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Assessment of Domestic Solid Waste Handling and Management Systems in Sekoru Town, Southwest Ethiopia, 2018

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Abstract

Solid waste is defined as a material which no longer has any value to its place of origin, discarded or unwanted at the point of generation; its management systems should be simple, affordable and sustainable. Domestic solid waste is wastes that are generated from household activities. The main objective of this study to assess domestic solid waste onsite handling and management systems in Sekoru town. A cross-sectional study was conducted from May 10-15, 2018 to assess solid waste handling and management patterns at household levels in Sekoru town. Data was collected using questionnaire and observations. The study finding show that, the type of storage container used most of the household was used sack 234 (75%) and metal dust bin 55 (17.6%). Concerning the place of waste disposal, 177 (69.9%) throw outside the yard and 42 (16.6%) throw it in the waste pit. Finally the study concluded that open dumping; outside yard is the major disposal methods practiced by the residents. These indicating that the absence of effective municipal service in the handling and disposal of solid waste, lack of awareness among the public at the town. The present study recommend develop and implement public education & awareness programs to promote environmentally sound handling, storage and disposal of domestic solid waste by collaborating the community and the municipal administration of the town.

Keywords: Solid waste; Solid waste management; Waste disposal; Waste

Introduction

With rapid urbanization and ever increasing population growth there has been a substantial increase in the generation of solid waste and city services; contamination of air, water and land resources. The solid wastes from different municipalities, not managed properly, have been creating problems for human health and environment. Some of the solid wastes have been proved to be extremely toxic and infectious. The uncontrolled dumping of such wastes have not only brought about increasing number of incidents of health hazard but also causing the surface and ground water contamination and thus posing serious environmental threat to the human being [1]. Realizing the seriousness of the problem of solid waste management and therefore to regulate the management and handling of the municipal solid waste, the draft situational analysis. Human and the act of production and consumption are always inseparable and in the process of utility maximization procedure there is unexpected externalities, waste. The waste could be both solid and liquid types, and the way they are going to be handled, stored, and disposed can expose the environment and public health to risks.

In developed countries the daily life of people can generate greater quantity of solid waste than developing countries, but most parts of developed nations are efficient in handling waste when compared to developing countries because of their technologically complex, institutionally efficient and cost effective solid waste management systems. On contrary compared to developed countries, developing countries produce less per-capita solid waste [2]. But the capacity of developing countries to collect, process and dispose waste is limited due to inadequate infrastructure, finance, political instability, inefficient institutional capacity and structure, and low level of awareness. However, recent events in major urban centers both in developed and developing countries have shown that municipal solid waste management has become a big challenge.

"Solid waste is defined as a material which no longer has any value to its original owner, and which is discarded or unwanted at the point of generation". The first humans did not worry much about waste management rather they simply left their garbage where it dropped. This implies that solid waste management task is becoming a serious concern due to the alarmingly increasing rate of population growth and the development of storage, transportation, processing, treatment, recycling, and final disposal of waste. Systems need to be simple, affordable, and sustainable (i.e. environmentally, socially, and economically) and should be equitable, providing collection services to poor as well as wealthy households. House hold solid waste is one of the most difficult sources of solid waste to manage because of its diverse range of composite materials.

A substantial portion is made up of garbage, a term for the waste matter that arises from the preparation, and consumption of food and consists of waste food, vegetable peeling and other organic matter. Other components of house hold solid waste include plastics, paper, glass, textiles, cell phone, metals and some hazardous waste from house hold products such as paint, garden pesticides, pharmaceuticals, fluorescents tubes, personal care products, batteries contain heavy

metals and discarded wood treated with dangerous substance. Generally, domestic solid waste defined as a wastes that are generated from house hold activities such as food preparation, cleaning, fuel burning , old clothes, furniture, obsolete utensils and equipment, packaging, newsprint, and garden wastes. In developing countries, food waste and ashes dominate house holds' solid waste.

