

Beliefs, Behaviors, and Perceptions of Community-Led Total Sanitation and Their Relation to Improved Sanitation in Rural Zambia

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Abstract. Inadequate hygiene and sanitation remain leading global contributors to morbidity and mortality in children and adults. One strategy for improving sanitation access is community-led total sanitation (CLTS), in which participants are guided into self-realization of the importance of sanitation through activities called “triggering.” This qualitative study explored community members’ and stakeholders’ sanitation, knowledge, perceptions, and behaviors during early CLTS implementation in Zambia. We conducted 67 in-depth interviews and 24 focus group discussions in six districts in Zambia 12–18 months after CLTS implementation. Triggering activities elicited strong emotions, including shame, disgust, and peer pressure, which persuaded individuals and families to build and use latrines and handwashing stations. New sanitation behaviors were also encouraged by the hierarchical influences of traditional leaders and sanitation action groups and by children’s opinions. Poor soil conditions were identified as barriers to latrine construction. Taboos, including prohibition of different generations of family members, in-laws, and opposite genders from using the same toilet, were barriers for using sanitation facilities. CLTS, through community empowerment and ownership, produced powerful responses that encouraged construction and use of latrines and handwashing practices. These qualitative data suggest that CLTS is effective for improving sanitation beliefs and behaviors in Zambia.

INTRODUCTION

According to the World Health Organization (WHO) Global Health Observatory, improvements in drinking water, sanitation, hygiene, and water resource management could reduce the total burden of disease worldwide by nearly 10%.¹ Among the health challenges resulting from poor water, sanitation, and hygiene, diarrhea is most common. There were an estimated 1.7 billion cases of diarrhea worldwide in 2010; and in 2011, an estimated 700,000 deaths were attributable to diarrhea.² In Zambia, the 2013–2014 Demographic and Health Survey revealed that the prevalence of diarrhea has not changed since 2007, with surveys showing 16% of children under 5 years of age experiencing diarrhea within the previous 2 weeks.^{3,4} The Global Burden of Disease study estimated 5,452 deaths in children under 5 years of age, with 528,019 disability-adjusted life years lost.⁵ On the basis of the WHO/United Nations Children’s Fund (UNICEF) Joint Monitoring Program Report (2015),⁶ approximately 5.6 million Zambians lack access to improved sanitation, and only 36% of rural inhabitants (and 44% overall) have access to improved sanitation facilities (defined as a facility that hygienically separates human excreta from human contact). Zambia thus has a high burden of morbidity and mortality due to diarrheal disease, and limited access to improved sanitation.

In an effort to improve sanitation, the Government of Zambia is collaborating with UNICEF and Department for International Development to implement the Hygiene and Sanitation Scaling-up Project (H&SSP), which is part of the initiative, Accelerating Progress Towards Meeting Sanitation Millennium Development Goal (MDG) Targets in Zambia by 2015. One program focus is community-led total sanitation

(CLTS), an innovative methodology for mobilizing communities to eliminate open defecation. The CLTS approach was first developed and tested in Bangladesh, where it was especially successful in rural areas.^{7–9} In 2007, Zambia piloted CLTS in Choma District in Southern Province, and it showed an increase in open defecation free (ODF: defined as a community where each household of 5–6 people has latrine with smooth floor, a lid to cover the pit, and a superstructure to provide privacy in addition to handwashing facilities) sanitation behaviors.^{8,10} Recent data indicate that CLTS has reached 1.3 million new users in the 47 districts where Zambia is implementing H&SSP.

In Zambia, CLTS begins at the district level where respected individuals in the community, identified as “community champions,” are trained to facilitate a process known as “triggering.” Triggering is a 2–3 hour process using hands-on exercises designed to persuade communities to realize that residents “eat their own feces” because of poor hygiene and sanitation. The transect walk (often called the “walk of shame” in Zambia) involves leading participants around their village and surrounding area to locate feces resulting from open defecation. The feces are then brought back to the central location in the village and used in an exercise where food is placed near the feces, and flies are observed moving between feces and food. After the triggering, communities will usually decide to create a formalized sanitation committee and to try to become ODF, leading to latrine building and waste management improvements. Importantly, these decisions emerge from within the community itself, rather than being imposed by the CLTS implementer. There is a standard protocol for CLTS triggering and implementation in Zambia, and champions work with communities to make minor adaptations to ensure appropriate implementation based on community context.¹¹

Little peer-reviewed literature has been published regarding community attitudes and behaviors toward CLTS. This

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study thus aimed to examine the sanitation beliefs and behaviors of CLTS participants and the perceived impact of CLTS on sanitation practices in districts where CLTS implementation was recently initiated in Zambia, to inform the development of sanitation programs in the region.

METHODS

This study used in-depth interviews (IDIs) with community members and other stakeholders in sanitation and hygiene as well as focus group discussions (FGDs) with caregivers, heads of households, schoolchildren, and CLTS implementers to gather information on several key themes. FGDs were used to collect community-level practices and beliefs surrounding sanitation and hygiene, while IDIs provided in-depth perspectives on individual attitudes. Both activities explored the following themes: 1) experiences with, reaction to, and acceptability of CLTS (including those related to pre-triggering and triggering activities, challenges, and success or impact); 2) the adequacy, availability, and accessibility of water and sanitation facilities and waste management practices; 3) barriers and challenges to improving access to water and sanitation facilities, including social norms and behaviors; and 4) awareness of illnesses and safe hygiene practices and sources of information.

