

## **Assessment of Status and Management Options of Municipal Solid Wastes: The Case of Ejaji Town, Ilu Gelan District, West Shewa Zone, Oromia Regional State, Ethiopia**

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**Abstract:** Municipal solid waste management is a globally challenging issue especially in developing countries, due to its adverse environmental effects and it is a major cause for environmental pollution and human health risks. The purpose of this study is to assess the status and management options of municipal solid wastes in Ejaji town. Data were collected from 136 sample households of the town. The methods used to collect the data were questionnaires, interviews, focus group discussions and observation. Questionnaires were collected and analyzed using descriptive statistical methods such as frequency and percentages. The results obtained were presented (Summarized) in the form of Tables. The finding of the present study shows that, there were poor waste collection and disposal methods followed and generally, poor management systems of municipal solid waste. The quantitative analysis using sample households data shows that, most of the respondents (72.1%) responded that they did nothing with but, throw it on open space, (14.7%) of the respondents burnt in an open space whereas, 10.3% and 2.9% of the sample households used as fertilizer (As a compost) and used as a fuel, respectively. The qualitative data analyses, using interview and focus group discussion also, showed that, people dump solid wastes in open space, along the river side, on road side and streets. This uncontrolled dumping of solid wastes creates unhygienic living environment that is used as breeding ground for communicable disease vector and deteriorated the overall quality of the town. To alleviate such problem, it can be possible to recommend collecting, sorting and separately disposing of organic and inorganic municipal solid wastes for its proper management systems. Promoting integrated municipal solid waste management systems which might be economically and environmentally sustainable through incineration, composting, reduce, reuse and recycle and also increasing public awareness shall be applied for proper management of municipal solid wastes.

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**Key words:** Ejaji town • Environmental pollution • Solid waste • Waste management

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### **INTRODUCTION**

Municipal solid waste management is a globally challenging issue especially in developing countries, due to its adverse environmental effects [1, 2]. Challenges associated with solid waste management in developing countries, collection and transportation capacity; inadequately managed and uncontrolled dumpsite and the problems with governance also complicate the situation. Weak institutions, chronic under-resourcing and rapid urbanization exacerbate the challenge [3].

Inorganic solid wastes are chemical substances of mineral origin; whereas organic wastes are chemical substances usually of animal or plant origin [4].

Ethiopia is facing rapid urbanization per annum, leading to overcrowding and the development of slums and informal settlements with poor waste management practices. Urban dwellers generally consume more resources than rural dwellers and so generate large quantities of solid waste and sewage [5]. The standard of waste management system is still poor and outdated in many developing countries, with poor documentation of

waste generation rates and its composition, inefficient storage and collection systems, disposal of municipal wastes with toxic and hazardous waste, indiscriminate disposal or dumping of wastes and inefficient utilization of disposal site space. Improper solid waste management has contributed greatly to river pollution, also contributes to climate change. Rapid development, population increase and changes in consumption pattern have directly or indirectly resulted in the generation of enormous amount of waste, ranging from biodegradable to synthetic waste [6].

Solid waste management is becoming a big concern for cities administration task in developing countries which might be due to the magnitude of rapid urbanization and increasing population growth; which in turn has greatly accelerated municipal solid waste generation rate in the urban environment [7]. According to World Bank [8] every year developing nations spend nearly 46 billion dollars on managing their municipal solid waste. These investments could exceed 150 billion dollars per year by 2025. In line with this, solid waste management system in Africa is often weak due to lack of appropriate planning, inadequate governance, poor technology, weak enforcement of existing legislation and lack of economic incentives [9]. Different approaches were used by countries to manage solid waste in order to prevent its impacts on the environment and health. Until recently, solid waste management services in Ethiopia were mainly the responsibilities of municipalities, which results in inadequate service provision reflected by lack of proper collection, poor sanitary facilities, improper planning and co-ordination [10, 11]. Regionally, for example in Gondar town, the solid waste generation of each household averagely was currently reached to 76.65 kg /annum [12]. As a result of this huge generation of solid waste, town residents considered municipal solid waste management as a necessary and vigorous urban service [13]. Regarding proper solid waste management system of Ejaji town no scientific research work have been done particularly in the present study area. Therefore, to fill the gap, the present study was initiated with the objectives of assessing and recommending some feasible solutions for proper disposal of solid waste with respect to Ejaji town of Ilu Gelan district, West Showa Zone.