Solid waste is a day to day problem for citizen of Ethiopia, cities and town. Now a day the types of solid waste generated vary throughout the world because of quantity and constituent mainly determines by social customs and living standards, solid waste storage, collection and disposal can head to short and long term risks. Solid waste management may be defined as the discipline associated with the control of generation, storage, collection, transfer and transport, Processing and disposal of with the best principle of public health, economics, engineering conservation and that is also responsive to public attitude.

However, the major solid waste management processes starts at solid waste production, storage, and followed by solid waste collection, transportation, and transferring. In large number of areas of the country, solid waste management services are either absent or inefficient [3]. A solid waste management system in Ethiopia is generally in poor state. For example, over the last few years, many micro and small enterprises have been set up to carry out waste pre-collection service from households. But this collection services are often inefficient and don't cover all areas. In general, the unauthorized and most of the authorized dump sites are poorly managed and causing significant environmental impacts. Therefore, clean and healthy living conditions in cities and towns cannot be achieved without reliable and regular waste collection and adequate disposal systems.

Solid Waste Management (SWM) is one of the critical concerns facing developing countries because of the social, economic and environmental implications once not properly managed.

Studies show that only 30%-50% of the waste generated in developing countries is collected and managed properly. The rest is either burned or left to decompose in open spaced or dumped in unregulated landfills, which is damaging the environment. Globally, millions tons of municipal solid waste are generated every day, among different source of solid waste domestic wastes are the major components. Therefore, urban waste management is drawing increasing attention, as it can easily observed that too much garbage is lying uncollected in the streets, causing inconvenience, environmental pollution ,and posing a public health risks.

The problem of solid, liquid, as well as toxic waste management in Africa has come with urbanization in the developing world including Ethiopia. An important feature of the urbanization of the developing world is the rapid growth of a cities and metropolitan areas. The high rate of urbanization in African countries implies a rapid accumulation of refuse. In many town of Ethiopia, there are many sanitation problems of which the most intractable is solid waste. There appear piles of rotting vegetables and other organic wastes around the streets, river banks, and market places. These generated wastes will have contact with human beings directly at several stages in the waste cycle. The groups at risk are numerous and include the population of unnerved areas, preschool children; waste workers; people living close to waste disposal facilities. In developing countries like Ethiopia, the increase of solid waste generation is resulted from rapid urbanization and population booming. The amount of solid waste in Addis Ababa and other fast growing areas in the country has been increasing over time, largely attributed to rapid population growth rate. Inadequate solid waste management in most developing countries like Ethiopia, has resulted in the accumulation of waste on open lands, in drains and in the residential areas, causing a nuisance and foul-smelling pools, environmental pollution through leachate from piles (water and soil pollution) and burning of waste (air pollution), clogging of drains. This situation is believed to result in poor environmental conditions, which in turn present a complicated threat to health.

Materials and Methods

Description of the area

The study area is in Sekoru town which is found in Jimma Zone Mana woreda, Oromia regional state and its 22 km away from Jimma University Main campass on the way to Agaro. Yebu town is about 1200 m to 1500 m above sea level and it's Woinadega.

Based on The information that I got from the kebele total population of yebu town is 8077.

- Male=3977
- Female=4120

The town has municipality offices, which is concerned working on solid waste and liquid waste management and also slaughter service for the kebele respondents. Solid waste generated from different sources of the town. Solid waste on average about 150 kg/day is generated (interview with municipality). Humans and animals have used the resources of the Earth to support life and to dispose of waste. Waste is a consequence of everyday life of all creatures. The problems associated with the management of solid waste in today's society are complex The reasons includes: Quantity and diverse nature of the wastes, Development of sprawling urban areas, Funding limitation for public services in many large cities, The impacts of technology, Humans have been producing solid waste forever as part of life.

Study design and period

A cross sectional study was conducted from May 15 to 30, 2018 to assess the household solid waste management and hygienic practice among Sekoru, Jimma town southwest, Ethiopia.

Source population

All residents of households found in Sekoru town were considered as source population.

Study population

The residents of residential households that are found during the study in Sekoru were my study population.