In addition, IDIs focused on approaches and activities for improving access to water and sanitation services, successes in improving access to water and sanitation facilities, and specific strategies and challenges in addressing access for vulnerable groups. FGDs included discussions of perceptions of risk factors for and causation of water and sanitation-related diseases.

Study participants. Participant selection aimed to include a broad cross section of individuals. Purposive sampling was used, based on recommendations from UNICEF staff members and other Water, Sanitation and Hygiene (WASH) stakeholders. For IDIs, a matrix of CLTS stakeholders was first

developed by the chief of WASH at UNICEF and then reviewed by other UNICEF sanitation staff members. Study personnel contacted all individuals on the list to request an interview. Most were successfully reached, and all those who were contacted agreed to participate. Additional participants were identified in interviews as stakeholders recommended other individuals in their communities who should be interviewed.

FGDs were conducted with four target groups: 1) caregivers of children under 5 years of age, 2) head of households, 3) female primary schoolchildren between the ages of 8 and 12 years, and 4) male primary schoolchildren between the ages of 8 and 12 years. After preliminary review of the results, a decision was made to conduct one additional FGD with implementers of the CLTS program. We conducted this interview despite the logistical challenges faced as implementers had to come from moderate distances to reach a convenient central location for the FGD.

To reach a broad range of stakeholders, a total of 67 IDIs and 23 FGDs were conducted (Table 1). Participants in IDIs provided deep, expert knowledge of CLTS, while those in FGDs provided a broader community perspective of beliefs and behaviors that surround CLTS. Exhaustive, standardized interview guides were provided for the data collectors; however, interviewers were trained to probe extensively and advised to omit unnecessary questions. Interviews were therefore tailored to each participant.

Data collection. Data were collected in two rounds. During June and July of 2013, IDIs and FGDs were conducted in three districts, all selected because they had varying durations of CLTS implementation. Choma District in Southern Province had been conducting CLTS activities since 2007; in both Lufwanyama (Copperbelt Province) and Lundazi (Eastern Province), CLTS had been implemented for 12–14 months. All three provinces are predominantly rural, with subsistence farming being the main occupation in Choma and Lundazi and mining in Lufwanyama.

TABLE 1
Demographic characteristics of participants

Participant type	No. of FGDs	Total no. of participants	% Female
Focus groups (<i>N</i> = 23)			
Primary school pupils, male	6	23	0
Primary school pupils, female	6	31	100
Caregivers of children, female	5	24	100
Heads of households, male	5	24	58
NGO WASH stakeholders	1	5	60
Total FGDs	23	107	–
IDI* (<i>N</i> = 67)			
CLTS champions	18	–	–
Environmental health technologists	7	–	–
Ward counselors	7	–	–
Community/traditional leaders	6	–	–
School teachers	6	–	–
WASH committee members	5	–	–
Sanitation action group members	5	–	–
DHMT WASH focal person	3	–	–
District WASH officers	3	–	–
District CLTS coordinators	3	–	–
NGO representatives	2	–	–
Other (communications and community development officers)	2	–	–
Total IDIs	67	–	–
Total no. of participants (IDI and FGD)	174		

CLTS = community-led total sanitation; DHMT = district health management team; FGDs = focus group discussions; IDI = in-depth interviews; NGO = nongovernmental organization; WASH = Water, Sanitation and Hygiene.

*Because of missing data, aggregate gender demographics are unavailable for IDI participants.

To gain a more in-depth understanding of the process of change and determinants of latrine construction, usage, and maintenance at the village level, a second round of IDIs were conducted in November and December 2013. We returned to Choma District and expanded our geographic reach by visiting Kalomo, as well as Chadiza and Chipata districts in Eastern Province (Figure 1). One additional FGD was conducted with CLTS champions and experienced sanitation and hygiene implementers from Lusaka Province.

Analysis. In round 1, we developed a coding system based on themes that emerged from the transcripts using inductive reasoning. Themes encompassed the views, attitudes, and experiences of participants as well as changes or issues within communities (e.g., “challenges to improving sanitation facilities”). The coding was done in Excel for Mac version 14.4.4 (Microsoft Corporation, Redmond, WA). As new themes emerged, codes were expanded and transcripts reread to ensure comprehensiveness and consistency of coding. During round 2, qualitative data were analyzed using Nvivo version 10.0.418.0, (QSR International, Melbourne, Australia). The interviewers transcribed the original audio recordings and the master coder read the transcripts before analysis. Transcripts were then coded based on themes from analysis of the first data set. A second investigator read each transcript, providing additional perspectives in the synthesis of themes. Proportions of participants reporting specific behaviors or perceptions were calculated as appropriate. We also explored unusual responses to understand the full range of participants’ experiences.

Ethical considerations. The Boston University Institutional Review Board and a local Zambian ethical review committee

(ERES Converge) provided ethical approval (protocol nos. H-32095 and 2013-Jan-012, respectively). Zambia’s Ministry of Health granted final approval to conduct the research. All participants provided written informed consent. Consent forms and study instruments were translated into the major local languages spoken in the six study districts (Bemba, Nyanja, and Tonga).

