

(RESEARCH ARTICLE)



Assessment of knowledge, attitude, and practice of solid waste management system among households of Darge sub-city, east Wollega Zone, Oromia, Western Ethiopia

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Abstract

Background: Inappropriate solid waste management produced in the course of human activities has serious problems for the environment that adversely affect the health of the human population. Thus, towns and cities in developing countries like Ethiopia face environmental health and aesthetic problems resulting from improper management of solid waste disposal. Uncontrolled waste management may also contribute to the transmission of communicable diseases from different systems as well as encourage fly breeding, which has nuisance effects in addition to disease transmission.

Objective: To assess knowledge, attitude, and practice of solid waste management systems in households in Darge sub-city, East Wollega Zone, Oromia, Ethiopia.

Methods: A community-based cross-sectional study was conducted using systematic random sampling techniques from February 1st to February 15th, 2022. Data was collected from 278 households using a structured interviewer-administered questionnaire. After data collection, data analysis was performed using SPSS computer software version 22.0.

Results: The study showed that 67.3% had good knowledge, 65.86% had a positive attitude, and 63.3% had good practice in solid waste management (SWM). Among the households, 12.6% and 42.1% dispose of solid waste in open fields and open disposal pits, respectively. The perceived reason for improper solid waste disposal was a lack of awareness (55.4%) and a shortage of a place for solid waste disposal (30.6%).

Conclusion: The knowledge, attitude, and practice of households in the study area need improvement according to standards for towns and sub-cities. Increasing knowledge, changing attitudes, and improving practice in SWM using the existing structure are recommended.

Keywords: Solid Waste Management; Darge Sub-City; Households; Knowledge; Attitude; Practice

1. Introduction

Solid waste management (SWM) refers to all activities associated with the handling of discarded solid material, including generation, prevention, characterization, monitoring, treatment, handling, reuse, and the ultimate residual disposition of solid waste. Solid waste management is one of the basic essential services provided by municipal authorities in the country to keep urban centers clean. Despite numerous SWM projects initiated worldwide, 50–70% of solid waste generated, particularly in cities in developing countries, remains uncollected [1].

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Waste management is the process of collecting, transporting, processing, disposing of, managing, and monitoring waste materials. The term usually refers to materials produced by human activity, and the process is generally undertaken to reduce their effect on health, the environment, or aesthetics. Waste includes all items that people no longer have any use for, which they either intend to get rid of or have already discarded, and these include packing items, garden waste, old paint containers, vegetables, metals, food waste, paper, wood, etc. [2].

The main causes of improper solid waste disposal in urban centers and cities, particularly in developing countries, are lack of good and sufficient infrastructure, non-implementation of existing environmental sanitation laws, irregular and unplanned dumping of solid waste, population, and urban growth due to rural-urban migration, insufficient capital to run the solid waste management process, and lack of new technology in waste disposal. In addition to the above reasons, a lack of awareness of the impact of solid waste disposal, a poor attitude towards its effect on human health and the environment, and inadequate practices in the management of solid waste seriously affect the health of the community in different ways [3].

Thousands of tons of solid waste are generated daily in Africa. Most of it ends up in open dumps and wetlands, contaminating surface and groundwater and posing major health hazards. Most waste in Africa is not collected by municipal collection systems because of poor management, fiscal irresponsibility or malfeasance, equipment failure, or inadequate waste management budgets [4].

Waste treatment, reduction from its source, recycling of wastes, or energy recovery from the wastes are not well exercised due to urbanization and uncollected solid wastes which are generated in urban centers of developing countries are estimated to be 30-50% that is due to inadequate or non-existence of garbage collection services by municipality [3].

World Health Organization (WHO) estimated that less than 20% of urban wastes are collected and disposed of properly in Africa [4]. Scattered solid wastes in markets, residential areas, or offices create soil, water, and air pollution and toxic areas. Improperly disposed of solid wastes favors the breeding of flies and rodents of different types. These are a major concern, as they are the primary carrier and dispersal of disease that can occur in endemic or epidemic patterns in many developing countries today including Ethiopia [5, 6].

Accumulation of solid wastes on open fields, drains, and in living areas of peoples causes nuisance and foul smell for people, water, land, air pollution, clogging of drains, and possible communicable diseases such as typhoid fever, amoebiasis, bacillary dysentery, skin infection, and infestation, etc especially in the poorest urban slum and rural areas [7]. According to WHO and UNICEF's joint report on sanitation and hygiene in Ethiopia basic sanitation and improved coverage in Ethiopia is estimated to be 63%. Similar global trends, in Ethiopia those lacking access to improved sanitation are those in the bottom poverty quintile practicing open defecation [8].

In rural areas, there is almost no solid waste disposal hole, and the available solid waste disposal hole is improperly and infrequently utilized, and households dispose of waste in open fields. Similarly, in a growing population of urban and suburban areas, solid waste collection and disposal is poor, and waste is disposed of along street sides, drainage lines, open spaces, or informally burned [9].

