



Assessment of Waste Disposal and its Management in Debre Tabor University, North Western Ethiopia

Kindu Geta*, Wubishet Assefa, Demek Nigus, Desalign Temesgen, Wubagegn Tsega, Yikanu Minale

Department of Biology, Debre Tabor University, Tabor, Ethiopia

ABSTRACT

Waste management is the collection, transportation, processing, recycling or disposal of waste materials, usually ones produced by human activity in an effort to reduce their effect on human health and environment. Improper waste management continues to be a major problem that affects all human beings and the environment in developing countries. However, waste disposal and improper waste management continues to be a major problem in Debre Tabor university, there were no scientific research done on the assessment of waste disposal and its management. Therefore, this research was aimed to assess waste disposal and its management in Debre Tabor university north western Ethiopia. Questionnaires were distributed for 120 randomly selected informants to collect data on waste disposal and its management in Debre Tabor university. The result shows that majority of the respondents lack awareness about waste management and majority of the respondents said that wastes cause problem like health related disease and pollute the environment. In Debre Tabor university the typical components of wastes were paper, plastics and food wastes. The university uses incineration and container to dispose solid wastes and sanitary landfill to dispose liquid wastes. Generally, the people lack awareness about waste, waste disposal and its management in university. Therefore, university administration create awareness about waste, waste disposal and its management and every members of the university should be collect and dispose wastes in affixed place.

Keywords: Debre Tabor university; Waste; Waste disposal; Waste management

INTRODUCTION

Waste can be loosely defined as any material that is considered to be of no further use to the owner and is hence discarded however most discarded waste can be reused or recycled one of the principles of waste management philosophies. Waste is generated universally and is a direct consequence of all human activities.

Wastes disposal is defined as placement of the waste so that if no longer affect societies or the environment. The wastes are either assimilated so that they can no longer be identified in the environment as by incineration to ash or they are hidden well enough so that they cannot be readily found. Disposal is the final functional element in waste management. Disposal is the ultimate fate of wastes, whether they are wastes controlled and transported directly to landfill site.

Waste management is the collection, transportation, processing, recycling or disposal of waste materials, usually once produced by human activity in an effort to reduce their effect or human health, local communities or amenity. In recent decades there has been an effort to reduce waste materials effect on the natural world and the environment and to recovers resources form them.

However, waste management has many benefits, it is one of the critical challenges of developing countries including Ethiopia because of the social, economic and environmental implications once not properly managed. One of the studies show that only 30%-50% of the waste generated in developing countries is collected and managed properly.

Correspondence to: Kindu Geta, Department of Biology, Debre Tabor University, Tabor, Ethiopia; E-mail: kindu2012@gmail.com

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The rest is either burned or left to decompose in open space or dumped in unregulated landfills, which is damaging the environment. Dumped solid wastes will generate a huge amount of polluted leachate that contains high concentration of toxic compounds which can cause severe damage to the ecosystem.

Improper waste management may have health, environmental and economic problems. Ecological phenomena such as water, soil and air pollution have been attributed to improper management of solid wastes. The solid waste materials block drainage systems, causing overflows during rainy seasons especially in urban regions.

Obviously, a reduction in the quantity of generated waste materials minimizes their impacts on the environment. Solid waste matter must either be recycled or reused. When these alternatives are unsuitable, waste must be incinerated with energy recovery and only as a last option, should landfills be employed. Most common practices of waste management's in many countries are uncontrolled dumping which causes mainly water and soil pollution. Moreover waste disposal and improper waste management is a major problem in Debre Tabor university and there were no scientific research done on the assessment of waste disposal and its management. To fill this gap and provide up to date information on the status of waste disposal and its management in the university, this study was designed to assess waste disposal and its management in Debre Tabor university north western Ethiopia [1].

MATERIALS AND METHODS

Description of the study area

The study was conducted in the Debre Tabor university. It is found 667 kilometers far from Addis Ababa, capital city of Ethiopia and 96 kilometers from Bahir Dar capital city of Amhara regional state. The university geographical coordinated is 11°05' N latitudes and 38°05' E longitudes and an average altitude of 2700 meters above sea level.

