

Community-Led Total Sanitation (CLTS) Interventions as a Tool to Improve Sanitation Practices in the Urban Slums of Choma District, Zambia

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ABSTRACT

Improving sanitation remains a critical public-health priority, particularly in urban informal settlements where rapid population growth, inadequate infrastructure, poverty, and insecure land tenure undermine access to safe sanitation. Although Community-Led Total Sanitation (CLTS) has demonstrated considerable success in rural settings, evidence regarding its effectiveness in urban slums remains limited. This study assessed the contribution of CLTS interventions to sanitation outcomes in Zambia Compound, an urban informal settlement in Choma District, Zambia. A convergent parallel mixed-methods design was employed, combining a cross-sectional survey of 170 households with six key informant interviews and four focus group discussions involving 32 participants. Household respondents were selected through systematic random sampling, while key informants and focus group participants were purposively selected. Quantitative data were analyzed using descriptive statistics and qualitative data thematically, with the two strands integrated during interpretation. CLTS was found to have improved sanitation awareness, community participation, and household ownership of sanitation facilities. Approximately 72.2% of households owned sanitation facilities, of which 80.7% were functional, yielding an estimated functional-facility-to-household ratio of 0.58, roughly one functional facility for every 1.7 households. Open defecation was reported to have declined by 55.7%, and positive sanitation behaviors were reinforced through community sensitization, household follow-up visits, and local leadership. Persistent challenges that include overcrowding, poverty, inadequate space for latrine construction, insecure land tenure and socio-cultural norms constrained the achievement of universal coverage. The findings indicate that while CLTS remains an effective behavior-change approach, its implementation in urban informal settlements requires adaptation to structural constraints that extend beyond individual and collective behavior. The study contributes empirical evidence on CLTS in urban Zambia and demonstrates that sustainable sanitation improvement requires integrating behavior-change interventions with urban infrastructure, inclusive participation, and supportive municipal policy.

Keywords: Community-Led Total Sanitation; urban sanitation; sanitation behavior; community participation; informal settlements; public health; Zambia.

INTRODUCTION

Access to safe sanitation is a fundamental determinant of public health, environmental sustainability, and socio-economic development. Adequate sanitation reduces the transmission of waterborne and faecal-oral diseases, enhances human dignity, protects environmental quality, and contributes directly to the Sustainable Development Goals, particularly SDG 6 on water and sanitation for all. Despite substantial global investment over the past two decades, inadequate sanitation persists in low- and middle-income countries where rapid urbanization has outpaced basic infrastructure. The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) estimate that billions of people still lack safely managed sanitation, exposing

vulnerable populations to preventable diseases such as diarrhea, cholera, typhoid, and intestinal worm infections.

The challenge is especially acute in urban informal settlements, where high population density, insecure land tenure, inadequate drainage, poor solid-waste management, and limited water and sanitation infrastructure create conditions conducive to disease transmission. Unlike planned neighborhoods, informal settlements often develop without adequate municipal planning, producing overcrowding and insufficient facilities. Households frequently rely on shared, poorly maintained, or makeshift latrines that fail to meet minimum public-health standards, increasing environmental contamination and leaving these settlements disproportionately vulnerable to recurrent cholera outbreaks.

To address these challenges, governments and development partners have combined infrastructure development with behavior-change interventions. Among these, Community-Led Total Sanitation (CLTS) has become one of the most influential participatory approaches. Developed by Kar and Chambers (2008), CLTS shifts sanitation interventions from externally driven infrastructure provision towards community ownership and collective behavioral transformation. Rather than subsidizing toilet construction, it mobilizes communities through participatory triggering that helps residents recognize the health, environmental, economic, and social consequences of open defecation and commit collectively to ending it. The underlying premise is that sanitation improvements are more sustainable when communities identify their own problems, develop locally appropriate solutions, and enforce positive social norms.

Evidence from Asia and sub-Saharan Africa indicates that CLTS has increased latrine construction, reduced open defecation, and strengthened community participation in many rural settings, largely through peer influence and collective accountability (Venkataramanan et al., 2018; Crocker et al., 2017). These successes have driven widespread adoption across developing countries, including Zambia, where CLTS is embedded in national sanitation strategies for rural and peri-urban areas and has been associated with measurable gains in rural sanitation coverage (Yeboah-Antwi et al., 2019; Bardosh, 2015).

Yet growing evidence shows that the effectiveness of CLTS is highly context-dependent, and its implementation in urban informal settlements has received far less attention than its rural application. Urban environments differ fundamentally: households face severe land shortages, insecure tenure, high residential mobility, overcrowding, inadequate drainage, and limited opportunities to construct private facilities. Under these conditions, behavioral change alone may be insufficient without complementary investment in infrastructure and supportive municipal governance, and the assumptions underpinning conventional CLTS therefore warrant critical examination in rapidly urbanizing contexts.

In Zambia, accelerating urbanization has been accompanied by the expansion of informal settlements with inadequate sanitation and poor environmental health. Although CLTS has been implemented in several districts, evidence on its effectiveness in densely populated urban settlements remains limited, and existing studies focus predominantly on rural communities (Bardosh, 2015; Thys et al., 2015). This leaves an important gap in understanding how urban socio-economic conditions, settlement characteristics, and institutional factors shape CLTS outcomes, a gap that constrains the design of sanitation programmes suited to urban realities.

