of the Respondents**

S. N	Opinion of increasing solid waste day by day	No of Respondents	Percentage
1	Due to unplanned settlement increase	15	30
2	Change in food habit and readymade packing	20	40
3	Not taking care of it	10	20
4	Other	5	10
	Total	50	100

*Source: Field Survey, 2023*

**Figure: 4.11 Opinions of the Respondents on Increasing of Solid Waste**



The table and figure 4.11 show the opinions of the respondents to increasing solid waste in municipality. Data shows that 30% focus on unplanned settlement increase, 40% indicate that changing food habit and readymade packing. In the same line 20% suggested that people not care about the waste and 10% give other answers.

### 4.3.3 Frequency of Waste Collection

In my study, there is no fixed time of collecting waste. The following table shows the frequency of waste collection in particular respondents' house.

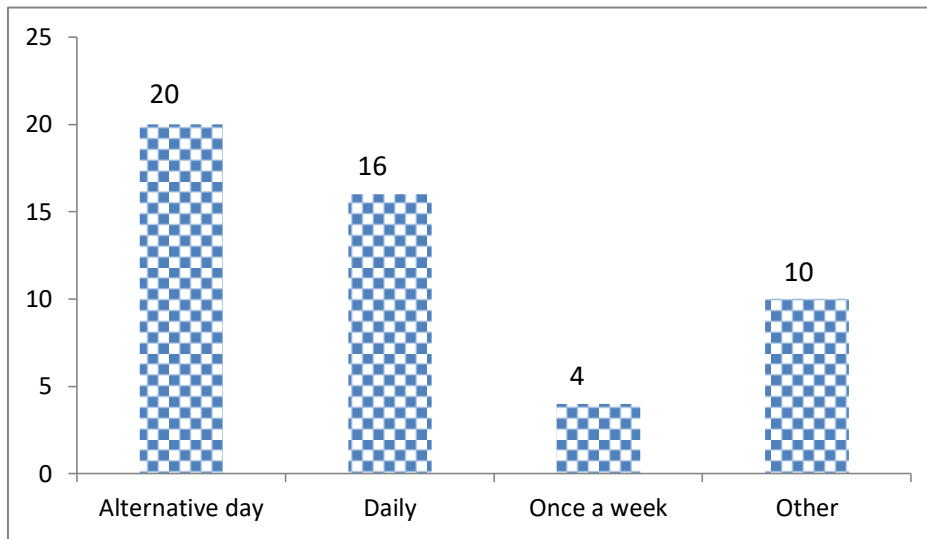
**Table: 4.12 Frequency of Waste Collection**

S. N	What is the frequency of the waste collection?	No of Respondents	Percentage
1	Alternative day	20	40
2	Daily	16	32
3	Once a week	4	8
4	Other	10	20
	Total	50	100

*Source: Field Survey, 2023*



**Figure: 4.12 Frequency of Waste Collection in Study Area**



The table mentioned above indicates the frequency of waste collection in the study area. Data shows that 40% noticed that there has collected alternative day, 32% argued there has collected daily, 8% answer once a week and in the same line 20% give other answers such as municipality hardly collect the waste from house.

#### 4.3.4 The day and time of Waste Collection

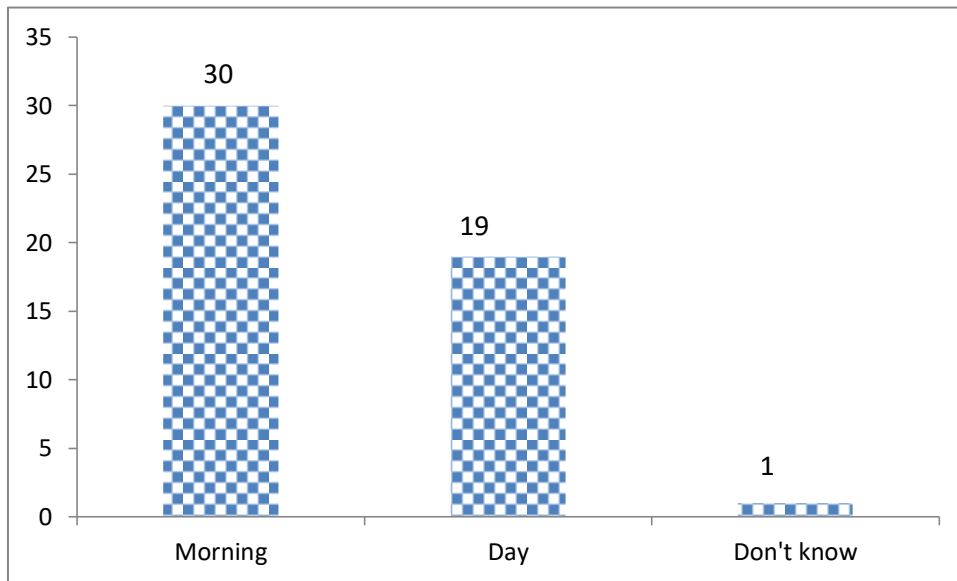
Municipality collects waste in different time that highlights in the following table.

