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COMMUNITY PERCEPTION ON SOLID WASTE AND ITS MANAGEMENT PRACTICES IN BEDELE TOWN, OROMIA REGION, ETHIOPIA

FEREDE ABUYE, *FIKIRU GAMACHU AND TEFERA JEGORA
Mettu University, Bedele College of Agriculture and Forestry, Department of Forestry, Bedele, Ethiopia
*Corresponding author: fikegem4@gmail.com

Abstract
The aim of this study was to assess community perception on solid waste management practice in Bedele Town, Oromia region, Ethiopia. Sampled households interview, field observation and key informants were used for data collection. Focus group discussion was also employed to cross check the data collected through interview. Food waste, plastic bags, plastic bottles, papers and cartons, cans and glass were some of solid waste released from each household and disposed to inappropriate disposal site and environment. Common diseases associated to poor solid waste management identified were common cold (52.9%), respiratory track and shyness (27%) and typhoid and cholera (4.6%), respectively. Mean daily solid waste generation rate per capita per household in the town based on the current finding was 0.3240 kg/day/house hold. Also, the determinants willingness of urban community on solid waste management practice was also highlighted using linear regression model. Age, educational level, awareness and availability of training on solid waste for the urban community affect the attitude and willingness of urban communities to practice solid waste management. Generally the communities had very low thinking on the impact of improper solid waste management on the environmental condition. Therefore, the municipality should have to intervene with the integration of concerned stakeholders with appropriate waste management practices and disposal sites like landfill, demonstration sites.

Key Words: *Solid waste, Community perception, Generation rate, Solid waste management*

Introduction

Solid wastes are non-liquid, non-soluble and degradable and non-degradable materials ranging from municipal garbage to industrial wastes that contain complex and sometimes hazardous substances. It is all inclusive, encompassing the heterogeneous mass of throw away from the urban community such as vegetables, food items, paper, plastics, rags, glass as well as more homogeneous accumulation of agricultural, industrial and mineral wastes (Mundhe *et al.,* 2014). Solid waste is unwanted matter or material of any type (non-liquid), often that which is left after useful substances or parts have been removed (Williams, 2005). Both domestic and industrial waste generation continues to increase world-wide in tandem with growth in consumption (Okalebo *et al.,* 2014) while quantity generated depends on the socioeconomic conditions, cultural habits of the people, urban structure, density of population, extent of

commercial activity, and degree of salvaging at source (Ladu *et al.,* 2011).

Solid waste management includes the entire process of dealing with solid waste, starting from the collection to ultimately disposing off it hygienically (Kumar and Pandit, 2013). Proper solid waste management reduces health risks to the public and lessens adverse environmental impacts, such as air, water and land pollution (Williams, 2005). Ladu *et al.* (2011) reported that a waste management system should not only ensure human health and safety, but it also environmentally and economically suitable. However, inappropriate methods of waste generation, handling, storage and disposal may pose serious risks to the environment and to public health (Asefa, 2017). Increasing population, booming economy, rapid urbanization and the rise in community living standards have greatly accelerated the municipal solid waste generation rate in developing countries (Minghua *et al.,* 2009).

In the last few decades, there was a significant increase in solid waste generation in some cities of Ethiopia. This is largely because of rapid urbanization coupled with increased urban population and a rather economic development in the country (Mengist and Assegid, 2014; EPA, 2015). Bedele town is one among, where there is rapid growth of urban population as well as constraint in the management of solid wastes and its improper management gravely affects the public health and degrades environment. Thus, this study was carried out to investigate the perception of community towards solid waste and its management practices in Bedele town.

