A Cross Sectional Study: Availability of Improved Sanitation Facilities and Associated Factors among Rural Communities in Lemo Woreda, Hadiya Zone, Southern Ethiopia

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Abstract

Background: Faecal-oral diseases represent the largest health burden associated with a lack of improved sanitation. Diarrhea is the most burdensome of these and accounting for over millions of deaths each year. Access to improved household sanitary facilities have great health benefits ranging from reductions in diarrhea, helmenth infections and trachoma through reduced risk of accidents and enhanced psycho-social well-being. Objective: This study was aimed at assessing the availability of improved sanitation facilities and factors affecting it among rural communities in Lemo Woreda of Hadiya zone in 2014. Methods: Community based cross-sectional study was conducted from March to April, 2014 in Lemo Woreda, Hadiya Zone. To draw a total sample of size 515, a multistage sampling technique was used. Heads of the households or their spouses were interviewed to collect data using structured, pretested questionnaire. Data were entered using Epi-Data version 3.1 and exported to SPSS version 16 for analysis. Binary logistic regression was used to predict variables which have independent association with outcome variables. Results: The findings of this study showed that 35.9% (95%CI: 30.9%, 40.9%) of the households included in the study had improved sanitation facilities. The likelihood of improved sanitation facility was 2.3 fold higher in households that had a higher income than those with lower income (AOR: 2.346 (1.483, 3.714)). The odds of having improved sanitation facilities was 6.5 folds higher in households headed by government employers/students as compared to households headed by farmers (AOR: 6.521, 95%CI: (2.216, 19.188)). Respondents who had sufficient knowledge on improved sanitation facilities were 1.6 times more likely to have improved sanitation facilities as those who had insufficient knowledge on improved sanitation facilities (AOR: 1.606, 95%CI: (1.022, 2.253)). Respondents who had positive attitude towards improved sanitation facilities were 2 times more likely to had improved sanitation facilities as those who had negative attitude towards improved

sanitation facilities (AOR: 1.989, 95%CI: (1.250, 3.165)). Conclusions: The findings of this study showed that 35.9% (95%CI: 30.9%, 40.9%) of the households included in the study had improved sanitation facilities. Income of the household, occupation of the respondents, knowledge and attitude of the respondents towards improved sanitation were the major factors affecting availability of improved sanitation facilities. Therefore, it is recommended that continuous education on improved sanitation facilities should be provided to rural communities and special attention should be given to farmers.

1. Introduction

Sanitation is a critical part of breaking the fecal-oral transmission route for many diarrheal and other illnesses [1]. Improved sanitation facilities refer excreta disposal facilities that can effectively prevent human, animal, and insect contact with excreta. Improved facilities range from simple but protected pit latrines to flush toilets with a sewerage connection [2]. Access to improved household sanitary facilities have great health benefits ranging from reductions in diarrhea, helmenth infections and trachoma through reduced risk of accidents and enhanced psycho-social well-being [3].

The right to safe water and adequate sanitation remains a promise unfulfilled for the world's poorest citizens [4]. The United Nations estimates that there are 2.5 billion people who still do not use an improved sanitation facility and a little over 1 billion practicing open defecation. Africa is lagging much to attain MDG goals in sanitation that aims to achieve improving coverage of 38% (in 2006) to a level of 66% (in 2015) [5].

In Ethiopia, a total of 81% of people in rural areas do not have access to improved sanitation facilities [6]. Such low coverage presented a major challenge to the Government and donors on how to scale up implementation at community level so as to ensure, the MDG target could be reached and the health status of the population improved [7].

Efforts to increase improved sanitation coverage have been limited due to lack of attention to the problem, as well as inadequate sanitation technologies and an incomplete understanding of the factors that influence sanitation choices in rural areas. Therefore, this study assessed the availability and identified factors which lead to low coverage of improved sanitation facilities. This enables concerned governmental and non governmental agencies and other concerned bodies who are working in water and sanitation program to design and implement possible interventions to alleviate human contact with excreta. The findings of the study will also be used as a baseline data for those who are in need of it for further study.

2. Methods

2.1. Study Design

A community-based cross-sectional quantitative study was conducted from April to May 2014 in Lemo Woreda rural communities. The Woreda has 33 rural kebeles (the lowest administrative unit in Ethiopia) and a total population of 144,244. Regarding health service distribution there are 7 health centers and 35 health posts in the woreda and 65 health extension workers.

Sample size was determined by Epi info version 7 using formula for single population proportion by considering 19% of improved sanitation facilities in rural Ethiopia [6]. Confidence level of 95%, design effect of 2 and 0.05 margin of error were taken in the calculation and adding 10% non-response rate, the final sample size was calculated to be 515.