**Table: 4.13 : The day ad time of waste collection**

S. N.	Day and time of waste collection	No of Respondents	Percentage
1	Morning	30	60
2	Day	19	38
3	Don't know	1	2
	Total	50	100

*Source: Field Survey, 2023*

**Figure: 4.13 Time of the Day of Waste Collection**



The table and figure 4.13 show the time of waste collection in day by municipality. Data shows that 60% respondents answer at morning time and 38% noticed that municipality collect waste at day time and 2% gives answer don't know about collection time.

#### **4.3.5 Place of Municipal Container Located**

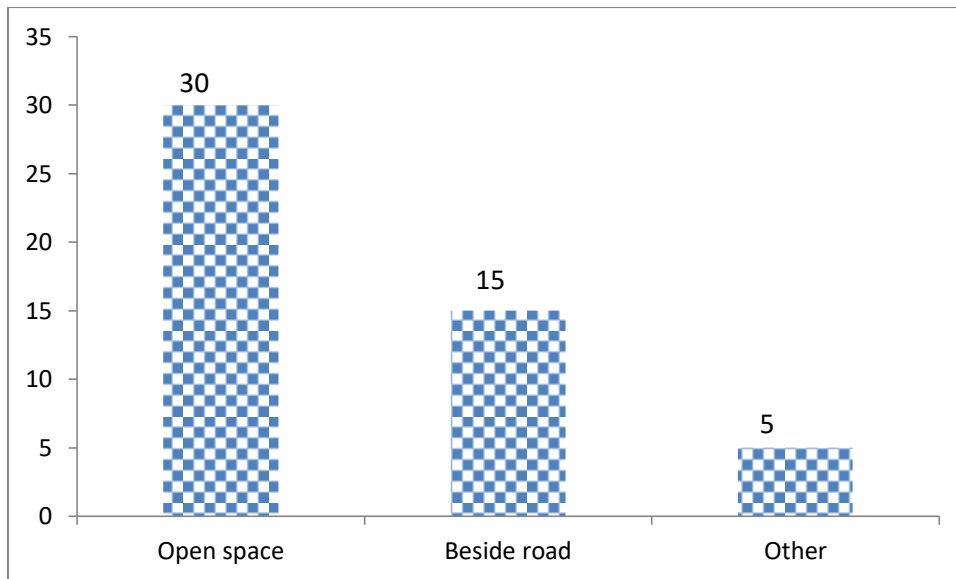
There is no fixed place to locate container in the municipality. The following table highlights the location of putting container by the municipality.

**Table: 4.14 Place of Municipal Container Located**

S. N	Place of Municipal container located	No of Respondents	Percentage
1	Open space	30	60
2	Beside road	15	30
3	Other	5	10
	Total	50	100

*Source: Field Survey, 2023*

**Figure: 4.14 Place of Municipal Container Located**



The table and figure 4.14 show the place of municipal container located area. Data shows that 60% answer as open space and 30% noticed that municipality put it as beside road and 10% shows other space like before individual house.

#### 4.3.6 Types of Waste Collection System

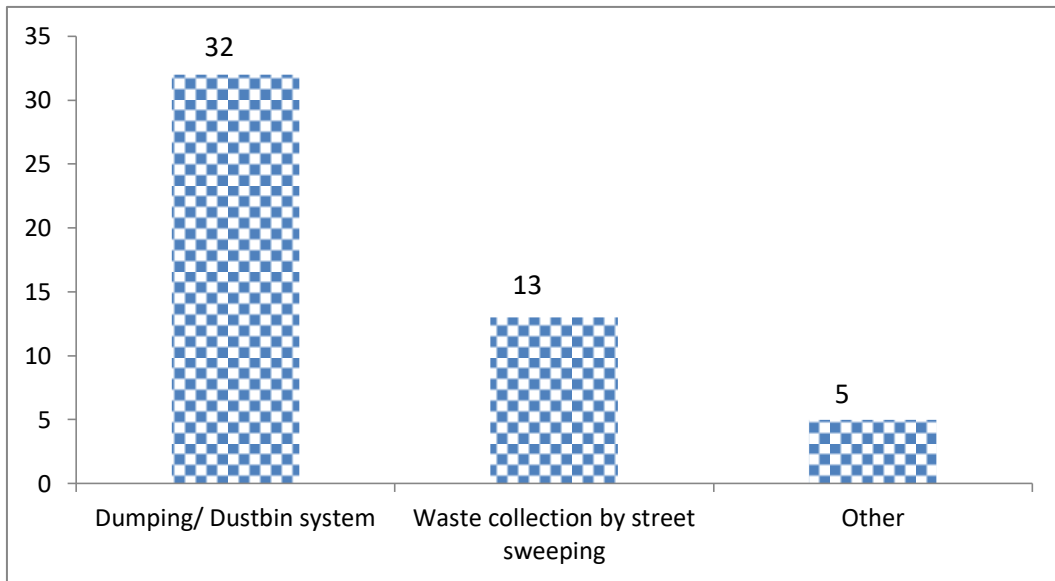
There is not fixed waste collection system in the study area. The following table highlight the waste collection system that practice in study area.