General Objective

The overall objective of the study was to assess community perception on solid waste management practice in the study area

Specific Objectives

1. To identify the community perception towards solid waste management in the town
2. To identify the common diseases caused by poor management of solid waste in the town
3. To evaluate rates of solid waste generation in the town

Materials and Methods

Study Area

Bedele Woreda lies between 8°20′-80 35′ N and 36°15′-36°30′ E at about 480 km road distance south-west of Addis Ababa. Administratively the woreda is located in Buno Bedele Zone at about 120km from Metu, Ilu Ababor zone capital. It is bounded by Borecha woreda in the east, Chora woreda in the west, Gachi woreda in the south and Dabo woreda in the north. It has 43 Kebeles, 41 rural and 2 towns. According to CSA (2007) the total population in the woreda is 118,157 (male 58,510 and female 59, 647). Agro-ecologically, the woreda is divided into three ecological zones namely mid-altitude (81.34%), low-land (18.6%) and highland (0.06%). Altitude in the woreda ranges from 1300 to 2000 m a.s.l. The woreda is characterized as mixed farming system of coffee-crop-livestock production with a total area of 88,049 ha of land used for different purposes; annual crops (35801 ha), perennial crops (16549 ha), forest land (10047 ha), grazing land (10120 ha), wetland (1112 ha) and area not used for any purpose (14420 ha) (ADARDO, 2012).