Inaccessibility of the sub-city due to the geographical structure, lack of a properly designed collection route system and time schedule, inadequate and malfunctioning operation equipment, open burning of garbage, poor condition of the final dump site, and littering of the corner around the skips, which encourages illegal dumping, can be technical problems related to SWM in the sub-city. To improve this problem in the community, evidence-based research is required to tackle it at the grass-roots level, which in turn needs to increase knowledge, change attitudes, and improve the practices of our community on solid waste disposal in rural and urban areas. In the study area, there is limited research done on solid waste management systems in the proposed study area.

The overall objective of the study was to assess the knowledge, attitude, and practice (KAP) of the solid waste management system of the households in Darge sub-city, East Wollega, Oromia, Ethiopia.

2. Methods and materials

2.1. Study Area and Period

The study was conducted in the Darge sub-city of Nekemte town, located 318 km away from the capital city of Ethiopia, Addis Ababa, from February 1st to 15th, 2022, among households found in the selected areas.

2.2. Study Design

A community-based cross-sectional study was conducted using a quantitative research approach.

2.3. Source Population

All households in the Darge sub-city were the source population of the study.

2.4. Study Subject

The data was collected from selected heads of households from the source population in the Darge sub-city, using a structured pretested questionnaire and observation.

2.5. Inclusion and Exclusion Criteria

2.5.1. Inclusion Criteria

Head of households in the Darge sub-city who were willing to take part in the study during the study period, and give consent, available during the study period was included in this study. If the study subject was not available at home during data collection, HH next to the selected HH was taken and usual sampling was continued.

2.5.2. Exclusion Criteria

Household heads or respondents who cannot respond due to speech and hearing impairment were excluded from the study. Households who lived in the sub-city for less than 3 months were excluded from the study.

2.6. Sample Size Determination

The sample size of the study was determined using the formula for a single population proportion with assumptions of 71.9% of solid waste disposal practice of Laga Tafo - Laga Dadi town on demographic and socio-economic factors affecting municipal solid waste management practice [19], 95% confidence interval, 5% of degree of desired precision or margin of error for sampling and 5% for non-response rate.

A Z-value of 1.96 was used at 95% CI and d of 5%. ($n = \text{sample size}$, $p = \text{proportion}$, $d = \text{margin of error}$). $n = \frac{(Z^2 P(1-P))}{d^2}$ $n = \frac{((1.96)^2 * 0.719)(1-0.719)}{(0.05)^2} = 310$

Since the source population is less than 10,000, a correction formula is used to determine the sample size.

$$nf = \frac{n}{(1+n/N)} \quad nf = \frac{310}{(1+310/1783)} = \frac{310}{(1.17)} = 265$$

So, with adjustment for non-response rate (5% contingency) $n = (265+13) = 278$

2.7. Sampling techniques

The sample size of the study was determined using the formula for a single population proportion with assumptions of 71.9% of the solid waste disposal practice of Laga Tafo-Laga Dadi town on demographic and socio-economic factors affecting municipal solid waste management practice [19], a 95% confidence interval, 5% of the degree of desired precision or margin of error for sampling, and 5% of the non-response rate.

2.8. Data Collection Tool and Procedure

Data was collected by using a pre-tested, structured, and interviewer-administered questionnaire which is prepared in English language and translated to Afaan Oromo. In the data collection 4 diploma nurses were recruited and collected data and 2 BSc nurse supervisors were assigned to ensure the quality of data collection on the spot.

2.9. Data Quality Management

A structured questionnaire was prepared in English and translated into the Afaan Oromo language and retranslated back to the English language by a language expert to increase measurement accuracy and for fieldwork purposes. A pre-test of the questionnaire was done on 5% of the sample size in Bekenisa Kese, which was not included in the study before the actual data collection to see for the accuracy of responses and to estimate the time needed. Daily collected information was reviewed and possible errors were returned to the collectors for correction. Training and orientation were given to the data collectors and close supervision was done during data collection.

2.10. Data Analysis

After data collection was completed, data was checked for completeness and consistency, and then it was coded. Using SPSS computer software version 22.0, data analysis was done and a descriptive summary of study results such as frequencies, proportions, mean, mode, median, and range was computed. The result of the study is presented using graphs, tables, and charts.

2.11. Ethical Consideration

Ethical clearance was obtained from the Ethical Review Board of Wollega University, College of Health Sciences, Department of Nursing and Midwifery. Privacy and confidentiality of collected information was ensured at all levels. Respondents were asked for their willingness to participate in the study and Informed consent was obtained from all individual participants included in the study.

3. Results

Data were collected from 278 study participants using structured, pretested, and interviewer-administered questionnaires, making the response rate 100%. The result of the study is categorized into four parts which are; socio-economic and demographic characteristics, Knowledge, attitude, and practice of the respondents towards solid waste management.

3.1. Socio-economic and demographic characteristics

Of 278 (100%) participants involved in the study, 189 (68%) were male and 89 (32%) female. The mean age of study participants was 39.03(SD+ 10.81) years with a minimum and maximum of 18 and 70 years respectively. The marital status of the respondents was 217 (78.1%) were currently married, 36 (12.9%) were single, while 16 (5.8%) and 9 (3.2%) were divorced and widowed respectively.

The mean family size of the households was 4.05 (SD + 1.65) and the average monthly income of the family of HH was 1848.83 (SD + 1490) ETB.

