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Is Using a Latrine “a Strange Thing To Do”? A Mixed-Methods Study of Sanitation Preference and Behaviors in Rural Ethiopia

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Abstract. Latrines are the most basic form of improved sanitation and are a common public health intervention. Understanding motivations for building and using latrines can help develop effective, sustainable latrine promotion programs. We conducted a mixed-methods study of latrine use in the Amhara region of Ethiopia. We held 15 focus group discussions and surveyed 278 households in five communities. We used the Integrated Behavioral Model for Water, Sanitation, and Hygiene interventions to guide our qualitative analysis. Seventy-one percent of households had a latrine, but coverage varied greatly across communities. Higher household income was not associated with latrine use (odds ratio [OR] = 1.9; 95% confidence interval [CI] = 0.5, 7.7); similarly, cost and availability of materials were not discussed as barriers to latrine use in the focus groups. Male-headed households were more likely to use latrines than households with female heads (OR = 3.5; 95% CI = 1.6, 7.7), and households with children in school were more likely to use latrines than households without children in school (OR = 2.3; 95% CI = 1.6, 3.3). These quantitative findings were confirmed in focus groups, where participants discussed how children relay health messages from school. Participants discussed how women prefer not to use latrines, often finding them strange or even scary. These findings are useful for public health implementation; they imply that community-level drivers are important predictors of household latrine use and that cost is not a significant barrier. These findings confirm that school-aged children may be effective conduits of health messages and suggest that latrines can be better marketed and designed for women.

INTRODUCTION

More than one-third of the world's population, 2.6 billion people, do not have access to improved sanitation, defined as the safe disposal of human excreta.¹ Despite the Millennium Development Goal target to halve the proportion of the global population without access to sanitation, global sanitation coverage has changed little in the past quarter century.¹

Ethiopia has made substantial progress on improving access to sanitation during the past decade. Still, just 29% of the population, nearly 30 million people, do not have access to improved sanitation.² A third (34%) of the rural population practices open defecation, compared with 6% of the urban population. Sewage connections are rare in urban areas (0.4–6.6%) and nonexistent in rural areas.²

To improve global sanitation coverage, development initiatives often promote latrines rather than more expensive piped sewage systems. Simple pit latrines are the least expensive and most basic form of improved sanitation. They typically consist of a pit dug into the ground, covered by a concrete slab, dirt or wooden floor. Although latrines are easy to build, achieving high coverage and long-term use has been a challenge. Coverage is defined as the proportion of a community who build a latrine, and use is measured by direct observation of the latrine, usually by visible human waste material around the drop-hole.³ The distinction between coverage and usage is relevant because reaching 100% coverage would do nothing to reduce envi-

ronmental fecal contamination from open defecation unless there was simultaneously widespread use.

Achieving high coverage (more than 80%) and long-term use has been a challenge for public health sanitation programs and for studies on the health benefits of latrines.^{4–6} A Carter Center–led latrine intervention program in the Amhara region of Ethiopia increased coverage from 5–32% in 3 years.⁷ Although this 27% increase was a notable public health achievement, still two out of three households did not have a latrine by the end of the program. Intervention trials measuring the health benefits of latrines often cite low latrine coverage and usage as a reason for not finding a health benefit of latrines. For example, in a recent sanitation trial in India just 38% of the intervention arm had functioning latrines by the end of the study.⁸ A sanitation study in the Amhara region Ethiopia found just half of households were using a latrine 3 years after an intensive latrine promotion intervention.⁹ Understanding why households chose to build and then use latrines for latrines can help develop effective, sustainable sanitation promotion programs.

The objective of this study was to understand individual, household, and communal motivations for building and using a latrine in rural Ethiopia. We examine these motivations using a mixed-methods approach by analyzing both qualitative data from focus groups and quantitative data from a household survey in the same communities. We implement our qualitative analysis using a model specifically designed to understand water, sanitation, and hygiene behavior and use a mixed-effects model to analyze our quantitative data at both the household and community level. The study was conducted as formative research to investigate hygiene and sanitation behaviors in preparation for a cluster-randomized trial to examine the impact of a comprehensive water, sanitation, and hygiene intervention

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on trachoma in the Amhara region of Ethiopia (clinicaltrials.gov no. NCT02754583).