Zambia Compound in Choma District exemplifies these challenges, combining overcrowding, poverty, limited infrastructure, insecure tenure, and inadequate environmental services. Although CLTS has been implemented there through household sensitization, triggering, community mobilization, and hygiene promotion, the extent to which these interventions have produced sustained improvement remains insufficiently understood, as does the relationship between community participation, perceptions, behavioural change, and sanitation outcomes in this urban setting.

This study addresses that gap by examining the implementation and outcomes of CLTS in Zambia Compound. Specifically, it evaluates the CLTS interventions implemented, assesses sanitation outcomes using the functional-facility-to-household ratio, examines the influence of community participation and information dissemination, and analyses community perceptions towards CLTS. By integrating quantitative and qualitative

evidence, it provides a comprehensive assessment of the opportunities and constraints of CLTS in an urban informal settlement.

The study is informed by the Theory of Planned Behavior, Social Cognitive Theory, and Participatory Development Theory, which together explain how sanitation behaviors emerge through the interaction of individual attitudes, social norms, observational learning, self-efficacy, and community participation. This framework conceptualizes sanitation not merely as a technical or infrastructural challenge but as a behavioral, social, and institutional process requiring sustained engagement alongside supportive environmental conditions.

The findings contribute to scholarship and policy by extending the CLTS evidence base beyond its traditional rural focus. Empirically, the study offers one of the few detailed assessments of urban CLTS implementation in Zambia; theoretically, it shows how behavior-change models interact with structural constraints; and practically, it generates evidence to inform urban sanitation policy, municipal planning, and community-based programming in rapidly urbanizing settlements.

Theoretical Framework

This study is anchored in three complementary perspectives; the Theory of Planned Behavior (TPB), Social Cognitive Theory (SCT) and Participatory Development Theory (PDT). Together these theories explain how individual attitudes, social interaction and community participation shape the adoption and sustainability of improved sanitation practices under CLTS.

The Theory of Planned Behaviour (Ajzen, 1991) provides the primary behavioral lens. It holds that behavioral intention is shaped by attitudes towards the behavior, subjective norms, and perceived behavioral control. In CLTS, positive attitudes develop when residents recognize the benefits of improved sanitation; subjective norms emerge as communities discourage open defecation; and perceived behavioral control reflects residents' confidence in their capacity to build, maintain and use facilities given available resources. Its limitation in informal settlements is that positive intentions may not translate into action where poverty, limited space, or insecure tenure intervene.

Social Cognitive Theory (Bandura, 1986) complements TPB by emphasizing that behavior develops through interaction between individuals, their social environment, and observed experience, via observational learning, reciprocal determinism, and self-efficacy. In CLTS, residents observe neighbors building and maintaining facilities and adopting hygienic practices, while Community Health Workers, extension workers and local leaders reinforce positive norms. Its limitation is that observation and motivation cannot overcome physical or economic barriers where households lack land, materials, or finance.

Participatory Development Theory (Chambers, 1997) provides the community-level perspective. It argues that interventions are more sustainable when communities identify problems, design solutions, implement them, and monitor progress as active agents rather than passive beneficiaries. These principles align directly with CLTS, which relies on mobilization, triggering, collective decision-making, peer accountability, and local leadership. Its limitation is that participation can be captured by dominant groups, and gender relations, unequal resource access and power imbalances may exclude vulnerable households, a caveat directly relevant to this study's findings on gendered decision-making.

Rather than treating these theories separately, the study adopts an integrated framework: TPB explains individual intentions, SCT explains how behaviours are reinforced through observation and self-efficacy, and PDT explains how collective ownership sustains improvement. Together they recognize that effective sanitation interventions require both behavioural transformation and supportive structural conditions. Guided by this framework, the study examines whether CLTS influences sanitation outcomes through four pathways — increasing knowledge and awareness, strengthening participation and ownership, promoting positive perceptions and behaviour, and improving access to functional facilities — while recognizing that these relationships are moderated by poverty, overcrowding, insecure tenure, limited infrastructure, and cultural norms.

LITERATURE REVIEW

Community knowledge is a fundamental determinant of the effectiveness of Community-Led Total Sanitation (CLTS) interventions because it shapes people's understanding of sanitation, hygiene, disease transmission, and the health benefits associated with improved sanitation practices. CLTS is based on the principle that sustainable sanitation improvements are achieved when communities recognize the dangers of open defecation and collectively take responsibility for eliminating the practice using locally available resources rather than depending on external subsidies (Kar & Chambers, 2008). When communities possess adequate sanitation knowledge, they are more likely to construct and consistently use latrines, practice proper handwashing, and maintain hygienic environments. Conversely, inadequate knowledge often contributes to persistent open defecation, poor hygiene practices, and continued exposure to sanitation-related diseases. Freire's (1970) Theory of Participatory Learning explains that knowledge is best acquired through dialogue, participation, and critical reflection rather than passive instruction. Likewise, Bandura's (1977) Social Learning Theory argues that individuals learn by observing and imitating the behaviors of others. Within CLTS, these theories demonstrate how participatory learning and peer influence enhance sanitation knowledge and encourage communities to adopt healthier behaviors.

