Utilization of Latrine and Associated Factors Among Rural Households in Takussa District, Northwest Ethiopia: A Community-Based Cross-Sectional Study

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ABSTRACT

BACKGROUND: The use of sanitation facilities is known to interrupt the transmission of fecal-oral related diseases. However, the evidence was limited about the utilization of latrines within the rural community of Takussa district. Therefore, this study was conducted to assess the utilization of latrines and associated factors among households in Takussa district, northwest Ethiopia.

METHODS: A community-based cross-sectional study design was employed to survey 801 rural households among initially computed 812 participants from February 15 to March 15, 2019. A structured questionnaire with face-to-face interviews was used to collect the data. SPSS version 20 was used to analyze the completed data. A binary logistic regression model was used to process bivariate and multivariable analysis of the data. The adjusted odds ratio was used for the interpretation of the data after controlling for the confounders.

RESULTS: The proper latrine utilization rate was 41.9%, with a 95% confidence interval of (38.8, 45.3). Households with school-aged children (AOR: 2.27, 95% CI: (1.44, 3.56), a clean latrine (AOR: 3.34, 95% CI: (1.26, 4.93), the optimal distance from the living room (AOR: 1.56, 95% CI: (1.09, 2.25), and perceived benefit (AOR: 3.64, 95% CI: (1.13, 11.67) were statistically associated factors.

CONCLUSION: The Proper utilization of latrines was low among rural households in the Takussa district. School children, distance, cleanliness, and the benefit of latrines were statistically associated factors. As a result, encouraging health extension workers integrated into district schools to pay special attention to frequent follow-up in order to promote proper latrine utilization at the household level.

KEYWORDS: Household, latrine utilization, Takussa district, northwest Ethiopia

Background

Sanitation is the provision of facilities for the safe disposal of human faces and urine that associate hygiene practices or a safe toilet accompanied by handwashing with soap.1 Human excreta are the source of many infectious disease agents. The provision of appropriate facilities for defecation is an essential response for people's dignity, safety, health, and well-being.2 Despite widespread recognition that effective sanitation is a prerequisite for improved health, welfare, and economic productivity, progress in reducing the burden of sanitation-related diseases in developing countries has been gradual.3,4

The latest figures from the Joint Monitoring Program (JMP) of the United Nations Children's Fund and the World Health Organization show that around 29% of Ethiopians (more than 28 million people) experienced open defecation. Despite the fact that open defecation (OD) has fallen by 64% points nationwide since 1990, the highest decline in that time period, open defecation is still prevalent. Access to adequate and equitable sanitation and hygiene care for all, ending open defecation, and paying special attention to the needs of women, and, girls and people in vulnerable situations are key to the Sustainable Development Goals.2,3

Ethiopia has made great strides in reducing open defecation, with a decline from 92% in 1990 to 37% in 2012. There are 38 000 staff members in counseling health, sanitation, and hygiene within the Community-Led Total Sanitation and Hygiene (CLTSH) approach.5 Rural health advisory service packages focus primarily on disease prevention and health promotion; hygiene and environmental sanitation are some of the most important components of good public health practices.6

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.7 Therefore, the aim of this study was to assess the utilization of latrine facilities and identify the associated factors that are helpful strategies to fill the identified gaps.
Methods and Materials

Study design and period

A community-based cross-sectional study design was employed to assess utilization of latrine and associated factors in the rural community of Takussa district, northwest Ethiopia, from February 15 to March 15, 2019.

Study setting and population

The study was carried out in the Takussa district (Figure 1), which is 79 km southwest of the city of Gondar, 264 km from Bahir Dar, the capital of the Amhara administrative region, and 812 km from Addis Ababa, the capital of Ethiopia. According to the 2018 CSA population forecast, the district’s total population in 2019 was around 179,830 residents, with 41,826 households. Of these, 166,931 of them were rural dwellers. The district is divided into 1 urban Kebele and thirty rural Kebeles (lowest administrative unit in Ethiopia). The climatic zones of 20 Kebeles including urban, are Dega (highland and cold) and Woyna Dega (midland and temperate), and the remaining 10 Kebeles are Kolla (lowland and hot). The community’s subsistence income depends on agriculture and livestock products. Agriculture, including crop production and dairy farms, is the primary life-supporting occupation in Takussa district, like in other parts of rural Ethiopia. The Woreda health offices indicated that the safe water and sanitation (latrine) coverage was 68.2% and 50%, respectively, in the Takussa district.8

