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IMPACT OF COMMUNITY-LED TOTAL SANITATION ON THE SUSTAINABILITY OF OPEN DEFECATION-FREE COMMUNITIES AND SANITATION INFRASTRUCTURE IN ONA ARA LOCAL GOVERNMENT AREA, OYO STATE

***Sakariyau Ahmed Olanrewaju, Oladejo Kabiru Adeola, [2]Sawyerr Henry Olawale, and [1]Adebayo Grace Kehinde**

Department of Environmental Health Science, Faculty of Allied Health Sciences, Kwara State University, Malete, Nigeria

*Corresponding authors' email: olanrewajuahmed30@gmail.com

ABSTRACT

Open defecation remains a major public health and environmental challenge in Nigeria, affecting millions of people across rural and urban communities. The problem is largely driven by inadequate sanitation infrastructure, poverty, and entrenched cultural practices. This study assessed the post-implementation impact of Community-Led Total Sanitation (CLTS) in Ona Ara Local Government Area, Ibadan, Oyo State, Nigeria, focusing on the sustainability of Open Defecation-Free (ODF) status and the development of sanitation infrastructure. A cross-sectional survey involving 150 respondents was conducted using structured questionnaires to gather data on sanitation practices and latrine ownership. The findings revealed that 96.0% of respondents no longer practice open defecation, and 74.7% of communities have maintained their ODF status. Latrine ownership was notably high at 98.0%, reflecting substantial improvement in sanitation infrastructure. However, 75.3% of respondents reported challenges in sustaining ODF status, attributed mainly to lack of awareness (30%), poor maintenance (25%), and cultural resistance (24.7%). The study concludes that CLTS has significantly improved sanitation outcomes in Ona Ara LGA by promoting latrine construction and reducing open defecation. Nevertheless, sustaining ODF status requires continued community sensitization, improved facility maintenance, and supportive policy implementation.

Keywords: Community-Led Total Sanitation (CLTS), Open Defecation, Open Defecation-Free (ODF), Sanitation, Sanitation infrastructure

INTRODUCTION

Rapid population growth and urbanization have exerted immense pressure on health and sanitation infrastructure globally, particularly in developing countries where governments struggle to meet rising demands (Tukahirwa *et al*., 2010). This challenge is more severe in sub-Saharan Africa, where limited resources and weak governance hinder progress toward adequate sanitation (UNICEF & WHO, 2021). Sanitation, as defined by UNICEF (2020) and WaterAid (2011), involves the safe management of human excreta from collection to disposal or treatment, while effective sanitation extends beyond infrastructure to include policies, community participation, and behavioral change (O'Reilly & Louis, 2014).

Poor sanitation has serious implications for public health, economic productivity, and environmental sustainability. It contributes to childhood stunting (Odagiri *et al*., 2020), poor mental well-being (Sclar et al., 2018), impaired growth (Headey & Palloni, 2019), and financial losses due to healthcare costs and reduced productivity (Sanitation & Water for All, 2020). Globally, about 3.6 billion people—46% of the world's population—lack access to safely managed sanitation services, and approximately 494 million still practice open defecation, mainly in sub-Saharan Africa and South Asia (UNICEF & WHO, 2021). Open defecation, the disposal of human waste in open spaces such as fields and water bodies (WHO/UNICEF, 2013), contributes to widespread diarrhoeal, cholera, typhoid, and schistosomiasis infections (Prüss-Üstün *et al*., 2008). The World Health Organization (2023) attributes about 829,000 annual deaths from diarrhoeal diseases and over 251 million schistosomiasis cases to poor sanitation practices.

To address this, the Community-Led Total Sanitation (CLTS) approach, pioneered in Bangladesh by Kamal Kar in 2000, emerged as a transformative community-driven strategy (Kar & Chambers, 2008). Unlike traditional subsidy-based sanitation programs, CLTS promotes collective behavioral change, empowering communities to end open defecation without external financial support (Harter *et al*., 2020). Through participatory methods such as "triggering" and "transect walks," the approach motivates households to construct and maintain latrines, fostering ownership and long-term sustainability (Crocker *et al*., 2016; Woyessa *et al*., 2022).