Empirical evidence demonstrates that improved community knowledge positively influences sanitation outcomes. Kar and Chambers (2008) explain that participatory activities such as community mapping, transect walks, and demonstrations of faecal contamination enable residents to understand how poor sanitation contributes to disease transmission. These activities encourage communities to take ownership of sanitation improvements and invest in locally developed solutions. Similarly, Sigler, Mahmoudi and Graham (2014) found that practical demonstrations illustrating the "five Fs" of disease transmission, that is, food, fingers, flies, fluids, and fields significantly improved community understanding of the links between open defecation and diarrheal diseases. Households that understood these contamination pathways were more willing to construct latrines, practice hand washing, and improve environmental cleanliness. However, the study was conducted across several African countries and did not specifically examine urban informal settlements in Zambia, leaving uncertainty regarding the applicability of the findings to Zambia Compound.

Further evidence indicates that participatory education and continuous learning strengthen sanitation knowledge and encourage sustainable behavioral change. Venkataramanan et al. (2018), through a systematic review of CLTS programmes implemented across developing countries, reported that communities actively involved in sanitation discussions, demonstrations, and planning achieved higher levels of latrine ownership and utilization than communities relying on conventional health education alone. Musyoki (2016) similarly found that repeated sanitation awareness activities significantly improved household understanding of hygiene practices regardless of formal educational attainment. However, the study also established that poverty and competing household priorities often prevented communities from translating sanitation knowledge into practical improvements. Crocker et al. (2017) further observed that peer learning strengthened long-term sanitation knowledge because households exchanged practical information on latrine construction, maintenance, and hygiene practices, thereby reinforcing positive behaviors. Nevertheless, these studies focused mainly on rural communities and provide limited evidence regarding knowledge acquisition in densely populated urban settlements such as Zambia Compound.

Community knowledge is also influenced by cultural beliefs, gender participation, schools, and local leadership. Dyalchand et al. (2024) found that communities possessing better knowledge of sanitation-related health risks responded more positively to CLTS triggering activities than communities where traditional beliefs minimized disease risks. Merga et al. (2015) reported that women with greater sanitation knowledge were more likely to promote hand washing and proper hygiene within households, while Kapathuka (2024) found that involving both men and women in sanitation education programmes strengthened community understanding of hygiene and disease prevention in Zambia. In addition, Odongo et al. (2017) demonstrated that school-based hygiene education enhanced children's sanitation knowledge, which was subsequently shared with family members and contributed to improved household sanitation practices. Although these studies highlight the importance of knowledge, they provide limited evidence on how these factors collectively influence CLTS interventions in Zambia Compound. Overall, existing literature confirms that community knowledge significantly enhances the success of CLTS interventions by improving awareness, strengthening

participation, and encouraging sustainable sanitation practices. However, limited research has examined this relationship within Zambia's urban informal settlements, thereby creating the need for context-specific evidence from Zambia Compound in Choma District.

METHODOLOGY

Study Design

The study employed a convergent parallel mixed-methods design to assess the contribution of CLTS to sanitation practices in Zambia Compound. Quantitative and qualitative data were collected concurrently, analyzed independently and integrated during interpretation. This allowed numerical evidence on outcomes to be complemented by participants' experiences and perceptions. A descriptive cross-sectional approach was adopted because the study examined sanitation conditions, participation and perceptions at a single point in time; the design supports description and association but not causal inference.

Study Area

The study was conducted in Zambia Compound, an urban informal settlement in Choma District, Southern Province. The settlement is characterized by rapid population growth, overcrowding, inadequate sanitation infrastructure, insecure land tenure, and limited environmental services, making it an appropriate setting for evaluating CLTS where conventional rural approaches may encounter structural constraints. CLTS has been implemented there through community sensitization meetings, household follow-up visits, hygiene-promotion campaigns, and triggering activities coordinated by the Choma Municipal Council and the District Health Office.

Study Population

The target population comprised all households in Zambia Compound together with key stakeholders involved in implementing CLTS. According to community records, the settlement contained 1,021 households at the time of the study. The qualitative component included officials and practitioners directly involved in sanitation programming, drawn from the Choma Municipal Council, District Health Office, Community Health Workers (CHWs), Community Health Extension Workers (CHEWs), CLTS facilitators, and community leadership.

Sample Size and Sampling Procedures

The minimum household sample size was calculated using Yamane's (1967) formula, $n = N / (1 + Ne^2)$, where n is the required sample size, N the population (1,021 households), and e the margin of error (0.05). This produced a minimum of 288 households. Owing to field-implementation constraints, 170 households were successfully surveyed. Although the achieved sample is smaller than the calculated minimum, it remains adequate for descriptive analysis, albeit with reduced statistical precision; this limitation is acknowledged in interpreting the findings. Households were selected through systematic random sampling from the household register: after a random start, households were chosen at regular intervals until the achieved sample was obtained. The qualitative sample comprised six purposively selected key informants with direct responsibility for sanitation implementation and four focus group discussions of eight participants each (32 in total), organized separately for men, women, and young people to encourage open discussion.

Data Collection

Data were collected using four complementary instruments. A semi-structured household questionnaire generated quantitative information on household characteristics, sanitation facilities and practices, participation in CLTS activities, and sanitation perceptions. Key informant interview guides were administered to public-health officials, municipal officers, CLTS facilitators, CHWs, and community leaders to capture programme implementation, institutional challenges, and sustainability. Focus group discussion guides facilitated collective reflection on sanitation practices, behavioral change, participation, and socio-cultural factors. Finally, an observation checklist was used to verify the physical condition, functionality, cleanliness, accessibility, and use of sanitation facilities, enabling triangulation with self-reported data.

