

The Use of Community-led Total Sanitation (Clts) in the Evaluation of Sanitation and Hygiene Situation Among the Residents of Tafawa- Balewa Town, Bauchi State, Nigeria

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Abstract

The use of Community-Led Total Sanitation (CLTS) has over time improved sanitation situation and reduced open defecation in many rural and low-income areas across the world. Previous studies highlight its health benefits, including reduced diarrheal diseases and increased latrine ownership, influenced by education, economic status, and cultural factors. However, the sustainability of CLTS interventions remains underexplored. This study assesses the viability of sanitation facilities and community practices among the households in Tafawa Balewa communities in Bauchi State, Nigeria. Data for this study were obtained through probability sampling of 397 households in five wards using a structured questionnaire, and SPSS was used for analysis. The results of this survey showed that 42% of people stated that triggering events were effective principles for CLTS in the area, indicating an improvement in sanitation behavior. Technical difficulties still exist, though, 23% of respondents held the view that multiple factors led to high rates of open defecation in the area and 34% also stated that all hands must be on deck for all sanitation and hygiene initiatives in the area to succeed. Concerns about financial sustainability are also present, as 20.6% of respondents can only afford to build latrines and not modern toilets. The result of this study also showed that the construction of latrines was prioritized over other aspects of environmental sanitation because there was very little scalability. Among the stakeholders, monitoring and follow-up were considered to be inadequate. Although fecal sludge-based fertilizers are widely accepted in the community, utilizing charcoal made from feces is viewed with suspicion. The report suggests improved infrastructure, funding, sludge management education, and regulatory changes to increase the long-term CLTS impact in order to guarantee sustainability in Tafawa-Balewa Town, Bauchi state, Nigeria.

INTRODUCTION

Nigeria is one of the countries in the world where the most people practice open defecation freely polluting the water and causing cholera, diarrhea, typhoid and other water-borne diseases.

Access to clean drinking water and sufficient sanitary facilities are fundamental human rights and guarantee open defecation free communities (Harter et al. 2020, Kingpriest et al. 2024, Mnyandu, 2022). In many poor countries, especially in rural and peri-urban areas of Sub-Saharan Africa, open defecation remains a significant problem despite significant international efforts to improve Water, Sanitation, and Hygiene (WASH) conditions (Ali, Vivan & Ayuba, 2024, Olagbemide & Oluropo, 2025). Open defecation, which is the practice of disposing of human waste in open areas like fields, forests, bushes, water bodies, or other undesignated places instead of using a proper restroom, is a serious environmental and public health risk that has a significant impact on the wellbeing of the community. With an estimated population of over 237 million, Nigeria is the most populous country in Africa and as such, it faces significant issues in providing its citizens with proper sanitary services. Nigeria is the second-largest country in the world for this regrettable measure, with an estimated 46 million people still defecating in the open (Agha et al., 2024; Olagbemide & Oluropo, 2025, Samie et al. 2022). Only 46% of Nigerians have access to basic sanitation services, and 23% of the country's population defecates in the open,

according to statistics from the Water, Sanitation and Hygiene National Outcome Routine Mapping (WASH-NORM) 2021 study (WASHNORM, 2021, Federal Government of Nigeria & UNICEF 2016, Water 2021). Smaller communities and rural locations where infrastructure development has lagged behind population growth are particularly affected by this predicament.

Nigeria, like most sub-Saharan African countries, is confronted by the challenges of socio-economic and health effects of the practice of open defecation. 'Open Defecation' (OD), according to WHO, is a condition where human faeces are disposed-off in open places, such as fields, open bodies of water, beaches or other open spaces or disposed along with solid waste. It has also been defined as the practice of defecating outside or in public; a condition that is obviously prevalent in some LGAs of Bauchi State, as current data shows that, 12% of the total population of the state practice Open Defecation (Ekhogbon, 2024).

Bauchi state has been one of the states obviously in the fore front of scaling up WASH activities in the country, with a strong focus on achieving behavioral change rather than on facilities construction in the implementation of its sanitation programme as demonstrated by its adoption of the Community Led Total Sanitation (CLTS) approach as a strategy for the attainment of Open Defecation Free (ODF) status by its communities. Therefore, achieving State-wide ODF has been the drive of Bauchi State over the years, as evidenced by the fact that two of her LGAs have been declared ODF and three more are on the verge of being declared ODF before the end of 2022. Nigeria as a nation has adopted the CLTS approach for the implementation of the road map, and Bauchi is already vigorously implementing CLTS in all its communities. This has involved creating an enabling environment for CLTS implementation, capitalizing on emerging experiences, thereby leading to development of complementary strategies, such as the introduction of Sanitation Marketing during triggering, and the Private sector involvement in sanitation service delivery, to mention but a few. Moving from local level objectives for sanitation, to the realization that a State-Wide movement is important and required, is a bold step in the right direction. This is further boosted by the presidential declaration of a state of emergency on open defecation and the desire for the realization of SDG-6. This study assesses the viability of sanitation facilities and community practices among the households in Tafawa Balewa communities in Bauchi State, Nigeria.

MATERIALS AND METHODS

Study Area

The Northeastern region of Bauchi State, Nigeria, is home to the Tafawa Balewa Local Government Area. The town of Tafawa Balewa serves as the headquarters of the Tafawa Balewa Local Government Area (LGA), which is situated in the southern region of Bauchi State, Nigeria. It occupies an area of around 2,451 km² and is situated roughly between latitudes 9°45'N and longitudes 9°34'E. Because of its closeness to the Jos Plateau, the area is known for its rocky topography, which includes hills. Situated in Nigeria's Northeastern geopolitical zone. Tafawa Balewa shares boundary with DASS, Bauchi, and Bogoro Local Government Areas. The terrain is a combination of steep, rocky regions and flat, Savanna plains. It

is a part of the Nigeria Basement Complex and stretches into regions close to Plateau State's border. Tafawa Balewa has an area of 2,451Km².

Local government shares boundaries with Dass, Bauchi, and Bogoro Local Government Areas. Tafawa Balewa's geography is made up of mild hills and flat plains, which are typical of the Savanna environment in the area. The terrain of Tafawa Balewa consists of undulating hills and level plains, with seasonal rivers supplying vital water supplies. The ecosystem and agricultural productivity are impacted by environmental issues like desertification, deforestation, and soil erosion. To safeguard natural resources and guarantee the region's agricultural industry's continued sustainability, sustainable land management techniques and environmental conservation initiatives are required. Agriculture is supported by the tropical environment, which features a hot dry season and a wet season. Seasonal rivers and streams are essential for supplying water for domestic purposes, including farming.

Source: NCRS, Jos 2025

Figure 1: Map of Tafawa Balewa, Bauchi State, Nigeria

The Siyawa ethnic group is the dominant culture and make up the majority of the population of Tafawa Balewa with Ngas, Hausa and Fulani also living in the area. The Siyawa people's norms and culture have a strong influence on the community's traditions and practices, which are seen in their daily life, festivals, and ceremonies. Siyawa and Hausa are the primary languages spoken in the area, with Fulfulde also common only among the Fulani community (Irmiya, Lumana & Nehemiah, 2025). The local culture is deeply rooted in traditional dance, music, and crafts, all of which enhance the lively social life of the neighbourhood. In spite of modernization, the residents of Tafawa Balewa strive to maintain their cultural customs since they are proud of them. The population of Tafawa Balewa LGA was projected to have reached about 395,200 in 2022, and 469,300 people by year 2025 at the annual growth rate of 3.7% with the density of 161.3/Km².