In Nigeria, open defecation remains a major challenge, with about 50 million people still practicing it, making the country the global leader since 2019 (Federal Ministry of Water Resources, 2019). The persistence of this problem is driven by poverty, cultural attitudes, and poor sanitation infrastructure (Ekong, 2015). To curb the trend, Nigeria adopted CLTS as a key rural sanitation strategy following pilot programs between 2004 and 2007, implemented by UNICEF, WaterAid, and the National Task Group on Sanitation (NTGS) (UNICEF, 2007). The program was later integrated into national sanitation policy and aligned with Sustainable Development Goal (SDG) 6.2, which seeks universal access to adequate and equitable sanitation by 2030 (United Nations, 2015). In 2019, the government launched the "Nigeria Open Defecation Free by 2025" roadmap to strengthen this commitment (Federal Ministry of Water Resources, 2019).

CLTS implementation in Nigeria involves multiple stakeholders, including the National Water Resources Institute, State Rural Water Supply and Sanitation Agencies (RUWASSA), Local Government WASH Units, and WASH Committees (UNICEF, 2007). Despite these collaborative efforts, evidence shows mixed outcomes. Studies in Ghana and Ethiopia found that gains achieved through CLTS were sometimes reversed after implementation, revealing challenges in sustaining ODF status (Crocker *et al*., 2017; USAID, 2018; Harter et al., 2020; Venkataramanan *et al*., 2018).

In Oyo State, particularly in Ona Ara Local Government Area (LGA), persistent open defecation, rapid population growth, and inadequate sanitation infrastructure pose ongoing challenges. With an estimated population of 265,000 (National Population Commission, 2006), Ona Ara has been a focus of CLTS interventions led by local WASH units and community facilitators. However, limited data exist on the sustainability of ODF achievements and the impact on sanitation infrastructure development. Evaluating the post-implementation impact of CLTS in Ona Ara is therefore essential to determine the extent to which the program has maintained open defecation-free status and improved sanitation infrastructure, providing insights to guide future sanitation policies and strengthen national efforts toward achieving SDG 6.2.

Statement of the Problem

Access to adequate sanitation remains a critical challenge in many developing countries, particularly in sub-Saharan Africa, where open defecation continues to undermine public health and environmental quality. In Nigeria, the situation is alarming, as the country ranks highest globally in open defecation prevalence, with approximately 50 million people still practicing it. This widespread challenge persists despite various interventions and national commitments to eliminate open defecation through the Community-Led Total Sanitation (CLTS) approach.

The CLTS strategy has been instrumental in promoting behavioral change and community participation toward achieving Open Defecation-Free (ODF) communities. However, evidence from various regions of Africa, including Nigeria, suggests that many communities relapse into open defecation after initial success. Weak post-implementation monitoring, poor maintenance of sanitation facilities, inadequate community ownership, and limited government support often hinder the sustainability of ODF outcomes. Similarly, while CLTS has encouraged latrine construction, the durability and proper maintenance of these sanitation infrastructures remain uncertain, raising questions about their long-term effectiveness.

In Oyo State, particularly in Ona Ara Local Government Area, CLTS interventions were implemented to eliminate open defecation and promote hygiene behavior change. Yet, there is limited empirical evidence assessing whether these efforts have been sustained over time or translated into lasting improvements in sanitation infrastructure. Without a systematic evaluation of CLTS outcomes in this area, it is difficult to determine the program's effectiveness, identify barriers to sustainability, and design evidence-based strategies for improvement. Therefore, this study seeks to assess the post-implementation impact of CLTS in Ona Ara LGA, focusing on the sustainability of ODF status and the development and maintenance of sanitation infrastructure.

Justification for the Study

Sanitation is a fundamental determinant of public health, and its improvement is central to achieving sustainable development and disease prevention. Despite the implementation of the Community-Led Total Sanitation (CLTS) approach in many parts of Nigeria, including Ona Ara Local Government Area, evidence on the long-term sustainability of Open Defecation-Free (ODF) status and the maintenance of sanitation infrastructure remains limited. Many communities that initially attained ODF certification often experience a resurgence of open defecation, suggesting gaps in post-implementation monitoring, behavioral reinforcement, and infrastructure upkeep.