## MATERIALS AND METHODS

This study was conducted in Western Ethiopia, Oromia Regional State, West Shewa Zone, Ilu Galan District, Ejaji town.

**Research and Questionnaire Design:** The research design used in the present study was both quantitative and qualitative method (Mixed method). In this study quantitative method was used to draw representative samples of the study from population and collect numerical data of the study. However, qualitative method was used to get deep information to support data collected through quantitative means. Descriptive survey research was also used to describe survey data and facts finding enquiries adding that description of affairs as it exist at present study. The research questionnaire designed consists of both open and close ended forms. The questionnaires was prepared in English and translated to “Afan Oromo” Language with the aim of making it simple for respondents to understand and respond to the questions.

**Sampling Technique and Method of Data Collection:** For the purpose of the present study, simple random sampling method was used to randomly select respondents from a sampling frame for commercial solid waste, systematic sampling method a random start and then proceeds with the selection of every element from that point onwards for household solid waste and purposive sampling method for institutional solid waste was used depending on the purpose of the study.

**Primary and Secondary Data Collection Methods:** The data for the study was collected from both primary and secondary data sources. In the primary data collection, filling questionnaires’ interview, Focus Group Discussions (FGDs) and observation methods were used and described here under: Structured interviews were recruited and short training was given in order to collect the primary data by using structured interview. Municipality administrative body, residential household and other stakeholders were included in order to get information through creating good relationship with the groups. Field observations were carried out to check the reliability of the data collected through interview and focus group discussions. The method was used to understand and validate the information gathered from the informants about the status of the town’s sanitation and other observable practices and facts. Focus groups discussion was conducted with various stakeholders who are directly have some influence on solid waste management in the town. It also includes the “Kebele” administrative officer, municipality sanitation committee, urban land management officer and community based organization leader. Secondary data was collected from different documents such as minutes and reports by the

town's administration and newsletters and from other reliable sources which can be incorporated in the present study.

**Sample Size Determination**

**Target Population:** The target populations for this study were available mainly from three sources: institution, commercial and households. The sample respondents were households and other stake holders in the town. In order to collect primary data the researcher used scientific statistical method developed by Kothari [14] and makes it available for interviews. Sample size for the present study was determined by the following formula.

$$n = \left[ \frac{Z^2 QpN}{e^2(N-1) + Z^2 Qp} \right] \tag{1}$$

where: n= total sample size, N= Total number of households, Z= standard normal deviation at the required confidence level that corresponds to 95% confidence interval equal to 1.96, e= the level of statistical significance (Acceptable level of error) (0.05), p = the proportion in the targeted population estimated to have characteristics being measured or probability of being included in the sample (10%), Q= probability not included in the sample (1-0.1) or (0.9).

$$\text{Thus, } n = \left[ \frac{1.96^2 \times 0.9 \times 0.1 \times 6,604}{0.05^2(6,604-1) + 1.96^2 \times 0.9 \times 0.1} \right] \tag{2}$$

Therefore, Total sample size of the study area was considered to be 136.

**Proportional Sampling Technique:** To select sample of specified size from each of available list of target population proportional allocation was used to determine sample size by using the following formula taken from Cochran [15].

$$n = \frac{Nc}{N} * n \tag{3}$$

where: n = Sample size of population, Nc = Total population i.e., number of individual from list of target population, N = Total population.

**Methods of Data Analysis:** Descriptive statistical methods such as frequency and percentages were used to analyze data and the results were presented in the form of Tables. The qualitative data gathered from report,

field survey and text which regard about the assessment of the challenges, status and management options of solid (Organic and inorganic) wastes in terms of their implementations.

**RESULT AND DISCUSSIONS**

**Demographic Characteristics of the Respondents:**

According to the survey questionnaire conducted for this study the results of gender, age, marital status and educational background of the respondents were presented in the Table 1.