RESULTS

Knowledge of CLTS. Nearly all community-level participants (mothers, school teachers, and children) in FGDs reported knowledge of CLTS implementation in their area. More than two-thirds also cited successes of the CLTS program. Roughly three-fourths of participants reported noticing positively changed behaviors in the community (or in themselves), including building of new latrines, and increases in latrine usage and handwashing behaviors.

Participants’ knowledge of the relationship between improved hygiene and sanitation practices and health was generally high.

During the rainy season, when you defecate in the bush, the rains wash away the feces into the rivers and unprotected well. This brings about a lot of sicknesses because they are our sources of drinking water. (Head of Household, Male, Lundazi)

Almost all household heads and schoolchildren were able to explain how flies could carry diseases from open feces to food—only one group of household heads from

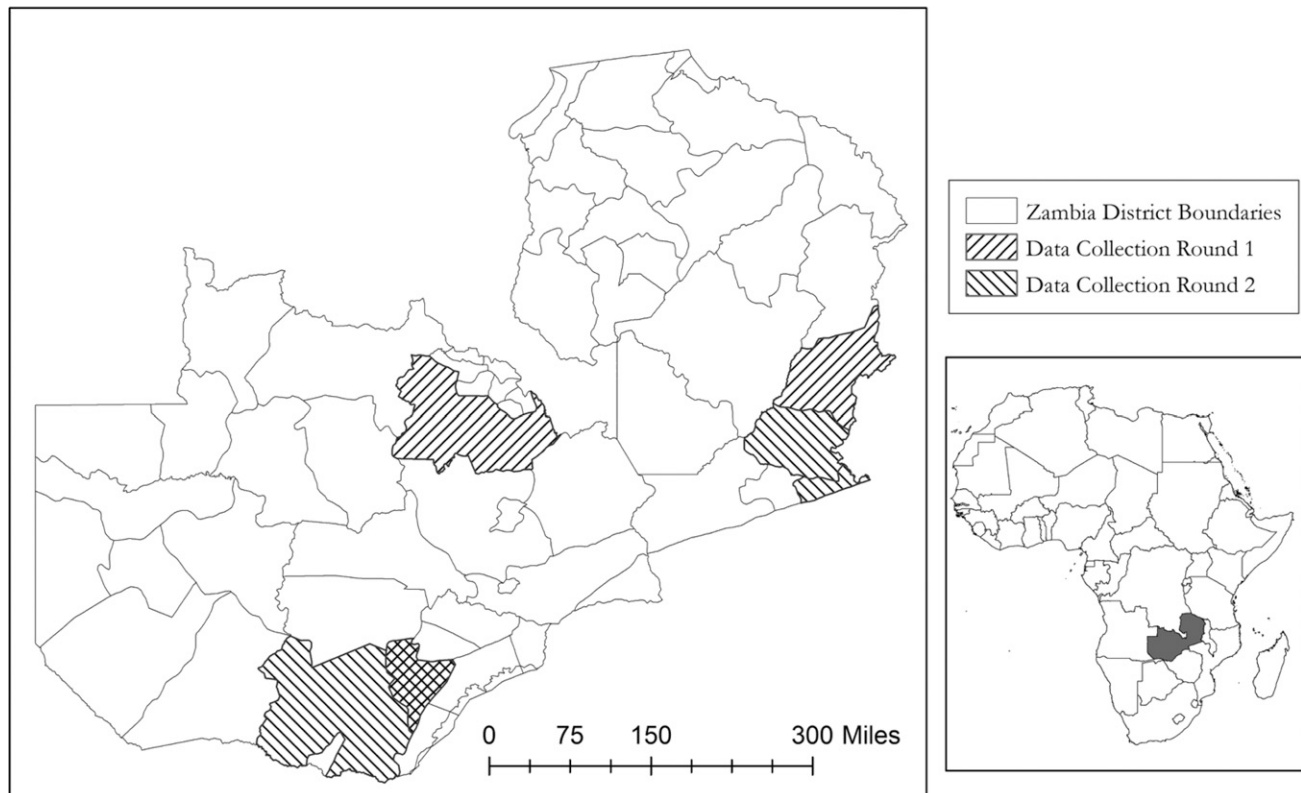


FIGURE 1. Locations of data collection in Zambia.

Lundazi could not explain this relationship, but even this group understood that “open defecation results in a lot of sicknesses.”

Frequently, throughout the IDIs and FGDs, participants reported an increase in knowledge of the importance of sanitation behaviors, including open defecation, latrine usage, and handwashing after CLTS implementation.

CLTS and the process of behavior change. *Social and emotive factors.* IDI participants reported a variety of interconnected emotive factors that influenced community members to construct and use latrines. These encompassed shame and disgust, pressure from hierarchical powers and community groups, and competition among villages to achieve ODF status (Table 2).

Shame from triggering emerged as a significant factor in behavioral change. Of 22 participants, 13 mentioned the transect walk as the most important aspect of triggering.

