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Original Research Article

A Community-Based Cross-Sectional Study on Latrine Utilization and Associated Factors Among Rural Community of East Meskan District, Gurage Zone, Southern Ethiopia

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Abstract

Background: Using sanitary facilities is proven to enhance health and halt the spread of fecal-to-oral disease. Despite efforts to improve the availability of latrine facilities in developing countries like Ethiopia, finding a village that is entirely free of open defecation remains difficult. To determine the need for intervention programs and promote regular latrine usage, local data is essential.

Objectives: This study aimed to assess latrine utilization and associated factors among households in East Meskan District, Southern Ethiopia.

Methods: A community-based cross-sectional study was conducted among 630 households from April 15 to May 30, 2022. A simple random sampling technique was used to select the study households. Data were collected using an interviewer-administered structured questionnaire and an observational checklist. The collected data were then entered into Epi-Info version 7.1 and analyzed using SPSS version 21. In binary logistic regression analysis, independent variables with a *P*-value < .25 were considered candidates for multiple logistic regression analysis. The association was expressed in odds ratio with a 95% confidence interval (CI), and significance was declared at *P*-value < .05 in the final model.

Results: The magnitude of latrine utilization was 73.3% (95% CI: 69.7, 76.8) in the study district. Husband being family head (adjusted odds ratio [AOR] = 12.9; 95% CI: 5.78 ,28.90), being female (AOR = 16.4; 95% CI: 6.52, 41.27), family size less than 5 (AOR = 24.2; 95% CI: 11.49, 51.09), absence of school children (AOR = 0.3; 95% CI: 0.13, 0.51), and greater than 2 years since latrine was constructed (AOR = 14; 95% CI: 7.18, 27.41) had a significant association with latrine utilization.

Conclusion: In this study, utilization of latrines was low compared to the national target plan. Family head, sex, family size, presence of school children, and length of years in which the latrine was constructed were factors associated with latrine utilization. Thus, regular supervision of early latrine construction and utilization in communities is essential.

Keywords

latrine utilization, East Meskan district, Gurage zone, rural community, Ethiopia

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Background

Latrines are excreta disposal facilities that can safely separate human excreta from human and insect contact. The use of sanitation facilities is known to halt the spread of fecal-to-oral disease. In addition to their physical presence, effective sanitation facility utilization enhances health (Tamene & Afework, 2021).

More than 2.5 billion people worldwide lack access to sanitation and hygienic facilities, particularly in South Asia

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and Sub-Saharan Africa (SSA) have the highest percentages of these people. Diseases attributed to inadequate water, sanitation, and hygiene account for more than 4% of all disease burdens and deaths (Abebe et al., 2020; Garn et al., 2017). In SSA countries like Ethiopia, 76% of the rural population did not have access to proper sanitary facilities, and a high burden of diarrheal infections existed (Nunbogu et al., 2019). The percentage of households with latrine facilities increased nationwide from 55% in 2011 to 61% in 2016, according to the Ethiopian Demographic and Health Surveys (EDHS) report. In rural areas, 59% of families utilize unimproved toilet facilities (Girma et al., 2018; Tamene & Afework, 2021). The progress, however, fell far short of the national target, which was set at 100% (Gebremariam & Tsehaye, 2019).

According to the World Health Organization (WHO), 1.5 million children die each year from diarrhea, which is caused by a combination of poor sanitation and poor personal hygiene (Farah et al., 2015). In developing nations, 88% of all deaths from diarrheal diseases are caused by inadequate access to sanitation, the use of contaminated drinking water, and poor hygiene combined. Improvements in sanitation alone, according to sanitation and health experts, have the potential to reduce parasite infections that harm children's development and the global prevalence of diarrheal disease, which is a primary cause of death for children, by one-third (Beyene et al., 2015; Islam et al., 2018). Because of inadequate sanitation, 15% of all fatalities result from diarrhea, primarily among a large number of children under the age of five. In addition to diarrheal illnesses, worm infestations are very common and significantly increase malnutrition levels (Godana & Mengistie, 2017; Ssekamatte et al., 2019).

Review of Literature

The combined global economic loss in 2015 attributed to early deaths connected to sanitation, medical costs for diseases related to sanitation, output lost due to illness, and time lost to use sanitation facilities was projected to be 222.9 billion dollars (Godana & Mengistie, 2017; Nyanza et al., 2018; Tamene & Afework, 2021).