**Table: 4.15 Types of Waste Collection System**

S. N	Types of waste collection system	No of Respondents	Percentage
1	Dumping/ Dustbin system	32	64
2	Waste collection by street sweeping	13	26
3	Other	5	10
	Total	50	100

*Source: Field Survey, 2023*

Figure: 4.15 Types of Waste Collection System in your Society



The table mentioned above show the types of waste collection system of the study area. Data shows that 64% argued Dumping/Dustbin system and 26% focused on collected by street sweeping and other 10% gives different answers.

#### 4.3.7 Problems face by Respondents due to Waste

Due to the waste respondents are facing various problems in the study area. The following table highlights the problems that have facing by the respondents.

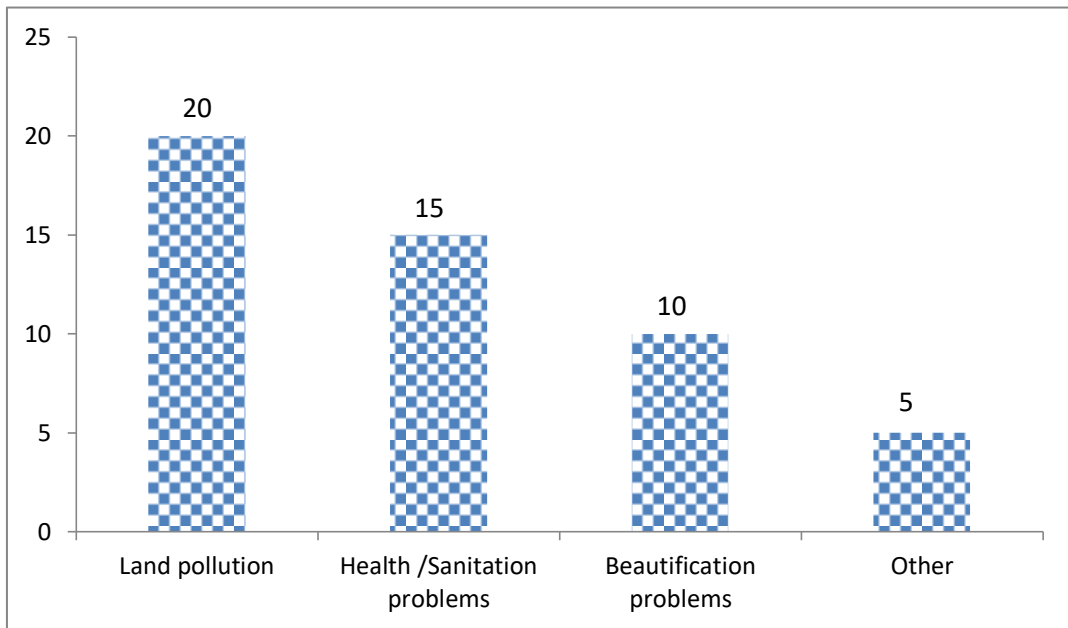
#### 4.3.8

**Table: 4.16 Problems face by Respondents due to waste**

S. N	Problems facing due to waste	No of Respondents	Percentage
	Land pollution	20	40
2	Health /Sanitation problems	15	30
3	Beautification problems	10	20
4	Other	5	10
	Total	50	100

*Source:* Field Survey, 2023

**Figure: 4.16 Problems face by Respondents due to Waste**



The table and figure mentioned above highlight the problems faced by the respondent due to waste. Data shows that 40% focuses on land pollution and 30% argued that effects in health and Sanitation problems. In the same way, 20% focuses on Beautification problems and 10% give other answers.

