Hygienic Child Feces Disposal Practice and Its Associated Factors among Mothers/Caregivers of Under Five Children in West Armachiho District, Northwest Ethiopia

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Moges Addis[1], Walelegn Worku[2], Laekemariam Bogale[2], Alebachew Shimelash[3] and Eniyew Tegegne[3]

[1]Abirha Jira Health Office, West Armachiho District, Abirha Jira, Ethiopia. [2]Institutes of Public Health, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia. [3]Department of Environmental Health, College of Health Sciences, Debre Markos University, Debre Markos, Ethiopia.

ABSTRACT

BACKGROUND: Children's feces are 5 times more dangerous than that of adults. Unhygienic disposal of child feces has been reported as one of the major sanitation problems in Sub-Saharan African countries. However, there is a scanty of information in the study area and evidences are insufficient in Ethiopia. Therefore, this study intends to assess child feces disposal practices and associated factors among Mothers/Caregivers of Under Five Children in West Armachiho District, Northwest Ethiopia.

METHODS: A community-based cross-sectional study was conducted in the West Armachho district from March 10, 2019 to April 10, 2019 by using a multistage cluster sampling method. Binary and multivariable logistic regression models were employed to identify factors associated to child faces disposal practice. The adjusted odds ratio with a 95% confidence interval and a *P*-value of ⩽.05 were used to declare statistical significance.

RESULT: The proportion of safe child feces disposal practice was 37.8% (95% CI: 34.6-40.89). Child feces disposal practice was significantly associated with the age of the child (AOR = 5.07, 95% CI: 2.52-10.21), the educational status of fathers (AOR = 2.34, 95% CI: 1.05–5.25), getting health education (AOR = 2.77, 95% CI: 1.84-4.16), utilization of basic type of latrine (AOR = 2.79, 95% CI: 1.55-5.02), knowledge of feces disposal technology options (AOR = 2.58, 95% CI: 1.88-3.96), and media exposure about child feces (AOR = 1.88, 95% CI: 1.22-2.99).

CONCLUSION: The practice of safe CFD was low. Age of the child, fathers' educational status, receiving health education, basic type of latrine, feces disposal technology options used, and media exposure were independent predictors of safe CFD practice. Interventions need to be designed targeting safe CFD practices taking into account different media outlets and advocacy of improved sanitation technology use by policy makers.

KEYWORDS: Feces, Disposal Practice, Children, West Armachiho, Ethiopia

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CORRESPONDING AUTHOR: Eniyew Tegegne, Department of Environmental Health, College of Health Sciences, Debre Markos University, Addis Ababa_Bahir Dar, Debre Markos 269, Ethiopia. Email: eniyewtegegne@gmail.com

Background

Many infectious diseases have been related to human excreta and a lack of sanitation, including cholera, typhoid, hepatitis, polio, cryptosporidiosis, ascariasis, and schistosomiasis.[1] Sanitation is a critical basis for the protection of public health and human welfare, and it has risen to prominence as a basic human right on the worldwide development agenda.[2-4] Sanitation seeks to keep human excrement out of the environment and protect people from fecal-oral disease transmission. More than 2.4 billion people in the globe do not have access to better sanitation, and nearly 1 billion individuals defecate in open fields.[5] Globally, 45% of CFD is unsafe. Unhygienic disposal of child feces has also been described as a widespread sanitation problem in Sub-Saharan African countries; primarily in rural areas.[6,7] Children's feces left out in the open, excrement thrown in the trash, feces buried or left on the ground, and feces poured or rinsed into drains or ditches are all unsafe CFD practices practiced by homes in low- and middle-income countries (LMICs), with more than half of households disposing of child feces in an unsafe manner.[8,9]

Sustainable Development Goal (SDG) 6 aspires to provide all people with equitable access to safely managed water and appropriate sanitation, as well as to eliminate open defecation.[10,11] Apart from SDG 6,[12] large-scale projects in some countries have expanded latrine coverage, although they do not always assure appropriate latrine use, such as the safe disposal of children excrement, which is a substantial source of fecal pathogen exposure.[13]