Studies conducted in several regions of Ethiopia to evaluate latrine utilization and associated factors indicated that the prevalence of latrine utilization is unsatisfactory and ranges from 60% to 71% in various settings (Asnake & Adane, 2020; Koyra et al., 2017). The use of latrines can be affected by a range of behavioral, cultural, social, geographic, and economic factors differing across communities (Leshargie et al., 2018).

Despite years of effort to increase the availability of latrine facilities, it is still difficult to find a village that is completely free from open defecation. The country's report points out a large discrepancy between the availability and utilization of latrine facilities in rural communities (Beyene et al., 2015). It is necessary to conduct such studies because the government's regular report on both latrine coverage and utilization has indicated a gap between what is real and what is desired. Open defecation and unsafe excreta disposal continue to be widespread in the study area, with major public health and economic consequences. Data on the utilization of latrines is still inadequate. Therefore, this study aimed to assess the utilization of latrine facilities and identify the associated factors that are helpful strategies to fill the identified gaps. Moreover, the findings of this study will help the health sectors at different levels, communities, and local decision-makers for health intervention programs with a view of adding to the existing body of knowledge to improve sanitation facilities in the study area in particular and reduce open defecation through different strategies.

Methods

Design

A community-based cross-sectional study was conducted from April 15 to May 30, 2022. East Meskan district is located 155 kilometers southeast of Addis Ababa, 90 kilometers east of Wolkite town, the administrative center of the Gurage zone, and 20 kilometers east of Butajira town. In 2021, the district administration office reports a total population of approximately 67,891 people, 34,624 females, and 33,267 males. The district has 15 *kebeles (a small administrative unit in Ethiopia)*, (one urban and 14 rural), and the total number of households is 13,855. There are three health centers and 14 health posts in the district. The current study was conducted on seven rural *kebeles* namely Elle, Bati Legano, Waja Bati, Bati futo, Ensenousme, Bamo, and Yemrwach.

Research Questions

1. What is the magnitude of latrine utilization and associated factors among the rural community of East Meskan District, Gurage Zone, Southern Ethiopia?
2. What are the factors that are associated with latrine utilization and associated factors among the rural community of East Meskan District, Gurage Zone, Southern Ethiopia?

Sample

An independent sample size was calculated for the two specific objectives of the current study and the largest sample was taken. The largest sample size was the one calculated using the single population proportion formula with the following assumptions: Based on a similar study done in Chencha District, SNNPR state where 60% of rural communities utilized latrines (Koyra et al., 2017), with margin of error of 4% at the 95% confidence level, and with a 10%

non-response rate, thus the total sample size required is 640 households.

Using a simple random sampling technique, seven *kebeles* were chosen at random from a total of 14 *kebeles*. Each of the selected *kebeles* received a consecutive sample size based on a proportional allocation to household number. Following that, study households were chosen from each selected *kebele* using simple random sampling from lists of households obtained from each *kebele* office executed via the lottery method. The household heads were then interviewed in the selected households, and observations were made (Figure 1).

Inclusion/Exclusion Criteria

The study populations were all households that have latrines in the selected *kebeles* of East Meskan District. Household heads that had lived for more than 6 months were included in the study. Members of each household who were less than 18 years old during the data collection period were excluded as study participants.

Data Collection

The data were collected by using an interviewer-administered structured questionnaire and observational checklist, which were developed after reviewing previous studies and different literature (Asnake & Adane, 2020; Beyene et al., 2015). The questionnaire was initially prepared in English then translated into Amharic and then translated back into English by different experienced persons to check the consistency of meaning. Data were collected by seven diploma nurses and supervised by two BSc Environmental Health professionals. The questionnaires were pre-tested on 5% of the total sample size of the study households in non-selected Beche bulchano *kebele* to ensure consistency in terms of easy understandability, coherence, and completeness to households. Data collectors and supervisors received one-day training on the data collection process. Supervisors reviewed and checked the collected data every day for completeness and consistency.

Study Variables

In the present study, the dependent variable is latrine utilization, and the independent variables are age, sex, religion, ethnicity, occupational status, educational status, marital status, average, monthly income, family size, presence of under-five children, and presence of schoolchildren.