People were so full of shame, especially the time we went looking for feces in the bush. Most of them were saying they can't [do it]. Now, after explaining [how they were eating their own feces] to them, at the end those that were so full of shame participated in the activity. (Champion, Female, Eastern Province)

Related to shame, disgust arose as an important influence of behavioral change. Respondents reported that disgust was particularly powerful in relation to the exercise where flies are observed moving between feces and food (see Table 2).

Counter to shame and disgust, pride, dignity, and competition emerged as themes that encouraged individuals to improve sanitation behaviors. Competition exists both within villages, where some residents desire to have the first village latrine, and between villages, when communities compete to first achieve ODF status. ODF status is highly sought and, as one community achieved this status, pressure mounted on nearby villages to follow suit. Two-thirds of participants noted that competition among villages was influential in earning ODF status.

Hierarchical pressure also had a strong influence on behavior. Traditional leaders, including chiefs and village headmen, have important cultural and legal influences in communities¹¹ and play a major role in changing sanitation behaviors. Almost all participants mentioned these leaders as being influential, with traditional leaders often creating and enforcing binding local regulations (or “by-laws” as one participant described) that require households to construct and use toilets. Additional pressures came from sanitation action groups, which are formed by community members after triggering

TABLE 2
Emotive factors that influence latrine construction

Shame/ disgust	“I brought fresh feces and put them right in front of everybody. Then I started explaining to the community . . . I didn't get them from the toilet, but from the bush . . . Then I brought nice food—beef—and put it next to the feces. Then flies appeared and started feeding of feces, then on the food . . . When people saw this, they believed that defecating in the bush is not healthy, and they also saw for themselves that the flies that feed on feces in the bush are the same flies that feed on their food and leave it contaminated.” (Champion, Male, Southern Province)	“They were so touched and embarrassed as we took the walk of shame. They realized that they have been eating shit and drinking contaminated water. They realized the importance of having a toilet.” (Champion, Male, Eastern Province)	“They were so ashamed. They said it was taboo to go and look for shit and bring it back to the village. It was unheard of. This really touched them.” (Champion, Male, Eastern Province)
Hierarchical/ peer pressure	“[Hierarchical pressure] does work as well . . . there was a time when the headmen themselves didn't have pit latrines, but when you involve them and they see the benefits, they would put by-laws within the villages that one who doesn't have a latrine will [have a penalty put in place] . . . and then referral to the Chief. And the Chief is very influential in that he doesn't spare them. Just mention that you will be taken to a chief then someone will get scared.” (Champion, Female, Southern Province)	“Headmen tell their subordinates to build latrines. Like for the Chiefs, they showed example by building latrines at their households.” (Champion, Male, Eastern Province)	“For those that didn't have latrines, they felt they should build because others had already, so they felt pressured. They also learned how they should keep the latrines clean. They saw the need.” (EHT, Male, Southern Province)
Pride, dignity, and competition	“The competition among villages is there because each and every village wants to be the first to become ODF.” (EHT, Female, Southern Province)	“. . . so competition is there because, for instance, the community I come from, they are saying they want to build latrines made of bricks. In some communities, they are building thatched ones, so competition is there.” (Champion, Male, Eastern Province)	“Yes there is [competition among villages]. When they see others celebrating, they also step up and build toilets so that they can also benefit from the program.” (Champion, Male, Eastern Province)

to promote latrine construction and usage and other sanitation behaviors.

The chief commanded that each individual is supposed to dig a toilet; if it's found that a person does not have a toilet, one is supposed to go and explain why he doesn't want to dig a toilet." (Female Caregiver, Copperbelt Province)

Factors that inhibit adoption after triggering. Overall, reported latrine usage was high after CLTS triggering. Virtually, all participants reported that they used a latrine every time or nearly every time they defecated, like most other community members. However, several inhibiting factors were discussed. These included sociocultural traditions and taboos regarding sharing a toilet facility and embarrassment using a latrine, because others may see someone enter and know that he or she is defecating.

Particularly influential is the long-standing taboo that people should never use the same toilets as their in-laws, members of the opposite sex, or different generations within a family. This belief has produced a formidable barrier to toilet use in many communities. About half of the Lundazi IDI participants, one-third of the Choma IDI participants, and one-fifth of those in Lufwanyama reported that people still refuse to share toilets with their in-laws.

You can't find a father is using a toilet [and] the in-law using the same toilet, so it is better that you just go in the bush as if you are trying to fetch for firewood. You just go there and help yourself . . . but I think they are changing for the better. (District Council Member, Male, Southern Province)

There is a tradition that in-laws like the daughter in-law and her father or mother-in-law cannot use the same toilet. This is what has made behavior change very difficult in our community. (Nongovernmental organization [NGO] Stakeholder, Lusaka)

Conversely, this gender-related cultural dynamic may also influence some individuals to use pit latrines, rather than the bush. Several individuals conveyed motivation to use a toilet to eliminate the potential embarrassment of "meeting the in-laws in the bush while defecating."

Although still an important factor in behavioral change, the effect of these cultural taboos may be diminishing over time, as one individual described

It became easy, even for those who live with their in-laws. It was taboo to use the same toilet. I used to tell them . . . it is better to mix shit in the toilet than in the stomach. (Champion, Male, Southern Province)

For some, additional factors preventing latrine construction included insufficient access to necessary materials (such as "strong logs") for building permanent toilet structures and poor soil conditions (either rocky soil that inhibits pit digging or sandy soil that predisposes latrines to collapse) (Table 3).