Table 1 Socio-economic and demographic characteristics of the study participants, Darge sub-city, Nekemte Town, East Wollega, Oromia, February 2022

Variables	Response	Number	Percent
Age of the head of the HH	15-24 years	72	25.9
	25-34years	105	37.8
	35-44years	56	20.1
	45-54years	14	5.0
	55-64years	12	4.3
	65+ years	72	25.9
Level of education	Illiterate	33	11.9
	Primary	68	24.5
	Secondary	56	20.1
	College	68	24.5
	University	53	19.1
Average Monthly income of the HHs (estimate)	< or = 500	54	19.4
	501-1000	78	28.1
	1001-2000	49	17.6
	2001-3000	47	16.9
	> or = 3001	50	18.0

Occupation	Daily laborer	50	18.0
	Government employee	72	25.9
	Employed in private sector	51	18.3
	Has private business	64	23.0
	Unemployed	34	12.2
	Other	7	2.5
Family size of the HH	1-2	41	14.7
	3-4	144	51.8
	5 or more	93	33.5

3.2. Knowledge of Respondents on Solid Waste Management System

The study respondents who scored 7 or more from 10 knowledge questions were categorized under good knowledge while those who scored less than 7 scores were classified under poor knowledge. Based on this, 187 (67.3%) had good knowledge while the remaining 91 (32.7%) had poor knowledge of the solid waste management system of the household.

Among study participants, 241 (86.7%) perceived knowledge of the association of improper solid waste disposal with the health problems of the community. The health problems that the study participants mentioned associated with improper solid waste disposal were respiratory disease 62 (22.3%), Gastrointestinal disease 94 (33.8%), Acute febrile illness like malaria & typhoid fever 71(25.50%), and Skin diseases 14 (5.0%). Of the total respondents, 247 (88.8%) know how to collect solid wastes and 243 (87.4%) know how to segregate solid wastes from other types at their source. Similarly, 249 (89.6%) of them responded that solid wastes have an impact on the environment the community lives while the rest 29 (10.4%) respondents replied that solid wastes do not have any impact on the environments we live.

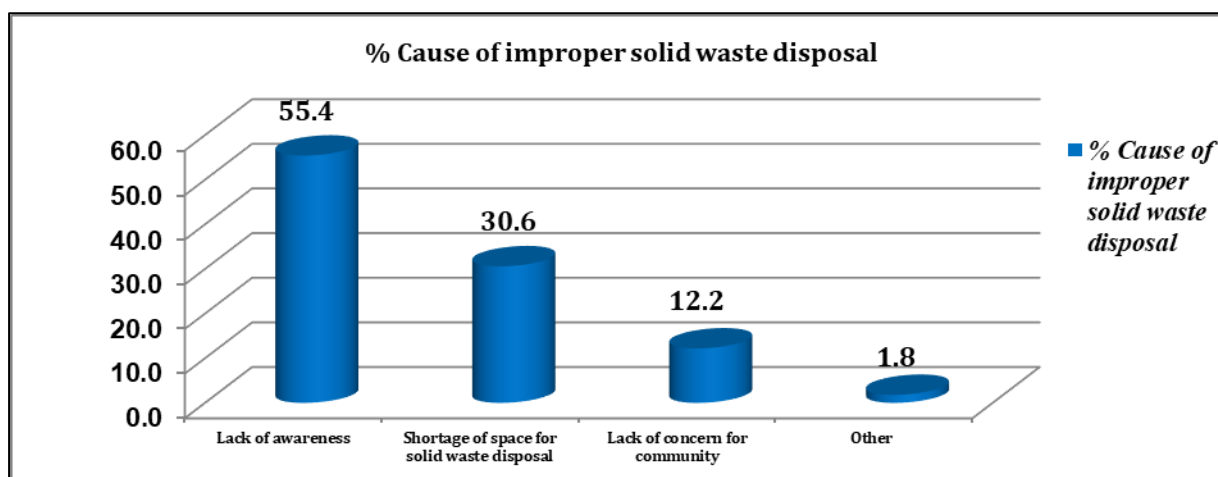


Figure 1 Cause of improper solid waste disposal in Darge Sub-city, February 2022.

Whether improper solid waste disposal has an impact on the drinking water of HH or not was requested; 242 (87.1%) of the respondents replied that it has an impact while other 36 (12.9%) it does not have an impact on the drinking water of HHs. Among study participants, 178 (64.0%) did not know that solid wastes can be used as fertilizers by composting and 237 (85.30%) responded that solid wastes can facilitate the transmission of communicable diseases while 41 (14.7%) the respondents reported solid wasted does not facilitate transmission of communicable diseases.