Operational Definitions

Latrine utilization: Households with functioning latrines of any design must exhibit at least these indicators of use: a functional footpath to the toilet or pavement covered in grass, the presence of fresh feces near the squat hole, the absence of a spider web in the gate, wetness of the slab, visible anal cleansing materials, and the presence of flies (Asnake & Adane, 2020; Omer et al., 2022).

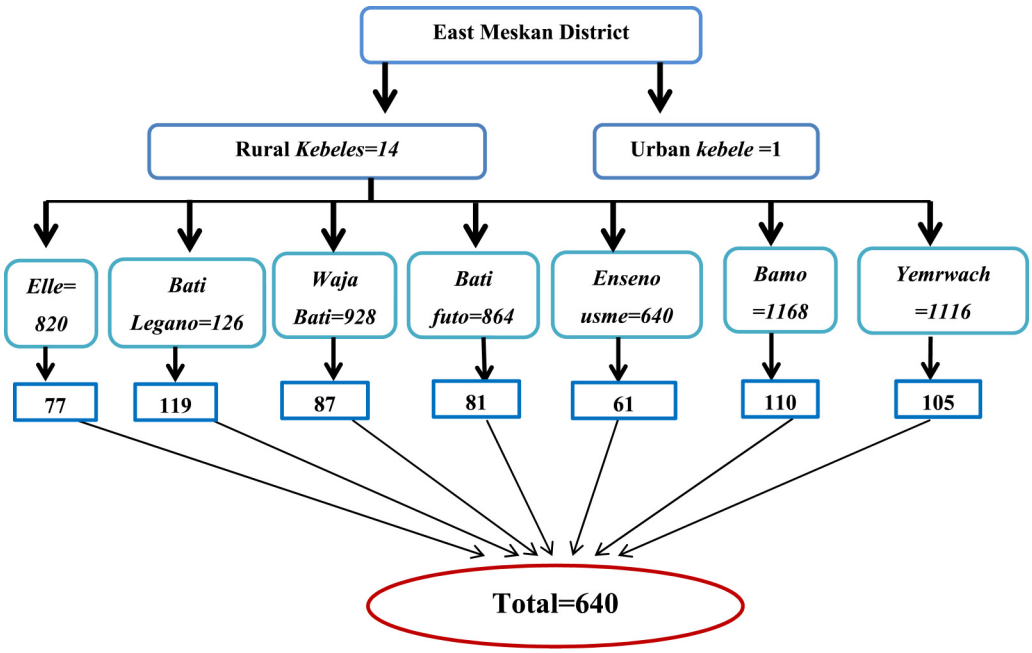


Figure 1. Schematic presentation of sampling procedure to assess latrine utilization and associated factors in East Meskan district Gurage zone, Southern, Ethiopia, 2022.

School children: Refers to whether there are any children in the household who are enrolled in formal education at the elementary school level or higher (Woyessa et al., 2022).

Latrine maintenance: Maintaining the existing functional latrine in case of broken sub or superstructures without digging a new hole (Koyra et al., 2017).

Shared latrines: Sanitation facilities shared between two or more households. Shared facilities include public toilets.

Statistical Analysis

The collected data were entered into Epi-Info version 7 and then exported to SPSS version 21 for analysis. Before analysis, data processing activities such as cleaning and coding were performed. Normality for continuous variables was checked using the Shapiro–Wilk test. Descriptive statistics were used to determine the magnitude of latrine utilization. Binary logistic regression was used to model the relationship between the dependent variable and the independent variable. The statistical assumptions for binary logistic regression (adequacy of sample in each cross-tabulated result, expected count in each cell) were assessed, and multi-collinearity was checked using variation inflation factor (VIF) at VIF > 10 indicating the presence of multi-collinearity. Simple logistic regression analysis was used to identify independent variables with a *P*-value < .25 considered a candidate for the multiple logistic regression analysis. Multiple logistic regression was applied to estimate the effects of independent variables on latrine utilization after adjusting for the effects of possible confounding effects. The regression model was fitted using the standard model-building approach. In the process of fitting the model, variables that didn't have a significant association with latrine utilization at *P*-value < .05 were excluded from the model. The odds of latrine utilization were estimated using an adjusted odds ratio (AOR) with 95% confidence intervals (CIs). At this level, the significance of associations was declared at a *P*-value of .05. The model fitness test was checked by the Hosmer and Lemeshow goodness of fit test at *P*-value ≥ .05.