**Sex and Age of the Respondents:** As it could be identified, majority of the respondents 72.1% (n = 98) was males and followed by females which were lowest in number 27.9% (n = 38) of respondents (Table 3). It was also identified that majority of the respondents (45.6%) are of between 40 - 49 age group and then followed by (35.6%) age group was between 30-39, (11%) and (8.1%) of the age groups was between (20-29) and (50-56) age ranges respectively (Table 3). These largest number of respondents were very well knows about the challenges (Problems), status and management options of municipal solid waste in the study area.

**Marital Status and Educational Level of the Respondents:**

As it could be observed from (Table 3), out of the total sample respondents, the majority of the respondents (72.1%) have getting married and followed by widowed (11.8%), single (10.3%) and (5.9%) of the respondents are divorced. Assessing educational background of the respondents was found to be important to analyze the challenges, status and solid waste management options at the household level and their level of understandings on the issue. Educational level of the respondents and level of understanding is important to forecast in what type of environment the residents want to live and their efforts to keep their environment clean. As it can be seen from the (Table 3), the educational level of the respondents ranges from the highest number of respondents (33.1%) which were able to read and write to the lowest number (10.3%) who have high school certificate. However, the large percentage of the household head about (33.1%) are read and write, primary school, Illiterate and University (College) are (28.7%), (16.9%) and (11%), respectively. This highest number of respondents who can read and write educational level indicates the present poor management of municipal solid waste in Ejaji town can be drawn to the educational level of the household head.

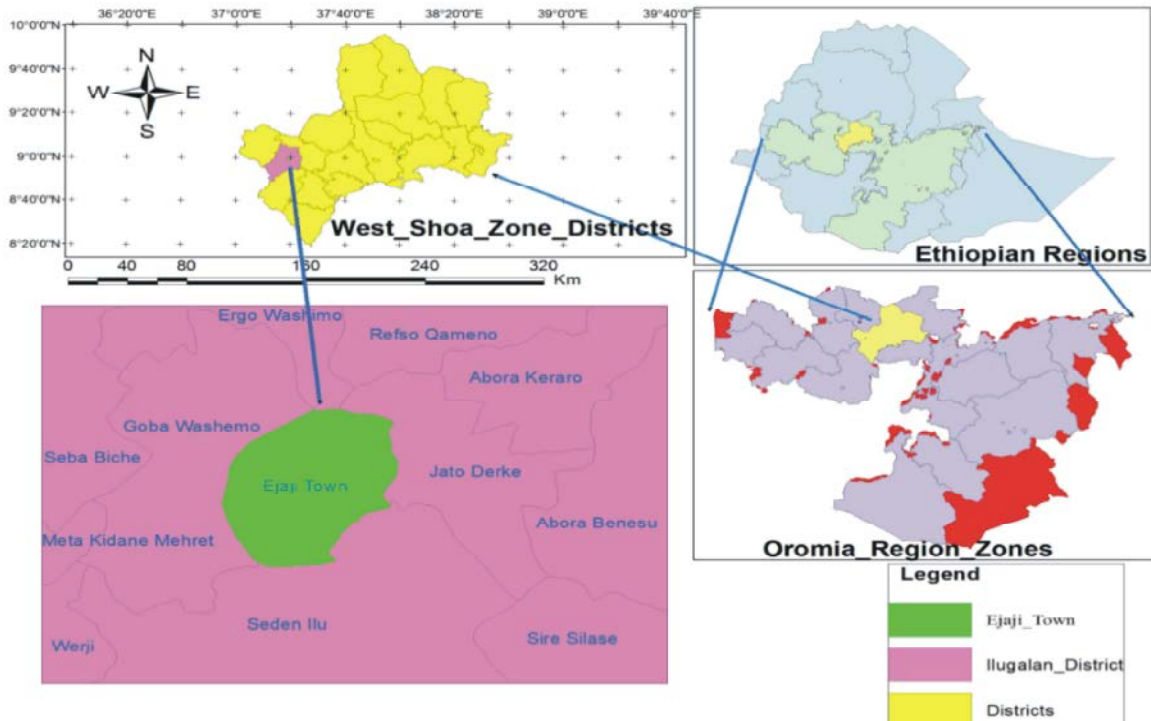


Fig. 1: Location Map of the study area

Table 1: Target population of the study

S.No.	List of target population	Amount	Available element		
			Male	Female	Total
1.	Institution	94	359	165	524
2.	Commercial	183	541	219	760
3.	Household	4, 801	3, 850	1, 470	5, 320
Total			4, 750	1, 854	6, 604