The sample size was calculated using a single population proportion formula \( n = \frac{Z^2 \cdot \alpha^2}{(P1-P)^2} \) with the assumption that the proportion of \( P \)-value from the previous study was 60%,9 marginal error (\( d \)) of 5%, a standard Z score of 1.96 corresponding to a 95% confidence interval, design effect (D) of 2, and adding 10% non-response rate. The final sample size was computed as 812 households.

Strategies were used to recruit the study Kebeles by the rule of thumb. The 20% of Kebeles were randomly selected out of 30 rural Kebeles in the district. A systematic random sampling technique was used to recruit the number of study households with \( k \)th intervals of 13 across the selected Kebeles.

Data collection tools

Structured questionnaires, including observational checklists, were used to collect data, which were adopted from different literature.10 These structured questionnaires addressed 4 parts of questions, which included socio-demographic factors, latrine utilization status, latrine conditions, and sanitation-related behavioral factors. The English version of the questionnaire was translated into the local language (Amharic), and it was translated back into English by the third person to check its consistency. Two days of training were given to data collectors and supervisors on the data collection process (completeness of questionnaires, cross-checking, questioning techniques, and ethical issues), interview techniques, and how to interact with respondents as precautions for data collectors and supervisors.

Operational definitions

Latrine utilization: a condition in which households have functional latrines of any design, shows at least these signs of use (functional footpath to the latrine or the pavement uncovered with grass, availability of fresh feces around the squat hole, no spider weave in the gate, or the slab is wet, visible anal cleansing materials, presence of flies.)
Data quality control

Data collectors and supervisors received 2 days of training, including demonstrations, on the objectives and contents of data collection tools. Prior to actual fieldwork, 5% of the questionnaires were pre-tested in rural Kebele of Denbia district, which has similar characteristics with study households to check the reliability of the questionnaires. The changes and experiences from the pre-tested questionnaires were used to amend the final questionnaires. Close supervision, cross-checking of daily filled questionnaires, editing, coding, and clearance of data were done for data quality assurance. For completeness and consistency, the collected data were rechecked daily.

Data Processing and Analysis

The data were entered into Epi-Info 3.5.3 and exported to SPSS 20 for further analysis. Descriptive statistics were employed to analyze proportions, medians, and inter-quartile ranges (IQR) for general characteristics of study participants and the proportion for the utilization of latrines. Tables, Figures, and texts were used for the final report of quantitative data. Binary logistic regression was applied to measure the relationship between the outcome variable and explanatory variables. Bivariate analysis was used to estimate the crude odds ratio and screen for bulk variables with a P-value ≤ .2 for further considered in the multivariable analysis model. Multivariable analysis was used to observe the relationship between many predictors and a single outcome in order to estimate the adjusted odds ratio (AOR) after controlling confounding factors. In addition, with 95% CI for all statistically significant tests, P-value < .05 was used as a cut-off point to declare that the association was statistically significant. The model fitness test was checked by Hosmer and Lemeshow goodness of fit test.

Results

Socio-demographic characteristics of respondents

A total of 812 respondents were recruited for this study. Of these, 801 respondents were recorded with a response rate of 98.6%. The median age of the respondents was 40.27 (IQR: 34.13–48.16) years. The majority 759 (94.8%) of respondents were married and have mean (± SD) family size of 5.68 (± 3.18) individuals. There were under 5 children in three-fourths of households, 603 (75.3%). Of these, 425 (53.1%) mothers and 361 (48.9%) fathers were unable to read and write (ineducated). Respondents were mostly farmers 663 (79%), and nearly three-quarters 589 (73.5%) of households had school-aged children. (Table 1).