Results

Socio-Demographic Characteristics

In this study, a total of 630 households participated, giving a 98.4% response rate. Of these 504 (80%) respondents were female, 546 (86%) respondents were Gurage by ethnicity, and 567 (89.4%) respondents were Muslim. Regarding marital status, 589 (89%) of respondents were married. The study showed that a family size less than 5 was 357 (56.7%) and 420 (66%) of households have under-five children. About 301 (47.6%) of heads of household were farmers and 357 (56.7%) of them were unable to read and write (Table 1).

Table 1. Socio-Demographic Characteristics of Respondents in a Rural Community of East Meskan District, 2022 ($n = 630$).

Variable	Frequency	Percent
Head of the family		
Husband	568	90.2
Wife	62	9.8
Sex of respondent		
Male	126	20.0
Female	504	80.0
Age in years		
20–30	88	13.9
31–40	168	26.5
41–50	231	36.4
Above 50	143	23.2
Religion		
Muslim	567	90.0
Orthodox	63	10.0
Ethnicity		
Oromo	41	6.6
Amhara	43	6.7
Gurage	546	86.7
Occupational status		
Housewife	147	23.3
Daily laborer	20	3.2
Farmer	301	47.8
Government employee	23	3.6
Merchant	139	22.1
Educational status		
Unable to read and write	357	56.7
Primary education (1st–4th)	168	26.7
Elementary (5th–8th)	84	13.3
High school education (9th–12th)	21	3.3
Marital status		
Married	589	93.5
Single	11	1.7
Widowed	21	3.3
Divorced	9	1.4
Average monthly income of HHs in ETB		
<2,000	63	10.0
2,000–3,000	126	20.0
3,001–4,000	251	40
4,001–5,000	168	26.7
>5,000	22	3.4
Family size		
Less than 5	357	56.7
Greater and equal to 5	273	43.3
Presence of under-five children		
Yes	420	66.7
No	210	33.3
Presence of schoolchildren		
Yes	504	80.0
No	126	20.0

Note. HHs = households; ETB = Ethiopian birr.

Behavioral Factors

Five hundred and forty-six (86.7%) of the respondents who had latrines explained that they were advised by health

extension workers to construct latrines. All 100% of respondents explained that the importance of having a latrine is to prevent disease and to keep a clean village. In this study, 323 (70%) respondents washed their hands after using the latrine and 267 (82.8%) of them washed their hands after using the latrine with only water (Table 2).

Characteristics of Latrine Facilities

Among the household latrines, 441 (70%) of them needed maintenance. Latrine superstructures made of wood and plastic accounted for 231 (36.7%), while wood and cloth accounted for 169 (26.8%). A total of 567 latrines (90%) were privately owned, 441 (70%) of latrines had a door and in 147 (23.3%) of latrines, feces were observed on the floor. 525 (83.3%) had been more than two years since the construction of the latrine (Table 3).

Research Question Results

Latrine Utilization. The result of this study showed that the magnitude of latrine utilization among the East Meskan district rural community was 73.3% (95% CI: 69.7, 76) (Figure 2). Of those who did not practice latrine utilization 105 (62.5%) participants claimed that the unreasonable unpleasant odor was their reason (Figure 3).

Factors Associated with Latrine Utilization. Family head, sex, occupation, educational status, family size, under-five children, presence of school children, privately owned latrine, the component of latrine, years since latrine was constructed, and status of latrine were the variables that fulfilled the criteria $P < .25$ and transferred to multivariable analysis. After adjusting for confounder variables in the multivariable analysis, family head, sex of respondent, family size, presence of school children, and years since the latrine was constructed were significantly associated with latrine utilization.