Data Analysis

Quantitative data were cleaned, coded and entered into SPSS version 22. Frequencies, percentages, tables and figures were used to summarize respondent characteristics, CLTS interventions, sanitation outcomes, participation and perceptions. A key outcome indicator was the functional-facility-to-household ratio, computed by relating the number of functional sanitation facilities to the total number of surveyed households; this provides a more meaningful measure of access than ownership alone because it accounts for operational status.

Qualitative interviews and discussions were audio-recorded, transcribed verbatim, and analyzed thematically using an inductive approach in which recurrent concepts were grouped into broader themes. Qualitative findings were integrated with quantitative results during interpretation to provide explanatory depth.

Trustworthiness and Quality Assurance

Several procedures enhanced research quality. For the quantitative component, the questionnaire was pre-tested to improve clarity, sequencing, and reliability, and completed questionnaires were checked daily for completeness and consistency.

For the qualitative component, credibility was strengthened through triangulation across household edit surveys, key informant interviews, focus group discussions, and field observation, with diverse stakeholder groups included to capture multiple perspectives. Verbatim quotations are presented in the Results and Discussion to illustrate major themes and improve transparency of interpretation.

Ethical considerations

Ethical approval was obtained from the relevant University Research Ethics Committee (MU/DRI/REC/2026/130 prior to data collection, and administrative permission was granted by the Choma District Health Office and Choma Municipal Council.

Participation was voluntary, and written informed consent was obtained from all participants after the purpose of the study had been explained. Participants were assured of anonymity, confidentiality, and the right to withdraw at any stage without penalty. Personal identifiers were removed during transcription and analysis, and all data were securely stored and used exclusively for academic purposes.

RESULTS AND DISCUSSION

Response rate and respondent profile

Of the 170 questionnaires distributed, 158 were completed and returned, giving a response rate of 92.9%, well above the threshold generally considered adequate for survey research and sufficient to minimize non-response bias. All quantitative results reported below are therefore based on 158 respondents.

The sample was demographically representative of an active urban farming and working population (Table 1). Most respondents were of economically active age, with 26.6% aged 28–37 years, 22.8% aged 38–47 years, and 21.5% aged 18–27 years; older residents (48 years and above) comprised 29.1%.

Women formed the majority (56%), reflecting their greater availability at home and their central role in managing household hygiene, supervising children, and maintaining facilities.

Just over half of respondents were married (51.9%), a group typically responsible for household sanitation decisions, while widowed, divorced, and separated respondents together accounted for 24.1% and often faced distinct socio-economic constraints in constructing and maintaining facilities.

Table 1. Demographic characteristics of respondents (N = 158)

Characteristic	Category	n	%
Age (years)	28–37	42	26.6
	38–47	36	22.8
	18–27	34	21.5
	48–57	25	15.8
	58 and above	21	13.3
Gender	Female	88	56.0
	Male	70	44.0
Marital status	Married	82	51.9
	Single	38	24.1
	Widowed	17	10.8
	Divorced	12	7.6
	Separated	9	5.7
Education	Secondary	61	38.6
	Primary	54	34.2
	Tertiary	24	15.2
	No formal education	19	12.0
Household size	5 and above	62	39.2
	4	36	22.8
	3	28	17.7
	2	20	12.7
	1	12	7.6

Source: Field data (2026).

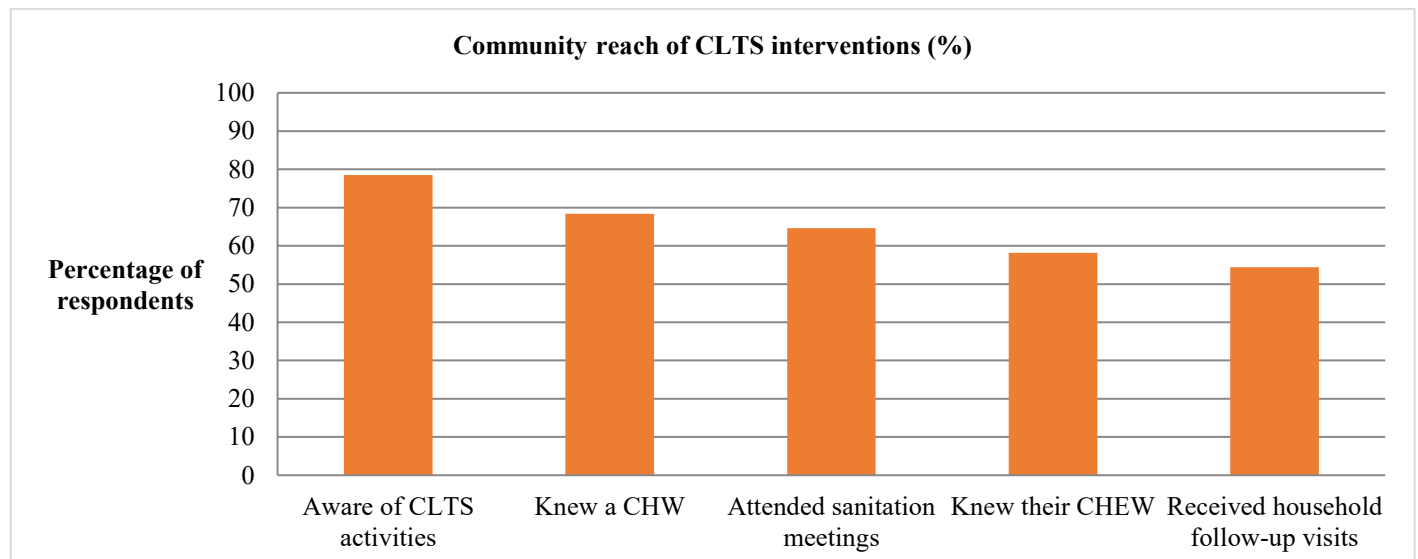
Educational attainment was moderate: 38.6% had reached secondary level and 34.2% primary level, giving most respondents the basic literacy needed to engage with hygiene education, while 15.2% had tertiary education and 12.0% no formal schooling. Household size was substantial, with 39.2% of households comprising five or more members; larger households placed heavier demands on facilities and were observed to face greater maintenance challenges and higher risk of hygiene lapses than smaller ones. This demographic profile of predominantly female, married, of working age and living in large households is directly relevant to sanitation outcomes, since it concentrates responsibility for facility use and maintenance among women while, as the socio-cultural findings show, locating decision-making authority largely with men.