Characteristics of latrine facilities

Of the total households, about half 402 (50.2%) latrines were privately owned and 399 (49.8%) were shared with neighbors. More than half 463 (57.8%) of latrines were served 4 years or longer prior to the study. Nearly two-thirds, 502 (62.7%) of the respondents explained that they were motivated by health extension workers and 156 (19.5%) were imposed by community leaders. Though small number 143 (17.8%) of respondents were self-initiated in constructing their own latrines. Almost more than half 435 (54.3%) of households’ latrines had need of maintenance (Table 2).

Utilization of latrine

The proportion of latrine utilization in rural households of Takussa district was 41.9% with 95% CI: (38.8, 45.3). However, only 22 (3.7%) children were using latrines. Half of 292 (50.3%) households improperly disposed of their children’s faeces in the backyard or in the nearby fields. Although, in the compound, faeces were physically observed in 460 (57.4%) of households, that have functional latrines. Understanding the dangers of excreta to health 185 (67.3%), maintaining privacy 61 (22.2%), and a lack of other places to defecate 29 (10.5%) were the reasons why household members used latrines (Table 3).

Reasons of not using the latrine

Figure 2 illustrated that most of the study participants 312 (38.90%) claimed that the latrines were full, followed by remote latrine locations as reasons for latrine non-use.

Factors associated with utilization of latrine

In bivariate logistic regression, educational status, presence of school children, distance of latrine from living room, latrine service year, presence of door, presence of superstructure, cleanliness of latrine, presence of hand washing facilities, latrine not shared by other households, presence of sufficient height of superstructure, reason for latrine construction, benefits of latrine use, and hand washing practice were found to be significantly associated variables with the utilization of latrines.

The outcome was adjusted with multiple variables; most of the variables did not resist the final model. In multivariable analysis, the presence of schoolchildren, distance from the living room, cleanliness of latrine, and benefits of latrine utilization were statistically associated with the utilization of latrines. Households having school children used latrine 2.27 times more likely than households that did not have school children (AOR: 2.27, 95% CI: [1.44, 3.56]). Households that had latrines less than or equal to 6 m far from the living room were 1.56 times more likely to utilize their latrine compared with households with greater than 6 m away from the living room (AOR: 1.56, 95% CI : [1.09, 2.25]). Households with clean latrines were 3.34 times more likely to use their latrines than their counterparts (AOR: 3.34, 95% CI: [2.26, 4.93]). Furthermore, study participants who knew about the benefit of good latrine utilization for disease prevention were 3.64 times
more likely to have good utilization of latrine than those who did not know about the benefit of latrine utilization about disease prevention (AOR: 3.36, [1.13,11.67]) (Table 4).

**Discussion**

The availability of latrine-like utilization does not have a guarantee the organization of an open defecation-free (ODF) environment. This study revealed that the status of latrine utilization among rural households in Takussa district was 41.9%, with a 95% CI: (38.8, 45.3). However, utilization of latrines was influenced by different potential factors, such as the presence of school children, the distance between the latrine and the living room, cleanliness of the latrine, and understanding the benefits of latrine utilization were found to be statistically significant predictors of the utilization of latrines.

The findings of this study (41.9%) is slightly higher than the study finding from different part of rural Ethiopia in Ilu Aba Bor Zone (36%), West Shoa Zone, (36.8%) and Hawzien district, Tigray, (37.4%). However, the current finding is lower than studies done in the others rural communities of Ethiopia in Chencha district, (60%), Aneded district(63.7%), Awabel district, 52%, and Hullet ejju Enessie district (60.7%). These variations might be due to the different socio-demographic characteristics. The effort of health extension workers may vary from region to region for promoting and close follow up on the proper utilization of latrines. In addition, community engagement may be varied to latrine utilization, which was mainly focused on latrine construction. As a consequence, emphasis only on latrine construction without utilization may not have a guarantee to keep an open defecation free (ODF) environment. Open defecation is a result of either inaccessibility or poor utilization of latrines, which is considered the leading cause of the wide spread of infectious diseases.