So far, no country's sanitation initiatives have paid much attention to children's feces, and in many nations, newborn babies' and children's stools are regarded as harmless and not

dirty.[14] Surprisingly, most sanitation programs focus on household sanitation and ignore children's stool disposal practices. People, especially children, are more likely to come into close contact with fecal pathogens when feces are left out in the open.[15] Because they play on the ground and put their hands near their faces and into their mouths, children are more likely to be exposed to fecal-oral infections.[16] Fecal-oral infections can induce diarrheal illnesses, which can lead to stunting. The association with hazardous CFD and stunting exemplifies the serious and long-term consequences of this behavior, as stunting results in impaired cognitive and physical development, lower productive ability, and other negative health consequences.[17]

Since 2003, Ethiopia has made significant progress in providing better latrines through the execution of health extension packages, reducing open defecation from 61% to 32.3% between 2005 and 2016.[18] Due to a higher prevalence of diarrhea and infections such as hepatitis A, rotavirus, and *E. coli* in children than in adults, the feces of newborns and small children are 5 times more harmful than that of adults.[19] As a result, children's feces should be handled with the same care as adults' feces, using safe disposal procedures that assure sanitary separation from human touch and contamination in the home. The improper disposal of children's feces, in particular, may be a significant pollutant in family surroundings, offering a significant risk of exposure to newborn infants.[20]

According to a survey conducted in 15 SSA countries, 58.73% of pregnant women securely disposed of their children's feces, with CFD levels ranging from 85.90% in Rwanda to 26.38% in Chad.[21] In line with studies of different settings, safe CFD is still uncommon in Ethiopia, and there is a high disparity of unsafe disposal practice ranging from 26% to 78% from region to region.[22]

Demographic characteristics are the most well-known drivers of safe CFD. Ownership of improved latrine, wealth, education and/or literacy, urban rural disparities, age of the child, number of children within the household, marital status of the woman, and water and sanitation infrastructure were related to safe CFD compared to their counterparts.[19,21-24] Evidence is critical for making well-informed decisions and intervening. Consistent and mutually supported results are indispensable to influence policy makers. Factors that influence safe CFD practice are not yet well investigated in Ethiopia. Better yet, it is recommended by a previous study to conduct further research to generate sufficient evidence regarding CFD.[22] Therefore, the goal of this study was to determine the level of children's safe disposal practices and associated factors in West Armachho district, Northwest Ethiopia, in order to develop effective interventions by directing policy makers.

Methods

Study area

The research was carried out in West Armachiho district, Northwest Ethiopia. West Armachiho is located 955 km north of Ethiopia's capital, Addis Ababa. It has a total population of 47 780, with 15 kebeles (10 rural and 05 urban). There are about 730 investors in the district, and 300 000 to 400 000 migrant workers arrive from various parts of Ethiopia for daily labor during crop harvesting season. There were 6570 children in the district. Latrine coverage was 64.5%. There is 1 hospital, 3 health centers, 11 community health posts, and 10 temporary clinic sites for migrant daily laborers on farm sites during the wet season in the district.

Study design and period

A community-based cross-sectional study was undertaken from March 10 to April 10, 2019.

Source population

All of the households in West Armachiho district were used as a source population.

Study population

All households that had a child at selected kebeles in the district.

Inclusion criteria and exclusion criteria

Inclusion criteria. Mothers/caregivers with children under the age of 5 years who are permanent residents of chosen kebeles were included in the study.

Exclusion criteria. Mothers/caregivers who were very ill at the time of data collection and unable to respond were excluded.

Sample size determination and sampling methods

The sample size was calculated using a single population proportion formula by considering the following assumptions. The proportion of safe CFD practice ($P = 34\%$) from the previous study done in Ethiopia,[22] the Margin of error as 4%, confidence level of 95%, non-response rate of 10%, and design effect of 1.5.

Therefore;

$$n = \frac{\left(Za/_2\right)^2 P\left(1-P\right)}{d^2} = \frac{\left(1.96\right)^2 .0.34\left(1-0.66\right)}{\left(0.04\right)^2} = 538,$$

After taking in to account a design effect of 1.5, and a 10% non-response rate;

$$\left(538\times 1.5\right) + \left(807\times 0.1\right)$$

The final sample size was 888.