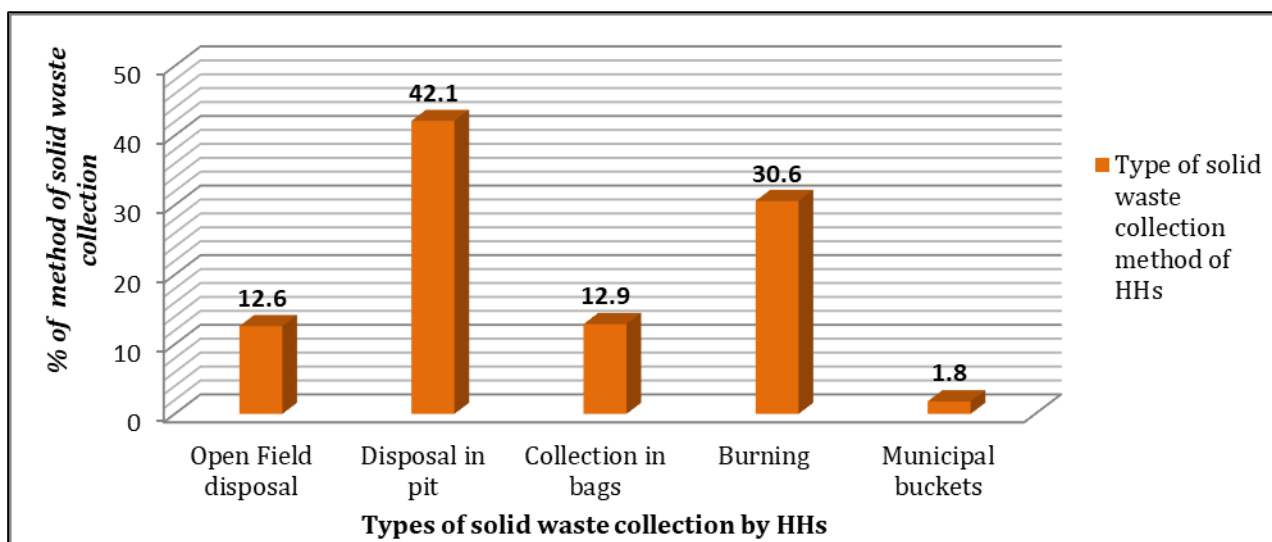


Figure 2 Type of solid waste collection methods of HH of Darge Sub-city, February 2022

Table 2 Cross-tabulation of Knowledge of SWM and socio-economic and demographic characteristics of respondents, Darge Sub-city, Nekemte Town, February 2022

Variables (n=278)	Response	Knowledge of respondents on SWM		
		Good	Poor	Total
Sex	Male	126 (45.3%)	63(22.7%)	189(68.0%)
	Female	61(21.9%)	28(10.1%)	89(32.0%)
Age of the respondents	15-24 Years	13 (4.7%)	6 (2.2%)	19 (6.8%)
	25-34 Years	43 (15.5%)	29 (10.4%)	72 (25.9%)
	35-44 Years	78 (28.1%)	27 (9.7%)	105 (37.8%)
	45-54 Years	38 (13.7%)	18 (6.5%)	56 (20.1%)
	55-64 Years	7 (2.5%)	7 (2.5%)	14 (5.0%)
	65 or more Years	8 (2.9%)	4 (1.4%)	12 (4.3%)
Marital status	Single	22 (7.9%)	14 (5.0%)	36 (12.9%)
	Currently Married	151 (54.3%)	66 (23.7%)	217 (78.1%)
	Divorced	9 (3.2%)	7 (2.5%)	16 (5.8%)
	Widowed	5 (1.8%)	4 (1.4%)	9 (3.2%)
Educational status	Illiterate	19 (6.8%)	14 (5.0%)	33 (11.9%)
	Primary (1-8)	41 (14.7%)	27 (9.7%)	68 (24.5%)
	Secondary (9-12)	36 (12.9%)	20 (7.2%)	56 (20.1%)
	Collage	44 (15.8%)	24 (8.6%)	68 (24.5%)
	University	47 (16.9%)	6 (2.2%)	53 (19.1%)
Occupation	Daily laborer	32 (11.5%)	18 (6.5%)	50 (18.0%)
	Government employee	53 (19.1%)	19 (6.8%)	72 (25.9%)

	Employed in private sector	33 (11.9%)	18 (6.5%)	51 (18.3%)
	Has private business	44 (15.8%)	20 (7.2%)	64 (23.0%)
	Unemployed	19 (6.8%)	15 (5.4%)	34 (12.2%)
	Other	6 (2.2%)	1 (0.4%)	7 (2.5%)
Average monthly income of the HH	< or = 500	34 (12.2%)	20 (7.2%)	54 (19.4%)
	501-1000	45 (16.2%)	33 (11.9%)	78 (28.1%)
	1001-2000	31 (11.2%)	18 (6.5%)	49 (17.6%)
	2001-3000	37 (13.3%)	10 (3.6%)	47 (16.9%)
	> or = 3001	40 (14.4%)	10 (3.6%)	50 (18.0%)
Family size of the HH	1-2	28 (10.1%)	13 (4.7%)	41 (14.7%)
	3-4	102 (36.7%)	42 (15.1%)	144 (51.8%)
	5 or more	57 (20.5%)	36 (12.9%)	93 (33.5%)

3.3. Attitude of Households towards Solid Waste Management

From the total 278 study participants 183 (65.86%) of them had positive attitudes and 95 (34.14%) had negative attitudes towards solid waste management. The level of their knowledge and attitude is almost similar to the study participants. Specifically, regarding the attitude of hand washing after solid waste disposal among the study participants majority, 268 (96.4%) had a good attitude and 194 (69.8%) of the participants had a positive attitude regarding disposing of solid wastes on an open field which means they disagreed to dispose of solid wastes on an open field.