METHODS

Study area and population. This study took place in a rural agrarian region in the Goncha Siso Enese “woreda” of the Amhara region in Ethiopia. “Woredas” in Ethiopia are further divided into districts known as *kebeles*, and at the time of the study, *kebeles* were further subdivided into government-defined units known as state teams. State teams, which were roughly equivalent to a village, consisted of approximately 275 people and are termed communities for this article. A previous study of an intensive latrine promotion program in the same region (Goncha Siso Enese “woreda”) documented a latrine usage of 16% in the control arm and 60% in the latrine intervention arm 12 months postintervention.^{10,11} The area is predominantly Ethiopian Orthodox Christian. Most heads of household of the study area are farmers, and without formal education. Household electricity is rare and paved roads nonexistent.¹²

Sampling and recruitment. Communities in the present study had already participated in a series of cluster-randomized trials testing different mass drug administration strategies for trachoma elimination beginning in 2006 (clinicaltrials.gov no. NCT00322972). As part of these trials, communities had received some form of mass azithromycin distribution for trachoma at least annually from 2006 to 2013. Methods for these trials are described in detail elsewhere.¹³ We selected five communities that were relatively accessible (< 1-hour walk from the farthest place a four-wheel drive vehicle could reach) and had poor access to water (≤ 1 community water points) for the focus group discussions (FGDs). All households in these five communities subsequently were eligible to participate in a household survey. Before and during the study, all communities continued to receive the routine government package of hygiene promotion activities.¹⁴

Sample size. Our sample size was driven by the number of focus groups conducted. We held focus groups until the content reached saturation (five communities, 15 focus groups), and then sampled all households living in these communities for the survey.

Conceptual model. For our qualitative analysis, we used the Integrated Behavioral Model for Water, Sanitation, and Hygiene interventions (IBM-WASH), a theoretical model specifically developed to understand water, sanitation, and hygiene interventions and behaviors. This model identifies three dimensions of water, sanitation, and hygiene-related behaviors: contextual, psychosocial, and technological factors at five separate levels of behavior: societal, community, household, individual, and habitual.¹⁵

Unlike other models that focus on individual behavior, the IBM-WASH model seeks to describe behaviors in a larger context, including at the household, community, and societal levels (Figure 1). The three interacting dimensions (psychosocial, contextual, and technological) are based on the concepts of reciprocal determinism found in social cognitive theory.¹⁶ The contextual dimension encompasses characteristics of the individual, setting, and environment that are beyond the scope of traditional health technology and behavior interventions. The psychosocial dimension

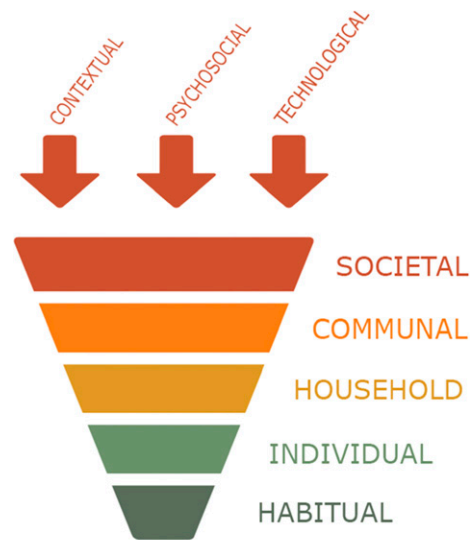


FIGURE 1. Integrated Behavioral Model for Water, Sanitation, and Hygiene (IBM-WASH).¹⁵

describes social, behavioral, and psychosocial factors that prompt behavior change and are amenable to intervention. The technological dimension explains behaviors and practices specific to the WASH technology and also addresses sustained and continued use and maintenance of latrines.¹⁵

Qualitative methods: FGDs. In April 2014, two investigators led 15 FGDs in Amharic, the local language. Three focus groups were organized in five study communities, each comprised of seven people in each community: one for female community members, one for male community members, and one group with both male and female community leaders. Focus group participants were ≥ 18 years of age; there was no upper age limit for participation. Community health workers used convenience sampling to enroll focus group by approaching households and asking for volunteers until the group had seven participants. Community leaders were recruited from the local government and from the health development army. The health development army is a group of community members who have been recruited by the local government to assist with implementation of development activities in Ethiopia. The health development army volunteers receive regular training from government-used health extension workers.