Multi-stage sampling technique was used. Primary sampling units, 10 kebeles, were selected from total 33 rural kebeles in the Woreda with probability proportional to size sampling (PPS). The sample size, 515 households, was allocated to selected 10 kebeles with population proportion to size allocation. The secondary sam-

pling units, the households in the selected kebeles were selected by using systematic sampling technique. Intervals (K) for selecting households was determined by dividing the number of households with the sample size allocated for each kebele which is 20. After determining the sampling (K) interval, the first household was selected randomly. The next households were selected systematically by adding the sampling interval to the first selected household and so on.

The study variables were selected after reviewing relevant literatures based on the objective of the research and by considering the local context of the study area. The dependent variable was availability of improved sanitation facility. The independent variables were socio-demographic characteristics, behavioral, environmental and assistance related factors.

2.2. Data Collection and Analysis

A structured questionnaire was produced in English and translated from English to Hadiyissa language. The Hadiyissa version was again translated back to English to check for consistency of meaning by another translator. The interview techniques were employed for the respondents in the chosen households and observation was conducted to confirm some items. The respondents were the household heads or their spouses. Explanation was given on the purpose of the study and the importance of their involvement. Then respondents who volunteered were interviewed face-to-face using structured and pretested questionnaires. The data collectors were environmental health technicians (Diploma) who know and speak the local language. They were trained on objective of the study, method of data collection and discussed thoroughly on the tools prepared for data collection for two days. The supervisors were one environmental health officers (degree) and one master degree holder in tropical medicine and infectious diseases. During the training days explanation was given on the purpose of the study and discussion was also held on the tool designed for data collection, how to implement, potential problems that can arise and how to solve them. Pre-testing of data collection tool was made in rural kebeles other than the study area on 10% of sampled households and based on the results of pre-testing necessary adjustment to the data collection tool was made. Spot check was done on the field. Filled questionnaires were also checked daily. Data cleaning was done using SPSS version 16.0. Data were entered using Epi-Data version 3.1 and exported to SPSS version 16 for analysis. Descriptive statistics (Frequency, mean, standard deviation, and proportion) were calculated to summarize the findings. Results were presented by tables and graphs. For knowledge and attitude scale, the items were summed up to produce composite measure and mean score was calculated for each score. Binary logistic regression was used to predict variables which have independent association with outcome variables. Variables which have a significant association at p-value ≤ 0.25 in the bivariate analysis were taken to multivariate analysis to include all potential variables. Odds ratio, and 95% CI was used to check for the existence and strength of association between independent and outcome variables. p-value of less than 0.05 considered as statistical significant in the multivariate analysis.

2.3. Operational Definitions

Availability of improved sanitation facility: If the household has flush or pour/flush facility connected to a piped sewer system, pit latrine with a slab, ventilated improved pit latrine and composting toilet excluding any of these facilities that are shared between more than one household or are public facilities.

Income: For rural study participant calculated in kind; the crop, cattle owned over a year 7 months was changed in to monetary forms. The individual respondents income was compared with the median ($\geq$median or <median).

Knowledge: Respondents were asked knowledge related questions and right answer was given a value of 1 and for those incorrect answers a value of 0 was given. Then, total score was computed by summing up all the items together. The respondents score was dichotomized as sufficient knowledge or insufficient knowledge.

- Sufficient Knowledge $\geq$ Mean
- Insufficient Knowledge < Mean

Attitude: Respondents were asked attitude related questions on five point likert scale ranged from strongly disagree to strongly agree. After computing respondent's score on likert scale, each respondent was dichotomized as had positive attitude or negative attitude.

- Positive Attitude > Mean

- Negative Attitude < Mean

Access to water supply: The water source is within one kilometer/30-minute round trip.

2.4. Ethical Consideration

Ethical approval and clearance was obtained from Jimma University medical and public health college Review Board Committee. Permission letter was also obtained from Lemo Woreda Health Office. To collect data from participants, explanation was given on the purpose of the study, the importance of their participation and true response. It was also explained that the study has no connection with individual affairs of respondents. Confidentiality of all data collected was kept. All sample populations were encouraged to participate in the study while at the same time they were told their right not to participate.