In the factor analysis, it was good to note that the proper utilization of latrines in households with school children was

| CHARACTERISTICS | NUMBER | PERCENT (%) | REMARK |
|----------------|--------|-------------|--------|
| Sex            | Male   | 667         | 83.3   |
|                | Female | 134         | 16.7   |
| Age (Year)     | 21-30  | 109         | 13.6   |
|                | 31-40  | 309         | 38.6   |
|                | 41-50  | 225         | 28.1   |
|                | ⩾51    | 158         | 19.7   |
| Marital status | Married| 759         | 94.8   |
|                | Not married* | 42       | 5.2    |
| Educational level | Mother | Uneducated | 425    | 53.1   |
|                | Educated | 376       | 46.9   |
|                | Father (n = 738) | Uneducated | 361 | 48.9 |
|                | Educated | 377       | 51.1   |
| Religion       | Orthodox | 761       | 95     |
|                | Muslim  | 40         | 5      |
| Family size    | ⩽5 | 447         | 55.8   |
|                | >5 | 354         | 44.2   |
| Occupation     | Farmer | 633        | 79     |
|                | Others@ | 168       | 21     |
| Under five children | Yes | 603        | 75.3   |
|                | No  | 198        | 24.7   |
| School children | Yes | 589        | 73.5   |
|                | No  | 212        | 26.5   |

*single, divorced, widowed, @ housewife, Daily laborer, Merchant, Government employee, and self-employed, IQR: interquartile range, SD: standard deviation.
encouraged more than twice as much as in households without school children \( (AOR = 2.27, P < .001) \). This finding is consistent with the findings from different districts of the west Gojjam zone, Ethiopia in Hulet Ejju Enessie, Awabel, and Aneded district, which was 2.5 times more utilized than households without school children. This could be partly explained by the fact that school children have learned in the classroom through curriculum support about environmental sanitation related to common diseases: their causes, transmission, and prevention methods. This is, therefore, a good opportunity for the dissemination of health information to make the household members aware of the proper use of latrines through the encouragement of their school children. In addition, schoolchildren are “agents of change” in pacing the behavior and practice of their family and community at large.

Cleaning the latrine is one of the factors that attracts household members to regularly utilize the latrine. In the current study, regarding the cleanliness condition of latrines, household members were attracted to use well-cleaned latrine 3.34 times more likely than uncleaned latrine \( (AOR = 3.34, P < .001) \). This finding is similarly supported with a study done at Denbia and Aneded districts which was encouraged 4 times more to utilize clean latrine. The reason could be attributed to the fact that participants behavior can be motivated by a clean floor of latrine and it may also be reduced from the problem of odor, which is released from nuisance dirt’s. On the other hand, unsanitary conditions and odors may deter households from proper utilization of latrines.

An appropriate distance between the latrine location and the living room motivates the latrine utilization among

Table 2. Characteristics of latrine facilities in the rural households of Takussa district, northwest Ethiopia, March 2019 (n=801).

| CHARACTERISTICS                          | NUMBER | PERCENT(%) |
|-----------------------------------------|--------|------------|
| Ownership of latrine                    |        |            |
| unshared latrine                        | 399    | 49.8       |
| Share latrine*                          | 402    | 50.2       |
| Service year of latrine                 |        |            |
| 1-3 years                               | 338    | 42.2       |
| ⩾ 4 years                               | 463    | 57.8       |
| Presence of superstructure              |        |            |
| Yes                                     | 676    | 84.4       |
| No                                      | 125    | 15.6       |
| Presence of door                        |        |            |
| Yes                                     | 326    | 40.7       |
| No                                      | 475    | 59.3       |
| Height of latrine                       |        |            |
| ⩾ 1.5 m                                 | 398    | 49.3       |
| < 1.5 m                                 | 403    | 50.3       |
| Squat hole cover                        |        |            |
| Yes                                     | 85     | 10.6       |
| No                                      | 716    | 89.4       |
| Distance from living room               |        |            |
| ≤ 6 m                                   | 382    | 47.7       |
| > 6 m                                   | 419    | 52.3       |
| Hand washing facilities                 |        |            |
| Available                               | 336    | 41.9       |
| Not available                           | 465    | 58.1       |
| Cleanliness of latrine                  |        |            |
| Good**                                  | 426    | 53.2       |
| Poor                                    | 375    | 46.8       |
| Latrine need maintenance                |        |            |
| Yes                                     | 435    | 54.3       |
| No                                      | 366    | 45.7       |
| Motivation of HHs to build latrine by   |        |            |
| HEWs***                                 | 502    | 67.2       |
| Community leaders                       | 156    | 19.5       |
| Self-initiation                         | 143    | 17.8       |