The FGD guide was based on the United Nations International Children’s Emergency Fund technical manual on hygiene promotion, which includes items related to knowledge and perceptions about sanitation, open defecation, and benefits/barriers to using a latrine.¹⁷ See Box 1 for example questions.

Each discussion lasted for approximately 1.5 hours. Focus groups were taped using a digital audio recorder, reviewed for identifying information, and transcribed verbatim in Amharic. Transcripts were then translated into English by a bilingual staff member and assessed for accuracy and consistency. Initial descriptive codes were based on data immersion with a transcript from each group

Box 1
Example focus group questions

- Where are the places that people use to defecate that are not in a latrine?
- Why do people choose to defecate in their backyard?
- In this particular area, where do people defecate?
- Which method is preferable to defecate? In the open yard or in the latrine?
- Do you think all members of the community dig latrine pits and use them?

(females, males, and community leaders). Codes were then organized into levels and dimensions of the IBM-WASH model. The investigators compiled a list of codes, definitions, and example quotes. Three researchers independently coded the transcripts. To assess the reliability of text coding, we calculated intercoder agreement using kappa coefficients on randomly selected transcripts. Three tests using three separate transcripts were performed until kappa coefficients were at least 0.75 for each pair of coders. After each test, discrepancies were compared and discussed among coders. The final kappa coefficients were 0.75, 0.81, and 0.88. After the data were coded, we developed matrices for each of the codes to analyze emerging themes across communities and focus group type (female, male, or community leader) and identify similarities and differences across these groups. To ensure mixed-methods integration, focus group probes were linked to quantitative questions on latrine use from the household survey. The focus group transcripts were coded in Dedoose 16.1.18 (SocioCultural Research Consultants, Los Angeles, CA), a cloud-based platform for qualitative data analysis.

Quantitative methods: household survey. Study staff not involved with the FGDs conducted a door-to-door household survey in each of the five communities in Amharic. Heads of households were asked a series of standardized questions about water, sanitation, hygiene practices, and economic status, as well as basic sociodemographic data. If the head of household was not available, the survey was conducted with the spouse. The quantitative survey was developed at the same time the focus group guide was developed, and it was conducted 1 month after the focus groups concluded.

We used bivariate and multivariate mixed-effects logistic regression models to determine predictors of household latrine use, with community as a random effect. The primary outcome was household latrine use, measured by direct observation of a household latrine with either the sight or smell of feces in the latrine. The following variables were selected a priori to investigate for associations with latrine use: household income, if the household had children, if the head of household was literate, gender of the head of household, and if the household had a mobile phone. Income was measured by self-report in Ethiopian birr, the local currency. Literacy was measured by self-report. Mobile phone ownership was considered as an alternate indicator of socioeconomic status. We included variables in the multivariate model with a *P* value greater than 0.10. We determined whether latrine use was associated with community by calculating the intraclass correlation coefficient (ICC) on the logit scale from the mixed-effects logistic regression model. All quantitative analyses were run in Stata 13.1 (StataCorp, College Station, TX).

Ethics statement. The Committee for Human Research of the University of California, San Francisco and the Ethiopian Ministry of Science and Technology granted ethical approval for this study. We obtained informed consent in Amharic for focus group and household survey participants. All data were deidentified before they were analyzed.

RESULTS

Qualitative results. A total of 105 people participated in 15 FGDs, five with all female community members, five with all-male community members, and five with both male and female community leaders. There were seven people in each discussion group. The age range for focus group participants was 18–70 with a mean age of 35.9 (± 10.8). The majority of focus group participants (72.6%) had no formal education. In the all-female focus group, 91.4% of women had no formal education compared with 62.9% in the all-male focus groups. The primary occupation for focus group participants was farming (72.4%). In the community leader focus groups, 14 (13.3%) participants were members in local government, and 13 (12.4) participants were volunteers in the development army (Table 1).