CLTS interventions and sanitation practices

CLTS interventions achieved substantial community penetration in Zambia Compound. As shown in Figure 1, more than three-quarters of surveyed households (78.5%) were aware of CLTS activities; 68.4% knew a CHW, 58.2% knew their CHEW, 64.6% had participated in community sanitation meetings, and 54.4% had received household follow-up visits. Implementation therefore extended beyond awareness creation to continuous engagement through multiple channels. Qualitative findings reinforced this. Participants described household visits and community meetings as the most influential components, providing personalized guidance, correcting misconceptions, and reinforcing behavior, while CHWs reported that repeated engagement

increased acceptance and strengthened local ownership. As one Community Health Worker explained, “Most households now understand that poor sanitation contributes to disease outbreaks, and this awareness has encouraged many families to build and use latrines.” Another noted the value of personalized contact: “Household visits allow us to identify specific sanitation problems affecting each family and provide practical solutions immediately.”

Figure 1. Community reach of CLTS interventions (%)



These patterns can be read through the Theory of Planned Behavior: the high level of awareness suggests CLTS shaped community attitudes while establishing social expectations that discouraged open defecation. Social Cognitive Theory further explains how repeated interaction with CHWs and observation of neighbouring households reinforced change through observational learning and self-efficacy.

The findings align with Harvey (2011), who found continuous follow-up strengthens long-term behaviour change, with Kar and Chambers (2014), who argued that improvements are more sustainable when communities assume collective responsibility, and with a systematic review identifying sustained engagement and an enabling environment as central to CLTS effectiveness (Venkataramanan et al., 2018); the present study extends these insights by showing that similar mechanisms operate in urban settings despite more complex structural constraints.

Coverage was not universal, however: about one-third of households had not attended meetings and almost half had not received a follow-up visit. In dense settlements with high mobility and limited personnel, maintaining contact with every household is a significant operational challenge, and sustained outreach remains essential if CLTS is to achieve universal behavioural change.

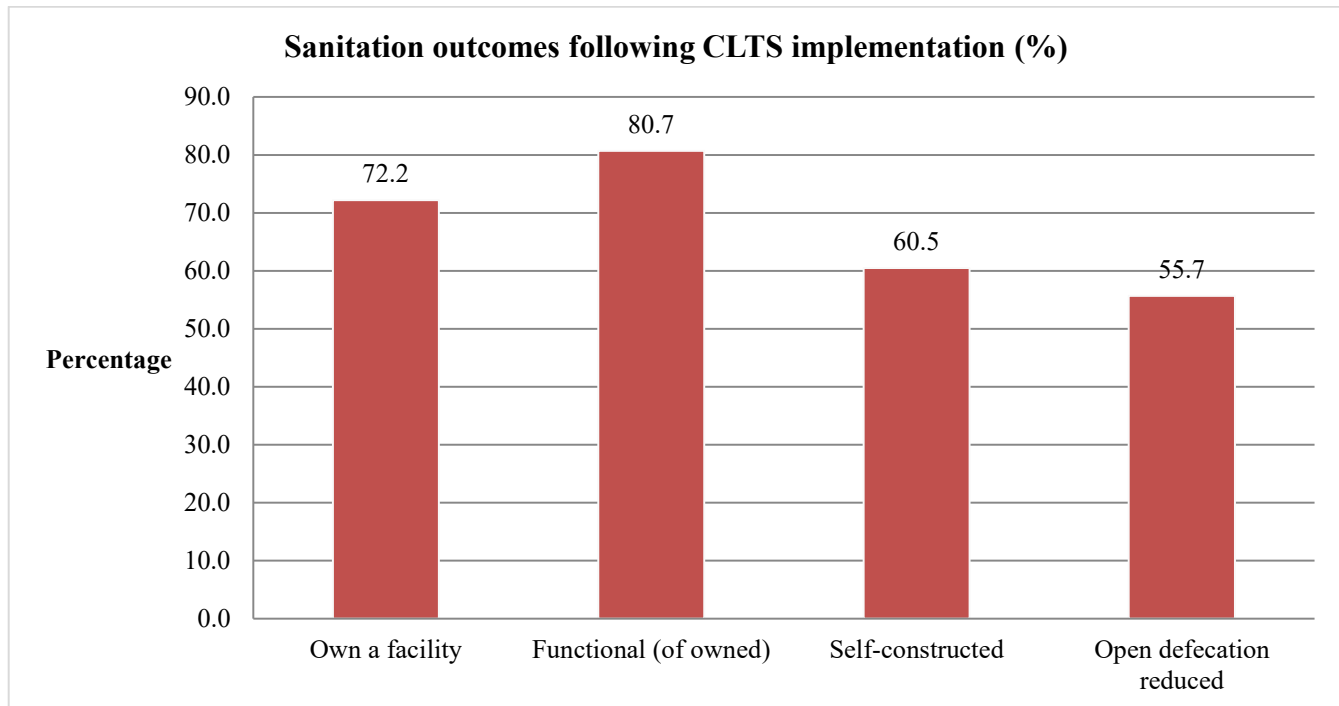
Sanitation outcomes following CLTS implementation

