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# Latrine Utilization and Associated Factors in Transformed District, West Gojjam Zone, Amhara Region, Ethiopia, 2021

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## ABSTRACT

**BACKGROUND:** Ethiopia has been encountering a higher predominance of communicable illnesses, which bring about high morbidity, mortality, and hospital admission rates. One of the higher contributing factors to this can be the lower level of latrine utilization.

**OBJECTIVE:** To assess latrine utilization and associated factors in transforming District, West Gojjam zone, Ethiopia.

**METHODS:** A community-based cross-sectional study was conducted from March to April 2021 among 352 households in the Dega Damot District, one of the transformed districts in the West Gojjam Zone. A systematic random sampling technique was used to select the study household. The data were collected through a face-to-face interview and right-away observation methods using structured questionnaires and an observational checklist respectively. Data were entered using Epi info version 7 and exported to a statistical package for social science's version 25. Independent variables that had a *P*-value of  $<.25$  were included in the multivariable binary logistic regression model. Variables with *P*-values of less than .05 were declared as statistically significant and an odds ratio of 95% CI was used to measure the strength of association between outcome and predictor variables.

**RESULTS:** We found that the prevalence of latrine utilization among households was 48.9% (95% CI: 44, 54). The household head has good knowledge of latrine utilization (AOR = 2.96, 95% CI 1.79, 4.87), a mother has formal education (AOR = 1.85, 95% CI 1.13, 3.04), daily cleaning of the latrine (AOR = 1.99, 95% CI 1.06, 3.74), and latrine having squat hole cover (AOR = 8.08, 95% CI 3.13, 20.87) were factors significantly associated with latrine utilization.

**CONCLUSION:** In the transformed district latrine utilization was low Knowledge, education status, latrine cleaning frequency, and squat hole cover were factors associated with latrine utilization. Market-based sanitation, health extension program, and behavioral change communication strategies need to be strengthened to improve sustainable and consistent use of latrines.

**KEYWORDS:** Sanitation, latrine utilization, Dega Damot, transformed, district, Ethiopia

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## Introduction

Latrine utilization is defined as the actual behavior in the practice of all family members in the household who regularly use existing latrines for safe disposal of feces.<sup>1,2</sup>

Globally, the World Health Organization(WHO)/United Nations International Children's Emergency Fund (UNICEF) joint monitoring program report 2021, shows that 3.6 billion people lacked safely managed sanitation services, (1.9 billion people have access to basic sanitation services, 580 million with limited sanitation services, 616 million used unimproved facilities, and 494 million practice open defecation), and the least developing countries 11% population have basic sanitation service, 16% have limited sanitation facilities, 31% have unimproved sanitation facilities, and 16% of the population practice open defecations.<sup>3</sup> Poor household latrine utilization increases the risk of transmission of diseases and primary risk factors of morbidity and mortality.<sup>4,5</sup> Contemplating the public health

impact, globally about half a million diarrheal cases each year are related to poor sanitation.<sup>6</sup> In developing countries where poor sanitation practices like open defecation are widespread, the magnitude of sanitation-related public health problems could even be higher.<sup>7</sup> According to the WHO 2017 report, poor sanitation is responsible for about 30% of annual diarrheal deaths in the least and middle-income countries in which the largest proportion is under-5 children.<sup>6</sup>

In Ethiopia, diarrhea is the leading cause of under-5 mortality, causing 23% of all under-5 deaths. Nearly 90% of diarrheal diseases are caused by poor personal hygiene, a lack of access to clean water, and poor sanitation.<sup>8</sup>

Globally, two-thirds of people who lived in rural areas still lacked even basic sanitation services, nearly half of them lived in sub-Saharan Africa, of which, 92% did not use latrines.<sup>3</sup> Despite, Ethiopia having made remarkable progress in water and sanitation access over the last 2 decades, sanitation



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coverage remains limited. According to the WHO/UNICEF 2021 report, 50% (16% in urban areas and 60% in rural areas) and 91% (79% in urban areas and 95% in rural areas) of the Ethiopian populations lack access to basic water supply and sanitation services respectively.<sup>3</sup> In Africa, the practice of open defecation has been attributed to a possible cultural-habitual predisposition.<sup>9</sup> A systematic review and meta-analysis indicated that latrine use was associated with better facility type, accessibility, cleanliness, maintenance, privacy, and better hygiene access,<sup>10</sup> and the socio-demographic variables such as the age of household head, presence of under-5 children, presence of school-age children, family size, education status of household head and occupation of household head were factors associated with latrine utilization.<sup>11–13</sup> We also consider knowledge and attitude of the household head could affect latrine utilization.