TABLE 1
Focus group participant demographic characteristics

	Female FGDs <i>N</i> = 35	Male FGDs <i>N</i> = 35	Community leader FGDs <i>N</i> = 35	Total <i>N</i> = 105
Age	32.5 \pm 7.03	38.1 \pm 13.1	37 \pm 11.0	35.9 \pm 10.8
Education				
None	32 (91.4)	22 (62.9)	22 (62.9)	76 (72.4)
Primary	2 (5.7)	13 (37.1)	13 (37.1)	28 (26.7)
Secondary	1 (2.9)	–	–	1 (0.95)
Sex				
Female	35 (100)	–	11 (33.3)	46 (44.7)
Male	–	35 (100)	22 (66.7)	57 (55.3)
Primary occupation				
Farming	34 (97.1)	35 (100)	7 (20.0)	76 (72.4)
Local government	–	–	14 (40.0)	14 (13.3)
Development army	–	–	13 (37.1)	13 (12.4)
Military	–	–	1 (2.9)	1 (0.95)
Liquor production	1 (2.9)	–	–	1 (0.95)

FGD = focus group discussion. Values are *n* (%) or mean \pm standard deviation.

TABLE 2
Selected quotes from focus group discussions

	Contextual dimension		IBM-WASH level
1	"Our houses are not concentrated in one place rather they are scattered, so we have vast fields to discharge [defecate]."	F2	Societal
2	"In the previous times, we used to have vast backyards. At that time, it wouldn't have been that bad to use [defecate] there but today it's not possible."	M5, L	Societal
3	"Those who own land prepare latrine and use it, but those who don't, use on the ground."	M1	Societal
4	"If I have a neighbor and if he excretes in the field while I use the latrine; he will be legally liable upon my complaint because his disease will be transmitted to me."	M5, L	Communal
5	"When we are in the farm we don't come to our house to use the latrine because it is too far. We just dispose it where we are."	F4	Communal
6	"Ideas are coming to build a latrine in the field and in the farm in which anybody even a passer-by can use it."	F4	Communal
7	"Women who don't have husbands don't have anybody to dig the ground for them. They are not physically fit to do it themselves so use their backyard."	F1	Household
8	"Q. 'Do women use latrine?' A. 'No, they go to backyard to discharge.'"	F2	Individual
9	"I have a latrine but prefer to use the back yard."	F2	Individual
10	"The women get scared of it; as if there is something scary with a latrine."	M2	Individual
11	"I have children who are students and when they return from where ever they were, they use the latrine. However, my wife is still using the field and she considers using a latrine as a strange thing to do."	M3, L	Individual
12	"It is the women who are most problematic. It has been almost 10 years since I dug a pit and started to use a toilet but when we tell women to use it they refuse saying that it has a bad smell."	M3, L	Individual
Psychosocial dimension			
13	"We know those who use outside as a toilet may be exposed to different type of disease. It's our belief that causes our backwardness. It is inappropriate to excrete in the street where there are so many people around; we got nothing to lose by using toilet. The society doesn't accept the education well."	M1, L	Societal
14	"It's an old belief that says excreting on the ground will serve as a fertilizer for the farm."	M5, L	Societal
15	"There are some people who think it is improper culture. Those who don't understand the education, when we tell them they won't listen, it's like trying to penetrate rock by water. They say we will construct temporary toilet, they do just for the sample."	M1, L	Communal
16	"If we prepare latrine and use them properly, we will create a clean community."	M5	Communal
17	"Previously, the community didn't have such practices. But now, it's changing that practice, defecating on fields is being seen as taboo. There are toilets in each house."	M4	Communal
18	"If we defecate outside, chickens, lamb and goats will eat them and transmit diseases when we eat them."	M1	Household
19	"If we throw away stool everywhere in the ground, then it will be a favorable place for flies to transmit diseases. However, disposing stools in the latrine means burying it underground so that flies won't get it."	M2, L	Household
20	"We keep on telling and advising our children to use latrine properly and purposely so that they live longer."	F4	Household
21	"Educated children advise the parents to build latrines . . . Nowadays, in every house there is student so there are many who keep their cleanliness."	M1, L	Household
22	"[Disposing of stool in the latrine] can preserve our health."	M1	Individual
23	"It is necessary to use toilets; because, if we throw stool everywhere, we will be infected with water borne diseases and other diseases that would be transmitted by flies."	M2	Individual
24	"There are some who use it and there are others who do not. Those who don't use it are not using it in compliance of a harmful tradition. It's those who don't have a deeper understanding of science and the women who do not use latrine."	M2	Individual
Technological dimension			
25	"There are people who used to say 'we were about to vomit because of the smell,' but now they are being accustomed to it."	M2, L	Individual
Other			
26	"Now a day's only 10% of the community use latrine."	M1, L	
27	"There is no one who doesn't have a latrine and doesn't use it."	F3	

F = female, IBM-WASH = Integrated Behavioral Model for Water, Sanitation, and Hygiene; L = community leader; M = male. The numbers 1–5 indicate Communities 1–5.