Sampling procedure

A multistage sampling procedure was used to get the sample. Kebeles were divided into urban and rural categories during the first stage. In the second stage, lottery method was used to select 3 kebeles out of 5 in urban and 4 kebeles out of 10 in rural. Finally, depending on the total number of homes presenting a child, the overall sample size was dispersed proportionally to the selected kebeles, and simple random sampling was used to select individual houses from each kebele. The sampling frame was accessed from health extension workers of the respective kebeles.

Study variables

Dependent variables

Disposal practice of children feces (Safe/Unsafe)

Independent variables

Socioeconomic and demographic variables: Mother's educational status, religion, ethnicity, educational status of fathers, the age of the mother, place of residence (urban or rural), the age of the child, marital status, and wealth index were included.

Environmental hygiene and sanitation practice: Source of water supply, the distance of water source, availability of latrine, latrine status, the distance of latrine, ownership of latrine, knowing technology options

Institutional factors: Health education about safe CFD practice, media exposure

Operational definition

***Safe/Hygienic CFD practice*:** Defecation into a latrine, put/rinsed feces into latrine or buried.[25]

***Basic latrine*:** Use of improved facilities that are not shared with other households.[26]

***Improved latrine*:** excreta disposal facilities that can guarantee the hygienic separation of human excreta from human and insect contact.[27]

***Unimproved latrine*:** Any *latrine*, whether a pit without a slab, a platform, a hanging, or a bucket *latrine*.[25]

***Improved water source*:** Water sources that have the potential to deliver safe water by nature of their design and construction, and include: piped water, boreholes or tube wells, protected dug wells, protected springs, rainwater, and packaged or delivered water.[28]

***Kebele*:** The smallest administrative unit in Ethiopia.

Data Collection Tool and Procedure

Data was collected using a pretested structured questionnaire and an observational checklist of household latrines for indicators of usage and of the compound for the presence of human stools. The survey was written in English first, and then translated into Amharic and back to English to check its consistency. The data was collected by eight (08) diploma nurses and supervised by two (02) health officer.

Data Quality Control

The data collection instrument was pretested in areas away from the areas of actual data collection. The data collectors and supervisors were given 2 days of training on how to collect data (questioning techniques and ethical issues). The lead investigator and supervisors routinely supervised the data collection process, and any ambiguities in the questionnaire handling and questioning process were corrected on the spot. Every day, a completed questionnaire was double-checked for accuracy, consistency, and completeness. Before starting the next day's work, the data collectors, supervisors, and lead investigator discuss the previous day's data gathering process and any issues that arose.

Data Management and Analysis

Data was entered into Epi Info™ version 7.2, and exported to SPSS version 23 statistical software for analysis. The study variables were summarized using descriptive statistics such as frequencies and proportions. To find parameters linked to the safe disposal of children's feces, researchers employed a binary logistic regression model. To control the likely effect of confounders, variables with a *P*-value of .2 in the binary logistic regression analysis were incorporated into the multivariable analysis. In the multivariable analysis, the adjusted odds ratio (AOR) with a 95% confidence interval was calculated to assess the strength of the association, and a *P*-value of ⩽.05 was used to declare statistical significance. The model's fitness was further tested using the Hosmer and lemeshow goodness of fit-test(*P*-value = .621).

Results

Socio demographic characteristics of study subjects

This study had received responses from 873 mothers out of 888 samples, resulting in a response rate of 98.31%. The mothers'/caregivers' median age was 30 years. Almost all (859, 98.4%) were Orthodox, and (14, 1.6%) others were Muslims in religion. About two-third of the respondents; (572, 65.52%) were living in urban residence, while (301, 34.48%) were living in rural. Most of the mothers; (847, 97.02%) were married. The assessment of the educational status of the study participants revealed that 354 (40.55%) were unable to read and write. It was also found that most of the mothers 751 (86.02(%) were a housewife. Six hundred sixty-four (76.05%) of the households studied had one child whereas the sex ratio of the children was almost similar; (50.28%) male and (49.71%) female (Table 1).

Household environmental factors associated with safe CFD practice

The common sources of drinking water for most of the households were improved public stand pipe; 805 (92.21%), and most of them (842, 96.44%) had a total fetching time of 30 minutes or less for a round-trip including the queue. The majority of the respondents; 676 (77.43%) reported that they

Table 1. Socio-demographic characteristics of households in West Armachiho district North West Ethiopia, 2019 (n = 873).