The Ethiopian government has been involved in various water, sanitation, and hygiene intervention activities such as the introduction of health extension, water, sanitation, and hygiene (WASH) and Community-Led Total Sanitation and Hygiene (CLTSH), and Market Based sanitation (MBS) programs to improve the hygiene and sanitation status of the population, and bring behavioral change.<sup>14–20</sup> Despite all the above-mentioned interventions underway for the years 2015 to 2020, the utilization of latrines improves by 15% only.<sup>3</sup> Studies also reported low utilization of latrine.<sup>21,22</sup>

In 2015, Ethiopia started implementing the strategy for the transformation of the health sector and certifying districts as transformed in accordance with the verification standards. A district is said to have undergone transformation when the proportion of model households, primary healthcare facilities, and community-based insurance is greater than or equal to 85%.<sup>14,23</sup>

The study area is one of the transformed districts in the Amhara region where CLTSH, MBS, WASH, and other sanitation and hygiene interventions have been implemented, and According to the 2020 annual report, latrine coverage of the district was 90%. However, household latrine utilization is still low.<sup>1,21</sup> Therefore, this study aims to determine the latrine utilization practice and associated factors.

## Methods and Materials

### *Study design and study area*

A community-based cross-sectional study design was conducted from March to April 2021 in the Dega Damot district; one of the transformed districts in West Gojjam Zone, north-western Ethiopia. The district is located 394.8 km from Addis Ababa (the capital city of Ethiopia,) and 254 km from the capital city of the Amhara Region (Bahir Dar). The district has a longitude of 37°24'59.99"E and a latitude of 11°04'60.00"N. According to the 2007 census, the 2020/21 projected population of the district was 181 325 with 42 169 households of which 37 953 have a latrine. The district has 34 Kebeles (the smallest administrative unit in Ethiopia) of which 32 are rural and the remaining 2 urban Kebeles. According to the district's

2020 annual report, about 90% of the households in the district have private latrines.<sup>24</sup>

### *Sample size determination and sampling procedure*

The sample size was calculated using a single population proportion formula taking the assumption of  $z_{\alpha/2}$  at 95% confidence level (CL), 5% margin of error (d), and 83.1% proportion of latrine utilization taken from a study in the Tigray Region, Ethiopia.<sup>25</sup> After multiplying with a design effect of 1.5, and adding 10% a non-response rate, the final sample size was 356. A multistage sampling technique was used to select the study respondents. Six rural kebeles were selected randomly for the study and the list of households that had a latrine in each Kebele was taken from the Health Extension workers' community-based health information list, and the number of households selected from each Kebele was proportionally allocated. Finally, we used a systematic random sampling technique to select the study household, total household ( $N = 6837$ ) divided by the final sample size ( $n = 356$ ) giving a sampling interval of 20. Then, the data were collected at an interval of every 20th house.

### *Population*

Households that had a latrine in the transformed district were the source population. While households who had a latrine in the randomly selected kebeles were our study population. The household head was the study unit.

### *Eligibility criteria*

All household heads in the selected Kebeles of Dega Damot district who had a latrine were included. However, household heads who were severely ill and, unable to communicate were not eligible for the survey.

### *Study variables*

Latrine utilization was our dependent variable denoted as yes (0) for latrine utilization or no (1) for latrine not utilized. On the other side, socio-demographic characteristics of households and respondents, characteristics of the latrine (cleanness ability of the latrine, latrine superstructure (roof and wall), odors, latrine having a door, squat hall cover), knowledge, and attitude were the independent variables of the study.