3. Results

3.1. Socio-Demographic Characteristics

From 515 sampled households, a total of 473 households were included in the study with a response rate of 92%. The respondents were either the heads of the households or their spouses.Majority of households 298 (63%) were headed by husbands and 363 (76.7%) of the respondents were married. Based on the findings; minimum, mean and maximum ages in years of the respondents were 18, 40.7 and 90 respectively with SD of 12.4. The average family size was 7 with in household. The minimum family size was 2 and the maximum was 15 with SD of 2.5. The median family income per month of the households was 533 Ethiopian birr. 163 (34.5%) of the respondents attended primary education and 310 (65.5%) were farmers (**Table 1**).

Table 1. Shows socio-demographic characteristics of the respondents, Lemo Woreda rural communities, April 2014 (N = 473).

Variables	Total (N and %), N = 473
Head of household	
Husband	298 (63%)
Wife	149 (31.5%)
Others	26 (5.5%)
Sex of household head	
Male	315 (66.6%)
Female	158 (33.4%)
Marital status	
Married	363 (76.7%)
Single	31 (6.6%)
Divorced	15 (3.2%)
Widowed	64 (13.5%)
Occupation	
Farmers	310 (65.5%)
Daily laborers/merchants	112 (23.7%)
Others[*]	51 (10.8%)
Educational status	
No formal education	141 (29.8%)
Primary (1 - 8)	163 (34.5%)
Secondary (9 - 12)	126 (26.6%)
More than secondary education	43 (9.1%)
Average monthly income	
<533	237 (50.1%)
≥533	236 (49.9%)

[*]Others: Government employers/students.

3.2. Availability of Improved Sanitation Facilities

From households included in this study, 170 (35.9%) with 95%CI: (30.9, 40.9) had improved sanitation facilities. All the available sanitation facilities were 253 (53.5%) pit latrine without slab/open pit, 164 (34.7%) pit latrine with slab, 18 (3.8%) ventilated pit latrine and 38 (8%) did not have any facility and use bush/field. From those households who had latrine, 21 (4.4%) shared the existing facilities with average of 2 households.

3.3. Behavioral Factors

From the participants included in this study, 82.2% of the respondents heard about improved sanitation facilities from different sources. With respect to knowledge on improved sanitation facilities, 60.5% of the respondents had sufficient knowledge on improved sanitation facilities. From the respondents, 350 (90%) knew the presence of different options of improved sanitation facilities and 299 (85.4%) of them knew pit latrine with slab. From the respondents, 359 (92.3%) knew diseases that can be transmitted due to lack of improved sanitation facilities. As the source of information, 245 (63.0%) heard mainly from health professionals. Out of 473 respondents, 250 (52.9%) had positive attitude towards improved sanitation facilities (**Table 2**).

3.4. Environmental Factors

Out of the households, 208 (44%) had access to water supply but more than half of the households 265 (56%) did not have access to water supply, that means, they spent more than 30 minutes or travelled greater than 1 km round trip to get water. Regarding the distance of the houses from the main town (Hossana town), nearly half of the houses 266 (56.2%) were located near to the main town and 207 (43.8%) of the houses were located far from the main town. Out of the households, 380 (80.3%) never faced flood problem but 93 (19.7%) faced flood problem.

3.5. Assistance Related Factors

Concerning health extension workers supervision per month, more than half 293 (61.9%) of the total households included in this study were visited 1 - 2 times per month and 40 (8.5%) visited ≥3 times but 140 (29.6%) of the households were never visited by health professional per month. Out of the 473 respondents, 200 (42.3%) of them complained that they didn't get skilled masons when they want to construct/maintain the sanitary facilities. Out of the total households included in this study, 200 (42.3%) replied availability of funding agencies for sanitation at household level. Out of these, 157 (78.5%) were funded by government and 43 (21.5%) by non-governmental organizations.

3.6. Factors Associated with Availability of Improved Sanitation Facilities

Selected variables that were significantly associated at the bivariate analysis were further examined in the logistic regression to see their relative effects on the availability of improved sanitation facilities.

Result of bivariate analysis showed that educational status ($p < 0.001$), occupation ($p < 0.001$), average monthly income ($p < 0.001$), knowledge ($p < 0.005$), attitude of the respondents towards improved sanitation facilities ($p < 0.05$), health professionals supervision per month ($p < 0.05$), availability of skilled masons ($p = 0.001$), presence of funding for sanitation ($p < 0.05$) were identified as candidates for multivariate analysis at p-value < 0.05, while access to water supply was identified as candidate for multivariate analysis at p-value ≤ 0.25 in bivariate analysis.

In multivariate logistic regression analysis average monthly income of the household, occupation of respondents, knowledge on improved sanitation facilities and attitude towards improved sanitation facilities were significantly associated with availability of improved sanitation facilities (**Table 3**).