VARIABLES	CATEGORIES	FREQUENCY	PROPORTION
Mother's age	15-24	109	12.49
	25-34	538	61.62
	⩾35	226	25.89
Religion	Orthodox	859	98.4
	Muslim	14	1.6
Residence	Urban	572	65.52
	Rural	301	34.48
Ethnicity	Amhara	816	93.47
	Tigre	40	4.58
	Kimant	17	1.95
Marital status	Married	847	97.02
	Single*	26	2.98
Educational status of mother	No education	354	40.56
	Primary	393	45.02
	Secondary	98	11.22
	Higher education	28	3.20
Employment status of mother	House wife	751	86.02
	Government employee	34	3.90
	Merchant	56	6.42
	Private org. employee	17	1.95
	Daily labor	15	1.71
Fathers educational status (848)	No education	386	45.52
	Primary	335	39.51
	Secondary	86	10.14
	Higher education	41	4.83
Employment status of father (848)	Farmer	652	76.88
	Government employee	89	10.49
	Merchant	53	6.25
	Private employee	21	2.48
	Daily labor	33	3.90
Sex of child	Male	439	50.28
	Female	434	49.72
Mobility capacity of child	Can walk	516	59.10
	Do not walk	357	40.90
Number of under-five children	One	664	76.05
	Two and above	209	23.95
Age of the child	<12 months	166	19.01
	12-23 months	192	21.99
	24-35 months	210	24.06
	36-47 months	193	22.11
	48-59 months	112	12.83

*Single, divorced, and widowed.

Table 2. Household environmental factors associated with safe CFD practice in West Armachiho district, North West Ethiopia, May 2019 (n = 873).

VARIABLES	CATEGORIES	FREQUENCY	PROPORTION
Water source	Improved	805	92.21
	Unimproved	68	7.79
Location of water	Inside the compound	123	14.08
	Outside the compound	750	85.92
Distance of water	<30 min	842	96.44
	30 min and above	31	3.56
Latrine availability	Yes	676	77.43
	No	197	22.57
Ownership of latrine (676)	Yes	605	89.50
	No*	71	10.50
Type of latrine (676)	Basic facility	113	16.71
	Improved	83	12.27
	Un improved	480	71.02
Distance of latrine (676)	<6 m	69	10.20
	6-20 m	607	89.80
The last time the latrine was cleaned (676)	Today	74	10.94
	Yesterday	88	13.02
	Between 2 and 7 days	105	15.53
	More than a week	189	27.96
	Do not known	220	32.55
Years of latrine (676)	<3 years ago	383	56.65
	3-5years ago	211	31.22
	6-10years ago	82	12.13

*Shared and communal latrine.

had a latrine. Most of the latrines were; 480 (71%) were an unimproved type. Only 123 (14.08%) of the households have water within their dwelling compound. The proportion of improved latrine coverage was 83 (12.27%). Seventy-one (10.5%) of the study participants had no their own latrine. A significant number of study participants 220 (32.55%) do not know the last time when they cleaned their latrine (Table 2).

Health related (behavioral) factors associated with safe CFD practice

The results of this study showed that most of the respondents 710 (81.32%) had visited health institution in the last 12 months. Majority of the respondents 528 (60.48%) do not had health education about CFD practices. Five hundred fourteen (58.88) of the study participants have knowledge of disposal technology options. Only 26.68% of the study participants have media exposure regarding CFD (Figure 1).

Level of safe disposal practice of children feces

The magnitude of safe CFD was found to be 37.85% (95% CI: 34.6-40.895). The study participants reported that 61 (7%) their child used the latrine for defecation; 265 (30.35%) children's stools were put/ rinsed into latrine/latrine, and a very small proportion (0.5%) of children's stools was buried. The remaining was unsafe CFD practices (Figure 2).