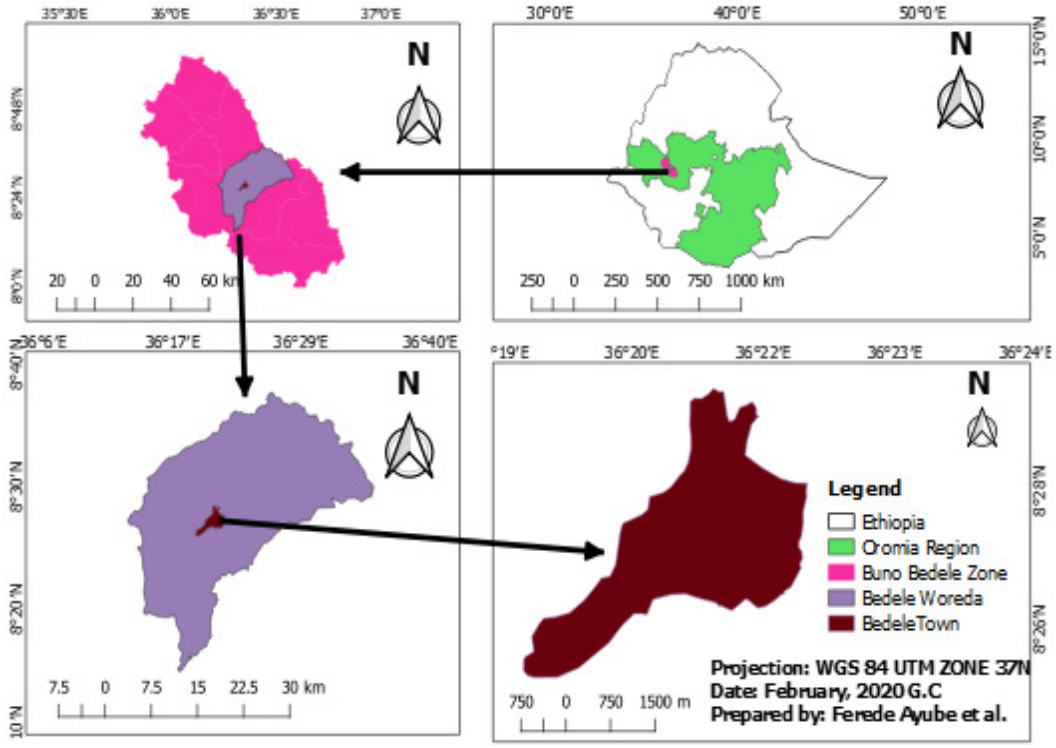

Fig. 1: Map of the Study Area

Data Source and Collection

Kebele town was classified in to two administrative sub-cities using stratified sampling technique. A total of 8 household head for key informant interview, 16 household head for focus group discussion and 240 household head were randomly selected for structured, unstructured and semi-structured interview from each sub-city administrations. Data was collected from primary and secondary sources. The primary data was collected from sampled households' respondents, researchers' observation, focus group discussions and key informants. Closed and open-ended questionnaires were prepared to gather information on basic household economic and demographic characteristics, participation, acceptance, and awareness about solid waste management. Field observation was conducted throughout the whole process of the research in order to ensure the validity of information obtained from the urban dwellers. Two focus group discussions were held in each of the sub-city administration. The discussion was carried out with group of dwellers comprising 16 members that consists of Kebeles leaders, religious leaders, and targets dwellers with indigenous knowledge of waste management methods, teachers and development agents. Secondary data were collected from published materials such as reports, official records, census records, project reports, research papers and data files from web sites.

Sampling Technique

Bedele town was purposively selected based on the intensive solid waste generation as a result of rapidly over population through the flow of the community from different districts in the

zone and from other zones and regions. Hence, waste disposal and management is a serious problem in the town due to population density, lack of awareness, absences of appropriate landfills and socio-economic condition. The study population was stratified into three groups based on job categories (namely farmer, trader, and civil servants). After stratification, simple random sampling was employed to select the representative households. The sample size was determined following the Yamane (1967) standard for sample size determination formula. A total of households living in the study were obtained from the city municipalities and sub-city administration. A total of 240 households (130 and 110 households from 01 and 02 kebele) was selected following the Yamane (1967) standard formula and calculated as:

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

Where: n=desired sample size, N= the estimated population size and e = is level of precision (0.05).

Data Analysis

The data collected from structured interview was systematically coded and analyzed using descriptive statistics by employing Statistical Package for Social Sciences (SPSS version 20) and presented using figure, pictures, tables and narration.

Determinant Factors of Solid Waste Management in the Study Area

Dependent variable

The dependent variable for this study was solid waste management and community perception in the study area

Independent variables

On the other hand the following variables were hypothesized to affect solid waste management and community perception:

Age - It is a continuous variable, which refers to the age of the household head measured in years.

Sex - This is a dummy variable measured as 1 if the household head is female and 2, otherwise.

Education - This variable will be measured in years of schooling and can be used as a proxy variable for managerial ability.

Family Size - In this study, the number of persons the household head administers/supposed to manage will be considered as family members, regardless of blood relationship. This is continuous variable.

Income - Refers to total annual income obtained from daily activities by the household head measured in birr.

Training - It is a dummy variable representing access to training for solid waste management related activities. If the households have access to training, the variable takes a value of 1 and 2, otherwise.

Perception - It is a variable which measures communities' perception towards solid waste management

Job category - It is a dummy variable representing job classes. The variable takes a value of 1 if farmers, 2 if traders, 3 if civil servant and 4, otherwise.

Dwellers' condition - It is a dummy variable representing 1 if permanent dwellers and 2 if semi-urban

Results and Discussion

Socio-economic Characteristics of Respondents

The percentage of male and female household heads respondents expressed as 66.3% and 33.8% respectively. The data

recorded on the age category of the respondent shown that about 30.4% of the respondents had lie between 31-40 age interval, while 23.3% and 22.5% were found at 18-30 and 41-50 age intervals respectively. A small number of respondents (10.8%) had recorded in age above 60 years old. The religion of the respondents was Orthodox (38.8%), Muslim (25.4%), Protestant (35%), and Wakefata (0.4%) (Table1).