Tafawa Balewa's cultural history must be preserved in order to preserve the community's identity and continuity. Local dialects, traditions, and traditional behaviours are all essential components of the region's social fabric. While tackling environmental issues that impact natural resources and agricultural output, efforts should be taken to preserve and advance these cultural aspects. Tafawa Balewa can prosper and preserve its legacy for future generations by striking a balance between growth and environmental and cultural preservation ((Irmiya, Lumana & Nehemiah, 2025, Muazu, Adamu & Inuwa, 2023).

In Tafawa Balewa, the Siyawa communities have strong ties to their ancestral homeland. Even with advancements in fields like healthcare and education, there are still major obstacles to development, especially in the area of infrastructure. To improve the standard of living in Tafawa Balewa, improvements must be made to the road systems, the electrical supply, and the availability of clean water. The region's progress and well-being depend heavily on development initiatives that prioritize social services, infrastructure, and agriculture (Muazu, Adamu & Inuwa, 2023).

A council in charge of public administration and development initiatives oversees Tafawa Balewa's local government. Local government is greatly aided by traditional leadership, such as the Emir or Tafawa Balewa chief, who offers community and cultural direction. In order to meet community needs, the local government works with traditional leaders, emphasizing healthcare, education, and infrastructure. This cooperative strategy facilitates efficient development planning and governance (Abdulhamid, Ahmad & Abba, 2026). Since Tafawa Balewa is a part of the Bauchi Central Senatorial District, rural development, agricultural improvement, and social service accessibility are frequently at the forefront of local politics. A crucial component of political participation is local elections, where citizens choose representatives who can represent their interests and meet their requirements. Local politics and community stability are also influenced by traditional leadership, such as the traditional institution.

Tafawa Balewa's economy is mostly centered on agriculture, and the majority of its citizens work as farmers. The production of crops including millet, sorghum, maize, and groundnuts is supported by the fertile terrain and ideal environment. An important economic activity is livestock farming, which includes raising sheep, goats, and cattle. Seasonal rivers make irrigation easier and enable year-round crop production. In order to support the local economy, local markets are essential for the exchange of livestock and agricultural products (Abdulhamid, Ahmad & Abba, 2026).

Methodology

This study adopted a cross-sectional survey research design to assess the effectiveness and sustainability of Community-Led Total Sanitation (CLTS) interventions in Tafawa Balewa Local Government Area (LGA), Bauchi State, Nigeria. The design was considered appropriate because it allows for the systematic collection of data from a large population at a single point in time, enabling the evaluation of sanitation practices, infrastructure conditions, and community perceptions following CLTS implementation. The study focused on both household-level sanitation outcomes and community-wide participation in hygiene and environmental management, in line with the objectives of assessing sanitation access, sustainability, and behavioural change. The study population comprised households across Tafawa Balewa LGA. A probability sampling technique was employed to ensure representativeness. Five wards were randomly selected, and households within each ward were proportionately sampled, resulting in a total sample size of 397 households. This sample size was deemed adequate to provide reliable estimates of sanitation practices and perceptions within the study area.

In addition, Focus Group Discussions (FGDs) were conducted with key community groups, including youth, women, elders, and community leaders, to capture qualitative insights into participation, community ownership, and perceived effectiveness of CLTS interventions. Data were collected using a structured questionnaire designed to capture information on socio-demographic characteristics, types and conditions of sanitation facilities, frequency of sanitation and hygiene activities, fecal sludge management practices, and perceptions of CLTS efficiency. The questionnaire was pre-tested in a neighboring community outside the study area to ensure clarity, reliability, and validity of the research

instrument. FGDs followed a semi-structured guide to explore community experiences, challenges, and institutional support related to CLTS implementation. Ethical considerations were observed by obtaining informed consent from all participants and ensuring confidentiality of responses. Quantitative data were analyzed using the Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics, including frequencies and percentages, were used to summarize sanitation conditions, behavioural patterns, and stakeholder participation. Qualitative data from FGDs were analyzed thematically to complement and enrich the quantitative findings. The integration of quantitative and qualitative data enhanced the robustness of the analysis and provided a comprehensive understanding of the sustainability of CLTS interventions in Tafawa Balewa LGA.

RESULTS AND DISCUSSION

Table 1
WASH Status in Nigeria, North East Zone and Bauchi State 2018

Basic WASH Services	National	North East Geopolitical Zone	Bauchi
	%	%	%
	11		9
Basic Water Supply Services	64.2	59.0	77
Sanitation	42	42.4	54
Hygiene	21	15	22
Safely managed	19.2	20	-
Limited service (Water & Sanitation)	32	-	47
Limited service (Sanitation & Hygiene)	13	-	11
OD Prevalence	24.4	21.8	12

Source: WASH NORMS, 2018

Figure 2 presents data on community perceptions or awareness of key principles of Community-Led Total Sanitation (CLTS). All of the Above" has the highest percentage (24.8%). This suggests that nearly a quarter of respondents recognize that multiple factors work together as key principles of CLTS, which is a positive indication of holistic understanding. Forms of Open Defecation (21.4%) is the most recognized individual component. This indicates strong awareness about the problem CLTS aims to address. Sustainable Solutions (14.8%) also ranks high, showing that many respondents see the importance of long-term sanitation strategies. Triggering Events is the least recognized at 5.8%, despite being a core method used in CLTS to provoke community-led action. This might indicate a gap in understanding the practical methods of initiating change.

Figure 3 indicated the way the Community-Led Total Sanitation (CLTS) initiatives impacted various environmental and public health indicators. The highest percentage (27.4%) chose “All of the Above”, indicating a strong recognition that CLTS positively affects multiple environmental and health concerns in the area. In the area of hygiene promotion, 14% of the respondents are of the view that hygiene is the most identified individual impact, indicating that CLTS's role in improving personal and communal hygiene is well understood. Responses like Minimize Air Pollution (8.2%), Community Engagement (8%), and Minimize Open Defecation (7.9%) are also relatively high, reflecting an awareness of CLTS's environmental benefits. Minimize Soil Pollution (5.8%) and Clean Environment (6.6%) are on the lower end. These may be less immediately visible effects or not as well communicated.

Figure 4 shows the mode of operation of CLTS in Tafawa Balewa which explores respondents' understanding of the main operational components of Community-Led Total Sanitation (CLTS). The majority (42%) selected “All of the Above”, showing that many respondents recognize CLTS as a comprehensive strategy combining multiple modes of operation. Sustainability received the highest individual percentage at 13.5%, highlighting a strong understanding of the importance of long-term solutions in CLTS. Community Mobilization and Sanitation Profile also scored relatively high, indicating awareness of foundational activities needed to drive behavior change. Triggering Events (10.8%) and Collective Action (10.6%) are slightly lower, suggesting some gaps in understanding the catalytic and group-based elements of CLTS operations.

From Fig. 5 there is a detailed analysis of the benefits of Community-Led Total Sanitation (CLTS) in Tafawa Balewa. Based on the provided responses ‘All of the Above (37.5%) is the most selected option, showing that over one-third of respondents understand that CLTS provides multiple benefits across sanitation, health, empowerment, and the environment. Improved Sanitation (15%) and Improved Waste Management (14.2%) were the most frequently cited individual benefits. This reflects that tangible outcomes like cleaner environments and proper waste handling—are among the most visible and appreciated results of CLTS efforts. Health benefits (9.5%) and reduced pollution (8.2%) were recognized, but to a lesser extent. These benefits, though crucial, might not be as directly observable or immediate to communities. Sustainable solutions (7.7%) and Community Empowerment (8.0%) had the lowest individual recognition. This suggests that while these outcomes are longer-term and systemic, they might require more communication and community engagement to be fully appreciated.