Study design

The design of the study was cross sectional survey involving questionnaire-administration and observation to assess waste disposal method and its management technique in Debre Tabor university.

Sample size and sampling technique

From the total population, 120 individuals were taken for the study using formula given by Cochran.

Total sample size (n) was calculated as

$$n = n_0 \frac{N}{1 + \frac{n_0}{N}} \quad \text{where} \quad n_0 = \frac{z^2 \frac{\alpha}{2} P(1-P)}{d^2}$$

n=Total sample size, d=Margin of error=Total number of the population, P=Proportion of population, α =Level of significance.

Seventeen questionnaires were distributed for 120 individuals to obtain information on waste disposal and its management. Each 120 individuals were selected in simple random sampling technique.

Among 120 individuals, 70 were males and the remaining 50 were females. From them 40 were students, 3 were natural and computational sciences faculty department head, 32 were stake holders, 10 were management, 20 were students cafeteria workers, 10 were lounge workers and remaining 5 respondents were students health centers workers from the university [2].

Data collection

Two basic data collection methods were used in this study: Questionnaire-administration and observation.

Questionnaire-administration: A structured questionnaire was distributed to students, natural and computational sciences faculty department head, stakeholders, management, students cafeteria workers, lounge workers and students health center workers. The questionnaires were used to obtain information on the socio-demographic characteristics of the respondents, levels of awareness of respondent on waste management, problems caused by waste in the university, the disposal methods of solid and liquid wastes, the reusing methods of waste, waste management procedures of university, typical components of wastes in the university, the mechanism and storage of wastes in the university.

Observation: Observation was also used to collect data. This method was the most important to observe overall the wastes, waste disposal method and its management.

Data analysis

The collected data were analyzed by using descriptive statistics and presented in the form of tables to assess waste disposal method and its management technique in the university.

RESULTS AND DISCUSSION

Socio-demographic characteristics of the respondents

Among 120 respondents more than half (58.33%) of the respondents who participated in this study were males and 41.67% of them were females. 66.6% were in age between 15-25 years; 29.16% were between 26-36 years and 4.17% were between 36-45 years. Concerning with religious 5.83% were muslims, 69.17% were orthodox and the remaining 25% were protestants. As it is indicated in Table 1, 33.33% of the respondents were students, 58.33% were employee and 8.34% were private worker. Moreover, about 85% of the respondents were single and 15% were married (Table 1) [3]. In relation to the study conducted in Kersa woreda, eastern Ethiopia by Bizatu Mengistie and Negga Baraki reported that, the socio demographic characteristics of respondents,

concerning with sex, 33.3% of the respondent was male and 66.7% of the respondents were female. Regarding with age group 48.6% of the respondents were in age between 18-30 years, 35.7% of the respondents were in age between 31-45 years and remaining 15.7% were above 45 years. Concerning with educational status, 75.6% were illiterate and the remaining 24.4% were literate (at least read and write).

Concerning with religion, 95% were muslim, 4.3% were orthodox and 0.7% were protestants. Concerning with occupation, 73.9% were farmer, 21.3% were housewife, 1.1% were merchant and 2% were civil servant [4].

Table 1: Socio-demographic characteristics of the respondents.

No.	Characteristics		Number of respondents	Percentage
1	Sex	Male	70	58.33
		Female	50	41.67
2	Age	15-25	80	66.68
		26-35	35	29.16
		36-45	5	4.17
		Above 45		
3	Academic status	Illiterate		
		1-8		
		9-12	46	38.33
		Higher education	74	61.67
4	Religion	Muslim	7	5.85
		Orthodox	83	69.17
		Protestant	30	25
		Catholic		
		Others		
5	Occupation	Student	40	33.33
		Employed	70	58.33
		Private worker	10	8.4
		Other		
6	Marital status	Single	102	85
		Married	18	15
		Others		

Levels of awareness of respondent on waste management

According to the respondents shown in Table 2, 25% of males and 20% of females totally 45% of the respondents have awareness about waste management, whereas 33.33% of males and 21.67% of females, totally 55% of the respondents lack of awareness about waste management [5].