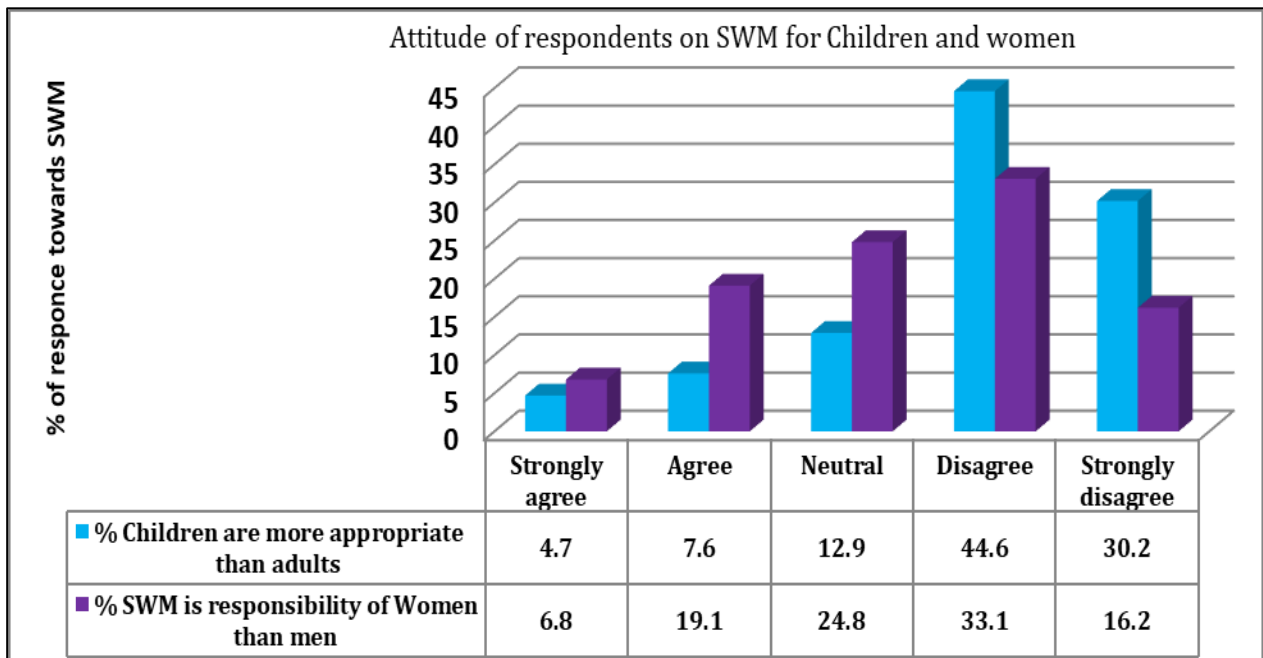


Figure 3 Attitude of respondents towards SWM by children & women Darge sub-city, Nekemte town, East Wollega, Oromia, Ethiopia, February 2022

Level of agreement on the segregation of wastes before disposal, 77 (27.7%) and 122 (43.9%) respondents strongly agree and agree respectively as well as on conducting environmental sanitation campaigns for its importance to community health 147 (52.9%) and 56 (20.1%) of respondents strongly agree and agree respectively which is taken as a positive attitude among the respondents towards solid waste management in the community they live.

Table 3 Cross-tabulation of Attitude on SWM and socio-economic and demographic characteristics of respondents, Darge Sub-city, Nekemte Town, Ethiopia, February 2022

Variables(n=278)	Response	Attitude of Respondents on SWM		
		Positive	Negative	Total
Sex of respondents	Male	129 (46.4%)	60 (21.6%)	189 (68.0%)
	Female	54 (19.4%)	35 (12.6%)	89 (32.0%)
Age of the respondents	15-24 Years	9 (3.2%)	10 (3.6%)	19 (6.8%)
	25-34 Years	50 (18.0%)	22 (7.9%)	72 (25.9%)
	35-44 Years	66 (23.7%)	39 (14.0%)	105 (37.8%)
	45-54 Years	40 (14.4%)	16 (5.8%)	56 (20.1%)
	55-64 Years	9 (3.2%)	5 (1.8%)	14 (5.0%)
	65 or more Years	9 (3.2%)	3 (1.1%)	12 (4.3%)
Marital status	Single	23 (8.3%)	13 (4.7%)	36 (12.9%)
	Currently Married	143 (51.4%)	74 (26.6%)	217 (78.1%)
	Divorced	11 (4.0%)	5 (1.8%)	16 (5.8%)
	Widowed	6 (2.2%)	3 (1.1%)	9 (3.2%)
Educational status	Illiterate	23 (8.3%)	10 (3.6%)	33 (11.9%)
	Primary (1-8)	37 (13.3%)	31 (11.2%)	68 (24.5%)
	Secondary (9-12)	33 (11.9%)	23 (8.3%)	56 (20.1%)
	Collage	51 (18.3%)	17 (6.1%)	68 (24.5%)
	University	39 (14.0%)	14 (5.0%)	53 (19.1%)
Occupation	Daily laborer	30 (10.8%)	20 (7.2%)	50 (18.0%)
	Government employee	53 (19.1%)	19 (6.8%)	72 (25.9%)
	Employed in the private sector	32 (11.5%)	19 (6.8%)	51 (18.3%)
	Has private business	40 (14.4%)	24 (8.6%)	64 (23.0%)
	Unemployed	24 (8.6%)	10 (3.6%)	34 (12.2%)
	Other	4 (1.4%)	3 (1.1%)	7 (2.5%)
Average monthly income of the HH	< or = 500	28 (10.1%)	26 (9.4%)	54 (19.4%)
	501-1000	53 (19.1%)	25 (9.0%)	78 (28.1%)
	1001-2000	30 (10.8%)	19 (6.8%)	49 (17.6%)
	2001-3000	33 (11.9%)	14 (5.0%)	47 (16.9%)
	> or = 3001	39 (14.0%)	11 (4.0%)	50 (18.0%)
Family size of the HH	1-2	27 (9.7%)	14 (5.0%)	41 (14.7%)
	3-4	93 (33.5%)	51 (18.3%)	144 (51.8%)
	5 or more	63 (22.7%)	30 (10.8%)	93 (33.5%)