Contextual dimension. At the societal level, focus group participants discussed the relationship between population density, open space, and open defecation. Participants viewed open defecation as more acceptable in less populated areas (see Table 2, Quote 1 [Q1]). There was a discussion about how population density is increasing over time and how this relates to the practice of open defecation (Q2). Participants noted that individuals must own the land to build a latrine, implying that tenants or temporary residents would be unable to build their own latrine (Q3). Laws prohibiting pollution were also discussed. For example, one

participant mentioned that community members could be liable for spreading disease when defecating in the open (Q4). At the community level, people lived some distance from their fields and reported that distance from home was a barrier to latrine use (Q5). Several participants suggested that a solution to this distance barrier would be to construct communal latrines in agricultural areas (Q6). At the household level, some community members discussed the need for physical strength to build a latrine, and how female-headed households (households without male members) could not dig a pit and build a latrine (Q7). Three

TABLE 3
Household survey demographics

	Community					Total N = 278
	1 N = 37	2 N = 33	3 N = 90	4 N = 45	5 N = 73	
Head of household female	13 (34.2)	4 (12.1)	20 (22.2)	9 (19.6)	20 (27.4)	66 (23.6)
Head of household literate	14 (37.8)	1 (3.0)	25 (27.8)	10 (22.2)	4 (5.5)	54 (19.4)
Household has a mobile phone	7 (18.4)	1 (3.0)	10 (11.1)	6 (13.6)	6 (8.2)	30 (10.8)
Household income less than \$2/day	29 (87.8)	33 (100)	70 (78.7)	35 (77.8)	73 (100)	240 (87.9)

Values are n (%).

individual-level characteristics concerning latrine use were described: gender, education, and personal preference for using the field. Gender differences in sanitation preference were discussed in detail. In particular, participants from the all-male, all-female, and community leader focus groups noted that women often prefer open defecation to using a latrine (Q8, 9) for a variety of reasons including smell (Q12), fear (Q10), and because it was seen as strange (Q11).

Psychosocial dimension. At the societal level, culture, belief, and tradition were discussed as barriers to using a latrine (Q13). The tradition of fertilizing fields with human waste was also mentioned (Q14). At the communal level, many participants brought up the idea of shared values and using latrines to collectively create a clean community (Q16). Norms about latrine use differed between communities. For example, in Community 1, a participant noted that members of his community do not construct latrines because they believe it is improper, or they construct them just for show but do not use them (Q15). In contrast, in Community 4, a participant described that open defecation was now being seen as a taboo and now nearly everyone in the community used a latrine (Q17). A widespread household-level motivation for building and using a latrine was to prevent livestock from eating human feces and transmitting disease (Q18). Many participants agreed latrines reduce flies and in turn the diseases flies transmit from human feces (Q19, 23). Parents described ensuring the well-being and health of children as a motivation for using a latrine (Q20). Many parents also noted that their children brought the health messages and behaviors they learned in school home to their families (Q21). Several participants brought up indi-

vidual and household health as a motivation for using a latrine (Q18, 19, 20, 21, 22, 23). Participants suggested that people who are educated and who understand science are more likely to use latrines (Q24).

Technology dimension. Few technological factors were discussed as barriers or motivators of latrine use. No participant mentioned difficulty in acquiring materials to construct a latrine or the cost of building a latrine as a barrier. The only technological barrier mentioned that discouraged some people, particularly women, from using the latrine was smell (Q25). We considered smell a technological factor because there are ways to build a latrine that minimize or eliminate bad odors.