Accordingly, in the multivariable analysis respondents with a family head being a husband were 12.9 (AOR = 12.9, 95% CI: 5.78, 28.90) times more likely to utilize a latrine than a family head being a wife. Regarding the sex of respondents, females were 16.4 (AOR = 16.4, 95% CI: 6.52, 41.27) times more likely to utilize latrines than males. Regarding family size, those households who had a family size of less than five were 24 (AOR = 24.2, 95% CI: 11.49, 51.09) times more likely to utilize a latrine than a family size more than and equal to five. Households who do not have school children were 70% (AOR = 0.3, 95% CI: 0.13, 0.51) less likely to utilize a latrine than Households who have school children. Households with more than two years since the construction of the latrine were 14 (AOR = 14, 95% CI: 7.18, 27.41) times more likely to utilize a latrine than those who constructed their latrine less than or equal to two years (Table 4).

Table 2. Behavioral Factors of the Rural Households in East Meskan District 2022 ($n = 630$).

Variable	Frequency	Percent
Initiation to construct a latrine		
Advice from a health extension worker	546	86.7
Self-initiation	84	13.3
Importance of having a latrine *(multiple answers allowed)*		
To keep a clean village	630	100
For privacy	201	31.9
Be free from odor	48	7.6
Prevent disease	630	100
Hand washing after using a latrine ($n = 462$)		
Yes	323	70.0
No	139	30.0
Materials used for hand washing ($n = 323$)		
Soap and water	56	17.5
Water only	267	82.8

Table 3. Characteristics of Latrine Facilities in Rural Households of East Meskan District, 2022 ($n = 630$).

Variable	Frequency	Percent
Condition of latrine superstructure		
Wood plastered with mud	126	20.0
Wood and plastic	231	36.7
Wood and grass/leave	84	13.3
Corrugated iron	20	3.2
Wood and cloth	169	26.8
Status of latrine		
Maintained	189	30.0
Needs maintenance	441	70.0
Owned latrine		
Shared	63	10.0
Privately owned	567	90.0
Presence of door		
No	189	30.0
Yes	441	70.0
Feces observed on the floor		
No	483	76.7
Yes	147	23.3
Availability of hand washing facility		
No	504	80.0
Yes	126	20.0
Years since the latrine had been constructed		
Less than 1 year	21	3.3
1–2 years	84	13.4
More than 2 years	525	83.3
Distance of latrine from the dwelling/kitchen		
Less than 6 meters	127	20.2
6–10 meters	356	56.5
Greater than 10 meters	147	23.3

Discussion

The main objective of this study was to assess the level of latrine utilization and its associated factors in the East Meskan District. Accordingly, the present study revealed that the level of latrine utilization in the community of the study area was 73.3% [(95% CI: 69.6–76.97)]. This study's findings were higher than those of Chencha District (60%) (Koyra et al., 2017), Dembia District (61.2%) (Yimam et al., 2014), and Aneded District (63%) in North West Ethiopia (Chanie et al., 2016). However, it was lower than the finding in Derashe District (88.7%) (Godana & Mengistie, 2017), Mahal Meda (91.2%) (Abebe et al., 2020), and a report from the rural village of Vietnam (79.2%) (Le & Makarchev, 2020).

This variation could be explained by the fact that the study population of these areas could have socioeconomic and cultural differences and may also be due to sample size and study period differences. The relatively higher prevalence of latrine utilization could be attributed to the fact that the majority of residents in this area are Muslim; Muslims in general have extremely high personal hygiene standards, as Islam places a high value on both physical and spiritual cleanliness and purification. While humankind in general usually considers cleanliness to be a pleasing attribute, Islam insists on it.

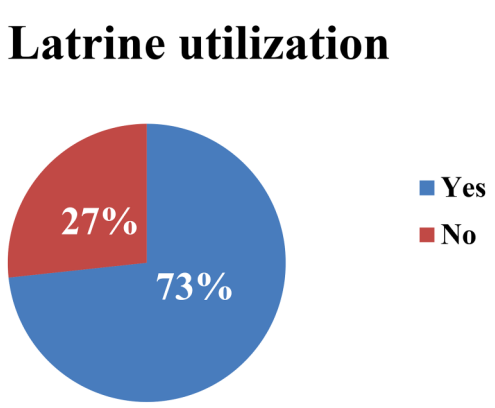


Figure 2. Latrine utilization in a rural community of East Meskan district, Gurage zone, Southern, Ethiopia, 2022.