Table 2: List of Sample respondents

No.	Name of target population	Sample size taken from each population	List of sample size		
			Male	Female	Total
1.	Institution	$\frac{524 * 136}{6,604} = 11$	8	3	11
2.	Commercial	$\frac{760 * 136}{6,604} = 16$	11	5	16
3.	Household	$\frac{5,320 * 136}{6,604} = 109$	79	30	109
Total			98	38	136

**Possessions of Animals:** As it could be seen from the above (Table 4), most of the respondents (46.3%) had cows and their calves. It implies that they have their own plots of land and animals outside of the town whereas, 30.1% of the respondents possessed goats and 7.4% of the respondents had sheep and the rest 16.2% of the respondents had no possessed animals. These domestic animals play an important role in solid waste generation.

**Current Status of Municipal Solid Waste Management Frequency of Disposing Municipal Solid Wastes:** The assessment of the present study revealed that, most of the respondents (74%) were responded that, the current status of municipal solid waste management systems was poor (Low) in the town whereas, 11 and 15% of the respondents were responded that there was a medium and high management systems of municipal solid

Table 3: The demographic characteristics of the respondents

No.	Item	Category	Frequency	Percentage
1.	Sex of the respondents	Male	98	72.1
		Female	38	27.9
		Total	136	100.0
2.	Age of the respondents	20-29	15	11.0
		30-39	48	35.3
		40-49	62	45.6
		50-60	11	8.1
		Total	136	100.0
3.	Marital Status of the respondents	Married	98	72.1
		Single	14	10.3
		Divorced	8	5.9
		Widowed	16	11.8
		Total	136	100.0
4.	Educational level of the respondents	Illiterate	23	16.9
		Read and Write	45	33.1
		Primary School	39	28.7
		High School	14	10.3
		University and College	15	11.0
		Total	136	100.0

Table 4: The livestock's of the respondents

Livestock's	Frequency	Percentage
Cows	63	6.3
Sheep	10	7.4
Goats	41	30.1
None	22	16.2
Total	136	100.0

Source: Results of field survey data, (2019)

Table 5: The current status of municipal solid waste management

The current status of municipal solid waste management	Frequency	Percentage
High	21	15.0
Medium	15	11.0
Low (poor)	100	74.0
Total	136	100.0

Table 6: Frequency of disposing municipal solid wastes

Frequency of disposition of solid wastes in to dumping site	Frequency	Percentage
Every day	99	72.8
Every 2-3 days	36	26.5
Every week	1	0.7
Total	136	100.0

Source: Results of field survey data, (2019)

waste management systems in the town respectively (Table 5). This implies that, there was a mismanagement of municipal solid waste. By supporting the above study, key informant interview conducted for this study purpose discussed that, there was the absence of solid waste disposal and lack of awareness in the town were forced most respondents to dispose solid wastes in open spaces. So, the municipality administration should raise public awareness to the residents and preparing appropriate

disposal site. The assessment on the frequency of disposing municipal solid waste was carried out and results were presented in the (Table 6).

As it can be seen from the above (Table 6), most of the respondents (72.8%), were disposed the solid wastes on an open space everyday whereas, 26.5 and 0.7% of the respondents were disposed the solid wastes in an open space every 2-3 days and every week in an open space or on to the illegal dumping site in the town respectively.

They collect their solid wastes from their homes and around their homes and also from their working places and also they disposed without separating the organic solid waste from inorganic solid waste. In this study, the daily generation and disposition of municipal solid waste in the study area was increasing. Unless it is managed well through preparing appropriate (Legal disposal site), providing continual awareness on the issue of solid waste related risks to the environment and implement rules and regulations of solid waste; the problems caused by the solid waste of the study area will make the town more risky than the status of its previous situations.