Factors affecting safe disposal practice of children feces

Residence of the respondents, age of mother, educational status of children mothers and fathers, their fathers and mothers occupation, age of children, media exposure, (availability, type, and cleaning time) of latrine, water source and distance from it, location of water source, visited health institution in the last 12 months, defecation site, getting health education about CFD

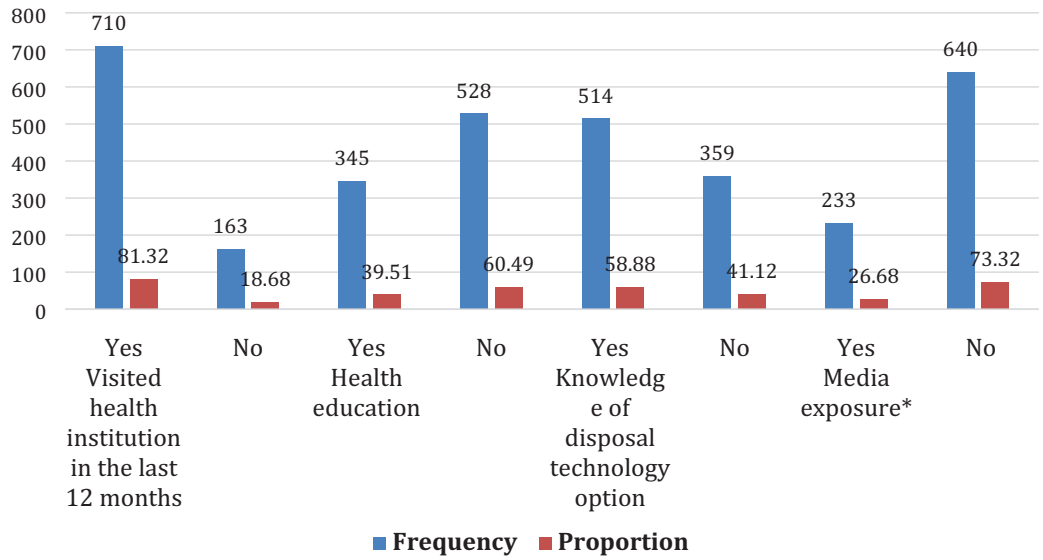

Figure 1. Institutional factors associated with safe CFD practice in West Armachiho district, North West Ethiopia, 2019 (n = 873). *watching TV and listening radio.

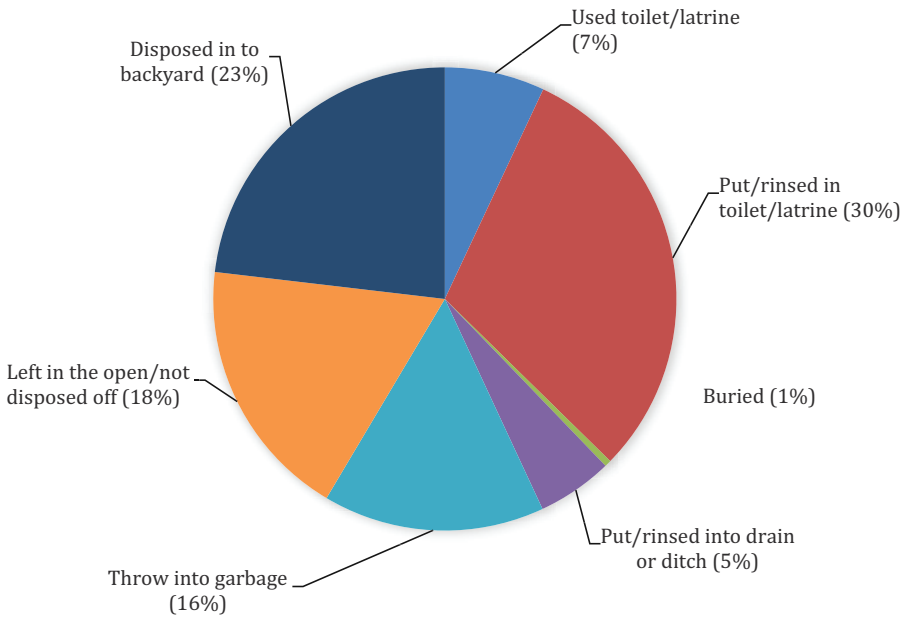

Figure 2. Proportion of methods practiced for CFD in West Armachiho district, North West Ethiopia, 2019.

practices and listening CFD technology options were fulfilled the criteria and were included in multivariable analysis.