#### 4.3.9 Practices before Prevailing waste Management System

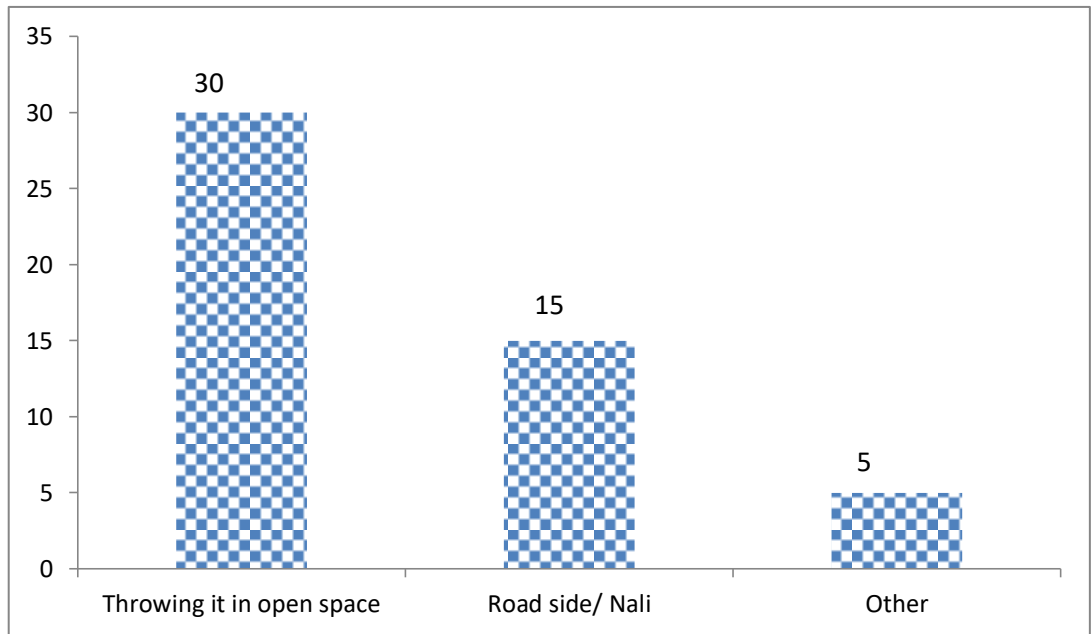
Before prevailing waste management system in the study area respondents used different method that has highlighted in the following table mentioned below.

**Table: 4.17 Practices before Prevailing Waste Management System**

S. N	Managing practice before prevailing waste collection system	No of Respondents	Percentage
1	Throwing it in open space	30	60
2	Road side/ Nali	15	30
3	Other	5	10
	Total	50	100

*Source: Field Survey, 2023*

Figure: 4.17 Respondents Manage waste before Prevailing Waste Management System



The table and figure 4.17 indicate the situation of manage waste before starting waste management system in the study area. Data shows that 60% throw in Road side / Nali and 30% collect in Road side/Nali. Only 10% dispose by using other method.

#### 4.3.10 Opinion of Respondents for Sustainable Waste Management

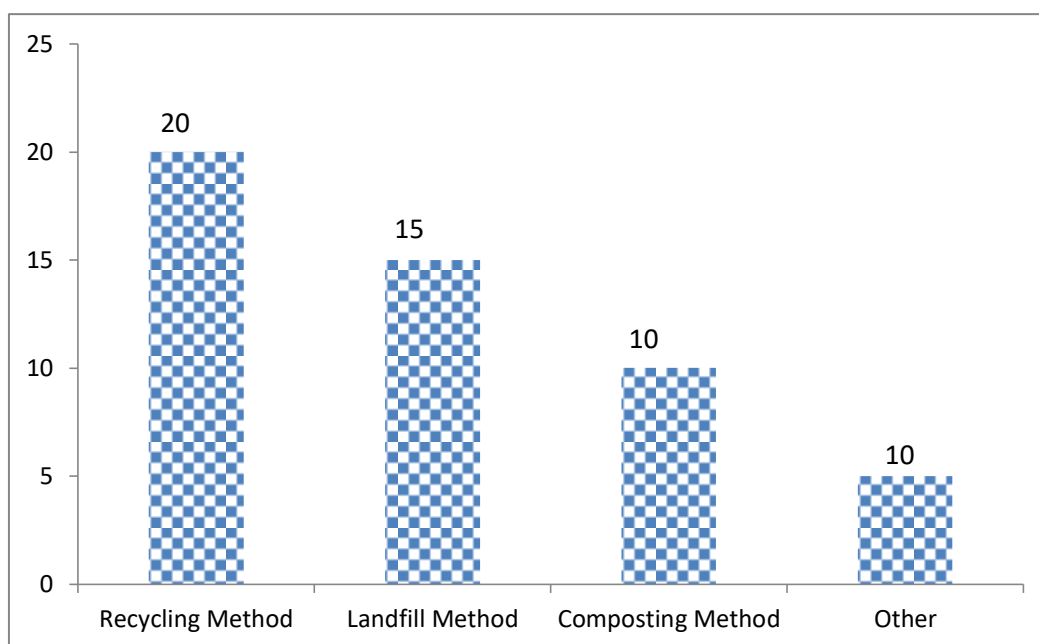
Respondents have given different opinions for the sustainable waste management in the study area. The following table projects the situations that are as follows.