**The Current Generation Level of Municipal Solid Wastes:** The assessment of the current generation and disposition level of municipal solid waste was carried out and presented in the following Table 7.

The assessment of the present study revealed that (Table 7), most of the sample households (94.9%) were responded that, the current generation and disposition level of municipal solid waste was increased and 5.1% of the respondents were responded that, there was no change at all to the current level of municipal solid waste generation. So, it implies that, the current generation and disposition level of municipal solid waste was increasing. The key informant interview conducted for this study purpose raised the issue of current generation and disposition level of municipal solid waste as increasing in the study area by supporting the result found from sample respondents. As it could be seen in the above (Table 7), 58.8% of the respondents were responded that, the main reason for increasing of the current generation and disposition level of municipal solid waste was the expansion of the town and population growth in the town whereas, 25, 5.9, 6.6, 2.2 and 1.5% of the respondents reflected that lack of awareness on waste management, absence of controlling mechanism, negligence of the concerned authority, absence of landfills and carelessness of the residents was the main reason for increasing of the current generation and disposition level of municipal solid waste respectively. Therefore, the expansion of the town and population growth was the main reason (Problem) for increasing the current generation and disposition level of municipal solid waste in the town.

**Challenges of Poor Municipal Solid Waste Management:** Ejaji town was caused by water pollution problem because of the poor municipal solid waste management. As it could be identified in the above (Table 8), 50.7% of the sample households were caused by river pollution

problem and 46.3% of the sample households were caused by air pollution problem, whereas 2.9% of the sample households were caused by soil pollution problem. This result is in line with [6].

#### **The Open Defecation Problems**

##### **Solid Waste Related Risks to Human and Animals**

**Healthy:** As it could be seen from the above (Table 9), almost all or 95.6% of the respondents were responded that there was an open defecation problem in the town whereas 4.4% of the respondents responded that there is no open defecation problems. So, it is concluded that there is an open defecation problem in the town. Open defecation is one of the serious problems encountered in Ejaji town which makes offensive smelling. Most of the respondents (77.2%) attributed the problem to the absence of public latrines in the town, whereas 22.8% of the respondents responded that they are poor and can't have their own latrines (Table 9). These facts invite people to defecate and urinate randomly in open spaces. The respondents were asked to express their opinion whether solid wastes have risks on human and animal health or not. Accordingly, most of the respondents (97.8%) were responded that the health of people and animals were affected by the municipal solid waste, whereas 2.2% of the respondents responded that no any health of people and animals were affected by municipal solid waste as this much in the town (Table 10). From this point of view, there was a serious impact of municipal solid wastes to people and animals in the study area. The key informant interview conducted during survey questionnaire for this study purpose revealed that, unmanaged solid wastes have a great role in polluting environment in which peoples and animals are living including the study area; in addition to this they raised that, peoples living in dirty area (Where solid wastes are unmanaged) and are more expensed due to problems of health payment fee.

##### **Types of Solid Waste Mostly Affect the Animals' Health:**

The assessment on the types of solid waste which mostly affect the animals' health was carried out and results were presented in the following Table 11. Respondents were asked how they know the risks of solid waste especially plastic bags on animal health from their experience. Accordingly, the majority of the sample households (70.6%) believe that plastic bags mostly affect the animal's health than textiles, whereas 29.4% of the respondents believe that, textiles affects animal health more than plastic bags (Table 11). The key informant interview were asked on the issue of risks of plastic bags

Table 7: The current generated level of municipal solid waste

No. Item	Category	Frequency	Percentage
1. The current generation level of municipal solid waste	Increasing	129	94.9
	No change at all	7	5.1
	Total	136	100.0
2. The reason for increasing the current generation and disposition of solid wastes	Expansion of the town and population growth	80	58.8
	Carelessness of the residents	2	1.5
	Absence of controlling mechanism	8	5.9
	Negligence of concerned authority	9	6.6
	Absence of landfill	3	2.2
	Lack of awareness on waste management	34	25.0
Total	136	100.0	