Children and sanitation behaviors. Reports of the age at which children used toilets varied widely, but approximately half of the participants said that children generally begin regular toilet use at 2–5 years of age. Another one-third

said that children did not begin to use a toilet until 5–8 years of age.

Almost two-thirds of participants reported that children were commonly afraid to use the latrine because they thought that they might fall in. As a simple solution to this problem, many reported making the holes in latrines smaller. In addition, several reported that the smell or perceived "dirtiness" of latrines was feared by children, and noted that it was important to keep latrines clean. For example, a female champion from Southern Province noted

One [problem] that I heard of at school . . . they expressed the smell. If the pit latrine smells, they told that they wouldn't prefer to go there because they feel when they come out of a smelly pit latrine, they will smell. (Champion, Female, Copperbelt)

Overall, children were deeply affected by CLTS triggering. Most participants reported that children have changed sanitation behaviors (including using latrines and washing hands) as a direct result of CLTS. Child-centered activities, including song and dance, were frequently mentioned as important components of CLTS triggering, stimulating youth involvement and, eventually, behavior change.

With children, you teach them through song, playing with them and things that make them happy . . . In that way, they learn to be attentive. (Champion, Male, Southern Province)

Disposal of children's feces. Almost all respondents reported that, before children could properly use a toilet, they would defecate in the open and a parent, usually the mother, would collect the feces with a shovel or hoe and deposit it into a latrine.

A child just goes to the bush and the mother has to go there quickly and pick the feces to throw them into the latrine. (Champion, Male, Eastern Province)

Several respondents said that some parents simply bury the feces. Others reported dangerous methods of feces disposal. Two noted that some individuals simply leave the feces on the ground or throw it in the bush, while others explained that feces might be disposed of in an open rubbish pit. Finally, one noted a community belief that the excrement of children was not harmful:

The child's feces traditionally are thought not to be infectious. So they would [throw it away] near what we call *chizaza*—that kitchen outside—thinking that it is non-infectious. (Champion, Female, Southern Province)

Role of children as CLTS agents of change. Children appeared to act as agents of change within their communities both during and after triggering in the CLTS process. Several participants reported that children use peer pressure (sometimes to the extent of ridicule) to influence peers to use latrines and practice other sanitation behaviors.

I see some children, a lot of times laugh at each other saying, "There is no latrine at your household, so we do not like to play there." So I have seen that

TABLE 3
Factors that inhibit latrine usage

Sociocultural norms	Those people . . . when we talk about polygamous families- where one woman would refuse to use [the latrine] saying, "I can't use the same toilet as the junior wife or senior wife." (Champion, Female, Southern Province)	"The Lamba [an ethnolinguistic group in Lufwanyama] tradition of using latrines was not encouraged. You would find that only the parents were supposed to use that latrine, [while] everyone [else] is supposed to go in to the bush." (CLTS coordinator, male, Copperbelt Province)	"There is a tradition that in-laws like the daughter in-law and her father or mother-in-law cannot use the same toilet. This is what has made behavior change very difficult in our community." (Female Caregiver, Eastern Province)
Gender	"In situations where the daughter in law is in the toilet and the father in-law comes to use, after she discovers it was him she gets scared to use the toilet again and goes to the bush instead If we are fair men we can use the same toilet." (SAG Chairperson, Eastern Province)	"When people used to go to the bush, they would find our people there and it didn't show respect. In other cases, someone's husband would find another man's wife and that is not good." (EHT, Male, Southern Province)	"Change is there because a lot of people have understood and accepted that having a latrine at home is a respectful thing, even when you have an in-law. In the past, they would bump into each other in the bush while defecating. But now they can tell when an in-law is in the latrine so they would wait." (Champion, Female, Eastern Province)
Availability of toilets	"Things have changed since [since CLTS triggering] because when we started, many people did not have latrines, but now, many people are trying- they have latrines." (Champion, Female, Eastern Province)	"Rainy season they spend most of their time in the field. . . so if you are in the field, some of the fields where the latrines are so you see no need why you should not just [defecate] in the maize and help yourself and continue working." (NGO Manager, Female, Southern Province)	"Especially we Tongas, [we] would want to have a [separate] latrine, but not to build as many as they can . . . so you end up overloading the latrine." (NGO manager, Female, Southern Province)
Physical barriers	"The barriers [to construction] are some areas have sandy soil. So you can dig a pit and put the logs and build a very good latrine, but when the rains come, rainy water flows in the latrine then it collapses." (EHT, Male, Southern Province)	"[Challenges with latrine construction include] variation in the type of soil in the villages, for instance a toilet which is located in a sandy area will not last long enough because they easily collapse." (Focus Group Participant, Lundazi)	"The only barrier is that the logs that we use, the very strong logs, are finished. We are remaining with the small ones such that, when we use them, they are eaten by termites." (Champion, Male, Eastern Province)

CLTS = community-led total sanitation; EHT = Environmental Health Technician; NGO = nongovernmental organization; SAG = sanitation action group.