According to the study conducted in Kersa woreda, eastern Ethiopia by Bizatu Mengistie and Negga Baraki reported that, the level of awareness of respondent on waste management, 73.9% of the respondents were highly aware about waste management and the remaining 26.1% of the respondent lack awareness about waste management. The present study was disagree with the result found by the authors.

Table 2: Levels of awareness of respondent on waste management.

Question number	Sex	Alternatives	Number of respondent	Percentage
Do you have any idea about waste management	M	Yes	30	25
		No	40	33.33
	F	Yes	24	20
		No	26	21.67

Problems caused by waste in the university

As indicated in Table 3, 45.85% of male and 33.33% of females, totally 79.18% of the respondents said that wastes cause any problem in the university, where as 12.5% of males and 8.33% of females, totally 20.82% of the respondents said that wastes does not cause any problem in the university [6].

In addition, 15.79% of the respondents said that waste cause health problem like amoeba, 20% of the respondents said they cause cholera, 14.73% of the respondents said they cause giardia, 24.22% of the respondents said they cause typhoid fever, 11.58% of the respondents said they cause common cold

and 13.68% of the respondents said they cause asthma and all of the respondents said that they pollute university as well as the environment.

According to the study done in India by Ramesh, et al. reported that the problem caused by waste were health related disease like common cold, typhoid fever and amoeba and they pollute air water and land as well as environment. The present study which was conducted in Debre Tabor university was agree with Ramesh, et al. results.

Table 3: Problems caused by waste in the university.

Question number	Sex	Alternatives	Number of respondents	Percentage
Do you know wastes cause any problem in the university?	M	Yes	55	45.84%
		No	15	12.50%
	F	Yes	40	33.33%
		No	10	8.33%
If your answer is yes in question number 1, what are these problems?	M	Amoeba	9	9.48%
		Cholera	11	11.58%
		Giardia	8	8.42%
		Typhoid fever	14	14.74%
		Common cold	6	6.31%
		Asthma	7	7.37%
	F	Amoeba	6	6.31%
		Cholera	8	8.42%
		Giardia	6	6.31%
		Typhoid fever	9	9.48%
		Common cold	5	5.27%
		Asthma	6	6.31%

The disposal methods of solid and liquid wastes

As shown in Table 4, 42.5% of male and 15.83% of females, totally 58.33% of the respondents use incineration to dispose solid wastes and 31.67% of males and 10% of females, generally 41.67% of the respondents uses container to dispose solid wastes. 58.33% of males and 41.67% of females, totally 100% of the respondents uses landfill to dispose liquid wastes [7]. According to the study conducted in Bahir Dar town by Fessa Hailu, indicated that the disposal method of solid wastes were

incineration and burial whereas disposal methods for liquid wastes were landfill and directly discharged towards Abay river. The study conducted in Nigeria by Toyobo et al., also reported that the disposal methods of solid waste were incineration and burial; and result of both authors were agree with the present study.

Table 4: The disposal methods of solid and liquid wastes.

Question number	Sex	Alternatives	Number of respondents	Percentage
Disposal methods of solid waste	M	Incineration	51	42.5
		Containers	19	31.67
	F	Incineration	38	15.83
		Containers	12	10
What are the methods used for disposal of liquid waste	M	Landfill	70	58.33
	F	Landfill	50	41.67

The reusing methods of waste

As the result shown in Table 5, that 17.5% of males and 13.33% of females, means 30.83% of the respondents said that the university reuses the wastes and 40.83% of males and 28.33% of females, 69.16% of the respondents said that the university does not reuse wastes [8]. The respondents stated that solid wastes like plastics and cartons were reused to store materials and food wastes were reused for animals as food resource.

In relation to the study done in dire dawa food complex company by Kibre Asrat and Tadele Kebede reported that, the reused wastes were carton and packaging bag were reused to package the raw materials and the rejected dough, pasta macaroni and other food wastes were reused for animal as food source. The present study was agree with the result found by Kibre Asrat and Tadele Kebede.