Figure 6 gives an in-depth analysis of the reasons for high open defecation rate in Tafawa Balewa. The highest percentage of respondents (23%) chose “All of the Above”, suggesting a broad understanding that the issue is not caused by one factor alone but by a combination of cultural, infrastructural, financial, and governance challenges. Paucity of Funds (21.4%) and Insufficient Sanitation Facilities (19.3%) are the most cited individual causes. This shows the community perceives lack of resources and inadequate infrastructure as central obstacles. Culture (10.8%) remains a notable factor—indicating that traditional practices and norms still play a role in open defecation habits. Inadequate Awareness (5.5%), Policy Gaps (5.8%), and Interagency Coordination (6.6%) are recognized but may be underemphasized, despite their potential to create lasting change if addressed. Low Enforcement Rate (2.6%) and High Population

Growth (5%) are the least acknowledged. These might be less visible but could be critical in the long run if not managed effectively.

Figure 7 outlines the perceived responsibility or enforcement level across different societal actors and stakeholders. The majority (34%) selected “All of the Above”, indicating a strong belief that sanitation and hygiene enforcement is a collective responsibility involving every level of society. The individual categories (13%–14%) show relatively even recognition, which means respondents see all actors as important but none as solely responsible. Office/Employer (14%) is the highest among individual roles, hinting at the importance placed on workplace hygiene enforcement likely due to increased awareness in institutional settings. Government (12.4%) is slightly lower, suggesting that while it's recognized, there may be reduced trust or expectation of effective enforcement from authorities.

Table 2: Level of Participation by Community Stakeholders in Tafawa Balewa

Focus Group	Level of CLTS Info Received	CLTS Intervention
Elders	No Participation	Received
Youth	Participation / Information Received	Received
Women	No Participation/ Information Received	Received
Community Leaders	No Participation/ Information Received	Received

Source: Field Survey, 2025

In all the focus groups of elders, youth, women, and community leaders it was agreed that they received the CLTS (Community-Led Total Sanitation) intervention. This suggests the intervention was implemented community-wide. Youth were the only group noted to have both participation and information, elders, despite being part of the intervention, had no participation and apparently no access to information, women and community leaders had no participation, and it's ambiguous as to whether they received any information—it says "No Participation/Information Received," which may imply both were absent. The lack of involvement of women, elders, and leaders could undermine the effectiveness of CLTS, which heavily relies on community buy-in and behaviour change. Community leaders, in particular, were crucial for local mobilization and support. Their exclusion from participation or information sharing may have reduced the intervention's impact. Since youth were the only group actively participating and informed, they might have acted as drivers of behaviour change. However, relying too heavily on one demographic could limit the scope and sustainability of the intervention.

It implications is that social cohesion and inclusivity are key in CLTS success. Marginalization of key groups like women and elders may lead to resistance or partial adoption of improved sanitation behaviours.

Figure 8 presented an in-depth analysis of the effects of CLTS on availability of sanitation facilities in Tafawa Balewa. The highest percentage (24.5%) of respondents are of the view that all the variables (All of the Above) are important in enhancing total sanitation adoption. This reflected an appreciation for the comprehensive improvements brought about by CLTS. Monthly environmental sanitation (22.7%) stands out as the highest individual response, suggesting that CLTS has institutionalized sanitation practices and fostered a sense of routine hygiene responsibility in the community. Improved Health of Residents (11.3%) and reduced waterborne diseases (9.0%) highlight the visible health benefits that the community attributed to improved sanitation access and usage. Increased number of toilets (8.7%) and construction of public toilets (7.7%) are two outcomes that confirmed that CLTS has translated into physical development, although they are seen as part of a larger package of improvements. The near ODF Status (8.2%) metric shows the momentum towards open defecation elimination, even if complete status hasn't yet been achieved.

Figure 9 presents a comprehensive analysis of the nature of Sanitation and Hygiene activities in Tafawa Balewa. The majority (33%) selected "All of the Above", signalling that most respondents recognized sanitation and hygiene as involving a wide range of interconnected activities, from practical cleaning to awareness creation. Mopping, often associated with indoor cleanliness (especially in homes, schools, offices), ranks highest among individual tasks, suggesting a strong emphasis on maintaining indoor hygiene. Sweeping (10.8%) and cutting of grass (9.5%) are common, visible tasks typically associated with outdoor environmental cleanliness, these activities might also reflect community participation during designated sanitation days. Creation of awareness (9.0%) indicates a decent level of appreciation for the educational and behavioural components of sanitation campaigns—an important part of sustainability. Cleaning of Toilets (7.4%) and waste evacuation (8.2%) are slightly less emphasized possibly due to social taboos or stigma around these roles. Limited access to facilities or structured waste collection services.

In Fig. 10, it is indicated that the highest individual facility availability is latrines (20.6%), followed by garbage bins (17.7%) and toilets (13%), facilities essential for basic hygiene such as hand washing basins (9.2%) and public bathing facilities (2.6%) are relatively low, critical infrastructure like sewage treatment (3.2%) and solid waste landfills (4%) are scarce and Encouragingly, 29.8% of the area has all of the above facilities, indicating nearly a third of the region has comprehensive sanitation coverage.

Figure 11 presents the nature of wastes generated in the given area based on the percentages. Over one-third of respondents (36.7%) reported "All of the Above", indicating that multiple types of waste were generated in the same locations. This suggests mixed or unsorted waste, which can complicate waste management and recycling efforts. Sewage (12.9%) and plastic (12.1%) are the most frequently reported specific waste types. This reflects potential issues with sanitation infrastructure and plastic consumption/disposal habits. Human faeces (10%) and food waste (9.2%) indicated both sanitary challenges and a need for better composting or food waste reduction strategies. Paper waste (11.1%) suggests common domestic or institutional waste typical in residential areas. Glass/metal waste (7.9%)

is still relevant, though lower in proportion, but can pose safety and environmental hazards if not properly disposed.

Figure 12 shows the frequency of sanitation and hygiene activities in the area. The frequency of these activities are as follows: hourly (2.6%), daily (22.7%), weekly (19.0%), monthly (10.8%), varied (26.9%) and All of the Above (31.9%) depending on need and nature of the activity. All of the Above" (31.9%) the most frequently reported response is "All of the Above", which suggests that a significant number of participants engage in sanitation and hygiene activities at multiple time intervals. This could reflect a comprehensive approach to hygiene practices. High variability (26.9%) The second highest category is "varied", indicating that many respondents do not follow a fixed schedule. This might suggest flexibility or inconsistency in hygiene behaviour depending on situational factors. Daily practices are substantial (22.7%) and a strong portion of respondents also reported daily hygiene activities, which is a positive indicator of consistent behaviour. Hourly (2.6%), weekly (5%), and monthly (10.8%) are relatively low, which makes sense given that hygiene practices are typically not performed strictly on these rigid schedules alone but as occasion demands.

Table 3: Efficiency of CTLS in Tafawa Balewa LGA

S/N	Variable	No	%
A	Community Empowerment		
1	Very Ineffective	55	14.5
2	Ineffective	111	29.2
3	Somewhat Ineffective	107	28.2
4	Effective	59	15.6
5	Very Effective	47	12.4
B	Behaviour Change		
1	Strongly Disagree	107	28.2
2	Disagree	70	18.5
3	Somewhat Disagree	61	16.1
4	Neutral	43	11.3
5	Somewhat Agree	41	10.8
6	Agree	35	9.2
7	Strongly Agree	22	5.8
C	Participatory Approach		
1	Very Ineffective	48	12.7
2	Ineffective	98	25.2
3	Somewhat Ineffective	77	20.3
4	Effective	97	25.6
5	Very Effective	59	15.6
D	Collective Action		
1	Very Useless	44	11.6
2	Useless	76	20.1
3	Somewhat Useless	106	28.0
4	Useful	133	35.1
5	Very Useful	20	5.3
	Total	397	100

Source: Field Survey 2025

Table 3 presents a structured analysis of the four efficiency categories of CLTS in the area. These include community empowerment, behaviour change, participatory approach, and collective action.