Households who had average monthly income of ≥533 Ethiopian birr per month were 2.3 times more likely to had improved sanitation facilities as households who had average monthly income of <533 Ethiopian birr per month (AOR: 2.346, 95%CI: (1.483, 3.714)).

The odds of having improved sanitation facilities was 6.5 folds higher in households headed by government employers/students as compared to households headed by farmers (AOR: 6.521, 95%CI: (2.216, 19.188)).

Respondents who had sufficient knowledge on improved sanitation facilities were 1.6 times more likely to

Table 2. It shows behavioural factors, Lemo Woreda rural communities, April 2014.

Variables	Total (N and %), N = 473
Knowledge	
Insufficient knowledge	187 (39.5%)
Sufficient knowledge	286 (60.5%)
Heard about improved sanitation facilities	
No	84 (17.8%)
Yes	389 (82.2%)
Source of information(n = 389)	
Health professionals	245 (63.0%)
Mass media	120 (30.8%)
Neighborhoods	24 (6.2%)
Knew the presence of different options of improved sanitation facilities	
No	39 (10%)
Yes	350 (90%)
Types of improved sanitation facilities respondents knew[*]	
Flush or pour/flush connected to sewer system	50 (14.3%)
Pit latrine with slab	299 (85.4%)
Compositing latrine	46 (13.1%)
Ventilated improved pit latrine	151 (43.1%)
Others/biogas	1 (0.3%)
Advantages of improved sanitation facilities[*]	
Prevent disease transmission	375 (96.4%)
Prevents environmental pollution	227 (58.4%)
Has economic benefits	220 (56.6%)
Has aesthetic values	265 (68.1%)
Knew diseases transmitted	
No	30 (7.7%)
Yes	359 (92.3%)
Diseases mentioned[*]	
Diarrhea	178 (49.6%)
Typhoid fever	257 (71.6%)
Cholera	221 (61.6%)
Trachoma	187 (52.1%)
Attitude	
Negative attitude	223 (47.1%)
Positive attitude	250 (52.9%)

[*]More than one possible answer was used.

Table 3. The main factors associated with the availability of improved sanitation facilities, Lemo Woreda rural communities, April 2014.

Variable	Availability of improved sanitation facilities N (%)		Odds ratio at 95%CI	
	No	Yes	Crude	Adjusted
Occupation				
Farmers	222 (71.6%)	88 (28.4%)	1	1
Daily laborers/merchants	68 (60.7%)	44 (39.3%)	1.632 (1.038, 2.566)[**]	1.579 (0.921, 2.707)
Others	13 (25.5%)	38 (74.5%)	7.374 (3.749, 14.504)[*]	6.531 (2.216, 19.188)[*]
Average monthly income				
≥533	124 (52.5%)	112 (47.5%)	2.788 (1.885, 4.122)[*]	2.346 (1.483, 3.714)[*]
<533	179 (75.5%)	58 (24.5%)	1	1
Knowledge on improved sanitation facilities				
Sufficient knowledge	168 (58.7%)	118 (41.3%)	1.823 (1.226, 2.713)[**]	1.606 (1.022, 2.523)[**]
Insufficient knowledge	135 (72.2%)	52 (27.8%)	1	1
Attitude towards improved sanitation facilities				
Positive attitude	147 (58.8%)	103 (41.2%)	1.631 (1.114, 2.389)[**]	1.989 (1.250, 3.165)[**]
Negative attitude	158 (70%)	67 (30%)	1	1

Significant at [*]$p \leq 0.001$; [**]$p < 0.05$.

had improved sanitation facilities as those who had insufficient knowledge on improved sanitation facilities (AOR: 1.606, 95%CI: (1.022, 2.253)).

Respondents who had positive attitude towards improved sanitation facilities were about 2 times more likely to had improved sanitation facilities as those who had negative attitude towards improved sanitation facilities (AOR: 1.989, 95%CI: (1.250, 3.165)).

4. Discussion

The findings of this study revealed that, based on WHO/UNICEF JMP criteria, the availability of improved sanitation facilities was about 35.9% (95%CI: 30.9%, 40.9%) which is lower than the report in rural Bangladesh (52%) [8] and Mtwara Rural District of Tanzania (50.5%) [9]. However, it was higher than the report by WHO/ UNICEF Joint Monitoring program on rural population of sub Saharan which stated in 2010 only 24% of the rural population in sub-Saharan Africa used an improved sanitation facility and Ethiopia in 2013 which was 19% of the rural population used improved sanitation facilities [2] [6]. It was also higher than the Ethiopian health and demographic survey report of 2011 which is 7% [10]. This may be due to the application of total sanitation principles by the Ethiopian government at different districts of the country.