Table 5: The reusing methods of waste.

Question number	Sex	Alternatives	No. of respondents	Percentage
Does the university reuse wastes	M	Yes	21	17.5
		No	49	40.83
	F	Yes	16	13.33
		No	34	28.33
If your answer is yes in question no.1 what type of wastes are reused and explain how you reused	M	Food waste	9	24.32
		Plastics	7	18.91
		Others	5	13.52
	F	Food wastes	8	21.62
		Plastics	5	13.52
		Others	3	8.11

Waste management procedures of university

As can be seen from Table 6, 25.83% of male and 19.17% of females totally 45% of respondents said that they had waste management procedures where as 32.5% of males and 22.5% of females totally 55% of the respondents replied in contrast means

there was no waste management procedures [9]. Regarding to waste management procedure, there was no any information done before this study.

Table 6: Waste management procedures of university.

Question number	Sex	Alternatives	No. of respondents	Percentage
Does the university have waste management procedures?	M	Yes	31	25.83
		No	39	32.5
	F	Yes	23	19.17
		No	27	22.5

Typical components of wastes in the university

According to the response of respondent shown in the Table 7, 27.5% of the respondents said that the typical components of wastes were papers, 23.33% of the respondents said that the typical components of wastes were plastics, 17.5% of the respondents said that the typical components of wastes were food wastes, 11.67% of the respondents said that the typical components of wastes were both plastics and papers, 8.33% of the respondents said that the typical components of wastes were both paper, plastics and food wastes and 11.67% of the

respondents said that the typical components of wastes were others [10].

According to Yetunde, reported that the component of house hold waste was organic wastes which include food waste and wood, plastics, paper and cardboard like news paper and paper packaging material etc. the present study which was conducted in Debre Tabor university was agree with Yetunde results which was conducted in Nigeria.

Table 7: Typical components of wastes in the university.

Question number	Sex	Typical wastes	No. of respondents	Percentage
What are the typical components of wastes in the university	M	Paper	19	15.83
		Plastics	16	13.33
		Food wastes	13	10.83
		Paper and plastics	8	6.67
		Paper, plastic and food waste	6	5
	Others	8	6.67	
	F	Paper	14	11.67
		Plastics	12	10
		Food waste	8	6.67
		Paper and plastics	6	5
Paper, plastics and food waste		4	3.33	
Other	6	5		

Types of storage containers of wastes in the university

This study also tried to address the mechanism and storage of wastes in the university [11]. The results of the mechanism and storage of wastes in the university were presented in Table 8. 22.5% of males and 17.5% of females, totally 40% of the respondents said that they store the wastes with big bag, 15.83% of males and 10% of females, totally 25.83% of the respondents

said that they store the wastes with sacs and 20% of males and 14.17% of females, totally 34.17% of the respondents said that they direct disposed wastes without any container.

According to the study done in Portugal by Vera and Margarida reported that, the mechanism and storage of waste were big bags (black and yellow big bags) and sacs. The present study was agree with Vera and Margarida results [12].

Table 8: Types of storage containers of wastes in the university.

Question number	Sex	Storage containers	No. of respondents	Percentage
Storage of wastes in the M university		With big bags	27	22.5
		Sacs	19	15.83
		Direct disposal without any container	24	20
	F	With big bags	21	17.5
		Sacs	12	10
		Direct disposal without any container	17	14.1

CONCLUSION

Based on the results obtained from the present study the major findings can be concluded as, the majority of the people who live in the university lack awareness of waste disposal and its management, but they were know wastes causes health related problem like cholera amoeba, giardia, typhoid fever, common cold, asthma and waste pollute university as well as the environment. The majority of the people used incineration to dispose solid wastes and landfill to dispose liquid wastes as stated by respondents. The main components of solid wastes in the university were paper, plastics and food wastes. Paper and plastics wastes were collected from universities by sanitation workers and food wastes used as a source of food for animal. Therefore, the university management should be creating awareness on proper waste management for the community and implement environmental friendly waste disposal methods like reduce, reuse and recycling instead of incineration.

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