**Table: 4.18 Opinion of Respondents for Sustainable Waste Management**

S. N	Appropriate process for sustainable waste management	No of Respondents	Percentage
1	Recycling Method	20	40
2	Landfill Method	15	30
3	Composting Method	10	20
4	Other	5	10
	Total	50	100

*Source: Field Survey, 2023*

Figure: 4.18 Opinion of Respondents for Sustainable Waste Management



The table and figure 4.18 indicate the respondents' opinion for sustainable waste management. Data shows that 40% focus on recycle and 30% highlights on landfill method. In the same way, 20% focuses on composing method and 10% focuses on other methods

#### 4.3.11 Respondents' Opinion for the Long-Term Solution

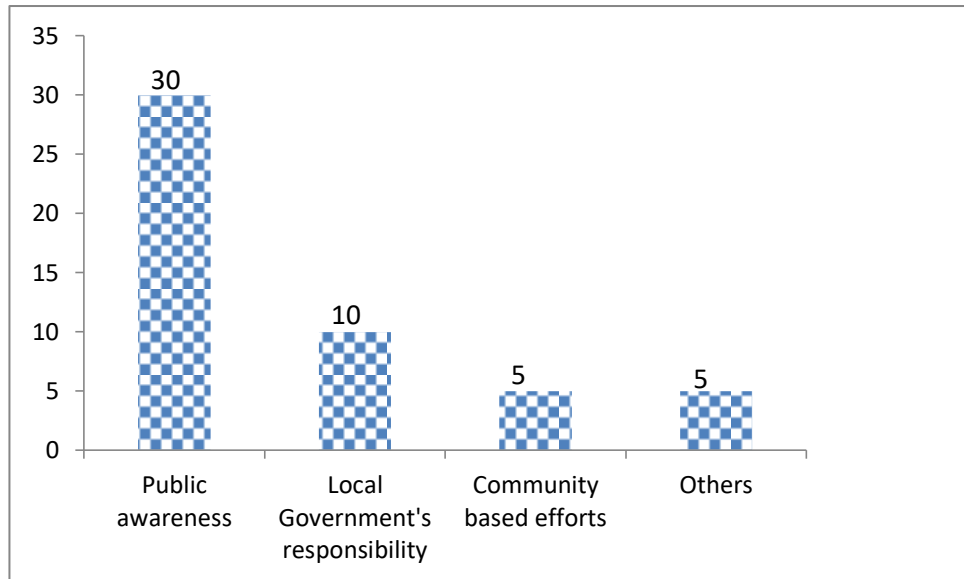
Respondents' have given differ opinions about long term solution of solid waste management in the study area that mentioned in the following table.

**Table: 4.19 Respondents' Opinion for the Long-Term Solution**

S. N	How can we have the long-term solution of the problems emerging from solid waste?	No of Respondents	Percentage
1	Public awareness	30	60
2	Local Government's responsibility	10	20
3	Community based efforts	5	10
4	Others	5	10
	Total	50	100

Source: Field Survey, 2023

**Figure: 4.19 Respondents' Opinion for the Long-Term Solution**



The mentioned table and figure 4.19 indicate the respondents' opinion about long term solution of solid waste management in study area. Data shows that 60% focus on public awareness and 20% highlights on wards responsibility. In the same line 10% focus on community-based effort and next 10% concentrates on other ways.

#### 4.3.12 Respondents' feeling on Present Waste Management System

Respondents" have different feeling about present waste management system that followed by the municipality. The following table highlights the situation.

**Table: 4.20 Respondents' Feeling on Present Waste Management System**

S. N	Felling on present waste Collection system	No of Respondents	Percentage
1	Yes	35	70
2	No	15	30
	Total	50	100

*Source: Field Survey, 2023*

Above table highlights the respondents' feelings about present waste management



system adopted by the municipality. Data shows that 70% are satisfied and 30% are not satisfied with the present system of waste management.