*shared: two or more households were commonly used a single latrine  
**Good latrine: a pit latrine having superstructure with a door (any cover), proper floor and properly clean which may not have nuisance insects and disgust fecal matter in and around the pit latrine. Otherwise, it was poor latrine.  
***Health extension workers
household members. The far distances can discourage latrine utilization due to the fear of health related risks at night.\textsuperscript{21} Even if it is advisable to build a latrine at a minimum distance of 6 m from the house.\textsuperscript{22}

This study revealed that households were motivated to utilize latrines 1.56 times (AOR = 1.56, \(P < .001\)) more where the location of latrines did not exceed 6 m from the living room. This study finding is in line with a study done from Ghana\textsuperscript{21} and Bahir Dar Zuria\textsuperscript{23} Ethiopia.

Furthermore, study participants who had awareness about the health benefits of latrine were 3.64 times more likely to adhere to latrine utilization than their encounters (AOR: 3.36, \(P < .001\)). This finding is similarly supported by a study done in Tanzania and Eastern Zambia.\textsuperscript{24,25} This could be due to the fact that knowledge is important to understand the disadvantage of an unclean environment tainted by human waste, which can put family members in danger of infectious diseases.

Limitation: This study, like other studies, may not be free from any bias. The results regarding the practice of latrine utilization were based on short time observation with assisted communication. Social desirability or observer biases due to some household members might not be used latrine, these may be led to either over or under estimates of true results.

Conclusions
The current level of proper utilization of latrine was low among rural households in the Takussa district whereas compared to the findings of different studies. The presences

| CHARACTERISTICS               | CATEGORY                        | NUMBER | PERCENT (%) |
|------------------------------|---------------------------------|--------|-------------|
| Proper Utilization of latrine | Yes                             | 336    | 41.9        |
|                              | No                              | 465    | 58.1        |
| Households with under five children | Yes                          | 603    | 75.3        |
|                              | No                              | 198    | 24.7        |
| Frequency of cleaning latrine (n = 437) | Usually                | 284    | 65          |
|                              | Rarely                          | 153    | 35          |
| Reasons for latrine utilization (n = 275) | Excreta are dangerous to health | 185    | 67.3        |
|                              | Privacy                         | 61     | 22.2        |
|                              | No other place to defecate      | 29     | 10.5        |
| Place of under-five children faeces disposal (n = 580) | Put in the pit | 288    | 49.7        |
|                              | Outside the compound            | 292    | 50.3        |
| Reasons for Under five children not used latrine (n = 580) | Large squat hole | 247    | 42.6        |
|                              | Slab was not safe to stand on   | 252    | 43.4        |
|                              | Poor cleanliness                | 81     | 14.0        |

Figure 2. Study participant’s reasons for not practicing latrine utilization in rural communities of Takussa district, Northwest Ethiopia, March 2019 (n=399).
of school children in household members, latrine distance from living room, latrine cleanliness, and understand the health benefit of latrine were statistically significant predictors for the utilization of latrine at household level. For the consistent utilization of latrines, therefore, motivating health extension workers integrated with in the district

Table 4. Binary logistic regression analysis of factors associated with utilization of latrine in the rural communities of Takussa district, northwest Ethiopia 2019, (n = 801).