In multivariable logistic regression analysis, the age of children, media exposure, getting health education about CFD practices, fathers' educational status, households having the basic type of latrine and knowledge of technology options were significantly associated with safe CFD practices. Those households whose child aged 48 to 59 months were 5.07 times more likely practice safe disposal than those households whose child aged <12 months (AOR = 5.07, 95%CI = 2.52-10.21). Children whose father's educational status was in the category between 9 and 12 were 2.34 times more likely to practice safe disposal compared to those born from unable to read and write father (AOR = 2.34,95% CI: 1.05-5.25). Households who had basic sanitary facilities were 2.79 times more likely to have a safe CFD practice (AOR = 2.79, 95% CI = 1.55-5.02) than those household without basic sanitary facility. Similarly, Households who had got health education about safe CFD practices were 2.77 times more likely to comply to safe CFD practices (AOR = 2.77, 95% CI: 1.84-4.16) as compared to households who did not get health education. Households who had got media exposure about safe CFD practices were 1.88 times more likely to practice safe CFD (AOR = 1.88, 95%CI = (1.22-2.99) as compared to non-exposed households. Households who know disposal technology options were 2.58 times more likely to practice safe disposal of child feces (AOR = 2.58, 95% CI = 11.68-3.96) as compared to those who did not know disposal technology options (Table 3).

Table 3. Bivariate and multivariable regression for factors affecting CFD practice in West Armachiho district, Northwest Ethiopia, 2019 (n = 873).

VARIABLES	SAFE CFD PRACTICE		ODD RATIOS		*P*-VALUE
	YES	NO	COR (95 %CI)	AOR (95% CI)	
Age of other's					
15-24	59	50	3.12 (1.98, 5.03)**	1.27 (0.62, 2.60)	.516
25-34	209	329	1.68 (1.20, 2.36)**	0.96 (0.58, 1.58)	.862
⩾35	62	164	**1**	**1**	
Residence					
Urban	251	321	2.20 (1.62, 2.98) **	0.98 (0.63, 1.54)	.932
Rural	79	222	**1**	**1**	
Educations of mother					
No education	88	266	**1**	**1**	.627
Primary	159	234	2.05 (1.50, 2.81) **	1.13 (0.67, 1.81)	.140
Secondary	59	39	4.57 (2.86, 7.32) **	1.76 (0.83, 3.71)	.197
Higher education	24	4	18.14 (6.13, 53.71)**	3.43 (0.53, 22.33)	
Occupations of mother					
House wife	256	495	**1**	**1**	.512
Govt. employee	27	7	7.46 (3.20, 17.36) **	0.60 (0.13, 2.76)	.373
Merchant	34	22	2.99 (1.71, 5.22) **	1.46 (0.46, 3.35)	.932
Private employe	7	19	1.35 (0.51, 3.60)	1.06 (0.28, 3.97)	.996
Daily labor	6	9	1.29 (0.45, 3.66)	0.99 (0.17, 5.86)	
Fathers educational status **(848)**					
No education	103	283	**1**	**1**	.549
Primary	139	196	1.95 (1.43, 2.66) **	1.16 (0.72, 1.85)	.039
Secondary	46	40	3.16 (1.955, 5.11) **	2.34 (1.05, 5.25) *	.003
Higher education	35	6	16.03 (6.55, 39.22)**	16.03 (2.65, 97.12)	
Occupations of father **(848)**					
Farmer	213	439	**1**	**1**	.925
Gov.t employee	53	36	3.03 (1.93, 4.78) **	0.97 (0.47, 1.97)	.059
Merchant	35	18	4.01 (2.22, 7.24) **	0.18 (0.04, 0.75)	.052
Private employee	8	13	1.27 (0.52, 3.11)	0.28 (0.08, 1.01)	.499
Daily labor	14	19	1.59 (0.75, 3.11)	1.46 (0.49, 4.35)	
Age of the child					
<12 month	71	95	**1**	**1**	.192
12-23 month	72	120	0.80 (0.53, 1.23)	1.47 (0.83, 2.62)	.268
24-35 month	73	137	0.71 (0.47,1.08) **	1.38 (0.78,2.47)	.439
36-47 month	48	145	0.44 (0.28,0.69) **	0.78 (0.42,1.45)	.000
48-59 month	66	46	1.92 (1.18,3.12)**	5.07 (2.52,10.21)*	