### *Data collection tool, procedures, and measurements*

The data were collected through a face-to-face interview and right-away observation methods using structured questionnaires and an observational checklist respectively. The socio-demographic, knowledge and attitude-related variables were collected through an interview using a structured questionnaire. Meanwhile, latrine-related characteristics (the presence of fresh excreta inside the squat, the presence of fresh footpath, lack of spider web on the squat, a splash of urine, presence of anal

cleaning material, and latrine superstructure were assessed by right away observation using a checklist. Three environmental health professionals who hold bachelor's degrees and have data collection experience were the data collectors.

### Data quality assurance

To ensure the data quality, the data collection tools were developed before the data collection time and 2-day training was provided for 3 data collectors and one supervisor before the actual data collection was carried out. The training was focused on how to fill out the questionnaire through interviews and right away observation of the latrines, how to approach respondents, and ethical issues during the data collection. A pre-test was conducted on 5% of the total sample size of the neighboring district (Bahir Dar Zuria), to check the consistency and clarity of the questions, the applicability of data collection procedures, and tools. The supervisor closely supervised data collectors during the data collection period. The collected data were checked for completeness, consistency, accuracy, and clarity each day after data collection.

### Data processing and analysis

After the paper-based data were collected, all questionnaires were checked, cleaned, coded, by the principal investigator and entered into the Epi-data version 7, and exported to SPSS version 25 for further analysis. Results were presented using text, figures, and frequency tables. A binary logistic regression model was used to assess factors associated with latrine utilization. First, a bivariate binary logistic regression analysis was conducted to select the candidate variables for the multivariable analysis. Independent variables that had a  $P$ -value of  $<.25$  in the bivariate were included in the multivariable binary logistic regression model to control the effect of confounding. The goodness of fit of the model was checked using the Hosmer-Lemeshow test. Finally, independent variables with  $P$ -values less than .05 were declared statistically significant and an odds ratio of 95% CI was used to measure the strength of association.

### Operational definition

**Transformed Woreda (TW):** Transformed districts are districts that graduated as a model District at least 2 years with a model household, coverage facility delivery, basic latrine ownership & utilization, model school, and a model youth center for urban.<sup>14</sup>

**Latrine utilization:** Households with functional latrines and children's feces being safely disposed of, and no observable feces in the compound, and at least one observable sign of use (eg, footpath to the latrine not covered by grass, latrine odor, lack of spider web in squatting hole, presence of anal cleansing material, fresh faces in the squatting hole, or a wet slab).<sup>2,12</sup>

**Clean latrine:** Pit not full, no fecal matter seen around the pit latrine, no anal cleansing material from the floor.<sup>2</sup>

**Table 1.** Socio-demographic characteristics of respondents in Dega Damot Woreda, West Gojjam Zone, northwestern Ethiopia 2021 (n=352).

VARIABLES		FREQUENCY	PERCENT
Sex	Male	334	94.9
	Female	18	5.1
Age	<35 y	87	24.7
	35-50 y	180	51.2
	>50 y	85	24.1
Educational status of the father (334)	Illiterate	75	24.4
	Literate	259	75.6
Educational status of the mother	Illiterate	159	45.2
	Literate	193	54.8
Occupation of the father	Farmer	302	90.4
	Merchant	32	9.6
Occupation of the mother	Farmer	315	89.4
	Merchant	37	10.6
Family size	≤ 3	135	38.4
	>3	217	61.6
Presence of under-5 child	Yes	162	46
	No	190	54
No. under-5 children (162)	One	136	83.9
	Two	26	16.1

**Knowledge:** A respondent was considered to have good knowledge if he/she score above the mean from the 7 knowledge questions; otherwise a poor level of knowledge.<sup>13</sup>

**Attitude:** A respondent was considered to have a positive attitude if he/she scored above the mean from the 9 attitude questions; otherwise respondent had a negative attitude.<sup>13</sup>

**Formal education:** respondent was considered formally educated if he/she reported grade one and above completed, otherwise non-formal educated.

## Results

### Socio-demographic characteristics of respondents

Of the total 356 respondents, 352 completed the interview (98.9%. Response rate) the majority (94.9%) of the respondents were males. The number of respondents who were unable to read and write was 259 (77.5%). Regarding family size, 135 (38.4%) of the respondents had less than or equal to 3 household members and 162 (46%) had under-five children. The mean age of respondents was 39 years with a standard deviation of 11 (Table 1).