A Community Empowerment

The Likerts scale responses indicated that CLTS is very ineffective according to 14.5%, 29.2% indicated that its merely ineffective, 28.2% stated that CLTS is somewhat ineffective, while those who stated that it is effective constituted 15.6%, and only 12.4% are of the view that it is very effective 12.4%. A majority

(71.9%) found community empowerment ineffective or only somewhat effective. Only 28% of the respondents saw it as effective or very effective tool of enhancing sanitation and hygiene in the area. This indicated that there is a serious gap in perceived impacts, suggesting that empowerment strategies may not have been well-executed or inclusive.

B. Behaviour Change

On behaviour change, majority constituting 28.2% indicated strongly disagree assertion, 18.5% of the respondents merely stated that they disagreed, while 16.1% of the respondents somewhat disagree, 11.3% of the respondents maintained neutral position, 10.8%, and 5.8% respectively maintained a somewhat agree and agree positions. In the positive sides, 9.2% and 5.8% of the respondents stated that they strongly agree and agree respectively. A significant 62.8% of respondents disagreed to some degree that behaviour change was achieved. Only 25.8% showed any agreement, and even that was mostly lukewarm. The presence of a sizable neutral (11.3%) segment may indicate uncertainty or lack of visible outcomes.

C. Participatory Approach

In the area of participation, 12.7% of the respondents stated that the approach is very ineffective, 25.2% said that the method is ineffective, 20.3% viewed the approach to be somewhat ineffective, 25.6% of them maintained that it is effective and only 15.6% are of the view that the approach is very effective. This category is more balanced than the others. Roughly 53.7% rated it as effective or very effective, while 58.2% saw it as ineffective to some degree – the overlap indicates a split perception. Suggests that while participatory methods were introduced, implementation quality varied across groups. Combining the two “Very Helpful” entries (48 + 43), the total becomes 91 (24%). Most respondents (67.6%) rated the triggering event as “Helpful” or “Somewhat Helpful. Only 8.4% found it unhelpful, suggesting the triggering event was largely effective in engaging the community.

D. Collective Action

On collective action, 11.6% of the respondents termed it as very useless, 20.1% said that it is useless, while 28.0% stated that it is somewhat useless, and 35.1% constituting the majority stated that it was useful while only 5.3% said that it is very useful. In the whole, 59.7% rated collective action as useless or somewhat useless, while only 40.4% found it useful. The limited “Very Useful” rating (5.3%) shows that collective mobilization either lacked scale, was inconsistent, or poorly facilitated and this is an indication of weak group cohesion or limited motivation to sustain group-led initiatives.

Table 4: Efficiency of CTLS in Sanitation and Hygiene Management

S/N	Variable	No	%
A. Triggering Event			
1	Very Unhelpful	48	12.7
2	Unhelpful	32	8.4
3	Somewhat Helpful	142	37.5
4	Helpful	114	30.1
5	Very Helpful	43	11.3
B. Sustainable Solutions			
1	Strongly Agree	35	9.2
2	Disagree	76	20.1
3	Somewhat Agree	87	23.0
4	Strongly Agree	116	30.6
5	Strongly Agree	65	17.2
C. Focus on Open Defecation			
1	Strongly Disagree	15	4.0
2	Disagree	55	14.5
3	Somewhat Agree	39	10.3
4	Agree	123	32.5
5	Strongly Agree	147	38.8
	Total	397	100

Source: Field Survey 2023

A Triggering Event,

On triggering event, 12.7% of the respondents said that it's very unhelpful, 8.4% stated that is unhelpful, 37.5% of the respondents constituting the majority said that it is somewhat helpful, while 30.1% said that is helpful, and only 11.3% said that it is very helpful. Combining the two "Very unhelpful" entries (48 + 43), the total becomes. Most respondents (67.6%) rated the triggering event as helpful or somewhat helpful. Only 8.4% found it unhelpful, suggesting the triggering event was largely effective in engaging the community.

B. Sustainable Solutions

Sustainable solutions were seen to be useful by only 9.2% who strongly agreed to its usefulness 9.2% stated that they agreed, 20.1% of them disagreed, Somewhat Agree, 30.6% and 17.2% stated that they agree and strongly agreed respectively. Multiple entries for "Strongly Agree" (35 + 116 + 65) = 216 total (57%) – indicating strong positive sentiment toward sustainability. Disagreement (Disagree = 20.1%) is notable and could point to some skepticism or gaps in perceived long-term benefits. Majority of

responses (80%+) lean toward agreement, suggesting general support for sustainable solutions despite some opposition.

C Focus on Open Defecation

On focus on open defecation, only 4.0% indicated that they strongly agree, 14.5% merely disagree and 10.3% somewhat agreed. On the other hand, 32.5% stated that they agreed, and 38.8% strongly agree. A focus on open defecation as a key issue in sanitation and hygiene sector is the surest way to ensuring the entrenchment of sanitation and hygiene behaviours among households and communities. Disagreement with this focus on the key area is relatively low (14.5%), suggesting the community recognizes open defecation as a problem, The Strongly agree category (38.8%) shows significant motivation for behaviour change around this issue.

DISCUSSION

The findings of this study demonstrate that Community-Led Total Sanitation (CLTS) has contributed to measurable improvements in sanitation access in Tafawa Balewa LGA. The high proportion of respondents using Ventilated Improved Pit (VIP) latrines (20.6%) suggests significant progress in reducing open defecation practices. This aligns with earlier studies that show CLTS interventions often lead to increased latrine ownership and improved sanitation awareness in rural communities (Kar & Chambers, 2008; Venkataramanan et al., 2018). The community's strong recognition of the need to eliminate open defecation also reflects growing alignment with global sanitation goals advanced by the World Health Organization and UNICEF. However, improved access alone does not automatically translate into sustainability. Despite the high rate of latrine ownership, the structural quality of facilities raises serious concerns. A majority of toilets were unplastered or constructed with mud, making them vulnerable to collapse, particularly during the rainy season. This finding corroborates evidence from rural sanitation programs in Sub-Saharan Africa, where low-cost but poorly constructed latrines often fail within a few years (World Bank, 2020). Such structural weaknesses threaten long-term Open Defecation Free (ODF) status, as households unable to rebuild may revert to previous practices. The 30.9% of households reporting inability to finance reconstruction highlights the economic vulnerability that undermines sanitation sustainability.