[sanitation behavior] change in children because they also admire those that live where there is a latrine. (Champion, Male, Eastern Province)

Finally, children often influenced their parents to improve sanitation behaviors by reminding them of things they had learned from CLTS, school, and their peers.

When you tell children something, they normally get it as Gospel Truth and stick to it. The teacher says this, the nurse says this, so they always stick to that which you tell them. They normally even encourage their parents to do the right thing if they see that their parents are not doing the right thing. (Environmental Health Technician, Female, Southern Province)

These driving forces of behavior change appear to be bidirectional within families as well; parents teach their children improved sanitation behaviors, and children, in turn, pressure parents to practice the behaviors they have been taught in the home and elsewhere, including in schools where many participate in school-led total sanitation initiatives and at the community level where they participate in CLTS.

[Children] even come up with songs and poems. They come and sing for the audience of the elderly. In one of

the songs, they say we are tired of eating feces, we don't want to eat feces, please build toilets! You know such simple slogans. The elderly also get sensitized. (Focus Group Participant, Female Champion, Lusaka Province)

[The driving forces behind sanitation behavior change in children] is because their parents embraced the program that they even get upset when the child goes to defecate in the bush. They teach the children to do the right thing. (Champion, Male, Southern Province)

CLTS implementation challenges. About one-third of IDI participants reported challenges with the program. The most common challenges were transport (named by over one-third of officials in Lufwanyama, almost half of those in Lundazi, and one-fifth of those in Choma) and a lack of resources. Many key personnel intimately involved in CLTS implementation, such as champions, headmen, and CLTS coordinators, lacked access to a vehicle or bicycle. This made it difficult to cover large distances between rural villages and spread critical messages about sanitation and hygiene.

In addition, many school-based participants (all school teachers from Choma and Lufwanyama but none of the Lundazi teachers) also reported problems with lack of human and financial resources to build and maintain latrines in the school setting. In contrast, when community members were

asked about building latrines, cost was not mentioned as a limiting factor as local and traditional building materials were used at little to no financial cost.

Finally, there may be overlap with other programs that might interfere with CLTS operation. For example, one program in Eastern Province encouraged community members to plant trees and offers to build latrines as a reward for tree planting. This directly contradicted the grassroots and unsubsidized approach used in Zambia's CLTS initiatives.

We have got different programs running at different times. There is an organization, which is called Total Land Care, those people are encouraging people in the community to plant trees. They are saying each household that plants 10 or 15 trees and looks after those trees successfully, they will dig them a toilet and build it for them when we are [promoting] this Community Led Total Sanitation, and [for our program] they are supposed to build it themselves. (CLTS Coordinator, Male, Eastern Province)

Perceived impact of CLTS. Many IDI participants reported a perceived reduction in diarrheal disease after CLTS triggering, both in the community and at health facilities. Some implied that the reduction in diarrheal disease had led to a reduction in infant mortality.

Overall, perceptions of CLTS were highly positive. All adult participants reported knowledge of the program, and most described the positive impact it had on their community, including shifts in attitudes regarding latrine construction and usage, handwashing behaviors, disposal of waste, and water usage. Specifically, community members reported significant increases in household latrine construction.

Well, before CLTS here in [our village] we used to go to the bush, but as of now, there are very few people who do not have toilets. (Champion, Male, Eastern Province)

DISCUSSION

Our study demonstrates a positive reception to CLTS in Zambia. CLTS appears to have had an important influence in promoting the adoption of improved sanitation behaviors. The study also provides insight into the process of change initiated by CLTS triggering activities. Leveraging community leadership, including traditional chiefs and village headmen, is a powerful tool for encouraging communities to embrace the CLTS program and mobilize to construct and use toilets. UNICEF and the Zambian government have established a chief-to-chief advocacy strategy¹² that uses seven national advocates who are all chiefs with verified ODF chiefdoms. The strategy supposes that, if properly engaged, traditional rural leaders, especially chiefs, can make a meaningful and sustainable impact on sanitation and handwashing practices.

Numerous emotive factors including shame and disgust, hierarchical and peer pressures, and competition (both internal at the village level and external with other communities) are influential in the process of behavior change. The transect walk seems to be particularly powerful in eliciting these emotive factors, driving much of behavioral change. Cultural norms that exist can paradoxically both inhibit and encour-

age latrine use. Children also have special influence on their families and communities in sanitation behaviors.

We believe that the strength of CLTS lies in its community-based approach in which local residents reach their own conclusions about the importance of sanitation and develop their own strategies for implementing changes based on personal cultural beliefs and practices.

Generally, community members perceive the impact of CLTS on their communities as very high (Table 4). New behaviors, including latrine construction and usage (among others) were widely reported across all areas. Participants held a strong perception that diarrheal and other disease burden decreased greatly after CLTS triggering. There was no documented evidence of a reduced disease burden, so these perceptions may stem from assumptions about the potential impact of CLTS. These results may actually suggest more about positive reception and acceptance of CLTS and the triggering process, than an actual reduction in diarrheal diseases and will require further research.

Children also contribute to sanitation efforts in communities. We found that children can influence both their peers and family members in enforcing the messages of sanitation behavior change.