The likelihood of improved sanitation facility was 2 times higher in households that had a higher income than those with lower income. This finding is in line with the results of a study conducted in rural communities in the District of Bahir Dar Zuria, Ethiopia, which was 1.5 fold higher in households who had higher income than those who had lower income [11]. The result is also near to the findings of studies conducted in Mtwara Rural District of Tanzania and rural Bangladesh [8] [9].

The odds of having improved sanitation facilities was 6.5 folds higher in households headed by government employers/students as compared to households headed by farmers. But, study conducted in Kenya showed that there was no significant association between occupation of the household head and the kind of sanitation facilities used by the households.

The odds of having improved sanitation facilities was 1.8 times higher in respondents who had sufficient knowledge on improved sanitation facilities as compared to households who had insufficient knowledge. This finding is in line with the results of a study done in rural households of Alaba District, Southern Ethiopia which revealed knowledge on sanitation and hygiene components has significant and positive relationship with owning safe excreta disposal facilities which accounts for 57.4% [12].

The attitude of the respondents was also associated with the availability improved sanitation facilities. Respondents who had positive attitude towards improved sanitation facilities were 1.6 times more likely to had improved sanitation facilities as those who had negative attitude towards improved sanitation facilities. The finding is similar with water aid report of 2009 in four West African countries—Burkina Faso, Ghana, Mali, and Nigeria and result of study done in Mubende district of Uganda [13] [14]. Attitude of the people towards sanitation is also known to have motivating or de-motivating effect on having sanitation facilities [15].

The multivariate analysis of this study revealed that educational status of the respondents did not have any independent statistically significant association with availability of improved sanitation facilities. However, study done in Indonesia revealed that a household that is headed by a person who has graduated from secondary school or higher is three times more likely to have improved sanitation facility compared to that headed by a person who has graduated from primary school or lower [16]. The study conducted in Indonesia used secondary data where as this study was community based and used primary data which might bring the discrepancy.

In the findings of this study the availability of skilled masons and the presence of funding for sanitation had no significant association with the availability of improved sanitation facilities. The finding was similar with the study done in Kenya which showed most households that own sanitary facilities were not provided with any external assistance [17]. Contrary to this finding, concerning the presence of funding for sanitation, study conducted in Rural Cambodia showed that in the subsidized households 93% of latrines fall in the category of improved latrines but in the non-subsidized only 77% of the latrines are improved types [18]. Another study done in Select African Nations, 2005-2008 also showed that low sanitation coverage level may be a result of the lack of funding sanitation projects receives worldwide [19]. This difference might be due to Households already spent comparatively large sums of money on sanitation facilities.

This study also showed health extension workers supervision did not have significant association with the availability of improved sanitation facilities. Contrary, the results of a study conducted in rural Bangladesh showed that Households that reported having been exposed to a follow up program were more likely to have an improved or shared latrine compared to those that did not receive a follow-up program. Similarly, a study conducted in Indonesia revealed that households that were visited by someone who advised them on latrine use were slightly more likely to have an improved or shared latrine compared to those who did not report receiving a visit [8] [16].

5. Limitations

Some of the data like income, availability of funding for sanitation at household level and the presence of masons in the area were based on interviews response. Shortage of literature addressing the research questions was also a limiting factor to discuss the findings.

6. Conclusion

The findings of this study showed that 35.9% (95%CI: 30.9%, 40.9%) of the households in the rural communities of Lemo Woreda had improved sanitation facilities. Income of the household, occupation of the respondents, knowledge on improved sanitation facilities and attitude of the respondents towards improved sanitation were the major factors affecting availability of improved sanitation facilities. From this study, it was concluded that Even though there is encouraging improvement, the availability of improved sanitation facilities are still believed to be low in rural Ethiopia in spite of the introduction of various interventions programs. Therefore, it is recommended that continuous education on improved sanitation facilities should be provided to rural communities and special attention be given to farmers.

Competing Interests

The authors declare that they have no competing interests.

Authors' Contributions

Tadele Yohannes contributed to proposal development, pre-testing the questionnaires, supervising the data collectors, data entry, data cleaning, data analysis, and manuscript preparation. Abdulalik Workicho and Henok Asefa have contributed to proposal development, data analysis and manuscript preparation. All authors have read and

approved the final manuscript.

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Abbreviations

AOR: Adjusted Odds Ratio
JMP: Joint Monitoring Programme
MDG: Millennium Development Goal
SPSS: Statistical Package for Social Science
UNICEF: United Nations Children Fund
WHO: World Health Organization