Table 1: Back ground of the households by sex, age, education level, religion and occupation

Back ground	Distinction	Frequency	Percent (%)
Sex	Male	159	66.3
	Female	81	33.8
	Total	240	100.0
Age	18-30	56	23.3
	31-40	73	30.4
	41-50	54	22.5
	51-60	31	12.9
	>60	26	10.8
	Total	240	100.0
Religion	Orthodox	93	38.8
	Muslim	61	25.4
	Protestant	84	35.0
	Wakefata	1	0.4
	Other	1	0.4
	Total	240	100.0

Table 2 below revealed that about 27.1%, 22.1%, 21.3%, 17.5 and 12.1% of respondents' educational level was high school, Bachelor degree, elementary school, diploma holder and basic education/informal education respectively. The job category assessment of the respondents indicated that, trader (18.8%), government employers (37.9%), Daily laborers (37.1%), NGO workers (0.8%) and Farmers (5.4%) (Table 2). Out of 18.8% traders 5.0% of them were invested on hotel, whereas, 8.3%, 5.4% and 1.3% of them were invested on hotel, shop, retailers and others respectively.

In table 3 majority of the surveyed households 62 (26%) had 3 family members, 19% had 4 families, and 16% and 15% had family sizes of 2 and 5 members per households respectively. However, less percentage 3% and 2% were recorded in family sizes of 7 and 8 families per households.

Table 2: Back ground of the households by education level, occupation and Business activities

Educational status	Informal education	29	12.1
	Elementary school	51	21.3
	High school	65	27.1
	Diploma holder	42	17.5
	BSc and above	53	22.1
	Total	240	100.0
Occupation	Trader	45	18.8
	Government employer	91	37.9
	Daily labor	89	37.1
	NGO	2	0.8
	Farmer	13	5.4
	Total	240	100.0
Business activities	Hotel	12	5.0
	Shop	20	8.3
	Retailers	13	5.4
	Others	3	1.3
	Total	48	20.0

Table 3: Family size distribution of the study area respondents

Number of Family size	Frequency	Percent (%)
1	24	10
2	38	16
3	62	26
4	45	19
5	35	15
6	25	10
7	7	3
8	4	2
Total	240	100

Waste Generation Rate in Bedele Town

Table 4: Solid Waste Generation Rate in Bedele Town (one year data, 2018)

Sub-Urban city/Kebele	Waste Generated (KG/Day/house hold)	Waste Generated (KG/Year/house hold)
01 Kebele	0.351	128.203
02 Kebele	0.2965	108.297
Total mean of solid waste generated per day/year	0.3240	236.50

Urban waste generation increased in Bedele Town due to affluence and population development. In Bedele Town solid waste generation rate was found to be 0.2965kg/household/day, this is due to absence of awareness on solid waste management and minimization, lack of waste segregation /pit hall/ for individual solid waste damping. This was the data obtained only for the year of 2018 and it

was increasing from year to year according the interview made with key informants during the survey in the town. In Bedele town the management of solid waste requires an immediate attention, because, countries such as Ethiopia, China, South Korea and Malaysia, have been categorized as emerging industrialized countries as it is revealed by (Dawda *et al.,* 2012). As Salim (2008) reported in his finding, countries with low income have the lowest waste generation rates, similarly in this case it is averaging from 0.90 kg per capita per day to 0.05kg per capita per day (Appendix table 1). From the total respondents this would be 71.17kg/capita per day as it is highlighted on the appendix table1. So the annual solid waste generation for Bedele Town was 25994.8425kg/year, whereas this was 108.311kg/year/household.

Community Perception towards Solid Waste Management

For the effectiveness and efficient management of solid waste in a given area, the perception of local communities towards the solid waste management plays a direct crucial role (Kumar, 2013). Here, as the information collected from the respondents, 211 (87.9%) and 229 (95.4%) of the respondents believed that mismanagement of the solid waste had a negative impact on the economy and health of the local communities in the study area respectively while about 12.1% and 4.6% of the respondents raised as solid waste had no any negative side on neighboring community economic and health status (Table, 5). This agreed with the study undertaken by Nuzrath and Ruzaik (2017) in Colombo Municipality Area that stated public perception on the various solid waste management strategies is positive and they are willing to support for implementation of proper solid waste management and disposal strategies in the area.