Although one evaluation showed limited success in long-term impact,¹³ the peer-reviewed¹⁴ and gray^{15–20} literature describe multiple examples of the success of the CLTS approach. In India, Barnard and others found that, although a major CLTS campaign was followed by dramatic uptake in latrine coverage in the population, the majority of defecation events were still in the open, exposing communities to human excreta. We found reported use of latrines to be high; however, further research should be conducted to determine actual usage.

Another potential limiting factor in uptake and the sustainability of CLTS successes may be the human and financial resources needed to build latrines, particularly given the lack of subsidies in this approach. Although communities are not told specifically how to build a latrine, reducing costs and allowing for innovation and adaptation to locally available materials and construction techniques, some communities still may find building latrines to be a burden, particularly in areas where natural resources are scarce.

In addition, since a major influencing factor of CLTS is “shame” and “social stigma,” Bartram and others²¹ argue that CLTS is potentially coercive and can infringe upon human rights. Engel and Susilo²² go further to say that CLTS is a “return to colonial public health practices.” However, with careful program implementation and properly trained champions, we would argue that it is possible to use the CLTS methodology to change community behaviors without infringing on human rights and that CLTS is currently being implemented in such a manner in Zambia. As Sigler and others illustrate,²³ there is wide variation in implementation on CLTS in different contexts. Throughout our extensive qualitative work, there were no reports of CLTS having a negative impact on individuals or communities. Indeed, CLTS is accepted and embraced by communities. Although the shame may be used as a powerful persuasive factor in CLTS, we did not find it to be coercive or in violation of participants' human rights.

Numerous theories of behavior change are used in CLTS implementation in various contexts including the theory of reasoned action/planned behavior, the social cognitive theory,

TABLE 4
Perceived impact of CLTS

Overall impact	<p>“With the CLTS approach, we’ve seen an improvement in the management of not only the human waste, but also domestic waste that is generated at household level. By and large I would say there has been a lot of success in the CLTS approach.” (Government Official, Male, Southern Province)</p>	<p>Before the CLTS program started, people didn’t understand that they were eating feces They didn’t know that after defecating and cleaning oneself, they were smearing feces on their hands and when shaking hands, they were smearing those feces on other people’s hands So when this program started, people opened their eyes. Their brains opened, they realized that for them to eradicate diseases in the community, and they need to take care of feces. They realized that if they take care of feces, the money and time they spend going to health centers seeking medical attention will be used on other developmental issues. So people have really appreciated the CLTS program, it came like a bush fire.” (NGO Stakeholder FGD Participant, Lusaka)</p>	<p>“CLTS—for now, I can say that it has tried [to mobilize communities to become ODF], but not completely because some are still defecating in the bush, while others have stopped, they now have their own latrines. They are concerned and now realize that they should not defecate in the bush.” (Champion, Male, Eastern Province)</p>
Increase in knowledge	<p>“Things have changed and it is so impressive even to our traditional leaders. In the past, people didn’t [have] toilets, they didn’t know the benefits of latrines. But now they know the benefits of latrines.” (Champion, Female, Eastern Province)</p>	<p>“Change is there yes because before we used to wash our hands in the same basin even if there were ten of you and then you start eating. But today we take turns to pour water on each other while washing so yes, there is change.” (Focus group participant, Female, Lusaka Province)</p>	<p>“People realized that they were contracting a lot of diseases by defecating in the bush because flies move from the feces in the bush to the food they eat. So people realized that most diseases are brought by flies and because of defecating in the bush, flies go to collect feces in the bush and bring it on food. Therefore, they believe that defecating in the bush is not a good thing.” (Champion, Female, Eastern Province)</p>
Reduction of disease	<p>“At the [health] centre, we are able to appreciate that the disease burden, to an extent, has reduced And also in the community, from what they say . . . they are able to give us feedback about the disease burden that they no longer experience a lot in the community.” (Champion, Female, Southern Province)</p>	<p>“Before we started this program, we lost a lot of children in [my] area, due to diarrheal diseases . . . when this program started, they were even taught that people should only shake hands after they have washed, otherwise the diarrhea would be spread. So these lessons have helped eradicate diarrhea and we are very grateful, this program should continue.” (Focus group participant, Male, Lusaka Province)</p>	<p>“There has been great improvement in that there are less diarrheal diseases. The clinic people are also thankful for the work that we [do] here. They could not facilitate and make people understand [the importance of sanitation], but with the coming of CLTS they are grateful that people now have toilets.” (Champion, Male, Eastern Province)</p>

CLTS = community-led total sanitation; FGD = focus group discussion; NGO = nongovernmental organization; ODF = open defecation free.

and the transtheoretical model, among others.²³ We find the Integrated Behavioural Model for WASH (IBM-WASH), proposed by Dreifelbis and others,²⁴ to be a particularly useful conceptual and practical tool for understanding the multi-level factors that influence sanitation behavior change. In the IBM-WASH model, there are three intersecting dimensions (contextual, psychosocial, and technological) that operate across levels (societal/structural, community, interpersonal/household, individual, and habitual). Although our study was not designed to investigate all 15 elements of the model, we did explore factors at all three dimensions (Table 5). Perhaps the most effectively used dimension in CLTS is the psychosocial dimension, which comprises the behavioral, social, and psychological determinants of behavioral change. At the structural level, headmen and traditional chiefs have immense influence over community and individual behavior. One year

after CLTS triggering, most community members perceived community-wide toilet usage to be high (interpersonal/household level). In addition, self-efficacy (individual level) for toilet construction and usage was high, with most participants suggesting that toilets could be built easily either by households alone or with assistance from community members with an interest in achieving ODF status. Finally, the habitual level is also engaged in CLTS as social norms on defecation are challenged and reshaped.