(Continued)

Table 3. (Continued)

VARIABLES	SAFE CFD PRACTICE		ODD RATIOS		*P*-VALUE
	YES	NO	COR (95 %CI)	AOR (95% CI)	
Media exposure					
No	178	462	**1**	**1**	.004
Yes	152	81	4.87 (3.54,6.71)**	1.88 (1.22,2.99)*	
Location of water					
Inside	74	49	2.91 (1.97,4.31) **	0.88 (0.50,1.58)	.673
Outside	256	494	**1**	**1**	
Latrine availability					
No	5	199	36.1 (14.68,18.95) *	4.73 (0.210.1080.91)	.332
Yes	325	349	**1**	**1**	
Type of latrine **(676)**					
Basic	85	28	4.47 (2.81,7.12) **	2.79 (1.55,5.02) *	.001
Improved	47	36	1.92 (1.20,3.08) **	1.31 (0.71,2.41)	.393
Un improved	194	286	**1**	**1**	
Visited health institution					
No	30	133	**1**	**1**	.055
Yes	300	410	3.24 (2.13,4.95) **	1.81 (0.99,3.32)	
Health education					
No	122	406	**1**	**1**	.000
Yes	280	137	5.05 (3.76,6.79)**	2.77 (1.84,4.16)*	
Knowing technology options					
No	113	410	**1**	2.58 (1.68,3.96)*	.000
Yes	217	142	5.42 (4.03,7.30)**		

Abbreviations: AOR, Adjusted Odds Ratio; COR, Crude Odds Ratio.
The model adequately fit the data at a *P*-value = .621 (Hosmer Lemeshow goodness).
**Significant at bivariate, and *significant at multivariable.

Discussion

For a healthy environment and human health, excreta disposal that does not pollute the environment, water, food, or fingertips is essential. The feces of babies and small children are more dangerous than that of adults, but there is a misconception that the feces of babies and younger children aren't harmful. This contradicts the fact, and proper precautions must be taken to protect residents.[14]

Safe CFD techniques were found to be used by 37.8% of research participants in this study. This indicates that residents might face a significant risk of illness exposure and environmental contamination. Children may be vulnerable to diarrhea, parasite infection, and environmental enteropathy if their feces are not properly disposed of. So, proper CFD may be especially important in preventing fecal-oral transmission. Diarrhea is the greatest cause of death among children under the age of 5 in Ethiopia, accounting for 23% of all under-five deaths, and over 70 000 children per year.[29] Through evidence-based strategic planning, coordination, and implementation of development actions; the water, sanitation and hygiene(WASH) sector need to be strengthened. A major focus should be on improving knowledge management by using data to improve and strengthen service delivery, policies, procedures, monitoring, and evaluation. Herewith, due attention should be given for safe disposal of child feces in West Armachiho district as the magnitude of safe disposal practice is low.

The level of safe CFD revealed in this study is comparable to that found in a study conducted in Madagascar (38%),[30] and Ethiopia.[21] However, the proportion of CFD practice in the current study was lower than studies of Zambia (77.81%),[21] Nigeria (56.95%),[21] Malawi (84.67%),[21] Kenya (70%),[31] Malawi (79%),[32] Mali (63.5),[21] Cambodia (70.73%),[33] and Uganda (75%).[34] This difference might be due to socio-demographic, environmental, cultural, institutional, economic, and

individual livelihood factors of the current study compared to the previous settings.

On the other hand, the proportion of safe CFD in this study was higher compared to studies done in Bangladesh(20%),[35] Anglola (32.69%),[21] Benin (34.13%),[21] India (21%),[19] the rural block of West Bengal in India (27.6%),[36] and Ethiopia (33.68%).[22] The presence of open defecation-free declared kebeles in the study area could be a feasible rationale for the differences. Another reason could be that, over time, community knowledge grows as a result of media, and the implementation of health extension program due to sensitization of achieving sustainable development goals in the case of the current study.