Data collection technique

Data was collected from May 10 to 15, 2018 period using structured questionnaire specifically developed for this purpose. I was also assessing the practice of the study community towards solid waste management through observation. The data was collected by structured questioners with my friends selected for this data collection purpose. The questionary was prepared based on statement of the problem and objectives of the study.

Data process, presentation and analysis

All the collected data was checked and analyzed using software known as SPSS version 20. Tables and figures will be used for the presentation of the study result and the interpretation of the study was carried out by relating the finding in the town with the other conducted researches in related subjects.

Data quality assurance

The data was collected carefully using structured questionnaire. The HH questionnaire will be translated in to Afan Oromo and the data collectors was trained. Pre testing of the questionnaire and other data collection tools was conducted in other similar village in the woreda in order to test the content of the questionnaire as well as to assess the skill of data collectors. Based on the result of the pretest, corrections were made on the data collection tools and feedbacks were given to data collectors.

Intensive supervision was made during the HH data collection. Unclear question will be clarified for respondents. The collected data was checked daily for completeness and accuracy before data entry and analysis.

Ethical consideration

Before starting the data collection legal permission with a letter support was granted from Jimma University, CBE office by principal investigator to concerned bodies. The willingness of the respondent was respected and if someone in the selected sample number is not interested to answer the question data collectors must not obligate them to do so. Norm, belief, value and confidentiality of data is fully respected.

Results

A total of 337 households were included in this particular study and interviewed on socio-demographic characteristics. Among respondents 75.07% of the households were females and 24.92% were males. Regarding marital status 54.89% were married, 29.97% were single, 5.04% were divorced and 10.09% of them were widows. The study finding also shows that on ethnicity, 87.54% were Oromo and the rest 12.46% were Tigre. With regard to religion 50.14% were Muslim, 37.38% were Orthodox, 7.4% were Protestant and 5.04% were others (Table 1).

S.no	Characteristics		Number of house hold	Percent (%)
1	Marital status	Single	101	29.97
		Married	185	54.89
		Divorced	17	5.04
		Widows	34	10.09
		Total	337	100
2	Ethnicity			
		Amhara	295	87.54
		Tigre	42	12.46
		Total	337	100
3	Religion	Muslim	169	50.14
		Orthodox	126	37.38
		Protestant	32	9.49
		Others	10	2.96
		Total	337	100

Table1: Socio demographic characteristics of households' kebele 02, in Sekoru town, 2018.

The literacy status of the households were predominated by those who attended grade 5-8 which accounts for 27.59% , whereas the smallest portion who attended above grade 11-12 which accounts for 7.41 % (Table 2).

Educational status	Frequency	Percentage
Illiterate	34	10.08
Read and write	59	17.5
44287	17	5.04

44413	93	27.59
44478	59	17.5
44541	25	7.41
>12	50	14.83

Table2: Educational status of households, kebele 02, in Sekoru town, 2018.

Regarding occupational status, the majority of the house hold head (35.01%) were government employee and the rest were merchant, daily laborer and students which accounts 29.9%, 10.09%&22.55% respectively (Table 3).

S.no	Occupation of house hold	Frequency	Percentage
1	Merchant	101	29.9
2	Government employee	34	10.089
3	Daily laborer	8	2.37
4	Students	76	22.55
5	House wife	118	35.01
	Total	337	100

Table3: Occupational status of households, kebele 02, in Sekoru town, 2018.

Among the total 337 households, the majority of them around 270 (80.1%) are owner of the house and the rest 67 (19.88%) were rental. Large number of the households family size are also found between four up to six, which accounts 244 (72.4%) , the rest 67 (19.8%) and 26 (7.7%) are one up to three and greater than six respectively (Table 4).

S.no	Ownership	Frequency	Percentage (%)
1	Owner	270	80.1
2	Rented	67	19.88
	Total	337	100
	Family size	Frequency	Percent (%)
3	44256	67	19.8
4	44351	244	72.4
5	>6	26	7.7
	Total	337	100

Table4: Ownership and family size of the households of kebele 02, in Sekoru town, 2018.