Quantitative results. Of the 279 eligible households in the five study communities, 278 households agreed to participate in the study. Of the survey respondents, 154 were female and 123 were male. The majority of households had a male head of household (211); 66 households had a female head of household. All households reported agricultural work as the primary occupation. The average household size was five, with a range between one and ten persons; 251 (90%) households had children. Few heads of household (54/278; 19%) were illiterate. No household had electricity. Approximately half of households (146/278) lived on less than US\$1/day and 240 (88%) lived on less than US\$2/day (Table 3).

Across the five communities, 196 (70.5%) households owned and used a latrine, and 82 (29.5%) did not own a latrine or owned a latrine but did not use it. The proportion of households who used a latrine varied greatly across the study sites from 13.5% in Community 5 to 100% in Community 3 (Figure 2).

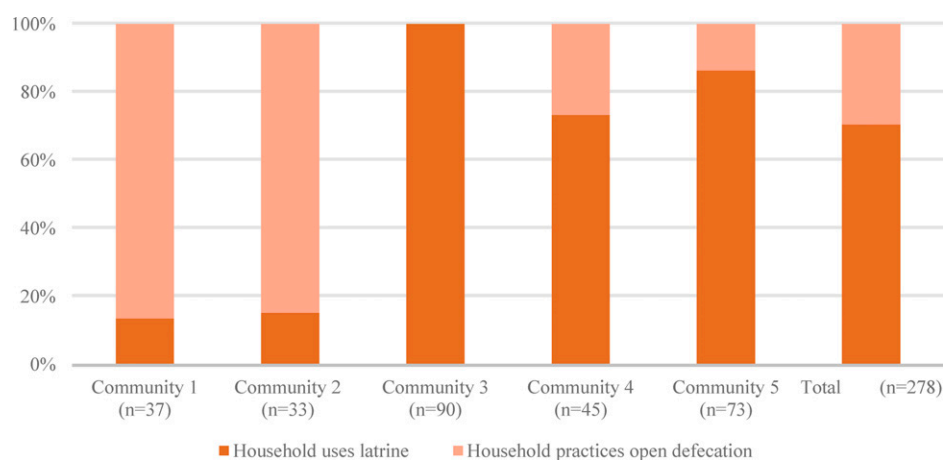


FIGURE 2. Sanitation practices by community.

TABLE 4
Household characteristics and latrine use

Model parameter	Bivariate OR (95% CI)	P value	Multivariate OR (95% CI)	P value
Household income less than \$2/day	1.9 (0.5, 7.7)	0.35		
Schoolchildren in household	2.6 (1.8, 3.8)	< 0.001	2.3 (1.6, 3.3)	< 0.001
Head of household literate	1.4 (0.4, 5.5)	0.60		
Head of household male	3.7 (1.7, 8.0)	< 0.001	3.5 (1.6, 7.7)	0.002
Household has mobile phone	1.7 (0.9, 3.2)	0.12		

CI = confidence interval; OR = odds ratio. Mixed-effects logistic regression models with robust standard errors.

In our multivariate model, the presence of schoolchildren in the household and the gender of the head of household were associated with latrine use. Households with male heads had 3.5 times higher odds of having and using a latrine compared with households with female heads (95% confidence interval [CI] = 1.6, 7.7). Households with children in school had 2.3 times higher odds of having and using a latrine compared with households without children in school (95% CI = 1.6, 3.3). Household income (greater than \$2/day) was not associated with latrine use (odds ratio = 1.9; 95% CI = 0.5, 7.7) (see Table 4). The ICC for the multivariate model was 0.74 (95% CI = 0.36, 0.93).

DISCUSSION

In our study area, 71% of households had and used a latrine, whereas the remaining practiced open defecation. Latrine coverage varied widely between communities, from 14–100%. We found households with children in school were more likely to use a latrine than households without children in school. FGDs confirmed that schoolchildren bring home health messages and behaviors, suggesting targeting schoolchildren may be an effective way to disseminate health messages and practices into the community. Households with female heads were less likely to use a latrine than households with male heads. In the focus groups, women often preferred open defecation to using a latrine.