3.4. The practice of Households on Solid Waste Management

Regarding the practice of the HHs on managing solid wastes, more than half, 176 (63.3%) of HHs had good practice while the other 102 (32.7%) of HH had a poor practice of solid waste management. Among HHs who participated in the

study majority, 261 (93.9%) of them cleaned their house and compound with different frequencies every week, and 176 (67.4%) of them three or more times per week compared to 85 HH (32.56%) who cleaned their compound once or twice per week. Seventeen HH (6.1%) of HH do not clean their compound at all and as a reason for not cleaning their compound mentioned lack of awareness 9 (52.9%), lack of disposal pit 7 (41.2%), and no need to clean 1(5.9%)

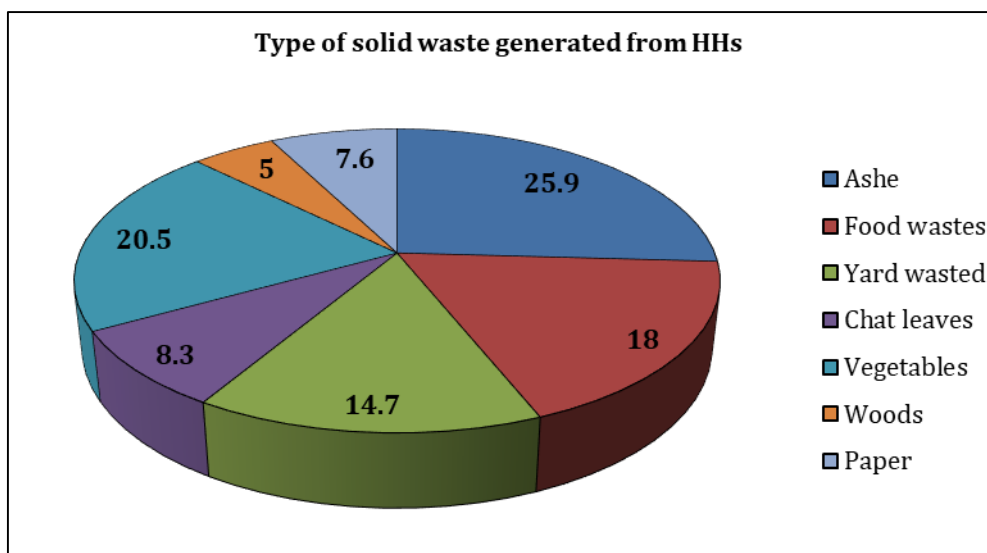


Figure 4 Types of solid wastes generated from HHs in Darge Sub-city, Nekemte town, Oromia, Ethiopia, February 2022

Among all study participants involved in the study, 215 (77.0%) of them use storage containers while the remaining 63 (23.0%) do not use storage containers for the collection of solid wastes in their compound. Among those who use storage containers 159 (74.0%) cover the storage container fitted with a proper cover and the remaining 56 (23.0%) of HHs do not use a cover for the container. Frequency of using storage containers for solid wastes among the HHs, 115 (53.5%) and 100 (46.5%) use always and sometimes respectively.

Almost similar to those study participants who know that solid waste can be used as fertilizer by composting, 95 (34.2%) of study participants use solid wastes for other purposes while 183 (65.8%) of them do not use solid wastes for other purposes and consider it as wastes once generated from the activities of human and animals.

The observation was made on two key indicators during data collection. These were the possession of a solid waste pit in the compound and the cleanness of the HH compound during actual data collection time. Among the study participants, 127 (45.7%) of them had solid waste pits while, more than half, 151 (54.3%) of the HHs did not have solid waste pits in their compound. Regarding cleanness of the compound 215 (77.3%) of the HH’s compound is clean as observed by data collectors and the remaining 63 (22.7%) of the HH’s compound was not clean.