Most of the households are used temporary storage for solid waste which is 92.5% and 7.42% are they do not have temporary storage for solid waste. Regarding separation of waste before storage 76 (22.55%) and 261(77.45%) was practice to separate the waste and not separate solid waste before storage respectively. Among the total households, 253 (75.05%) of them in kebele 02, had no access to community bins for solid waste disposal (Table 5 and Figure 1).

House hold practices	Activities may practice or not				
	Yes		No	Total	
	No	%	No	%	

Temporary storage of solid waste	312	92.5	25	7.42	337
Separate waste before storage	62	22.55	250	77.45	312
Use of solid waste for other purpose	236	70.03	101	29.97	37
Access of community bins	84	24.9	253	75.05	337
Availability space in back yard for waste disposal	101	29.97	236	70.03	337

Table 5: Household practices at household's level for domestic solid waste handling, management, and accessibility of community bins at kebele 02, in Sekoru town, 2018.

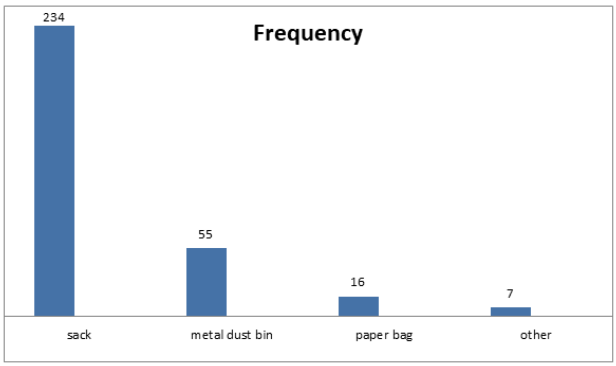

Figure1: Types of temporary container used for domestic SW storage at household level of kebele 02, Sekoru town, 2018.

Regarding the type of temporary onsite storage of domestic solid waste most of them 234 (75%) were used sack and the smallest were 7 (2.24%) included under other.

From total of 337 interviewed based on response of the respondents mother 120 (35.6%) were the major responsible man for the house to handle and dispose of solid waste and children 97 (28.78%), house made 84 (24.9%) and 36 (10.68%) of them were included under other to handle and dispose solid waste (Table 6 and Figure 2).

Responsible man to the house for handling and disposal of solid waste	Frequency	Percent (%)
Mother	120	35.6
Children	97	28.78
House made	84	24.9
Others	36	10.68
Total	337	100

Table6: Responsible person for handling and disposal of solid waste in the house of residents kebele 02, in Sekoru town, 2018.

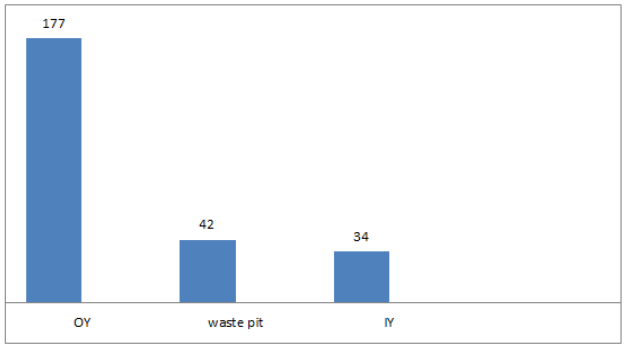

Figure2: Place of domestic solid waste disposal site by the residents of kebele 02, in Sekoru town, 2018.

Among the total of 253 households, 177 (69.9%) of them throw their solid waste were outside of the yard in openly, the rest 42 (16.6%) and (13.4%) were throw in waste pit and inside the yard respectively.

Based on our study, the majority of households were a problem of vector and rodents, 203 (75.2%) and 194 (57.56%) household have a problems of house flies around the garbage bins. Among the total of 337 households, 270 (80.1%) dumping waste observed outside the compound within 20 meters (Table 7).