The study revealed that respondents with the head of the family being the husband were 12.9 times more likely to utilize a latrine compared to the head of the family the wife. The result was supported by a similar study conducted in a rural village in Vietnam (Le & Makarchev, 2020). The reason could be that in many female-headed households, low income combined with a lack of technical expertise or physical ability to dig soil and erect latrines severely limits the sanitation options available to them.

According to this study, females were 16.4 times more likely to utilize a latrine than males. This could be because many of the men and a few of the women work in their farm fields from dawn to dusk. For many, the lack of community-level public latrines near their farms encouraged open defecation. They do not return to their residence to use the latrine when they are on the farm because it is too far away.

Households with a family size of less than five were 24 times more likely to utilize a latrine than households with a family size greater and equal to five. This result was supported by a similar study conducted in semi-urban areas of northeastern Ethiopia (Asnake & Adane, 2020). This could be because the family size is too large, and if there aren't enough squat holes, the chances of finding a latrine that isn't already occupied by another member decrease. Sharing a latrine among a small number of family size

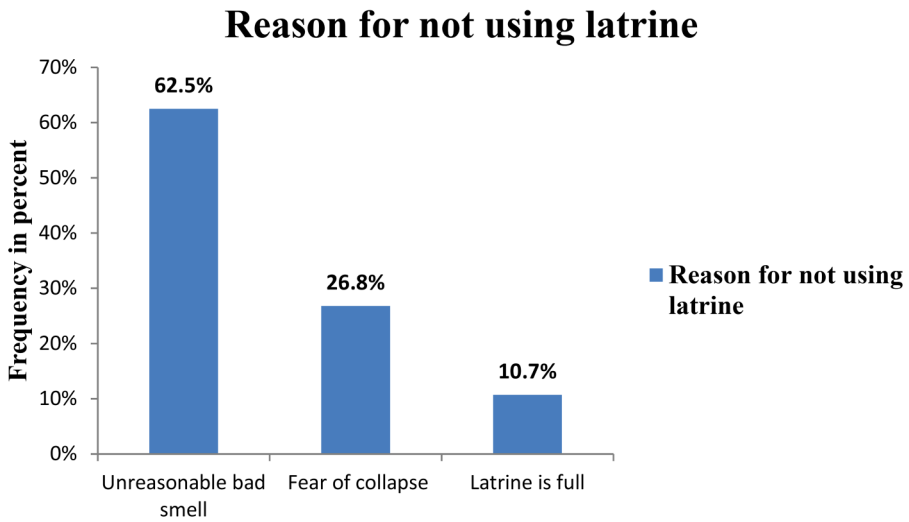


Figure 3. Study participant's reasons for not practicing latrine utilization in a rural community of East Meskan district, Gurage zone, Southern, Ethiopia, 2022 ($n = 168$).

Table 4. Factors Associated with Latrine Utilization in a Rural Community of East Meskan District, 2022.

Variable	Category	Latrine utilization		COR (95% CI)	AOR (95% CI)
		Yes (%)	No (%)		
Family head	Husband	441 (77.6)	127 (22.4)	6.8 (3.87, 11.89)*	12.9 (5.78, 28.90)**
	Wife	21 (33.9)	41 (66.1)	1	1
Sex of respondent	Male	63 (50.0)	63 (50.0)	1	1
	Female	399 (79.2)	105 (20.8)	3.8 (2.52, 5.73)*	16.4 (6.52, 41.27)**
Family size	<5	315 (88.2)	42 (11.8)	6.4 (4.31, 9.59)*	24.2 (11.49, 51.09)**
	≥5	147 (53.8)	126 (46.6)	1	1
Presence of school children	Yes	378 (75)	126 (25)	1	1
	No	84 (66.7)	42 (33.3)	0.66 (0.98, 2.29)*	0.3 (0.13, 0.51)**
Years since latrine constructed	≤2	21 (20.0)	84 (80.0)	1	1
	>2	441 (84.0)	84 (16.0)	21 (12.34, 35.75)*	14 (7.18, 27.41)**
Privately owned latrine	Yes	420 (74.1)	147 (25.9)	1.4 (0.82, 2.49)	0.4 (0.13, 1.04)
	No	43 (68.25)	20 (31.75)	1	1
Status of latrine	Maintained	169 (89.0)	20 (11.0)	4 (2.44, 6.56)*	0.5 (0.24, 1.16)
	Need maintenance	295 (67.2)	146 (32.8)	1	1