The study also revealed limited adoption of fecal sludge management practices, with only 21.8% engaging in proactive management. While awareness of sanitation benefits is relatively high, waste treatment and safe reuse remain underdeveloped. This gap reflects a broader pattern in rural sanitation initiatives where emphasis is placed on toilet construction rather than full sanitation service chains, including containment, emptying, treatment, and reuse (UNICEF, 2022, Okullo et al. 2017). The suspicion surrounding fecal-based charcoal production further illustrates the need for sustained environmental health education and culturally sensitive awareness campaigns. Community empowerment and collective action core pillars of CLTS were perceived as weak by a majority of respondents. Over 70% rated community empowerment as ineffective to some degree, while nearly 60% considered collective action weak. This finding contradicts the foundational philosophy of CLTS, originally developed by Kamal

Kar, which emphasizes social mobilization, shared shame, and collective responsibility as drivers of behaviour change. The limited participation of women, elders, and community leaders observed in the study may have reduced ownership and weakened long-term commitment to sanitation goals. Interestingly, triggering events were largely rated as helpful, suggesting that the initial mobilization phase of CLTS was relatively successful. However, the persistence of weak behavioural change indicators implies that post-triggering follow-up and monitoring were insufficient. Evidence suggests that sustained engagement, regular monitoring, and community-led enforcement mechanisms are critical for preventing slippage after ODF declaration (Venkataramanan et al., 2018, Khan et al. 2019). The perception of inadequate monitoring among stakeholders in Tafawa Balewa supports this argument and indicates a need to strengthen institutional oversight. Overall, the discussion reveals a mixed performance of CLTS in Tafawa Balewa: strong initial gains in sanitation access and awareness, but significant sustainability challenges related to infrastructure durability, financial capacity, inclusive participation, and sludge management. While progress toward ODF status is evident, the long-term viability of sanitation improvements depends on integrating behavioural change strategies with structural support, financing mechanisms, and inclusive governance. Without these complementary measures, sanitation gains may remain fragile and susceptible to reversal.

CONCLUSION

This study evaluated the effectiveness and sustainability of Community-Led Total Sanitation (CLTS) interventions in Tafawa Balewa Local Government Area of Bauchi State, Nigeria. Using a cross-sectional survey of 397 households, the research assessed sanitation infrastructure, behavioural change, community participation, and institutional enforcement mechanisms. The findings indicate that CLTS has contributed to improved sanitation access, with 74.5% of households using Ventilated Improved Pit (VIP) latrines and strong recognition of the need to eliminate open defecation. Awareness of sanitation benefits, hygiene promotion, and environmental cleanliness was generally high, aligning with national WASH targets and global sanitation frameworks promoted by the World Health Organization and UNICEF. However, the sustainability of these gains remains uncertain. A significant proportion of sanitation facilities are structurally weak, with many unplastered or mud-built, making them prone to collapse. Financial constraints limit households' ability to rebuild damaged toilets, while fecal sludge management practices remain inadequate. Moreover, perceptions of weak community empowerment, limited collective action, and insufficient post-triggering monitoring suggest that behavioral transformation has not been fully institutionalized. Although triggering events were largely viewed as effective, the broader participatory framework central to CLTS appears unevenly implemented, particularly among women, elders, and traditional leaders whose involvement is critical for long-term adoption. In conclusion, while CLTS has made measurable progress in improving sanitation coverage and awareness in Tafawa Balewa, its long-term viability depends on strengthening infrastructure quality, inclusive participation, sanitation financing mechanisms, and sustained monitoring systems. Moving beyond initial open defecation reduction toward durable sanitation systems will require integrated technical, social, and institutional support. Without addressing these sustainability gaps, the

achievement of lasting Open Defecation Free (ODF) status and alignment with Sustainable Development Goal 6 may remain fragile.

RECOMMENDATIONS

To address the structural and sustainability gaps identified in this study, policy-driven interventions are necessary at state and local government levels. First, Bauchi State Government should strengthen sanitation regulations and enforce minimum construction standards for rural latrines to ensure durability and safety. Technical guidelines for plastering, lining, and improved pit design should be institutionalized through the State Rural Water Supply and Sanitation Agency (RUWASSA). Second, structured post-ODF monitoring frameworks should be mandated, with periodic verification and compliance audits to prevent slippage. Third, sanitation financing mechanisms including targeted subsidies for the poorest households and sanitation microcredit schemes should be incorporated into local government budgets. These measures align with the study's findings on weak facility durability, financial constraints (30.9% unable to rebuild), and inadequate monitoring systems, and are consistent with the sanitation improvement roadmap promoted by the Federal Ministry of Water Resources. Beyond formal policy actions, non-policy community-driven strategies are equally critical for sustaining CLTS gains. Community sanitation committees should be restructured to ensure inclusive participation of women, elders, youth, and traditional leaders, addressing the participation gaps identified in the findings. Regular community dialogue sessions and hygiene education campaigns should emphasize fecal sludge management, safe reuse practices, and long-term maintenance of facilities. Strengthening social cohesion and collective responsibility can revive the participatory spirit central to CLTS and improve community empowerment outcomes, which were rated largely ineffective in the survey. Furthermore, partnerships with civil society organizations, faith-based institutions, and local artisans should be promoted to enhance sanitation awareness and technical support without relying solely on government directives. Training local masons in improved and low-cost resilient toilet construction can improve quality while maintaining affordability. Community savings groups and cooperative models can support vulnerable households in rebuilding damaged facilities. By combining regulatory reinforcement with grassroots mobilization and behavioural reinforcement, Tafawa Balewa LGA can transition from short-term open defecation reduction toward sustainable sanitation management and long-term alignment with Sustainable Development Goal 6 targets.

Declarations

Disclosure statement: The authors report there are no competing interests to declare.

Internal Review Board (IRB) in the Ethics Approval declaration

Ethical approval

for this study was waived by the Health Department, Tafawa Balewa Local Government Area (Ethics Committee/Institutional Review Board), chaired by Dr. Wambai Woktong, in accordance with institutional and research guidelines. The waiver was granted because the study utilized fully anonymized, publicly available data and did not involve human participants, personal identifiers, or direct interaction with individuals. Therefore, formal ethical approval and informed consent were not applicable for this research.

Consent to Publish:

Not Applicable

Human Ethics and Consent to Participate declarations

Not Applicable

Clinical Trial Number

Not Applicable

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Author Contribution

Author Contributions: Andesikuteb Yakubu Ali was responsible for the conception, Innocent Isaac Iko handled the design of the study, data collection was undertaken by Nenpomigyi Christopher Beka. Tony Aku Amba, Ezra Lekwot Vivan and Andesikuteb Yakubu Ali undertook the analysis of data, interpretation of findings was carried out by Andesikuteb Yakubu Ali, Ezra Yunana Para and Nenpomigyi Christopher Beka, and the final drafting and revision of the manuscript was done by Ezra Lekwot Vivan and Tony Aku Amba. All work presented in this publication was completed independently by the authors.

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Data Availability

Data for this study would be made available on request from the authors.