S.no			Frequency	Percent (%)
1	Dumped waste observed outsides the compound within 20meter	YES	270	80.1
		NO	67	19.88
		Total	337	100
2	Problem of vector and rodents	YES	203	75.2
		NO	67	24.8
		Total	270	100
3	House flies observed around the garbage bins	YES	194	62.17
		NO	118	37.8
		Total	337	100
4	Use of festal coverage for collection of solid waste	YES	152	45.1
		NO	185	54.89
		Total	337	100

Table7: General status of the house and storage surrounding in kebele 02, in Sekoru town, 2018.

From the respondent there was used solid waste for other purpose most of them used for soil conditioning 177 (75%) and 34 (14.4%) of them used as biofertilizer (Table 8, Figures 3 and 4).

Use of solid waste for other purpose	Frequency	Percent (%)
Soil conditioning	177	75
Biofertilizer	34	14.4
For recycling and reusing	17	7.2
Other	8	3.39
Total	236	100

Table8: Use of solid waste for other purpose in residents of kebele 02, in Sekoru town, 2018.

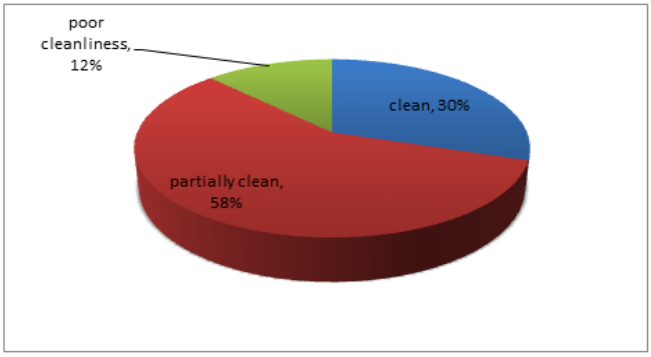

Figure3: *General state of the house and its surrounding in kebele 02, of Sekoru town, 2018.*

During observation majority of the house were fairly clean 194 (57.56%), 101 (29.97%) and 42 (12.46%) were clean and dirty respectively.

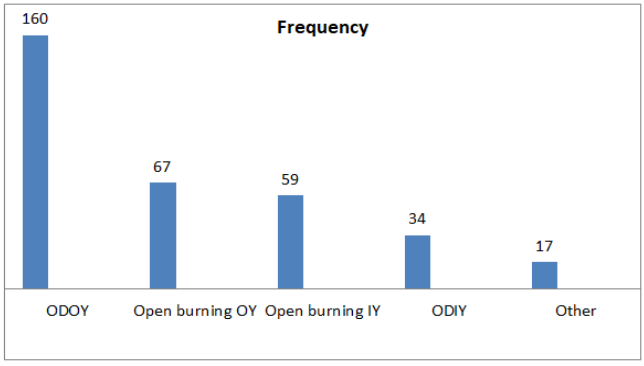

Figure4: *Domestic solid waste disposal method of households in kebele 02, Sekoru town, 2018.*

The dominant solid waste disposal method employed by households were ODOY 160 (47.47%) which is considered as open field methods of disposal, followed by 59 (17.5%) and the smallest were included under other 17 (5.04%).

Discussion

The problem associated with solid waste management in today's society is complex because of the quantity and adverse nature of those wastes. Waste generation is an activity that is difficult to control in present and in the future, however, more control will be exercised over the generation of waste.

Based on the finding of our research, 92.5% of the households in Sekoru town at kebele 02 had on site temporary solid waste storage containers even though they did not have proper cover and they had no community dust bin facility to dispose domestic solid wastes [4]. A similar study was conducted in Bonga town by Temesgen, 2002 indicated that 42.3% of the households had on site solid waste storage containers. When we compared our results with the above study its much higher, this indicates that the residents of kebele 02 had greater awareness about onsite handling and management of domestic solid wastes.