Source: Results of field survey data, (2019)

Table 8: Challenges of poor solid waste management

Challenges of poor solid waste management	Frequency	Percentage
Water pollution problem	69	50.7
Soil pollution problem	4	2.9
Air pollution problem	63	46.3
Total	136	100.0

Source: Results of field survey data, (2019)

Table 9: The problems of open defecation

No. Item	Category	Frequency	Percentage
1. The problems of open defecation	Yes	13	95.6
	No	6	4.4
	Total	136	100.0
2. The reasons for open defecation problem	There are no public latrines	105	77.2
	People are poor and can't have their own latrines	31	22.8
	Total	136	100.0

Source: Results of field survey data, (2019)

Table 10: Views of respondents on solid waste related risks to human and animals healthy

No. Item	Category	Frequency	Percentage
1. Views of respondents on solid waste related risks to human and animals healthy	Yes	133	97.8
	No	3	2.2
	Total	136	100.0

Source: Results of field survey data, (2019)

Table 11: Shows that the type of solid waste mostly affects the animals' health

The type of solid waste mostly affects the animals' health	Frequency	Percentage
Phestals (Plastic bags)	96	70.6
Textiles	40	29.4
Total	136	100.0

Source: Results of field survey data, (2019)

Table 12: The management options for municipal solid wastes

The management options	Frequency	Percentage
Use it for fertilizers (As a compost)	14	10.3
Use it as fuel	4	2.9
Nothing with but throw it on open space	98	72.1
Burn it in an open space	20	14.7
Total	136	100.0

Source: Results of field survey data, (2019)

on animals health and raised their views by saying plastic bags cause the death of grazing animals when they eat and swallowed it blocks their digestive organs and affects their health or kills them.

**The Management Options for Municipal Solid Wastes:**

The assessment of the management options for municipal solid wastes was presented in the following Table 12.

Table 12 presented management option on solid waste. The sampled respondents taken from study area were asked which option they are using to manage solid waste. Depending on the answers replied by respondents 10.3 % (N = 14) were managing solid waste through using it as fertilizers, while 2.9 % (N = 4) of respondents were managing by using it as source of fuel. A large number of respondents that is 72.1 % (N = 98) were doing nothing to manage solid waste management rather than throwing it to on space in which they are living in, whereas 14.7 % (N = 20) of respondents burn it in an open space. This result implies that among the sample respondents only 13.23 % (N = 18) of respondents were using proper management option of solid waste (Those are using as a compost or fertilizer and fuel). On the other hand the large amount of respondents 86.77 % (N = 118) were poorly managing solid waste that can cause damage to the environment in which they are living (Those were throwing and burn it on an open space in which they are living in).

**Disposal Sites of Municipal Solid Waste:** In the study area, the disposal sites observed were all illegal disposal site. Throwing solid waste in open areas is a common practice as there is no common municipal dumping site in the study area. Not only but, also they dispose their solid wastes without separating organic solid waste from inorganic solid wastes on the river side, open spaces, road side. Solid waste dumping practices of respondents were presented in the following (Table 13). The absence of solid waste disposal site and lack of awareness in the town were forced most respondents to drop solid wastes in open spaces or around their fences. There was a clear indication of most of the respondents throw their solid waste in open spaces, river side, road side (Street), around their living homes and other areas of the town. The study (Table 13) indicated that, 72.1% of the respondents throw solid waste in open areas of the town where and 25.7% of the respondents were store and burn it in a hole of their backyards which can serve as part of solid waste management at an individual level whereas 2.2% of them were throw it in to the small river side that pollutes

the water in the present study area. The separated (Organic from inorganic municipal solid waste) disposal site: The present study showed that, the town was faced lack of separated (Organic from inorganic municipal solid waste) disposal site. The assessment of disposal site for organic and inorganic solid waste was discussed in the following Table 14. As it could be seen in the above (Table 14), almost all of the respondents (99.3%) were viewed that there was no separated (Organic from inorganic municipal solid waste) disposal site in the town whereas, few respondents (0.7%) were viewed the presence of the separated disposal site for organic and inorganic municipal solid waste in the town.