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Figures

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Figure 1

Source: NCRS, Jos 2025

Map of Tafawa Balewa, Bauchi State, Nigeria

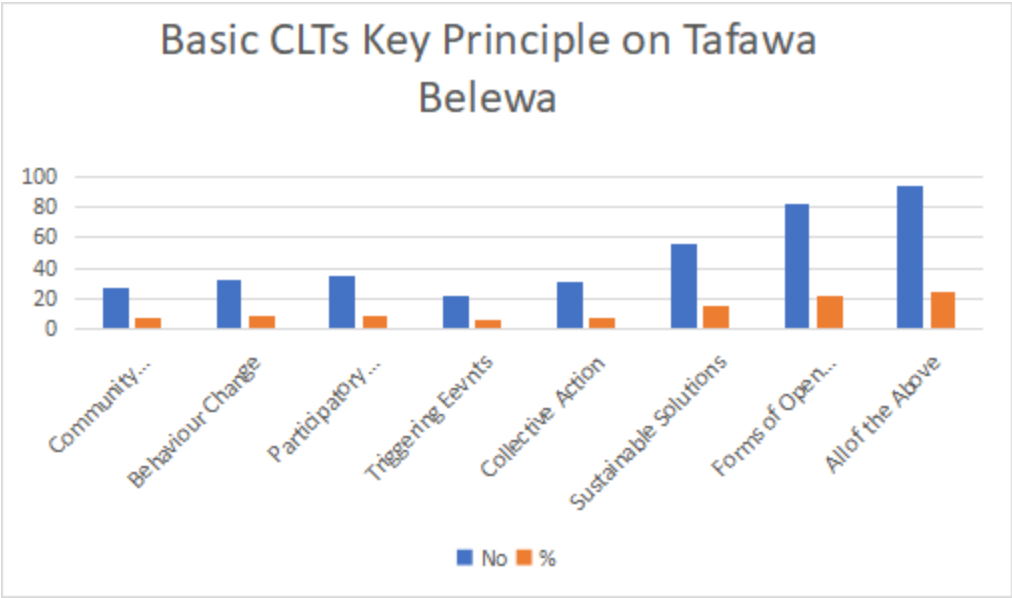


Figure 2

Basic CLTs Key Principles in Tafawa Belewa

Source: Field Survey, 2025

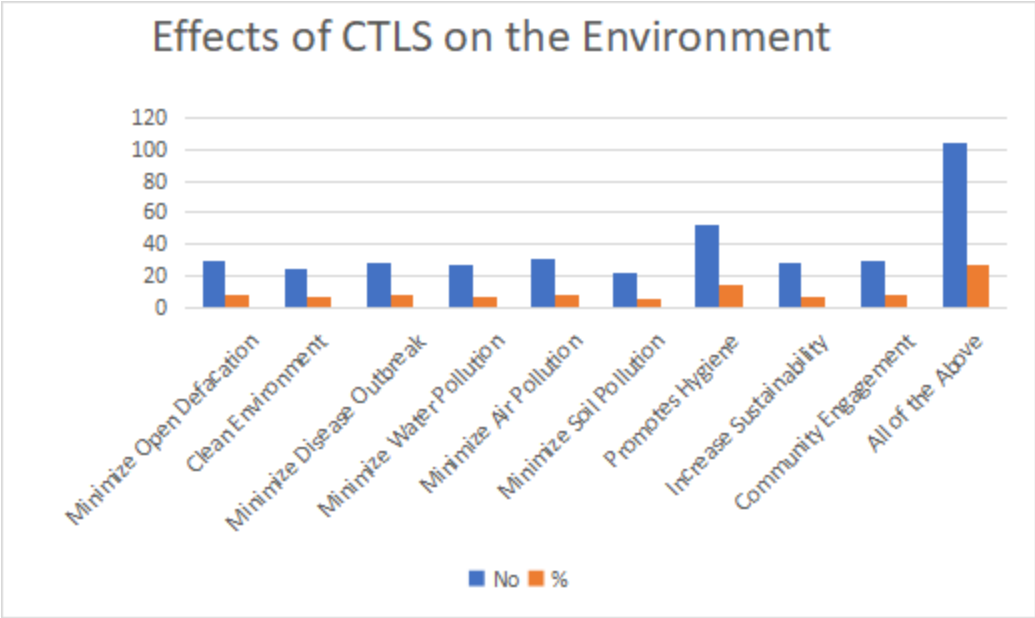


Figure 3

Effects of CTLS on the Environment

Source: Field Survey 2025

Mode of Operation of CTLS in Tafawa Belewa

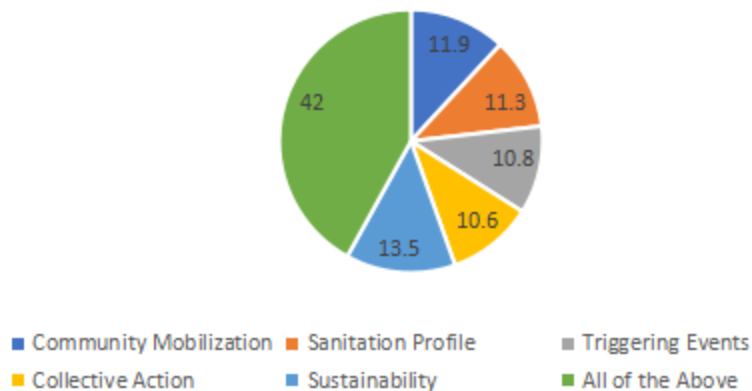


Figure 4

Mode of Operation of CTLS in Tafawa Belewa

Source: Field Survey 2025

Benefit of | Community Led Total Sanitation in Tafawa Balewa

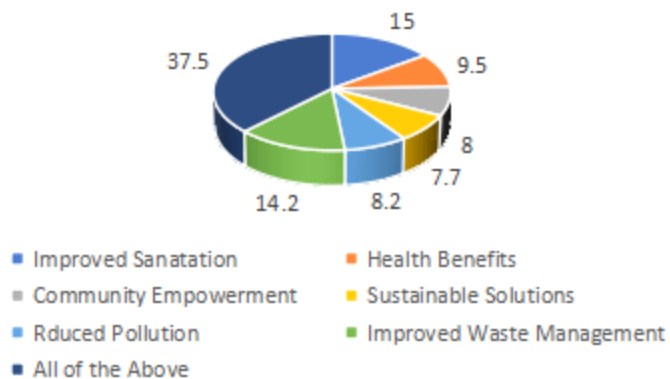


Figure 5

Benefits of Community Led Total Sanitation in Tafawa Balewa

Source: Field Survey 2025

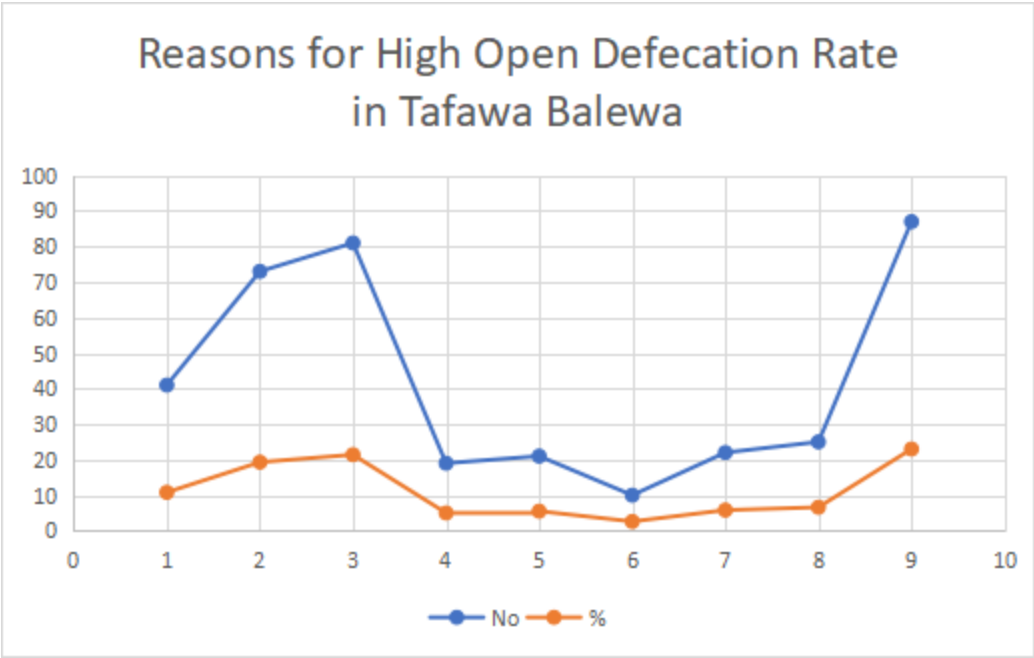


Figure 6

Reasons for High Open Defecation Rate in Tafawa Balewa

Source: Field Survey 2025.