#### 4.3.13 Respondents' Contribution of Waste Management

Some of the respondents have given contribution to manage waste that produced in municipality. The following table highlights the situation

**Table: 4.21 Respondents' Contribution of Waste Management**

<b>S. N</b>	<b>Payment Practice for the waste collection Service</b>	<b>No of Respondents</b>	<b>Percentage</b>
1	Yes	40	80
2	No	10	20
	<b>Total</b>	50	100

*Source: Field Survey, 2023*

The table 4.21 highlights the respondents' contribution of waste management by paying fee. 80% pay the fee for waste management and 20% still have not pay for waste management.

#### 4.3.14 Involvement of the Private sector in waste management

**4.22 Involvement of the Private sector in Waste Management**

<b>S. N</b>	<b>Involved of Private sectors in waste management</b>	<b>No of Respondents</b>	<b>Percentage</b>
1	Yes	35	70
2	No	15	30
	<b>Total</b>	50	100

*Source: Field Survey, 2023*

Above table shows the situation of the involvement of the Private sectors in solid waste management of Ilam municipality. Data shows that 70% answered there is involvement of Private sectors and other response that there is no involvement of the Private sector in waste management.

#### 4.4 Situation of Solid Waste Production

Nature of solid waste depends upon the sources from which the wastes are generated. In general, rural areas produce more biodegradable waste, whereas in urban areas biodegradable and non- biodegradable waste are found because of the varied sources of solid waste.

**Table:4: 23 Sources and Types of Solid Waste**

S. N	Sources	Types
1	Residential	Organic waste, paper, plastics rags, cloths, bottles and others
2	Hotel/Restaurant	food waste, paper plate, disposable cup and spoon, plastics and others
3	Grocery shop	Rotten vegetables, peel off
4	Fish/Meat shop	Feathers, Hairs, Horns and Bones and others
5	Institutional area	paper, plastics, rubbish ashes, food waste
6	Hospital/Clinic	paper, plastics cotton, syringes, gauge, rags, cloths, rubbish ash
7	Industry/Factory	food waste, paper, packing materials, cloth, ash, scrap, rags and others

*Source: Field Survey, 2023*

The composition of solid wastes is similar throughout the world, but the proportions vary widely. The generated waste is composed of both biotic and abiotic elements. Biotic elements contain degradable waste like garbage, combustible material such as the branches and yard trimmings, rags and packing things, some industrial waste and sewage waste. Abiotic elements are non-biodegradable components consists of waste such as old machine parts, demolition waste and construction waste etc. Over the years, it is likely that changes occur in the composition of waste for reasons such as: -

- A rising standard of living and changes in public taste which particularly influence the proportion of non-biodegradable waste;
- Changes in food technology (food processing and packaging) to increase the use of materials such as plastic, tins, metals, cartoons and paper and
- Paving of roads which could cause a decline in inert materials.

Waste is a part of human activity from time immemorial and its management is

essential. Management of solid waste has become a problematic job in recent years. The basic problems of solid waste in the study area are as follows: -

- Lack of dumping site
- Improper management of waste from the concerned agency
- Lack of technology for managing the waste
- Unable to enforce proper rules and regulation.
- Lack of public awareness.

The range of key issues that have to be tackled when seeking to improve solid waste management includes: -

- Daily waste collection service to be provided
- Door to door waste collection service to be provided
- Waste segregation system
- Public awareness programs to be launched
- Proper location of dumping site
- Maximum numbers of containers to be provided
- Proper management of solid waste from the concerned agency
- Both government and private sector to come forward for proper management of solid waste.

The prospects given by the local people are the outcome of their day-to-day experiences. It is necessary to incorporate the mentioned suggestions while making any solid waste management strategy in study area.

With the rapid urbanization the waste generation trend is ongoing day by day. The present scenario of waste management even at municipality level was as that in household level. That is; the waste collected first either sweeping mainly in bazar area was collected different points. After then, the waste was found to be collected by tractor and transported to the landfill site situated inside the catchment of Khalde Community Forest. Although there is sufficient opportunity to manage the waste of the municipality by promoting the Public private partnership model. However, in some of the households, the organic wastes were found to be used as the organic manure. According to municipal master plan a well-equipped sanitary landfill site within the municipality is on the construction phase.

## CHAPTER V

### SUMMARY CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Summary

In the context of study area solid management is being a serious problem because unmanaged construction of the market produced solid waste in large scale. The study focused on the situation of solid waste management in Ilam municipality ward no. 7 bazar area. General objective of this study is to analyze the situation of solid waste management in Ilam municipality ward no. 7. Specific objectives are to examine the current solid waste management system in the study area, to analyze the sources and composition of solid waste and explore the problems and prospects of solid waste management. Both analytical and descriptive research design were used to complete of this study. Quantitative data were analyzed by using analytical research design and qualitative data were analyzed by using qualitative research design and find out the situation of solid waste management situation of the study area.