Our study also looked at contextual dimension factors regarding physical barriers to latrine construction and access to raw materials, division of labor, and financial influencers of adoption of new sanitation behaviors. In several areas of Zambia’s Southern and Eastern provinces, the main challenges in latrine construction include soil conditions and insufficient natural resources to build latrines. In Zambia, many

TABLE 5
Application of the IBM-WASH for promotion of latrine construction and usage with CLTS

Levels	Contextual factors	Psychosocial factors	Technology factors
Societal/structural	Seasonality of toilet usage; rocky and sandy soils in some locations	Headmen and traditional leaders (e.g., chiefs) are strongest community-level influencers	Raw materials for latrine construction are locally available, construction costs are either zero or very low
Community	Access to materials needed for building latrines	Community leadership; community-wide use of toilets	Desired location, at least one latrine for every household; collective ownership seems to be strong; maintenance/cleaning is responsibility of mother/wife
Interpersonal/household	Division of labor (building/maintenance, cleaning); use of latrines by adults, disposal of child feces; physical condition of latrine	Perceived prevalence of community-wide toilet usage	Sharing and access to latrines at household and community levels
Individual	Wealth of individual; educational background	Self-efficacy in building/using latrine; disgust/shame of open defecation; perceived threat of diarrheal disease	Strengths and weaknesses of toilet models/designs (improved, "executive," etc.); adaptation of designs for contextual settings
Habitual	Favorable environment for formation of sanitation behaviors/habits	Existing norms of open defecation; expectations of ODF free villages and reduction of disease with initiation of sanitation behaviors	Ease of routine use for latrines; physical structure of latrine as a cue to action

CLTS = community-led total sanitation; IBM-WASH = Integrated Behavioral Model for Water, Sanitation, and Hygiene; ODF = open defecation free. Adapted from Dreifelbis and others.²⁴

such barriers have been overcome through community-led innovations in latrine construction. In CLTS triggering, specific designs of latrines are not presented. Instead, basic principles of sanitation are conveyed and communities are left to adapt their own designs and methods for building toilets.^{7,25}

Although our study showed that many aspects of the IBM-WASH model are innately nested in the CLTS program, implementers may find greater potential to foster change by utilizing the model as a framework for addressing various influential factors and dimensions.

Strengths and limitations. This study had a relatively large sample size as well as a diverse set of participants. We conducted IDIs and FGDs with a wide variety of stakeholders in sanitation, including community members and program recipients, CLTS champions, government officials, NGO representatives, teachers, and schoolchildren. Despite this diversity, general perceptions of CLTS were similar across various demographic groups, including gender, age, and geographic distribution.

One limitation of this research is that we were unable to draw conclusions about the long-term effects of CLTS. In fact, in Choma, an original beneficiary of CLTS with little recent CLTS activity, there appears to be knowledge loss over time. This is particularly relevant given the lack of consensus in the literature on this crucial aspect of the program. Further studies are needed to explore the long-term impact of CLTS on sanitation behaviors.

Another limitation, which may reduce the generalizability of our results, was the use of CLTS champions for input on the program. The CLTS champions are volunteers, who receive small incentives of cellphone airtime for reporting on the ODF status of villages. Although there is a risk of fraudulent reporting since the reporting is dependent on the incentives paid, the organizations running the program

perform random spot checks and have not found this to be an issue. The CLTS champions that we interviewed tended to be well spoken and therefore provided a greater quality of input on the program than did many of the other interviewees. However, given their central role in the program implementation, this might have resulted in a reporting bias for our research.

In addition, given the scope of the study, we were only able to collect data on reported latrine usage. As with most socially desirable behaviors, reported usage and actual usage may be different. This may be especially true in CLTS, where shame and disgust play an important role in behavior change. The guilt that community members felt as a result of the CLTS process might have caused them to be unwilling to openly admit that they still had open defecation in their villages.

Finally, the purposive sampling method may have led to some reporting bias, as almost all participants were also program beneficiaries. In addition, because of the nature of information that we sought, many participants in the study were also participants and leaders in CLTS programming (e.g., CLTS champions). Data collectors attempted to mitigate potential biases by explaining study goals thoroughly, stressing that the research was being conducted by independent evaluators and would lead to improvements to the CLTS program.

CONCLUSIONS

With marginal gains in sanitation in response to MDGs 4 (to reduce the under-5 mortality rate by two-thirds) and 7c (to half the proportion of the population without access to sustainable drinking water and basic sanitation), there is a heightened need for innovative and cost-effective strategies for promoting sanitation in resource-limited settings. CLTS has been used in numerous countries and cultural settings

for over 15 years. This qualitative study supports the effectiveness of CLTS as a behavior change strategy for promoting adoption of improved sanitation behaviors in Zambia.

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