Abbreviations: COR = crude odds ratio; CI = confidence interval; AOR = adjusted odds ratio.
Note. *Significant at *P*-value < .25 in unadjusted logistic regression analysis, **significant at $P < .05$ in adjusted logistic regression analysis, 1 = Reference.

results in less frequent latrine usage, which increases the chance of the latrine being cleaner, this in turn increases latrine utilization. Sharing a latrine with a large family, on the other hand, increases the number of times the latrine is used daily and puts a person's sense of responsibility to use the latrine properly in danger, resulting in the latrine being dirty, which may decrease latrine utilization. Furthermore, because latrines in rural areas are built at a shallow depth, they will be out of service sooner (Asnake & Adane, 2020).

Households who do not have school children were 70% less likely to utilize latrines than households who have school children. This study was supported by other studies Achefer District Amhara Region (Kishiru et al., 2019) and Hulet Ejju Enessie Woreda (Anteneh & Kumie, 2010). The justification could be school children may have gotten information from the school about sanitation and implemented it with their parents and developed awareness in the community (Koyra et al., 2017).

Households with more than two years since the construction of the latrine were 14 times more likely to utilize a latrine than their counterpart. This result was supported by other studies done Mahal Meda (Abebe et al., 2020) and Hulet Ejju Enessie Woreda (Anteneh & Kumie, 2010). This could be because behavioral changes in the community require a lot of time. The longer they use the latrine, the more comfortable they become with it and the more they notice the positive effects of using it (Asnake & Adane, 2020).

Strengths and Limitations of the Study

The main strength of this study was its attempt to address a neglected health concern in the study area by obtaining data from primary sources. As a limitation, the study was cross-sectional; therefore, it is difficult to establish a temporal relationship between the dependent and independent variables. In the absence of follow-up, the magnitude of latrine utilization and other independent variables may be greatly underestimated or overestimated in this study. Although on-the-spot observation was used to determine latrine utilization during the study period, it was difficult to determine whether there was the consistent use of the latrine using.

Conclusion

This study concluded that latrine utilization was found to be low. Family head, sex, family size, presence of school children, and the length of years in which the latrine was constructed were the major predictors affecting the utilization of latrines. East Meskan District Health Office should conduct regular supervision of early latrine construction and use in the communities.

Implications for Practice and Research

Open defecation and inadequate sanitation are frequently connected to diarrhea and other communicable diseases. Increased open defecation rates are also linked to serious economic, environmental, and substantial public health effects that have an impact on the general well-being and dignity of mankind. Regular supervision of early latrine construction and utilization in communities should be conducted. Households with latrines should have enough latrines to accommodate the number of people living in the same household and adapt to latrine usage.

To enhance knowledge regarding the causes, modes of transmission, and contribution of human waste to the

incidence of infectious illnesses, a variety of diverse actions, strategies, and programs must be implemented. Having said that, nurses design initiatives to promote community health and educate people about the risks associated with not using latrines. Changing habits that can significantly affect someone's health is the ultimate goal. Researchers should further investigate with qualitative research to understand the behavioral aspects of the community and the effective utilization of latrines and associated factors.

Acknowledgments

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Authors' Contributions

ENZ worked on the conception and design of the study, training and supervising the data collectors, data analysis, and interpretation of the data. NTB redid the statistical analysis and drafted the manuscript. NTB and YMN critically reviewed the draft manuscript and wrote the final version. MSG and AMG advised the study. All authors read and approved the final manuscript.

Data Availability

The data that support the findings of this study are available upon reasonable request.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethics Approval and Consent to Participate

Ethical approval and clearance were obtained from the Institutional Review Board (IRB) of Adama Hospital Medical College, and a letter was submitted to the Gurage Zone health department and East Meskan District Health office, and respective *Kebele* administrators. Respondents were informed about the purpose of the study, the importance, and the duration of the study to get their free time. The information sheet and consent were provided for respondents for those who can read and the interviewer read for those who can't read. Verbal consent from all study subjects was obtained before data collection. Participants were informed that they have the full right to discontinue or refuse to participate in the study or to be interviewed. To ensure confidentiality, the name of the interviewee was not written on the questionnaire.

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