**Types of Containers Used to Store Municipal Solid Wastes:**

Respondents of the towns were used temporary waste storage materials such as fertilizer sacks and baskets with different sizes so as to keep their compound clean and disposing it at the illegal disposal sites. As it shown in (Table 15), most of the respondents (72.1%) were using fertilizer sacks as temporary waste storage material known by its local name as “*Madaberiya*” or cement sacks by self-experience and the rest 27.9% of the respondents were using basket.

**Separation and Disposal Practices of Organic from Inorganic Solid Wastes:**

As it can be seen from the above (Table 16), most of the sample households (88.2%) were disposed their solid wastes without separating organic municipal solid wastes from inorganic municipal solid wastes whereas 11.8% of them were separate and dispose inorganic solid wastes which are not easily decomposed (Non-degraded) such as glass, bottles and the like from organic solid wastes. Even they disposed in to inappropriate dumping site. The municipality administration (The concerned bodies) should construct an appropriate separated disposal site (Legal dumping site) and creating awareness for the residents.

People are forced to dispose solid wastes at in appropriate disposal site. It can be observed from Table 17 above, most of the respondents (76.5%) were viewed that because of the absence of the residents disposal site or absence of landfill, people dispose their solid wastes in an open spaces, road side and river side areas and 10.3% of the respondents were reasoned out that because of it is downward and so easy to carry the solid waste whereas 4.4% and 8.8% of the respondents were reasoned out that because it is far from authorities site and because it sparsely populated the residents were disposed their solid wastes in an open spaces, road side



Table 13: The disposal sites of municipal solid wastes

Disposal site	Frequency	Percentage
Throw it on an open space	98	72.1
Store and burn in hole in my backyard	35	25.7
Throw it in to the river side	3	2.2
Total	136	100.0

Source: Results of field survey data, (2019)

Table 14: The separated (Organic from inorganic municipal solid waste) disposal site

The separated disposal site	Frequency	Percentage
Yes	1	0.7
No	135	99.3
Total	136	100.0

Source: Results of field survey data, (2019)

Table 15: Types of containers that residents used for temporary disposal of solid wastes

Types of containers used for temporary disposal of solid waste	Frequency	Percentage
Fertilizers sacks	98	72.1
Basket	38	27.9
Total	136	100.0

Source: Results of field survey data, (2019)

Table 16: Separation and disposal system of organic from inorganic solid wastes

Separation and disposal of organic from inorganic solid wastes	Frequency	Percentage
Yes	16	11.8
No	120	88.2
Total	136	100.0

Source: Results of field survey data, (2019)

Table 17: Why people are forced to dispose solid wastes at inappropriate disposal site

Respondents opinion to the reason for people dispose waste at that site	Frequency	Percentage
Because it sparsely populated	12	8.8
Because it is far from authorities site	6	4.4
It is downward and so easy to carry the waste	14	10.3
Because there is no disposal site	104	76.5
Total	136	100.0

Source: Results of field survey data, (2019)

Table 18: Shows that the intervention by the town administration

The intervention by the town administration	Frequency	Percentage
Yes	1	0.7
No	135	99.3
Total	136	100.0

Source: Results of field survey data, (2019)

Table 19: The existence of municipal solid waste management

The existence of municipal solid waste management	Frequency	Percentage
Yes	19	14.0
No	117	86.0
Total	136	100.0

Source: Results of field survey data, (2019)

Table 20: Composition of municipal solid waste disposed in open space in the town

No.	Organic solid waste	Inorganic solid waste
1.	Chat debris	Broken bottles and broken glasses
2.	Bone and horns of different dead animals	Ashes
3.	Pieces of papers and cartons	Broken metals
4.	Broken woods and saga Tura disposed from wood works	
5.	Animal dungs	
6.	Textiles	
7.	Plastic bags (Phestals)	
8.	Hair from barber houses	
9.	Plastic bottles	

Source: Results of field survey data, (2019)

and river side areas respectively. By supporting the above reasons, key informant interview conducted for this study purpose discussed the following reasons; disposing solid waste to the open space is taken as culture in the study area which needs providing continual education, training and awareness to the town dwellers. On the next point they raised problems related to lack of implementing rules and regulations available for the issue, lack of critical attention from municipality of the study area about risks related with in appropriate disposal site of solid waste in the town of the present study site.