| FACTORS                        | LATRINE UTILIZED | LATRINE NOT-UTILIZED | COR(95%CI)       | AOR(95%CI)       |
|--------------------------------|------------------|----------------------|------------------|------------------|
| Father education               | Educated         | 195                  | 182              | 1.4 (1.05, 1.88) | 1.167 (0.80,1.69) |
|                                | Uneducated       | 156                  | 205              | 1.0              | 1.0              |
| School children                | Yes              | 300                  | 289              | 1.89 (1.37, 2.63)** | 2.27 (1.44,3.56)** |
|                                | No               | 75                   | 137              | 1.0              | 1.0              |
| Shared latrine facilities      | Yes              | 212                  | 187              | 1.0              | 1.0              |
|                                | No               | 163                  | 239              | 0.60 (0.45, 0.79) | 0.83 (0.57,1.21) |
| Service year of latrine        | 1-3 y            | 174                  | 164              | 1.38 (1.04, 1.83) | 0.72 (0.48,1.09) |
|                                | $\geq$ 4 y       | 201                  | 262              | 1.0              | 1.0              |
| Cleanliness of latrine         | Good             | 280                  | 146              | 5.65 (4.15, 7.68)** | 3.34 (2.26, 4.93)** |
|                                | Poor             | 95                   | 280              | 1.0              | 1.0              |
| Superstructure                 | Yes              | 348                  | 328              | 3.85 (2.45, 6.05) | 1.67 (0.89, 3.12) |
|                                | No               | 27                   | 98               | 1.0              | 1.0              |
| Availability of door           | Yes              | 185                  | 141              | 1.96 (1.47, 2.61) | 0.94 (0.61, 1.45) |
|                                | No               | 190                  | 285              | 1.0              | 1.0              |
| Height $\geq$ 1.5 m            | Yes              | 220                  | 178              | 1.97 (1.49, 2.62) | 1.28 (0.84, 1.94) |
|                                | No               | 155                  | 248              | 1.0              | 1.0              |
| Need of maintenance            | Yes              | 172                  | 263              | 1.90 (1.43, 2.52) | 0.85 (0.56, 1.28) |
|                                | No               | 203                  | 163              | 1.0              | 1.0              |
| Distance from living room      | $\leq$ 6 m       | 221                  | 161              | 2.36 (1.77, 3.13)** | 1.56 (1.09, 2.25)** |
|                                | $>6$ m           | 154                  | 265              | 1.0              | 1.0              |
| Reasons for latrine construction| Advice from HW  | 289                  | 213              | 1.72 (1.18, 2.50) | 1.38 (0.84, 2.29) |
|                                | Self-initiation  | 23                   | 133              | 0.22 (0.12, 0.38) | 0.86 (0.42, 1.78) |
|                                | Fear of punishment| 63                  | 80               | 1.0              | 1.0              |
| Benefits of latrine utilization| Disease prevention| 323                 | 238              | 14.38 (5.66, 6.53)** | 3.64 (1.13, 11.67)** |
|                                | Privacy          | 47                   | 135              | 3.69 (1.39, 9.78) | 1.96 (0.62, 6.20) |
|                                | No benefits      | 5                    | 53               | 1.0              | 1.0              |
| Hand washing facility          | Available        | 202                  | 134              | 2.54 (1.90, 3.39) | 1.32 (0.88, 1.97) |
|                                | Not available    | 173                  | 292              | 1.0              | 1.0              |
| Hand washing practice          | Yes              | 242                  | 158              | 3.08 (2.31, 4.12) | 1.40 (0.96, 2.04) |
|                                | No               | 133                  | 268              | 1.0              | 1.0              |

Statistically significant at ***P-value < .001, **P-value < .01. HW, healthcare worker. Hosmer and Lemeshow goodness of fit test was 0.795 (ie, >0.05) and the test result of VIF was <10 for each independent variables in the final model. Therefore, the actual test result (<3) is confirmed that no multicolinearity was observed.
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Authors’ Contributions
All stated authors NO, BDB, GTE, AG are involved in the study from the inception to design, acquisition of data, analysis and interpretation and drafting of the manuscript. All authors read and approved the final manuscript.

Data Availability
We, all the authors do have the data of this study and the corresponding author can provide it as per the request.

Ethical Consideration
Ethical clearance was approved and obtained from the Institutional Review Board of the University of Gondar, College of Medicine and Health Science, Institute of Public Health. Then an official permission letter was collected from the central Gondar zone health department and from the district admin offices. Written informed consent was obtained from each study participant after they were included in this study. The purpose of the study was explained to study participants before giving consent. We deliver information on the rights to interrupt the interview. The interview was conducted using anonymous questionnaires. Confidentiality was maintained to protect their personal information.

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