CLTS contributed to measurable improvements in household sanitation (Figure 2). Approximately 72.2% of households owned sanitation facilities, and 80.7% of these were functional at the time of the survey, yielding a functional-facility-to-household ratio of 0.58 — roughly one functional facility for every 1.7 households.

While this represents considerable progress relative to widespread open defecation, it also shows that universal access to functional sanitation has not been achieved. The decline in open defecation reported by 55.7% of respondents further supports the positive contribution of CLTS; focus group participants attributed this to greater awareness, stronger social pressure, and increased household responsibility, noting that open defecation had become socially unacceptable through changing norms rather than external enforcement.

As one participant observed, “Today, people are embarrassed to be associated with open defecation because the community now understands its dangers,” while another remarked that “children even remind adults to use the toilet because everyone now knows that going to the bush is wrong.”

Figure 2. Sanitation outcomes and facility status (N = 158)



Percentage of owned facilities, not of all households. Functional-facility-to-household ratio = $(0.722 \times 0.807) \approx 0.58$, i.e. approximately one functional facility per 1.7 households. Frequencies computed from reported percentages.

These findings support Participatory Development Theory, as the predominance of household- and community-constructed facilities indicates that residents increasingly regarded sanitation as a shared responsibility rather than a government obligation. A key informant stressed that functionality matters as much as ownership:

“A household may have a toilet, but if it collapses or becomes unsafe to use, people may return to open defecation. Functionality is just as important as ownership.”

The findings also reveal structural limits, however: nearly one-fifth of facilities were non-functional owing to poor construction quality, inadequate maintenance, seasonal flooding, and financial constraints. Ownership should therefore not be equated with effective access, rather, functional infrastructure is the more meaningful indicator of success. This echoes evidence from eastern Zambia that latrine use is shaped not only by facility availability but by social, cultural, and economic determinants (Thys et al., 2015; Bardosh, 2015).

This contributes to the international debate on CLTS sustainability: whereas many evaluations report increased construction immediately after triggering, fewer examine the durability of facilities. Longitudinal evidence from Ethiopia and Ghana shows that CLTS gains can be sustained where an enabling environment, latrine quality, and market access support repair and rebuilding, but that low-durability latrines are prone to collapse and reversion to open defecation (Crocker et al., 2017). The present study similarly indicates that sustained outcomes require both behavioural change and continued investment in maintenance.

Beyond ownership and functionality, disposal practices and construction sources further illuminate the reach of CLTS. Facility construction was predominantly local: 33.3% of facilities were built by household members and 27.2% through community effort, against 18.4% by NGOs and 10.5% by government (Table 2), a pattern of local ownership that field observations linked to better maintenance and more consistent use, consistent with Participatory Development Theory and Harvey (2011).

Disposal of child and sick-person excreta, a sensitive route of faecal-oral transmission, showed clear progress alongside a persistent gap: 48.1% of caregivers used a facility and 30.4% buried excreta, but 17.7% still disposed of it in the bush.

Community acceptance of facility use was high (73.4%), yet 32.9% of respondents reported that open defecation still occurred, most often citing limited space, unsafe facilities, or lack of privacy. This underscores that behavioral gains coexist with unresolved structural constraints.

Table 2. Facility construction sources and disposal of child/sick-person excreta (N = 158)

Indicator	Category	%
Construction source	Household (self)	33.3
	Community	27.2
	NGO	18.4
	Government	10.5
	Other	10.5
Excreta disposal	Using a facility	48.1
	Burying	30.4
	Thrown in bush	17.7
	Other	3.8

Source: Field data (2026).

Socio-cultural factors shaping sanitation practices

Sanitation behavior in Zambia Compound was strongly conditioned by cultural norms and gendered household roles. Norms around privacy sharply restricted facility sharing: 70.9% of respondents reported that men and women are not permitted to share the same facility, and 88.6% that fathers should not share with daughters (Table 3). These norms shape construction and use, sometimes prompting households to build separate facilities even under financial and spatial constraints, and thereby raising the effective cost of achieving adequate coverage.

Table 3. Socio-cultural norms on facility sharing (N = 158)

Question	Response	n	%
Men and women may share the same facility	No	112	70.9
	Yes	36	22.8
	Other	10	6.3
Fathers may share a facility with daughters	No	140	88.6
	Yes	12	7.6
	Other	6	3.8

Source: Field data (2026).