**Table 2.** Latrine utilization and its characteristics of respondents in Dega Damot Woreda, West Gojjam Zone, northwestern Ethiopia 2021 (n=352).

CHARACTERISTICS		FREQUENCY	PERCENT
Types of latrines	Latrine with washable slab	9	2.6
	Latrine without a washable slab	343	97.4
Means of disposal of feces under-five children	Disposed of into pit latrine	48	13.6
	Disposal in the compound	114	32.4
Number of years since latrines were constructed	<1 y	26	7.4
	1-2 y	83	23.6
	2-3	155	44
	>3 y	88	25
The latrine squat hole covered	Yes	46	29.1
	No	306	70.9
Latrine has a washable slab	Yes	9	2.6
	No	343	97.4
Latrine has a door	Yes	136	61.4
	No	216	38.6
Latrine has a wall	Yes	158	44.9
	No	194	55.1
Is the toilet slab hygienic?	Yes	151	42.9
	No	201	57.1
Latrine has a roof	Yes	158	44.9
	No	194	55.1
Frequency of latrine cleaning	Daily	76	21.6
	Rarely	276	78.1
Overall latrine utilization	Utilized	172	48.9
	Not utilized	180	51.1

### *Latrine utilization and its characteristics*

The magnitude of latrine utilization in the Dega Damot district was 48.9% (95% CI: 44, 54). The time since the latrine had been constructed was 2 to 3 years for 44% of households. Greater than two-thirds of the 306 (70.9%) of latrines did not have a squat hole cover, and only 13.07% of latrines had squat holes covered. About two-thirds (61.4%) of latrines had a door. Regarding the hygienic condition of the latrines, 151 (42.9%) of the latrines were hygienic (Table 2).

### *Knowledge, attitude, and latrine utilization related characteristics of the respondents*

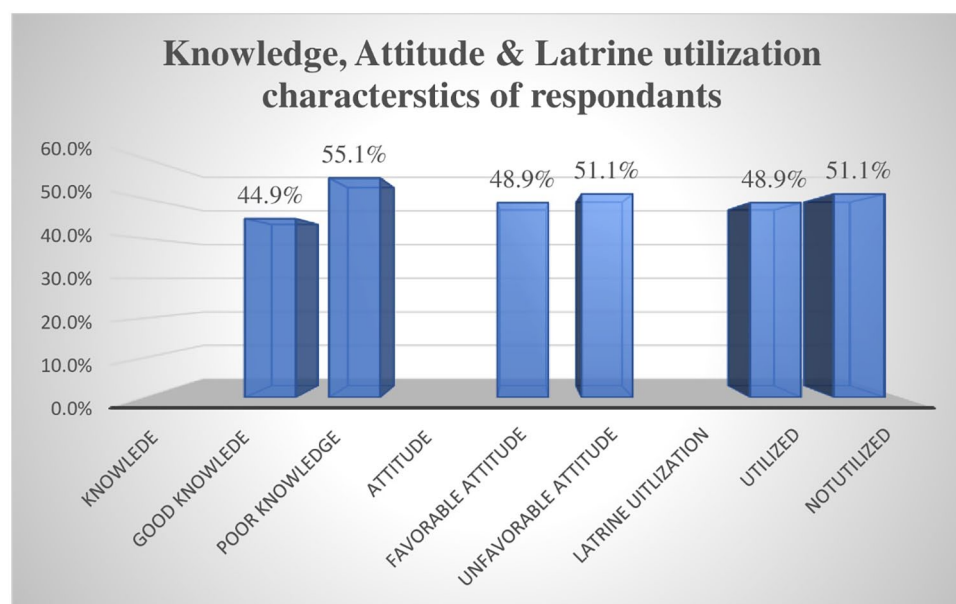
Knowledge was assessed using 7 knowledge questions, and less than half (44.89%) of the respondents had good knowledge of respondents on latrine utilization. Regarding respondents'

attitudes, the composite score of the respondents having a favorable attitude was 57.4%, and also, 49% of households in the district have used latrines optimally (Figure 1).