Table 4 Cross-tabulation of Practice of SWM and socio-economic and demographic characteristics of respondents, Darge Sub-city, Nekemte Town, East Wollega, Ethiopia, February 2022

Variables (n=278)	Response	The practice of respondents on SWM		
		Good	Poor	Total
Sex of respondents	Male	116 (41.7%)	73 (26.3%)	189 (68.0%)
	Female	60 (21.6%)	29 (10.4%)	89 (32.0%)
Age of the respondents	15-24 Years	14 (5.0%)	5 (1.8%)	19 (6.8%)
	25-34 Years	41 (14.7%)	31 (11.2%)	72 (25.9%)
	35-44 Years	65 (23.4%)	40 (14.4%)	105 (37.8%)
	45-54 Years	36 (12.9%)	20 (7.2%)	56 (20.1%)

	55-64 Years	10 (3.6%)	4 (1.4%)	14 (5.0%)
	65 or more Years	10 (3.6%)	2 (0.7%)	12 (4.3%)
Marital status	Single	20 (7.2%)	16 (5.8%)	36 (12.9%)
	Currently Married	144 (51.8%)	73 (26.3%)	217 (78.1%)
	Divorced	8 (2.9%)	8 (2.9%)	16 (5.8%)
	Widowed	4 (1.4%)	5 (1.8%)	9 (3.2%)
Educational status	Illiterate	22 (7.9%)	11 (4.0%)	33 (11.9%)
	Primary (1-8)	46 (16.5%)	22 (7.9%)	68 (24.5%)
	Secondary (9-12)	31 (11.2%)	25 (9.0%)	56 (20.1%)
	Collage	39 (14.0%)	29 (10.4%)	68 (24.5%)
	University	38 (13.7%)	15 (5.4%)	53 (19.1%)
Occupation	Daily laborer	32 (11.5%)	18 (6.5%)	50 (18.0%)
	Government employee	42 (15.1%)	30 (10.8%)	72 (25.9%)
	Employed in the private sector	34 (12.2%)	17 (6.1%)	51 (18.3%)
	Has private business	46 (16.5%)	18 (6.5%)	64 (23.0%)
	Unemployed	18 (6.5%)	16 (5.8%)	34 (12.2%)
	Other	4 (1.4%)	3 (1.1%)	7 (2.5%)
Average monthly income of the HH (In ETB)	< or = 500	28 (10.1%)	26 (9.4%)	54 (19.4%)
	501-1000	51 (18.3%)	27 (9.7%)	78 (28.1%)
	1001-2000	30 (10.8%)	19 (6.8%)	49 (17.6%)
	2001-3000	27 (9.7%)	20 (7.2%)	47 (16.9%)
	> or = 3001	40 (14.4%)	10 (3.6%)	50 (18.0%)
Family size of the HH	1-2	27 (9.7%)	14 (5.0%)	41 (14.7%)
	3-4	93 (33.5%)	51 (18.3%)	144 (51.8%)
	5 or more	56 (20.1%)	37 (13.3%)	93 (33.5%)

4. Discussion

The study findings indicated that 67.3%, 65.86%, and 63.3% of the respondents have good knowledge, positive attitudes, and good practices on solid waste management systems at the household level. At the household level, the respondent's knowledge is a little bit greater than their attitude, and also their attitude is somewhat higher than their practice of managing solid wastes.

Worldwide 50-70% of solid wastes generated, particularly in cities in developing countries, remain uncollected. When the current study is compared with the global status of solid waste collection 63.3% of households collect the wastes generated at the household level which is almost in the same range as that of the global practice of solid waste collection [1].

In the current study, there is limited public service for the collection and disposal of solid wastes, and in the sub-city, the households collect and dispose of solid wastes in open fields, and some of them are disposed of in solid waste pits, burn on the open field and very limited number of HH use a municipal bucket for collection of solid wastes who are located near the main road. The number of HHs who dispose of solid wastes other than solid waste pits and municipal buckets is very high which accounts for 85.6% of the study participants. This problem is similar to the poor solid waste management of African urban slums and developing cities which is estimated that 80% of cities in developing countries do not possess adequate and meaningful refusal management [11]. The similarity of solid waste management in the

current study area and some African urban could be due to the nature of the development in Africa may have similarity. In addition, knowledge, attitude, and practice across the continent of Africa can be similar to SWM.

In this study area, different types of solid wastes are generated and the level of waste segregation before disposal is poor. Some of the HHs who collect solid waste use various types of containers that may or may not have properly fitted covers that can pose the problem of foul smell around the environment HHs live in and expose them to communicable diseases, injuries, and infection through air, water, and soil pollution. Similarly, in most developing countries, the collection of solid wastes often involves a face-to-face transaction between generators (households, offices, shops, and small-scale factories) and collectors (commonly municipalities). The level of services is low and generators often have to bring their waste long distance and place them in containers that are sometimes difficult to use presenting a permanent risk of pollution, infection, and injury of particular concern potentially infected injuries from sharp articles. [12].

In this study, the practice of proper disposal of solid wastes was 63.3% and the positive attitude towards SWM was 65.86%. Domestic solid waste disposal practice and attitude towards its disposal in Ghana, Accra was assessed and revealed that 61.0% dispose of their wastes in appropriately designed areas and 76.5% had a positive attitude. The attitude of this study is lower than that of Ghana Accra town while the practice was almost in line with each other. Regarding the impact of improper solid waste disposal on the health of the community and household, 86.70% of the current study area respondents said that improper solid waste disposal had an impact on the health of HH and community which are nearer to each other with 83.2% of Ghana Accra and [13].