Decision-making authority was markedly gendered. Although women bear primary responsibility for cleaning, maintenance, and children's hygiene, 69.6% of respondents reported that women were excluded from sanitation decision-making. Household-role data confirm a male-dominated structure: husbands led facility construction in 53.2% of households, made the decision to construct in 62.0%, and controlled sanitation expenditure in 65.8%, while wives contributed 22.8%, 17.7%, and 20.3% respectively (Table 4). Interpreted through Participatory Development Theory, this concentration of authority is consequential: facilities decided and built without input from their primary users may not meet privacy, accessibility, or convenience needs, reducing consistent use. Notably, the 11.4% of households reporting collaborative, whole-household decision-

making showed better maintenance and higher compliance with CLTS recommendations. This suggests that inclusive decision-making is itself associated with better outcomes.

Table 4. Household roles in latrine construction and decision-making (N = 158)

Activity	Husband (%)	Wife (%)	Everyone/Other (%)
Constructing the facility	53.2	22.8	24.0
Deciding to construct	62.0	17.7	20.3
Controlling sanitation expenditure	65.8	20.3	13.9

Source: Field data (2026). “Everyone/Other” combines collaborative and other responses; children’s contributions were minimal.

Gendered norms also shaped the timing of facility use. Most women (45.6%) and men (58.2%) used facilities during the day, but nighttime use was limited (24.1% of women, 15.2% of men), constrained by poor lighting and safety concerns along unlit compound pathways. Because men dominated daytime access, women in single-facility households could face reduced privacy and convenience, which may discourage consistent use and, at night, elevate the risk of reverting to open defecation. These findings indicate that CLTS interventions in urban settlements must attend to intra-household scheduling, facility safety, and lighting — dimensions that a purely behavioral triggering model tends to overlook.

Community participation as a driver of behavioral change

Community participation emerged as one of the strongest determinants of successful implementation. Respondents who participated in meetings, visits, and mobilization activities showed higher awareness, stronger acceptance of improved practices, and greater ownership of facilities (Table 5). Qualitative findings indicate that meetings created opportunities for dialogue, collective decision-making, and peer accountability, and that sanitation shifted from an individual household responsibility to a collective community concern. As one focus group participant put it, “Before the meetings, sanitation was considered an individual issue. Now we discuss it together and encourage each other to build toilets.” This collective ownership was reinforced through self-construction; as another explained, “When people contribute their own labour, they are more committed to maintaining the toilets because they know the effort that was invested.” These findings correspond to Participatory Development Theory and, through repeated interaction with CHWs and local champions, to Social Cognitive Theory’s account of observational learning and social reinforcement.

Table 5. Community participation and barriers (N = 158)

Participation indicator	Percentage (%)
Attended community sanitation meetings	64.6
Received household follow-up visits	54.4
Reported women excluded from sanitation decision-making	69.6

Percentages as reported in the household survey (N = 158).

Important barriers nonetheless remained. Gender inequalities continued to shape decision-making: as reported in Table 6, 69.6% of respondents indicated that women were excluded from sanitation decision-making, with many female participants reporting limited involvement in decisions about toilet construction despite bearing primary responsibility for household hygiene. Shortages of CHWs likewise limited follow-up visits and reduced opportunities for sustained engagement; as one health worker acknowledged, “Sometimes we fail to visit every household because the number of health workers is small compared to the population we are expected to serve.” A female participant captured the gender dimension directly: “Women are expected to keep the home clean, but decisions about building toilets are usually made by men.” Strengthening CLTS therefore requires not only wider participation but greater gender inclusion and increased institutional capacity.

Community perceptions and the sustainability of CLTS

Community perceptions towards CLTS were overwhelmingly positive. As Table 6 shows, most respondents recognized the link between poor sanitation and disease, 91.1% agreed that poor hygiene causes disease and 88.6% that open defecation contributes to diarrheal disease, and a substantial majority (81.0%) regarded open defecation as socially unacceptable, indicating that CLTS transformed sanitation from a private household issue into a collective public-health concern. The Theory of Planned Behaviour explains this: as positive norms developed, households increasingly perceived improved sanitation as expected community behaviour, and the resulting social pressure encouraged continued toilet use. One participant reflected on this shift: “At first, people felt embarrassed discussing sanitation, but the meetings gradually helped us realize that sanitation affects everyone’s health.” Persisting cultural norms were also voiced, however, “In our culture, certain family members are not expected to share toilets because privacy is highly respected”. This illustrates why privacy and gender considerations continued to shape facility use.

Table 6. Community perceptions towards sanitation (N = 158)

Perception statement	Agreement (%)
Poor hygiene causes disease	91.1
Hand washing and facility use prevent diarrheal disease	89.9
Open defecation contributes to diarrheal disease and worms	88.6
Fathers should not share toilets with daughters (privacy norm)	88.6
Open defecation is shameful	81.0
Men and women should not share sanitation facilities	70.9
Uncomfortable discussing sanitation publicly	62.0

Percentages as reported in the household survey (N = 158).

Positive perceptions alone, however, did not guarantee universal adoption. Persistent socio-economic constraints such as poverty, overcrowding, insecure tenure and inadequate materials. continued to limit households’ ability to build and maintain durable facilities, and cultural norms regarding privacy and gender roles influenced utilization in some households. These findings reinforce the study’s central argument: behavioral change is a necessary but insufficient condition for sustainable sanitation in urban informal settlements. While CLTS effectively transforms attitudes, strengthens participation, and promotes positive norms, its long-term effectiveness depends on supportive structural conditions that enable households to translate intention into practice. Behavior-change interventions should therefore be complemented by urban planning, improved infrastructure, targeted support for vulnerable households, and stronger municipal service provision.