**An Intervention Mechanisms and Management Options:**

Intervention of municipality administration is important to increasing public awareness to the necessity of clean environment for good health is facing public pressure to the proper management of the municipal solid waste in the town. As it could be shown in the above (Table 18), almost all of the respondents were responded that there is no intervention by the town administration whereas only 0.7% of the respondents were responded that the presence of an intervention by the town administration. So it implies that there was lack of giving awareness of the town administration regarding the status and management options of municipal solid waste in the town. The town administrations should be made and integration with concerned bodies through meeting with municipality sanitation committee and giving awareness to the residents regarding the issues of solid waste management. As it could be seen in the above (Table 19), 86% of the respondents were responded that there is no municipal solid waste management in the town and only 14% of the respondents were responded that the presence of municipal solid waste management in the town. In general overview of the study, because of the absence of the giving awareness by the town administration and lack of applying rules and regulations about the municipal solid waste management, poor municipal solid waste management was happened in the town.

**Field Observation by the Researcher:** Composition of municipal solid waste disposed in an open space and inappropriate disposal observed by the researcher was listed in Table 20 From the above observation (Table 20), as the researcher observed that, organic municipal solid wastes such as chat debris, pieces of papers and carton was disposed more than inorganic municipal solid waste. But, in general, from both organic and inorganic municipal solid waste, chat debris, plastic bags (“Phestals”), plastic bottles and pieces of papers were mostly produced and disposed in the town.

**CONCLUSIONS AND RECOMMENDATION**

The assessment of the present study was conducted in Ejaji town of West Shewa Zone, Oromia Regional State, Ethiopia. Municipal solid waste management is being a serious problem in the world especially in developing country like Ethiopia since it is a major cause for environmental pollution as well as human and animal health risks. From the field observation, questionnaires, interviewee and focus group discussion indicates Ejaji town is facing serious problems as a result of poor management of municipal solid waste and accompanied environmental pollutions and health problems. The results of the present study showed that, most of the sample households (88.2%) were disposed their solid wastes without separating organic municipal solid wastes from inorganic municipal solid wastes whereas 11.8% of them were separate and dispose inorganic solid wastes which are not easily decomposed (Non-degraded) such as glass, bottles and the like from organic solid wastes. Even they disposed in to inappropriate dumping site. So, the municipality administration (The concerned bodies) should construct an appropriate separated disposal site (Legal dumping site) and creating awareness for the residents. Moreover, the absence of solid waste disposal site and lack of awareness in the town were forced most respondents to dispose their solid wastes in open spaces

or around their fences, river side, road side (Street), around their living homes and other aesthetic areas of the town. The municipal solid waste management problems in the town were generally characterized by poor (Low) status of management systems for municipal solid waste in the study area. Therefore, there is a need to introducing the community for waste fee to avoid illegal waste dumping through awareness creation, promoting integrated municipal solid waste management systems which are economically and environmentally sustainable through using organic waste for composting as fertilizer, using biogas to produce energy for reusing and usable inorganic solid waste materials recovered through recycling (Reusing and recycling) and constructing the legal and appropriate dumping site in the present study area. Based on the findings of the study, the following recommendations were drawn to improve the present situations:

- Constructing (Preparing) appropriate separated disposal site (Legal dumping site) of organic from inorganic municipal solid wastes and constructing public latrines.
- The municipality has raising public awareness and participation to the necessity of clean environment for good health, are facing public pressure to the proper management of the municipal solid waste.
- Contribution of community based organization such as women's associations, youth associations and "Idir" or invitation of non-governmental organization take active participations.
- The municipality should establishing (Developing) and strengthening micro and small enterprise waste collectors prepare sanitary land fill and place municipal container like dustbin.

**Conflict of Interest:** The author declares that there are no conflicts of interest with regard to the publication of this original research paper.

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