Regarding the method of solid waste collection, the result of the current study as a method of solid waste collection was open field disposal (12.6%), disposal in the pit (42.1%) collection in bags (12.9%), burning (30.6%) and municipal buckets (1.8%). A similar study was conducted in Tanzania, Morogoro municipality and the result was burning (20%), bags (30%), dust bins (15%) dump pits (22%), and municipal buckets (13%). The difference could be due to the availability of service provided by the town municipality free of charge in Morogoro town [14, 17].

Thirty percent of Addis Ababa and 46.0% of per urban and urban centers outside Addis Ababa residents use open field disposal which is much higher than the current study area open field solid disposal even though there is a solid waste collection service from municipality administration in the stated city [16, 19]. Even though the municipality administration of cities and towns in Nekemte is expected to collect solid wastes in the Darge sub-city the service is very limited to certain areas like asphalt roadside and did not cover all areas with low-cost recovery by HHs. This may need partnership and collaborative activities with the community and some stakeholders working on solid waste management in the town. Like some sub-cities of Ethiopia town, Darge sub-city also practices field dumping of solid wastes [15].

In the current study, good knowledge and positive attitudes toward SWM among respondents were 67.3% and 65.86% respectively. The knowledge and attitude of participants of the Lideta sub-city of Addis Ababa on SWM were 75.9% and 73.9% respectively. When compared with a current study that of Addis Ababa Lideta sub-city is higher than in both knowledge and attitude. The discrepancy could be the economy, awareness difference, and access to disposal pits prepared by the city municipality [16].

About one-fourth of the HHs in the current study generate ashes as wastes from their house which is followed by vegetable and food wastes that account for 20.50% and 18.0% respectively of the total of the HHs. The type of solid wastes generated from HHs in the current study area differs from that of the Somali Region, Jigjiga town which was food wastes (7%), papers (18%), cardboard (33%), metals (14%), plastic bottles and festal (18%). The difference could be due to the study area variation and food items consumed and wastes generated during food processing could be the reason for the difference [17].

In the current study, 12.6% of HHs dispose of solid wastes in open fields, 42.1% dispose of them in open pits and 12.9% use temporary solid collection materials. In similar community-based research conducted on HH management of waste and hygiene practices in Kersa Woreda, Eastern Ethiopia, 66% of households disposed of solid wastes in open dumps, and only 6.9% of the households had temporary storage means for solid waste. Further, 85.6% of the HHs in Kersa Woreda reported they use solid waste as manure but in the current study, only 34.2% of the HHs use solid wastes for another purpose [18]. In Laga Tafo- Laga Dadi town 71.9 % of waste produced from numerous sources in the town is collected and disposed of informally or illegally on open fields, roadside, and drainage [19]. About 84.1% and 98.4 % of the respondents in this study and Kersa Woreda respectively revealed that the responsibility of waste management is left to women and girls. This attitude of the respondents can affect SWM practice at the HH level which could be a double burden on the women with the other activities expected from women in the HH [18, 19].

Perceived use of wastes once generated from the house was assessed, 63.8% of the current study area and 54.0% of Bahir Dar city respectively reported that wastes are useless once generated. Using wastes for other purposes was low in the current study area when compared to that of Bahir Dar city. Regarding segregation of solid wastes, 71.6% of respondents in the current study area agree that solid wastes should be segregated from other wastes before disposal and in Bahir Dar city 42.7% of them agreed that their participation in segregating, collecting, reducing, reusing, etc of solid wastes may amount a significant contribution to the SWM process. Relatively the current study's perception of solid waste segregation is higher than that of Bahir-Dar city [20].

5. Conclusion

The knowledge, attitude, and practice of the respondents were almost similar to each other. The KAP observed among study participants when compared to other study areas and some standards of solid waste management need improvement. The solid waste collection and disposal service provided by the town municipality administration in the sub-city was very limited. Due to this, the HHs in the study area are forced to dispose of solid wastes on open fields and in open pits as well as burn them in open areas.

Recommendations

- Health education provision to increase knowledge, change attitudes, and improve the practice of SWM among the HHs is needed
- The community should conduct regular (scheduled) environmental sanitation campaigns in the study area in collaboration with and facilitation by stakeholders and municipality administration.
- Municipality administration of the town and sub-city should provide solid waste collection and disposal service routinely free of charge if possible or the community should pay accordingly.
- The Darge sub-city is expected to facilitate the linkage of stakeholders and donors working on solid waste management in the area to work on SWM as a project through Nekemte town municipality.
- Communities of the sub-city should actively participate in solid waste segregation, collection, handling, recycling, and disposal at the HH level and practice the reuse of solid wastes for another purpose.

Compliance with ethical standards

Disclosure of conflict of interest

The researchers declare a conflict of interest none.

Statement of ethical approval

Ethical clearance was obtained from the Ethical Review Board of Wollega University, College of Health Sciences, Department of Nursing and Midwifery. Privacy and confidentiality of collected information was ensured at all levels. Respondents were asked for their willingness to participate in the study and Informed consent was obtained from all individual participants included in the study.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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