Knowledge and beliefs on WASH and disease prevention

Underpinning these perceptions was a strong grasp of the links between hygiene, sanitation, and disease (Table 7). Large majorities recognized that poor hygiene causes diarrheal disease and eye infections (91.1%), that hand washing prevents diarrheal disease (89.9%), that facility use prevents disease (89.9%), and that open defecation causes diarrheal disease and worm infestation (88.6%). A comparable majority (78%) rejected the belief that human excreta is harmless. This consistently high WASH literacy indicates that CLTS and allied health-education activities have been effective in communicating the mechanisms of faecal-oral disease and field observations linked such knowledge to concrete practices such as hand washing stations near facilities (often locally made tippy taps), safer child-excreta disposal, and more consistent facility use.

Table 7. WASH knowledge and beliefs (N = 158)

Statement	Agreement (%)
Poor hygiene causes diarrheal disease and eye infections	91.1
Hand washing prevents diarrheal disease	89.9
Facility use prevents diarrheal disease	89.9
Open defecation causes diarrheal disease and worms	88.6
Rejected that human excreta is harmless	78.0

Source: Field data (2026).

The residual minority in each case is instructive. Respondents who disagreed that hand washing prevents disease more often cited the absence of a hand washing facility than genuine unawareness, and those who continued to practice open defecation typically lacked facility access or faced strong cultural constraints. This distinction between knowledge deficits and structural barriers reinforces the study's central argument that where CLTS has succeeded in building awareness, the remaining obstacles to universal sanitation are predominantly material and infrastructural rather than cognitive and must be addressed as such.

CONCLUSION

This study examined the contribution of CLTS to improving sanitation practices in Zambia Compound, an urban informal settlement in Choma District. Using a convergent parallel mixed-methods design, it assessed the interventions implemented, evaluated sanitation outcomes, examined community participation, and explored perceptions of sanitation improvement. The findings show that CLTS contributed positively by increasing awareness, strengthening participation, promoting positive behaviors, and reducing open defecation. Community sensitization, household follow-up, hygiene promotion, and the active involvement of CHWs and CHEWs collectively facilitated behavioral change and enhanced ownership, transforming sanitation from an individual concern into a shared community responsibility.

Behavioral change alone, however, proved insufficient to guarantee sustainable improvement. The functional-facility-to-household ratio of 0.58 indicates that many households still lack reliable access, and persistent structural challenges such as poverty, overcrowding, insecure tenure, inadequate materials, seasonal flooding, and limited municipal infrastructure continue to constrain long-term effectiveness. CLTS should therefore not be treated as a stand-alone strategy for urban informal settlements; its effectiveness depends on integrating behavior-change interventions with investment in infrastructure, supportive municipal governance, inclusive participation, and policies that address the socio-economic barriers facing vulnerable households. Theoretically, the study shows that sanitation outcomes are shaped by the interaction of behavioral intentions, social learning, participation, and structural conditions, and that the integrated application of the three theories offers a comprehensive explanation of sanitation behavior in resource-constrained urban environments. Overall, it contributes new empirical evidence on urban CLTS in Zambia and underscores the need to adapt conventional rural approaches to the realities of rapidly growing informal settlements.

Policy and Practical Implications

The findings carry several implications for policy and practice. First, CLTS should be redesigned for urban informal settlements by incorporating space-efficient sanitation technologies suited to high-density conditions, so that behavior-change interventions are complemented by practical engineering solutions for limited land. Second, local authorities should strengthen post-triggering support through regular follow-up visits, technical guidance, and continuous monitoring, since sustained engagement is essential to maintain facilities and prevent reversion to open defecation. Third, interventions should adopt more inclusive participation strategies that actively involve women, young people, landlords, and vulnerable households in decision-making, as greater gender inclusion is likely to improve household investment and strengthen ownership. Fourth, municipal authorities should integrate CLTS within broader urban planning by improving drainage, solid-waste

management, and sanitation infrastructure. Finally, development partners should prioritize capacity building by strengthening the technical and logistical capacity of CHWs, CHEWs, and local sanitation committees.

Study Limitations

Several limitations should be considered. The cross-sectional design captured conditions at a single point in time and cannot establish causal relationships or assess long-term change following CLTS implementation. Although triangulation strengthened credibility, some quantitative information relied on self-reported practices and may be subject to recall or social-desirability bias. The study was conducted within a single settlement, so caution is warranted in generalizing to other districts or national contexts with different conditions. Finally, the achieved household sample was smaller than the calculated minimum; although sufficient for descriptive analysis, this may have limited the statistical precision of some estimates, and future studies with larger samples across multiple settlements would provide stronger evidence.

Recommendations for Future Research

Future research should adopt longitudinal designs to examine the sustainability of sanitation improvements several years after implementation, providing stronger evidence on the durability of behavioral change and facility functionality. Comparative studies across multiple urban settlements, and between rural and urban implementation, would clarify how contextual factors shape effectiveness and what adaptations different settlement types require. Research should also examine the cost-effectiveness of integrating CLTS with municipal infrastructure investment, to inform efficient resource allocation between behavioral and infrastructural approaches. Finally, future studies should investigate how land-tenure security, gender relations, urban governance, climate-related hazards, and settlement planning influence sanitation outcomes, strengthening understanding of sustainable sanitation in rapidly urbanizing contexts.

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