Table 5: Local community's perception towards solid waste management

Community perception	Response	Frequency	Percent
Do you think solid waste have economic impact?	Yes	211	87.9
	No	29	12.1
Do you think solid waste have health impact?	Yes	229	95.4
	No	11	4.6
Do you think solid waste have an environmental impact?	Very high	1	0.4
	Medium	15	6.3
	Low	86	35.8
	Very low	130	54.2
	I don't know	8	3.3
Do you agree solid waste used as a resource?	Agree	149	62.1
	Disagree	46	19.1
	I don't know	45	18.8

On the other hand, 149 (62.1%) of the respondents agreed that solid waste used as a resources and about 46 (19.1%) disagreed on the values of solid wastes. The rest 18.8% of the respondents didn't neither agree nor disagree on the use of solid wastes as a resource. Especially from the ecological role of proper solid waste management point of view, about 130 (54.2%), 86 (35.8%) and 15 (6.3%) of the respondents had very low, low and medium degree of awareness respectively

(Table, 4). The study undertaken by Nigatu *et al.* (2011) in Addis Ababa City revealed that some people know at least the use of organic waste for soil fertility improvement.

Table 5: Common disease resulted to poor management of solid waste in the study area

	Disease types	Frequency	Percent
What are common diseases related to poor solid waste?	Cholera	2	0.8
	Common cold	127	52.9
	Typhoid dysentery	11	4.6
	Malaria	5	2.1
	Cancer	11	4.6
	Shyness (respiratory tracks and asthma)	65	27.1
	Missing value	19	7.9
Total		240	100.0

Improper management of solid waste substance has its economical, ecological/environmental and health problems. Thus, the above table indicated the common diseases that affect human health due to improper management of human health. In the present finding, 52.9% of the respondents revealed that common cold ranked as the first disease and followed by shyness (respiratory tracks and asthma) which resulted from the improper solid waste management practices in the study area. The other waste related diseases rarely attack the health of human beings are typhoid dysentery, Cancer and Malaria. About 7.9% of the respondents did not responded on the types of diseases related to improper management of solid waste in the current study area (Table, 5). According to Ferner (as cited in Njagi *et al*., 2013)) argues that relationships between an environmental contaminant and health are the results of the perceptions that an individual has been exposed to, which in turn are influenced by a host of individual and contextual factors such as environment and attitudes. People's perception regarding the health implications of solid waste disposal is duly influenced by the settings that they find themselves and their general upbringing

Binary Outcome of Logit Model for Urban Community Willingness on Solid Waste Management

Age: Result shows that, age has significant and does affect the urban willingness on solid waste management practice in the areas as highlighted in the table below (Table 6). This show that, age has impact on the urban dwellers to bring difference to response solid waste management attitude in the area as indicated in the table below (Table 6). As age increased by one unit the urban community willingness on solid waste management increased by 0.97%. The result agreed with (World Urbanization Prospects, 2005) which stated that age, were the key factors to determine urban communities' willingness to practice solid waste management in the town. Also the finding is agreed with (Struk and Soukopova, 2016) who reported that the youngest group generates less waste and contributes less efforts towards the

management of solid wastes than the oldest age groups.

Family size (F. Size): The result clearly showed that, family size was insignificant and has effect on urban communities' willingness to practice solid waste management by the dwellers in the area (Table 6). The table 6 showed that as family size increased by one unit the urban community willingness to practice solid waste management decreased by 3.02%. From this table we can understood that, negative coefficient suggests that as family size increased, the willingness of urban community for solid waste management tends to decrease and the reverse is true according to this finding. This indicated that as the number of individuals in the family increases they consume more resources that contribute for the disposal of more solid wastes and became difficult to manage. This is not agreed with the study undertaken by Suman and Achlesh (2018) who reported that there were inverse relationships between family size and rate of waste generation, as the family increases rate of waste generation decreases. This indicated that the lower in generating waste, the higher is managing or controlling more wastes.