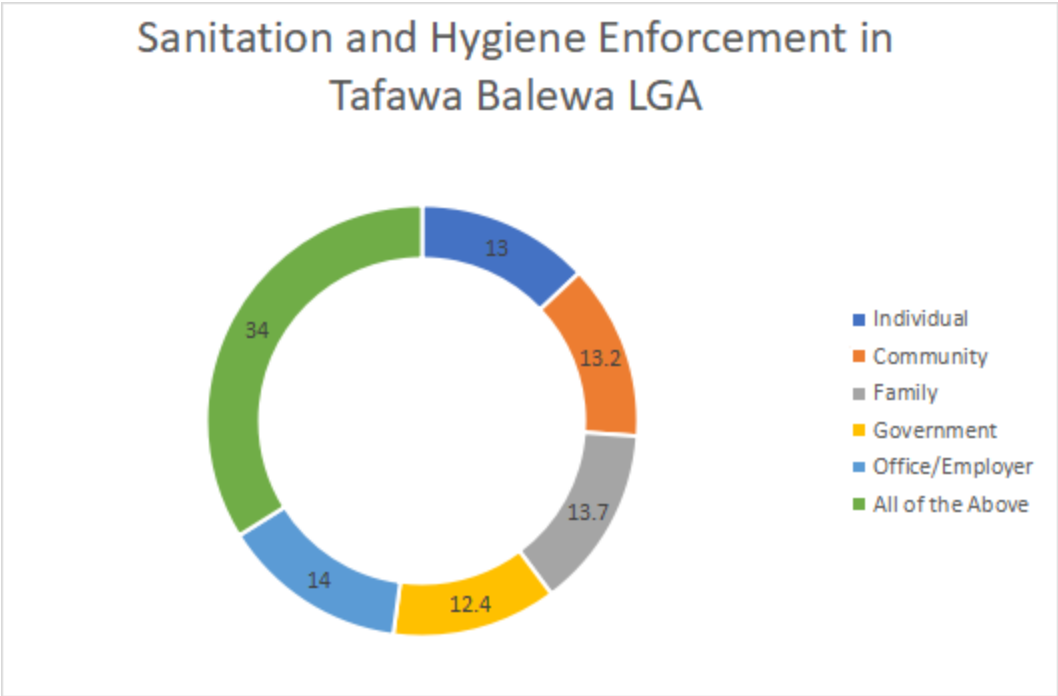


Figure 7

Sanitation and Hygiene Enforcement in Tafawa Balewa LGA

Source: Field Survey 2025

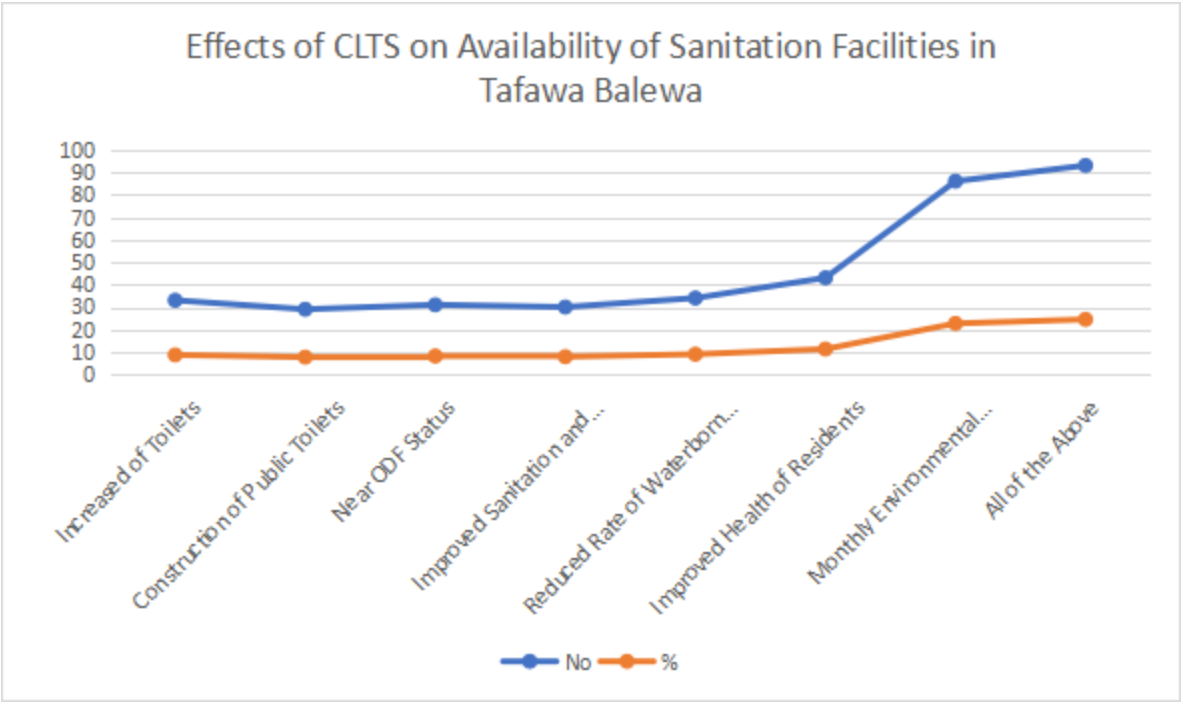


Figure 8

Effects of CLTS on Availability of Sanitation Facilities in Tafawa Balewa

Source: Field Survey 2025

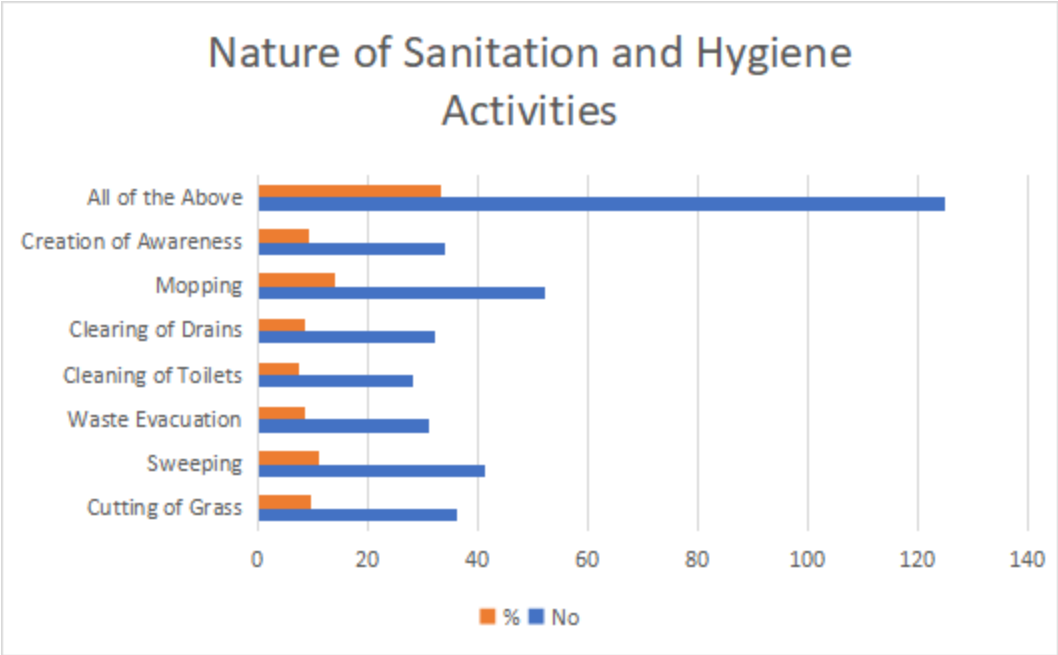


Figure 9

Nature of Sanitation and Hygiene Activities

Source: Field Survey 2025

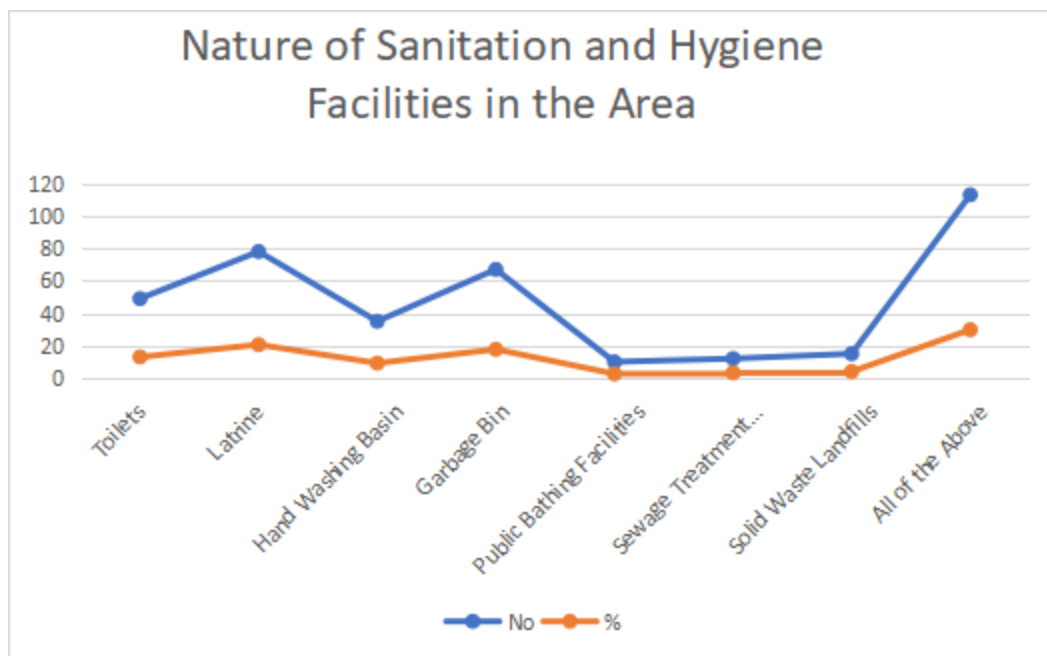