Ilam municipality ward no 7 is the sample site of this study. Total population of the wards is 5744. In main chock bazar area, there are 202 households among them 25% households (50) were taken as sample household. From each household single individual was taken for interview by using random sampling method. The present study was based both primary and secondary data. Secondary data were used in literature review and that were collected through library study method and books, article, journal, previous thesis is used as the main sources of secondary data. Primary data were collected from the field by using various data collection techniques such as questionnaires and observation.

A set of semi- structured questionnaires were prepared to generate the realistic and accurate data from the field through interview questionnaires. The respondents were requested to fill up the questionnaires. In case of the respondents who could not fill up the questionnaire, the questions were asked to the respondents and answers were filled up to collect the required data. Questions were related to waste management situation of the study area and their perception about the waste management. During the time of data collection, I have frequently visited the study area and necessary data were

Collection by observation. I observed the landfill side and the street where solid waste was spread here and there. Necessary information also collected from by observation check list. After the data was collected from the field survey, data was checked thoroughly and edited wherever needed. Simple statistical tools like tables, graph, bar diagrams, were used to analyze the collected statistical data and other qualitative data were analyzed by using paragraph description. I also discussed the status report with Ilam Municipality office.

Socio economic characteristics of the respondents such as castes, education, and sex also play important role for the producing and management of the solid waste. In this study 22 % of total are Brahmin, 10% were Newar, 9 % were Chhetri, 6 %were Limbu, 4 % were Rai, 3 % Marwadi, 3 % Tamang, 2 % were Bishwakarma and next 2% other. Out of the total there are 58 percentages is 21-35 age group. More than 50 years are only 4 percentages of the total. It is found that the of age 21-35 are more active in income generating activities, because they are more responsible to their family's economic betterment. 52% respondents are males and 48% respondents are females. Similarly, 76 percentages are Hindu, 20% Kirat, 5% Buddhist and 2% are others. This table shows that multi religious people live in the study area. Form the family size perspectives, 62 percentages have medium size of family (5 and 6) and 28 percentages of has small size family (up to). It has been noted that there is only 10 percentage who has large size (above 6) family.

It shows that 56% put in container and 12% throw in roadway. In the same way, 3% collect in open space of the house and 4% throw in Kholsha/ Nali and other 3% throw whatever they like. 40% focus on change in food habit and readymade, 30% due to unplanned settlement increase. In the same line 20% suggested that people not care about the waste and 10% give other answers. Similarly, 40% noticed that there has collected alternative day, 32% argued there has collected daily, 8% argued once a week and 10% answer other give other answers such as municipality hardly collect the waste from house. For the opinion on sustainable waste management 40% answer to recycle method, 30 % answered as Landfilled method and 20% put their opinion for composting method.

## 5.2 Conclusion

Solid wastes are a growing environmental problem in the study area. Increase in population along with the unplanned settlement and urbanization has led to the increase in waste generation rate in the study area. These have added to the problems in solid waste management which is a global issue. The major sources of solid waste in Ilam municipality are municipal, domestic, commercial and agricultural, which consists of both organic and inorganic. The total waste generated and segregation problem in Study area has been increasing day by day. The management of waste is fully maintained by Municipality and provides different services such as collection, transportation and disposal of waste. There is no door-to-door collection of domestic waste. Local people have to collect and dispose their household waste through dustbin in the nearby road head. In Some area plastic bins are provided by the local government. Ilam Municipality collect this waste through tractor in routine base but only in road area. The concerned authority is lacking modern and advanced technology for handling municipal proper waste. There is no experts and trained person who can help to develop some strategic planning for proper waste management. The main bazaar is well served by the municipality but it is due to the lack of sufficient tools and manpower, the concerned authority is unable to provide off road service in all areas of Study area.

The local people are also not much concerned about the municipal waste. Though they manage their household waste by disposing it in the community bins but they have not shown any interest to find out the sustainable management of municipal waste. There is lack of public awareness and participation for proper management of solid waste. Previously every household segregate their waste themselves through separate bins, but now only few of the households segregate their household waste at home before dumping. Rests of them dump it without segregation. One small composting plant is operating by PPP model but they are also facing same segregation problems form household. The concerned authority is trying their best to make maximum community participation. In modern concert waste management is only possible through polluters pay principle and zero waste concept.

### 5.3 Recommendations

Based on the findings of the study the following recommendations are suggested for further improvement in the solid waste management in the study area.