According to the findings of this study, households with a basic facility/improved latrine were more likely to practice safe feces disposal than those with an unimproved latrine, which is similar to a study done in Zambia.[37] CFD habits vary widely, with a higher frequency of unsafe practices in households lacking access to adequate sanitation.[37] Another study conducted in Ethiopia and South Africa found that mothers (caregivers) who lived in a home with a better latrine were more likely to practice safe CFD.[16,22,36] However, a study conducted in India found that the opposite of this study is true, indicating that even in households with improved latrines, 54% of children's stools were disposed of unsafely. This shows that simply having better latrines does not guarantee that the latrine facility will be used to dispose of the children's feces.[19]

Fathers with a high school, a college diploma, or a higher level of education were found to be more likely than fathers with no formal education to have safe CFD practices. This finding is supported by research conducted in Bangladesh, South Africa, and Ethiopia.[22,38,39] This could be due to a father's educational attainment, which could lead to a greater role in the safe disposal of child feces by assisting the child during defecation and by buying sanitary pans for his children. Furthermore, educated fathers were more aware of sanitary issues and tend to provide a better care for their children.

These findings suggest that media exposure and health education about correct children's feces disposal could help avoid improper feces disposal. This observation is in line with the findings of a research conducted in Kenya.[40] Health promotion efforts should make extensive use of information, education, and communication as well as mass media. Village Health, Sanitation, and Nutrition Committees established under the National Rural Health Mission (NRHM) must be strengthened, trained, and made operational in order to raise community awareness about proper stools disposal.[19] Another study conducted in South Africa found that improved communication channels to reach members of rural communities, particularly home visits, small group meetings, and community meetings, were cited as motivating factors to practice safe CFD.[39] Also, health promotion programs involving health education and the media resulted in a 4% increase in the safe disposal of children's feces in Burkina Faso.[40]

The age of the children was also one of the factors linked to safe CFD in this study. Research in Bangladesh, India, and Ethiopia had found similar results.[22,38,40] This result was also supported by research undertaken in West Nigeria and Kenya.[41,42] When a child reaches a certain age, his or her feces will have a terrible odor and visible food remnants, making the feces more disgusting.[20] Another possible justification is that as children get older, especially between the ages of 48 and 59 months, they can practice using the latrine without assistance, and that the pattern of child defecation and the location of defecation in these communities vary with age.

Knowing about children's excrement disposal technology options was found to be strongly related with safe CFD practices in this study. This finding was further supported by a study conducted in Cambodia.[38] The primary reasons reported by caregivers for their satisfaction with existing products included that they were easy to use to dispose of feces and clean; they saved time, especially at night; they were safe and hygienic; they kept the household clean; they were multipurpose, and they were cheap.[38] This suggests that community lobbying and advocacy efforts are essential for enabling people to become dependent on better sanitation technology and for providing them with affordable costs associated with using them.

Strength and limitation of the study

Strength

- We have tried to minimize reporting bias by enquiring about the "last time" the child defecated rather than asking about the usual practice for disposal of child feces, as the latter question has been suggested to be more likely to elicit the socially desirable response.

Limitation. This study shares the cross-sectional study design's shortcoming of being unable to demonstrate a cause-and-effect link. When monitoring the compound/backyard, observer bias may be prevalent, especially when recognizing the excrement of children and adults.

Conclusion

In conclusion, practice of safely disposing of child excrement was found to be poor in the West Armachiho district. Children's age, media exposure, fathers' educational status, and health education about children's feces disposal practices, as well as the type of latrine facility available and knowledge of disposal technology options, were factors associated to safe CFD practices. These findings highlighted the need for a sustained intervention to be designed targeting CFD practices, taking into account different media outlets and advocacy of improved sanitation technology use by policy makers.

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Authors' Contributions

MA, WW, and LB have been involved in the study from the inception to design, acquisition of data, analysis and interpretation. AS, and ET read and approved the final manuscript.

Availability of Data and Materials

Data will be made available upon the reasonable request to the primary author.

Ethics Approval and Consent to Participate

Ethical clearance was gained from the institutional ethical review board of the Public Health Institute, University of Gondar. Official letters of support were also received from the West Armachiho health office. Informed written consent was agreed with the mothers/caretakers before the interview. The respondents were informed of the confidentiality and anonymity of study participants. Moreover, the respondents' right to resign from the interview was insured if any uncomfortable condition occurred. All methods were carried out in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Consent for Publication

Not applicable.

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