### *Factors associated with latrine utilization*

In the bi-variable binary logistic regression analysis; knowledge, latrine cleaning frequency, educational status of the father, father's occupation, educational status of the mother, latrine with doors, latrine has superstructure, latrine has a squat hall cover, and hygienic status of latrine were factors associated with latrine utilization at  $P$ -value  $\leq .25$ . While in the multivariable logistic regression analysis, latrine with a squat hole over, knowledge of respondents on latrine utilization, latrine cleaning frequency, and mother's educational status was significantly associated with latrine utilization at a  $P$ -value  $< .05$ . The odds





**Figure 1.** Knowledge, attitude characteristics of respondents in the Transformed district, West Gojam Zone, Northwestern Ethiopia.

of latrine utilization in households that had mothers who didn't have formally educated were 1.85 times (AOR: 1.85; 95% CI 1.13, 3.04) most likely not utilized than that of households that have formally educated mothers.

The study also revealed that the latrine utilization for households where the head of household has poor knowledge was 2.96 times (AOR=2.96, 95% CI, 1.79, 4.87) more likely not to utilize than for those household heads who have good knowledge of latrine utilization. Similarly, the likelihood of households using a latrine for those who hadn't a latrine with the squat cover was 8.08 times (AOR=8.08, 95%CI, (0.11, 0.59) more likely not to utilize a latrine than those who had a latrine without squat cover. Households cleaning their latrine rarely were 1.99 times more likely not to utilize latrine than those households cleaning their latrines daily (Table 3).

## Discussions

The finding of this community-based cross-sectional study revealed that the household's latrine utilization was poor and the factors associated with latrine utilization were latrine with a squat hole over, knowledge of respondents on latrine utilization, latrine cleaning frequency, and educational status of a mother. In the current study about half (48.9%, 95% CI: 44, 54) of households have used a latrine. The finding was in-line with studies done in the Laelia-Maichew District (46.8%) of Tigray Region, Ethiopia,<sup>26</sup> and North Achefer district (44.5%) of Amhara Region, Ethiopia,<sup>27</sup> and the National latrine utilization report of 50.02%,<sup>28</sup> but lower than studies done in different areas of Ethiopia such as in Hulet Ejju Nesie 96.5%,<sup>12</sup> Mehal Meda Town 91.2%,<sup>11</sup> Wondo Genet District 83.1%,<sup>29</sup> Denbia district 61.2%,<sup>30</sup> semi-urban areas of northeastern Ethiopia 71.8%.<sup>2</sup>

The possible reason for the observed difference might be due to the low supportive supervision of health extension

workers and district health office experts after latrine construction. It also may be due to low awareness of the preventive effect of utilization of latrine, sanitation, and hygiene practice on communicable disease prevention. The finding was also lower than the study conducted in India (62%),<sup>9,31</sup> which might be due to the difference in the country's open defecation-free interventions strategy.

Latrine utilization was significantly associated with knowledge, latrine has a squat hole cover, daily cleaning of latrine, and educational status of mothers. Household head good knowledge of latrine utilization was also one of the determining factors. The finding is consistent with a study conducted in Central Java, Indonesia.<sup>32</sup> This might be due to the fact that the more people are knowledgeable about the causation and transmission of disease, the more the practice in the prevention and control of the occurrence of infectious diseases.<sup>28</sup>

Maternal educational status has also shown a significant effect on the utilization of latrines in that those who reported not attending formal education were more likely not to utilize latrines than those who attained formal education. The finding was consistent with studies conducted in Hulet Ejju Enessie district in Amhara region,<sup>12</sup> Laelai Maichew district of Tigray region,<sup>26</sup> Gulomekada<sup>25</sup> of Ethiopian and a study done in Thailand.<sup>33</sup> This might be due to the effect of education on human behavior toward proper sanitation and hygiene practice, and carrying out healthier lifestyle activities.

Households with latrines without squat hole covers were less likely to use latrines than households with latrines with squat hole covers. This might be because if the latrine doesn't have a squat hole cover, then the feces and other contaminants may be found around the squat hole. So, household members may not use it consistently for fear the contamination. The finding of our study also revealed that the cleaning of the latrine daily was significantly associated with latrine utilization,

**Table 3.** Factors significantly associated with latrine utilization transformed district in the West Gojjam Zone, northwestern Ethiopia, 2021.