- The concerned authority should provide door to door collection service even in off road area.
- The citizen should be encouraged by the authority for the segregation of wastes at household level. They shall promote recycling or reuse of segregated materials.
- Waste minimization efforts should be motivated at the primary and secondary levels of waste collection. The citizen should be encouraged by the authority for the segregation of waste at household level and for composting of waste for stabilization of wastes.
- Landfill should be restricted to non-biodegradable and other wastes that are not suitable either for recycling or for biological processing.
- Community participation should be increased and local NGOs or tole Bikash Sastha should be mobilized in solid waste management.
- There should be immediate need of scientific landfill site (sanitary landfill; if possible) in the other place. This landfill project should be out of area like community forest, drinking water source, human settlement area, etc. which directly impact on livelihood of people and biodiversity.
- Alternative way of awareness programs on Sustainable waste management should be found out and facilitate behavioral changes within local level as well as training.
- Formulation and Review on exiting policy for SWM from municipality level along with budgeting on SWM should be given in priority for healthier livelihood.
- Lastly, the enforcement of these measures has to be ensured through appropriate laws and regulation and regular monitoring of development activities.

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## ANNEXES

### Annex: 1 Questionnaire for the Solid waste Management practice

This questionnaire has been designed to explore the information for purely academic purpose. This is to enable the researcher, Bandana Adhiari. This Thesis on the topic *Solid Waste Management Practice A Case Study of Ilam Municipality 7 Ilam Nepal*, in pursuance of marks of Arts in Rural Development Dgree.

#### **1. Interview Questionnaire**

#### 2. Socio economic characteristics of the respondents

1. Name
2. Address
3. Sex
4. Age
5. Education
6. Caste/ethnicity
7. Marital status
8. Religion:
9. Family Size
10. Occupation
- 11. Having knowledge about solid waste management**

#### **3. Question related to solid waste management in Ilam municipality**

1. Where do you dump your household waste?
  - a. Container
  - b. Open space
  - c. Kholsha/Nali
  - d. Roadway
  - e Others
2. How do you think the solid waste in increasing day by day?
  - a. due to unplanded settlement increase
  - b. Change in food habit and Readymade packing
  - c. Not taking care of it.
  - d. Others
3. What is the frequency of the waste collection?
  - a. Once a week
  - b. daily

- c. Alternate day
- d. Others

4. In which time of the day waste collection does?

- a. Morning time
- b. Day time
- c. Evening time

5. Where is the Municipal container located?

- a. Open place
- b. beside the road

6. What type of waste collection system do you have in your locality from the concerned agency?

- a. Door to Door.
- b. Dumping
- c. Waste collection by street sweeping
- d. Others

7. What type of problem do you face when these wastes were not collected?

- a. Land Pollution
- b. Health and Sanitation problems
- c. Beautification Problems
- d. Others

8. How had you used to manage the waste before this prevailing waste collection system?

- a. Throwing it in open space
- b. Roadside/Nali
- b. c Others

9. Do you have to pay for the waste collection service?

- Yes ( )
- No ( )

10. If yes, how much do you have to pay for the service per month?

.....

11. Are you satisfied with the waste collection system?

Yes ( )

No ( )

12. Are there any NGOs or private sectors involved in this activity?

Yes ( )

No ( )

13. Which process would be more appropriate for sustainable waste management?

a. Recycling Method

b. Landfill Method

c. Composting Method

d. Others

14. How can we have the long-term solution of the problems emerging from solid waste?

a. Public awareness

b. Local Government's responsibility

c. Community based efforts

d. Others

15. Do you have any suggestions regarding solid waste management system?

.....

16. Do you have any idea about the best collection system?

.....

17. What are the problems of solid waste management?

.....

Date

Sign

### **Case 1: Bishnu Nepali, Ilam Municipality-7, Kuldhara**

45 years old Bishnu Nepali (Change name) worries about waste collection practices in Ilam 7. Plastic waste dispersed around the open space of Kuldhara, nearby his house. Ilam has become a common sight. As it is also way to the school wrappers of candy, noodles and biscuits can be seen everywhere. This particular area is a bit off the road as a result the cleaning staffs from Ilam Municipality do not reach there on regular basis. Local resident says they do scold passerby who throw the waste but most of the waste is thrown at night. There is no public dustbin in the place as well.

The smell of rotten disposable waste along with smell of used sanitary pads and dippers is unbearable. On top of that dogs carry the waste from one place to another. *"Solid waste gets mixed with waste water and the combination is lethal. Ilam Municipality needs to focus on areas that are a bit off the road as well"*, says Bishnu Nepali from Kuldhara, 7 Ilam.

## Annex: 2 Research Related Photography



Photo 1: Unmanaged waste dumping nearby road



Photo 2: Solid waste collection through tractor



Photo 3: Open solid waste dump at landfilled side



Photo 4: Plastic bin provided by Municipality for solid waste collection



Photo 5: Waste Composting Machine



Photo 6: PPB for 4Gs Office Ilam