Figure 10

Nature of Sanitation and Hygiene Facilities in the Area

Source: Field Survey 2025

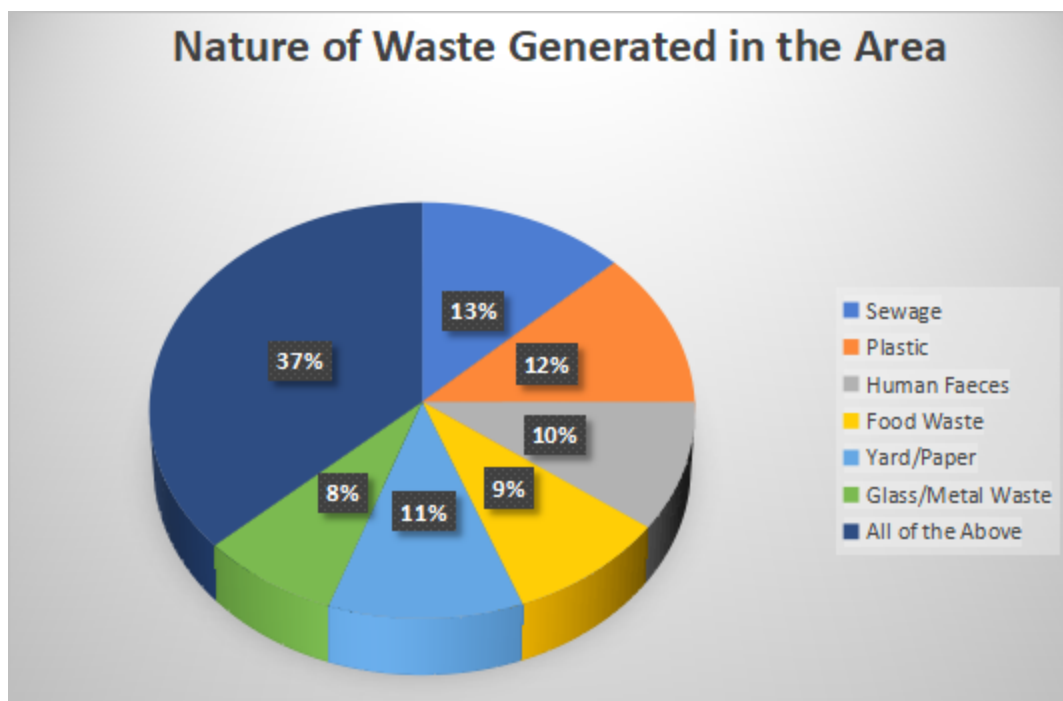


Figure 11

Nature of Waste Generated in the Area

Source: Field Survey 2025

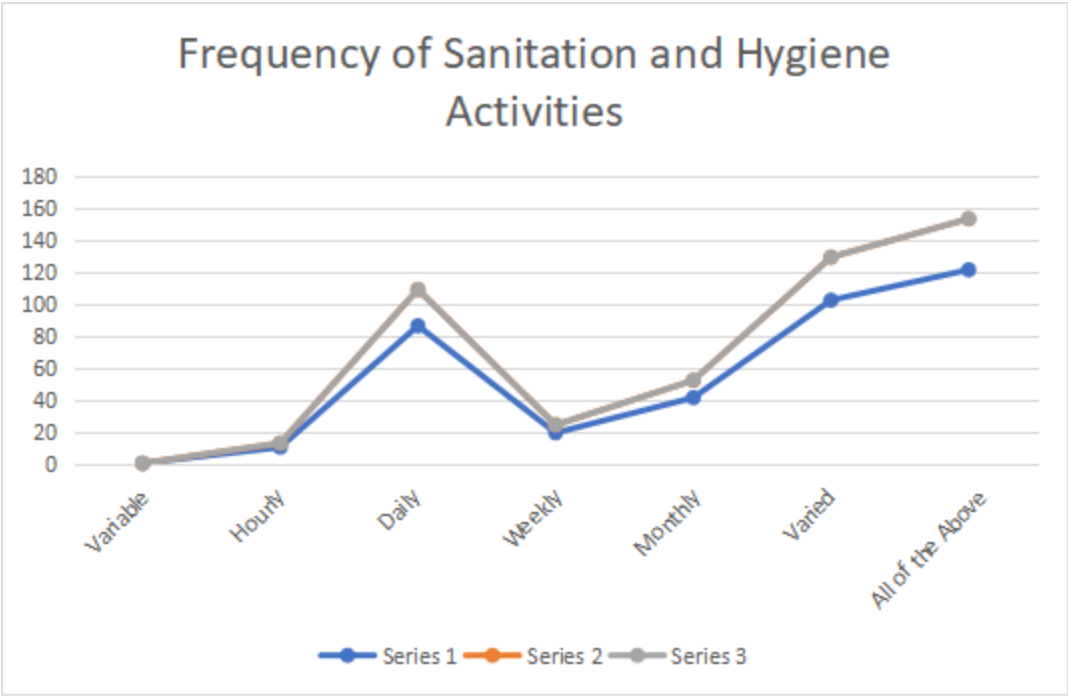


Figure 12

Frequency of Sanitation and Hygiene Activities

Source: Field Survey 2025

Supplementary Files

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