The wide variation in latrine use across communities suggests that the principal factor determining latrine use operates at the community level. This observation was also confirmed by the very high ICC from our mixed-effects model, which indicated that 74% of the variation in latrine use is explained at the community level. Using the multilevel IBM-WASH model, we captured community- and society-level concepts beyond the scope of many individual-level behavior models. For example, focus group participants discussed community-level predictors of latrine use that may explain the community-level variation, including land ownership, distance from agricultural fields to homes, and proximity to towns. Government sanitation programs are implemented at the “woreda” (district) level and thus cannot explain differences in latrine use across communities.¹⁸ However, implementation of the government sanitation policy due to differences in health extension workers and/or assigned hygiene officers may have varied. Social networks may also explain community-level variation in latrine use. For example, a social network analysis in India found that households were more likely to use latrines if their social contacts also used latrines.¹⁹ Another study in rural India demonstrated that proximate social pressure was an integral component of successful sanitation adoption.²⁰

To further understand the large differences in latrine use between communities, we compared FGDs about community-level characteristics and norms from high-latrine-use communities where more than 70% of households used a latrine (Communities 3, 4, and 5) to low-latrine-use communities where less than 20% of households used a latrine (Communities 1 and 2). Interestingly, in the high-latrine-use communities, population density was cited as a reason people now use latrines (Q2), whereas in low-latrine-use communities, participants noted that houses were far apart and there were “vast fields” to defecate. In one high-latrine-use community (Community 4), a participant noted that there were actual community-level laws that prohibited community members from practicing open defecation (Q4). In the low-latrine-use communities (1 and 2), several focus group participants discussed culture, beliefs, and habits that were barriers to latrine use (Q13, 15). In particular, participants noted that community members knew that latrines could be beneficial for health but still chose not to use them (Q13). Some community members even built latrines for show but then did not use them (Q15). In terms of forming sanitation interventions to increase latrine coverage in communities like these, our FGDs imply that simply educating communities on the health benefits of latrines may not be sufficient to elicit behavior change.

Interestingly, the cost of building and maintaining a latrine was not discussed in the focus groups as a barrier to use. The Ethiopian government currently promotes a simple pit latrine made from locally available materials, and our study area has an abundance of eucalyptus trees, making latrine construction relatively affordable for most households. This qualitative finding agreed with our household survey, where we found no association between household income (of two or more dollars a day) and latrine use. We used mobile phone ownership as an alternative measure of economic status, but similarly did not find an association. Our results are consistent with other qualitative studies of latrine use, which similarly did not find the cost of latrine as a restricting factor.^{21–23} However, a cross-sectional survey of latrine use in Ethiopia did find an association between an income greater than \$24 a month and owning a latrine.²⁴ The multifaceted role of cost is an important finding for development initiatives that propose building free latrines to increase coverage.

The strongest household-level predictor of using a latrine in our quantitative analysis was the gender of the head of household. Male-headed households were more likely to use a latrine than female-headed households. This finding agrees with the gender differences in sanitation preference discussed in the focus groups (Q7, 8, 9, 10, 23). Many female participants preferred to use open fields instead of latrines,

citing that latrines were dirty, smelly, or even scary. This finding suggests that sanitation behavior interventions may need to be targeted differently to women and men. A cross-sectional study in rural Tanzania also found that female-headed households were less likely to use latrines than male-headed households.²⁵ In contrast, studies from south Asia have demonstrated a preference by women for latrines over open defecation.^{26,27} Although women are often the primary implementers of sanitation in the household, they rarely have a say over latrine design, placement, or maintenance.²⁸ The United Nations Department of Economic and Social Affairs has called for collecting gender-disaggregated sanitation data to evaluate and track the important role of women in the water and sanitation sector and enhance sanitation access for both women and men.²⁹

Another household-level predictor of latrine use was whether the household had children in school. In the focus groups, many parents discussed how children brought them health messages from school and that children were more likely to use latrines than adults (Q29). This finding also agrees with a cross-sectional survey study in north-west Ethiopia³⁰ and a study in Ghana,³¹ which both found households with children in school were more likely to use latrines. These results suggest that targeting children in school may be an effective and efficient conduit to carry sanitation messages and action into the community. The FGDs revealed sanitation preferences vary within a household—something we could not measure in the household survey. For example, one male participant noted that while he and his school-aged children use the latrine, his wife prefers defecating outdoors (Q16).