Educational level: Result shows that, educational level has significant and does affect the urban willingness on solid waste management practice in the areas as highlighted in the table below (Table 6). This showed that, educational level has impact on the urban dwellers to bring difference to respond on solid waste management attitude in the area as indicated in the table below (Table 6). As educational level increased by one unit the urban community willingness on solid waste management increased by 6.7%. The previous finding on the ground also reported that, Educational level were the key factors determining urban communities' willingness to practice solid waste management (Dennis and Enrique, 2017). A positive coefficient indicates that as the value of the educational status increased, the mean of the willingness of urban community on solid waste management tends to increased. This indicated that educated persons understood more about the impacts of solid wastes on the human health and its environmental risks and pay more attention to keep their environment clean than the illiterate one.

Access to Waste information: The result shows that, access to waste information has significant and does affect the urban willingness on solid waste management practice in the areas as highlighted in the table below (Table 6). This show that, access to waste information has impact on the urban dwellers to bring difference to response solid waste management attitude in the area as indicated in the table below (Table 6). As access to waste information increased by one unit the urban community willingness on solid waste management increased by 16.915%. A positive coefficient indicates that as the value of the access to waste information increased, the mean of the willingness of urban community on solid waste management tends to increased. Thus, well informed societies about the impacts of solid waste on the health of the environment are more active to manage the solid waste than the non-informed community (Dennis and Enrique, 2017).

Access to Training and Awareness: Result shows that, access to training has significant and does affect the urban willingness on solid waste management practice in the areas as highlighted in the

table below (Table 6). This show that, access to training has impact on the urban dwellers to bring difference to response solid waste management attitude in the area as indicated in the table below (Table 6). As access to training increased by one unit the urban community willingness on solid waste management increased by 29.045%. The table indicates that as the value of access to training and awareness increased, the mean of the willingness of urban community on solid waste management tends to increased also (Licy *et al.,* 2013).

Daily Labourers' Availability for Solid Waste Collection: The result revealed that, daily laborers' availability for solid waste collection has significant and affect the urban willingness on solid waste management practice in the areas as highlighted in the table below (Table 6). This showed that, daily laborers' availability has adverse impact on the urban dwellers to bring difference to respond to solid waste management attitude in the area as indicated in the table below (Table 6). As daily laborers' availability increased by one unit the urban community willingness on solid waste management increased by 3.56%.

Table 6: Logit model on solid waste management

Explanatory Variable	Coeff.	Mfx.	Stand. Error	Prob. value	Constant
Age	0.0451544	0.0097	0.00412	0.019*	2.04090
Fam.size	-0.14063381	-0.0302	0.02881	0.294	-1.76
Edn.level	0.0310787	0.067	0.02552	0.00794**	0.078
Waste info	0.7877252	0.16915	0.9382	0.071*	-7.60191
Training	1.352589	0.29045	0.17267	0.0093**	0.3983
Access of labor	0.1656872	0.03558	0.06547	0.0587*	0.4312

Conclusion

Solid wastes were highly generated from every household from day-to-day in Bedele town. Lack of appropriate disposal site, lack of environmental awareness, low level of education and level of ecoonomic condition highly affect solid waste management in the study area. The community have been seen the problem of improper solid waste management on environment and human health. Thus, about 95% of the respondents raised mismanaged solid waste cause health problem while about 54% reported that the communities had very low thinking on the impact of improper solid waste management on the environmental condition.

Recommendation

Based on the above results, the following recommendation was given:

- ✓ The local communities had informed on the problem of improper management of solid waste from different media sources. Therefore, the municipality should have trained the communities to aware them towards the effective and efficient solid waste management techniques.
- ✓ The municipality should have to intervene with the integration of concerned stakeholders with appropriate waste management practices and disposal sites like landfill, demonstration sites etc.

- ✓ Further investigation must needed on socio-economic effects of improper solid waste disposals

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