According to the study conducted in jimma zone by Mohammed in 2000, around 39.5% of households used sack, 15.8% plastic dust bin, 13.15% metal dust bin, 7.9% paper bag for storage which are not washable and do not have proper cover. Similarly our study showed that from a total 312 (92.5%) households, 75% of them used sack for onsite storage of domestic solid waste, the rest 17.6% and 5.3% were using metal dust bins and paper bags respectively. Out of those onsite domestic solid waste storage container used, 250 (80.1%) store mixed solid waste in the same container.

In Sekoru town, 236 of the households used domestic solid waste for other purpose and among them 75% of households using solid waste for soil conditioning and 14.4% of them using as biofertilizer. However, majority of the households in the study area did not have any space that available for preparation of compost as well as for planting of different vegetation.

The recent study conducted in Ghana showed that 61%of households disposed their waste at community bins or had waste picked up at their homes by private contractors (ref), but in our study area it is clearly evident that the majority of households had no community bins availability. In the town there are only two community bins exists. Due to the reason among 337 total households in kebeles 02, of Sekoru town, 160 (47.47%) of them dispose their waste open dump outside the yard [5]. This is because, in the town the location of community bins are not found in proximity to the habitations and their number is also not adequate. Not only this, but also in the town there is no any organized department (crews) to collect domestic solid waste from each households and also absence of vehicles for solid waste transportation.

In Sekoru town at kebele 02, the predominant domestic solid waste disposal method employed by households was 'open dump outside yard' accounts 69.9% and followed by open burning outside yard 19.88%. Based our observation during data collection, from the total 337 households, 194 (57.56%) were partially clean and the rest 101 (29.97%) and 42 (12.46%) were clean and poor cleanliness respectively.

A study conducted in Agaro town, 2000 and in Bonga town indicated that 44.52% open dump out side yard and 46.15% open dump inside yard, respectively. Similarly the present study indicated that households dispose their domestic solid waste in uncontrolled methods since no attention has been paid to handling, storage and disposal of solid waste as its source. The major problem that is present in study area is open disposal outside yard; this is due to the absence of effective municipal services and public awareness.

Based on the results of respondents, mothers were largely responsible for handling and disposing of domestic solid waste, which accounts 35.6% and children 28.78% respectively. From the total 337 households, 236 (70.03%) of them had no domestic solid waste disposal space in the yard and 270 (80.1%) of households were disposing their waste within 20 meter outside the compound. Due to this reason around 203 (75.2%) of households were facing problems of insects and vermin that are vectors and carriers of disease because in our study area. WHO recommended that the disposal site should be 30 meters from water source and 500 meters from residential areas in order to prevent possible contamination but the disposal sites in and around households are not fulfilling WHO recommendations and are far away from the standards set by WHO.

Conclusion

In conclusion the study has shown that open dump outside yard is the major disposal methods being practiced by the residents, which indicates the absence of effective municipal services in the handling and disposal of domestic solid waste at the town even though it followed open burning outside the yard. This may encourage throwing of solid waste in any available spaces especially near the roads and rivers. However, households did have proper type of onsite storage containers but they did not have final disposal site or availability of community bins. Most of the disposal methods practiced by households are indiscriminate outside of the yard, which could create serious health hazards including pollution of air, water source, fire hazards and increase population of rodents and insect vectors of diseases as well as blockage of the drainage.

Recommendation

To minimize the existing domestic solid waste problems, the following possible solutions are recommended:

- World health office should be intensifying health education with emphasis on the link
- Between problems associated with domestic solid waste and proper solid waste management.
- The mayors of the town and municipality should invite and encourage the introduction of
- NGO and amp; private sectors in solid waste management.
- The health professional like HEW should give awareness on compost preparation by using domestic solid wastes.
- The municipality should have regular solid waste management program that has to be monitored until the final disposal system
- The municipality should also be access community bins in everywhere and implement restrict rule and regulations.

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Authors' contributions

Abraham Teym Conceived and developed the study, designed the checklist, collected the data analysis. AN and MA were interpretation editing preparing, and writing the manuscript.

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