Other studies have found disgust is key motivator for changing hygiene behaviors.^{32–34} In our study, most participants did not feel disgust towards open defecation. Unexpectedly, we did find that many participants (all female) were disgusted by the latrine itself and preferred open defecation (Q9). A qualitative study on latrine use in Zambia also found that people felt disgust towards the latrine itself, especially towards the smell.³⁵ This finding presents an alternate angle to discuss in latrine promotion programs and activities. Open defecation was easily discussed in our focus groups, implying this practice was not considered shameful as it has found to be in other studies. These findings suggest that sanitation interventions using disgust to motivate behavior change, such as community-led total sanitation, may not be as effective in this population.

Qualitatively, we found health and nurture were important motivators of latrine use (Q18, 14, 15, 16, 17). This finding contrasts with the Jenkins and Curtis qualitative study in Benin, which found prestige and status to be the leading drivers of latrine demand for men, comfort to drive demand for women, and health only playing a minor role. The concepts of prestige and status did not come up in the present study. Our finding does agree with a cross-sectional survey on latrine use in Ethiopia, which found that cleanliness and health benefits were the most frequently cited advantages of using latrines.³⁶ These results suggest that factors driving hygiene and sanitation behaviors vary between contexts and geographic areas, implying that a sanitation promotion program built for one country may not work in another.

We compared latrine coverage documented from our household survey with reported coverage from our FGDs.

Focus group estimated coverage tended to agree with survey coverage. For example, in Community 1, 14% of households surveyed used a latrine, and community leaders estimated coverage at 10% (Q26). Similarly in Community 3, 100% of households used a latrine, and focus group participants agreed that everyone in the community used a latrine (Q27). The generally good agreement between the survey and the focus groups discussions suggests reliability between our qualitative and quantitative measures of latrine use.

Limitations. Our qualitative and quantitative findings must be considered in the context of several limitations. We elicited self-reported hygiene and sanitation behaviors in the context of a trachoma control program. Self-reported behaviors are susceptible to social desirability bias, a form of measurement error which could have resulted in over-reporting latrine use, especially if respondents thought that the researchers were interested in latrine promotion. However, we found fairly good reliability of reported latrine use between the FGDs and the household survey, suggesting over-reporting latrine use in the focus groups was not extreme. Moreover, the primary outcome of the quantitative portion of the study, latrine use, was measured by direct observation and should have been less subject to measurement bias. Focus groups are ideal for understanding community-level behaviors and descriptive norms. Individual-level behaviors and injunctive norms can be harder to attain from FGDs because people may feel reluctant to discuss certain behaviors in groups. However, open defecation, which is typically described as a socially undesirable behavior, was discussed freely. Still, future work using individual interviews may better identify individual behaviors and injunctive norms in this population. Similarly, our survey was at the household level, and thus we could not distinguish individual-level behaviors from household practices. We learned in the focus groups how latrine use and preference varied within households. Although we could not analyze many individual-level factors, an important strength of this study is that we investigated norms and behaviors at the household, community and societal levels. Finally, we conducted our study in five rural villages in the Amhara region of Ethiopia; our findings may not be generalizable to other areas of Amhara or Ethiopia.

A key strength of this analysis is that we compared quantitative survey data with qualitative focus group data from the same five communities—a unique perspective in the literature. This is also the first study to implement the IBM-WASH model to understand sanitation behaviors, a model specifically tailored to understand water, sanitation, and hygiene behaviors at societal, communal, household, and individual levels.

CONCLUSIONS

We conducted a mixed-methods study on sanitation behaviors using FGDs and household surveys in a rural area of the Amhara region in Ethiopia. This formative research was conducted both to inform a planned sanitation and hygiene intervention and to help guide similar interventions and studies elsewhere in the world. We found a large proportion of the variation in household latrine use

was explained at the community level. Cost and availability of materials were not considered barriers to latrine use in either the household survey or in the focus groups. Households with children in school were more likely to use a latrine than households without children in school. Households with female heads were less likely to use a latrine than households with male heads. In the focus groups, women preferred open defecation because latrines were dirty, strange, and even scary. Making latrines more appealing to women could improve sanitation coverage in this population. We also found health and nurture were important motivations for using latrines and that people did not generally feel disgust towards open defecation. Given the variability in motivations for building and using latrines between our study in Ethiopia and other studies in west Africa and South America, we urge public health practitioners to understand behaviors and norms in their target communities before implementing sanitation interventions.

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