VARIABLES		LATRINE UTILIZATION		COR 95% CI	AOR 95% CI
		NOT UTILIZED	UTILIZED		
Knowledge on latrine utilization	Poor	102	55	2.78 (1.7, 4.1)	2.96 (1.79, 4.87)*
	Good	78	117	1.0	1.00
Educational status of father	No formal education	47	28	1.8 (1.06, 3.05)	1.47 (0.77, 2.79)
	Formal education	125	134	1.00	1.00
Educational status of Mother	Non formal education	96	84	1.98 (1.29, 3.05)	1.85 (1.13, 3.04)*
	Formal education	63	109	1.00	1.00
Latrine with door	No	121	95	1.66 (1.07, 2.56)	1.64 (0.98, 2.76)
	Yes	59	77	1.00	1.00
Squat cover	No	37	143	4.68 (2.18, 10.04)	8.08 (3.13, 20.87)*
	Yes	9	163	1.00	1.00
Supra structure	Yes	92	66	1.00	1.00
	No	88	106	1.68 (1.09, 2.56)	1.51 (0.92, 2.49)
Frequency of cleaning	Rarely	156	120	2.81 (1.64, 4.82)	1.99 (1.06, 3.74)*
	Daily	24	52	1.00	1.00
Father's occupation	Merchant	11	21	1.00	1.00
	Farmer	159	143	2.12 (0.98, 4.55)	1.03 (0.41, 2.54)
Latrine hygienic status	Good	69	82	1.00	1.00
	Poor	111	90	1.46 (0.59, 2.24)	1.27 (0.76, 2.12)

1 = reference group, \* =  $P$ -value < .05.

a finding in line with different studies in Ethiopia, such as in Mehal Meda Town,<sup>11</sup> Laelia-Maichew District,<sup>26</sup> semi-urban areas of northeastern Ethiopia,<sup>2</sup> and Aneded district.<sup>34</sup> It is true that when the latrines are cleaned frequently, feces, flies, and bad odors are eliminated, all of which may increase latrine utilization. Poor latrine cleaning frequency and lack of squat hole cover mean that stool, flies, and bad smells will be prevalent, which could cause sanitation-related morbidity and mortality. Therefore, it is more important for the government to work on community buy-in for latrine cleaning and the use of squat covers to prevent public health problems, particularly sanitation-related diseases. As a strength, we were able to determine if the household had actually used the latrine properly or not by using an observational checklist. However, the reason for the inadequate latrine utilization coverage may be that we used the regional health bureau report that the district accepted as transformed but may not have actually been transformed.

## Conclusion

We conclude that in the transformed District less than half (48.9%) of the household utilized a latrine. Knowledge of

respondents on the health importance of the latrine utilization, the education status of the mother, latrine cleaning frequency, and a latrine with a squat hole cover were factors associated with latrine utilization. To improve the sustainable and regular use of latrines, market-based sanitation, health extension programs, and behavioral change communication strategies must be strengthened by the government at all levels, NGOs, and other actors involved in water, sanitation, and hygiene intervention.

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## Author Contributions

AD: had primary responsibility in the process of conceptualization and research design, data collection, data analysis and interpretation, and manuscript drafting and revision. MG and AB assisted in the conceptualization and design of the study,

development of data collection instruments, interpretation of the result, and preparation and edition of the manuscript. All authors read and approved the final manuscript.

## Availability of Data and Material

The datasets used and/or analyzed during the current study are available from the corresponding author on request.

## Ethical Approval

Ethical clearance was obtained from the Bahir Dar University, College of Medicine and Health Sciences. The letter of ethical clearance was submitted to the Dega Damot district health office and a permission letter was obtained. Verbal informed consent was obtained from all study participants after explaining the purpose of the study. All household heads were assured that the data will not have any negative consequences on many aspects of their life. Confidentiality was kept by not exposing or sharing the information gathered from the respondents at all levels of the study. Participants who are not willing to participate and want to withdraw at any step of the interview in the study were informed to do so without any restriction.

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