Assessing the post-implementation impact of CLTS in Ona Ara LGA is therefore essential for determining the extent to which the program's goals have been sustained. This evaluation will provide insight into the factors influencing community compliance, infrastructure durability, and the effectiveness of local monitoring mechanisms. The findings will help policymakers, health planners, and implementing agencies identify strengths and weaknesses in current sanitation interventions, improve future program designs, and develop targeted strategies for sustaining ODF achievements. Moreover, this study will contribute to achieving Sustainable Development Goal (SDG) 6.2, which emphasizes access to adequate and equitable sanitation and hygiene for all by 2030. It will also provide an evidence base for strengthening community-led initiatives and government partnerships toward eliminating open defecation across Nigeria. By focusing on Ona Ara LGA, the study offers localized insights that can inform scalable sanitation policies in other parts of Oyo State and beyond.

Aim and Objectives of the Study

Aim

The aim of this study is to assess the Impact of Community-Led Total Sanitation on the Sustainability of Open Defecation-Free Communities and Sanitation Infrastructure in Ona Ara Local Government Area, Oyo State

Objectives

i. To determine the extent to which CLTS has sustained open defecation-free (ODF) status in rural communities of Ona Ara LGA.
ii. To assess the impact of CLTS on the development and maintenance of sanitation infrastructure.

Research Hypotheses

Based on the study's objectives and preliminary data analysis, the following null hypotheses (HO) and alternative hypotheses (H1) are proposed to test the associations between key variables related to CLTS implementation in Ona Ara LGA:

Null Hypotheses

H_0: CLTS has not significantly sustained open defecation-free (ODF) status in rural communities of Ona Ara LGA.

H_0: CLTS implementation has no significant impact on the development and maintenance of sanitation infrastructure in Ona Ara LGA.

Alternative Hypotheses

H_1: CLTS has significantly sustained open defecation-free (ODF) status in rural communities of Ona Ara LGA.

H_1: CLTS implementation has a significant impact on the development and maintenance of sanitation infrastructure in Ona Ara LGA.

MATERIALS AND METHODS

Study Area Description

The study was conducted in Ona Ara LGA, one of 33 LGAs in Oyo State, Nigeria, established in 1989. Located in the south-western part of Ibadan, Ona Ara lies between latitude 7.1°N and 7.3°N and longitude 3.9°E and 4.1°E, covering a land area of approximately 290 km² (Oyo State Government, 2020). According to the 2006 National Population Census, Ona Ara had a population of 265,059, projected to 347,752 by 2025 using a 2.7% annual growth rate (National Population Commission, 2023). The LGA's postal code is 200, and its headquarters are in Akanran.

Ona Ara comprises 11 geo-political wards: Akanran, Araromi, Aperin, Agugu, Badeku, Gbada Efon, Gbedun, Odi Odeyale, Odi Aperin, Ogbere, and Ogbere Tioya (Oyo State Government, 2020). The population is ethnically diverse, including Yoruba (predominant), Igbo, Hausa, and other minority groups, reflecting varied socio-cultural practices that influence sanitation behaviors (Ekong, 2015). The primary occupations are agriculture (e.g., cocoa, kolanut, cashew), trading, and petty businesses, with markets like Akanran and Odi Aperin facilitating commerce. Other economic activities include wood carving, weaving, and textile dyeing, though limited sanitation infrastructure hinders development (Agha *et al*., 2024).

Ona Ara's tropical climate features a wet season (April–October) with 1,300–1,600 mm annual rainfall and a dry season (November–March) with low humidity (25–35%) (Oyo State Ministry of Environment, 2021). The Guinea Savannah vegetation, with tall grasses and scattered trees, supports agriculture but is degraded by open defecation (OD), which contaminates water sources used for domestic and farming purposes (Umar, 2012). Geologically, Ona Ara is characterized by Precambrian basement complex rocks, with sandy and rocky soils that pose challenges for latrine construction due to erosion and instability (Agunwamba, 1998). The Oyo State Rural Water Supply and Sanitation Agency (RUWASSA) oversees sanitation, but inadequate infrastructure and OD practices persist (Federal Ministry of Water Resources, 2019). Ona Ara was selected due to its active CLTS programs, high OD prevalence, and rural/peri-urban context, making it ideal for evaluating CLTS's impact.

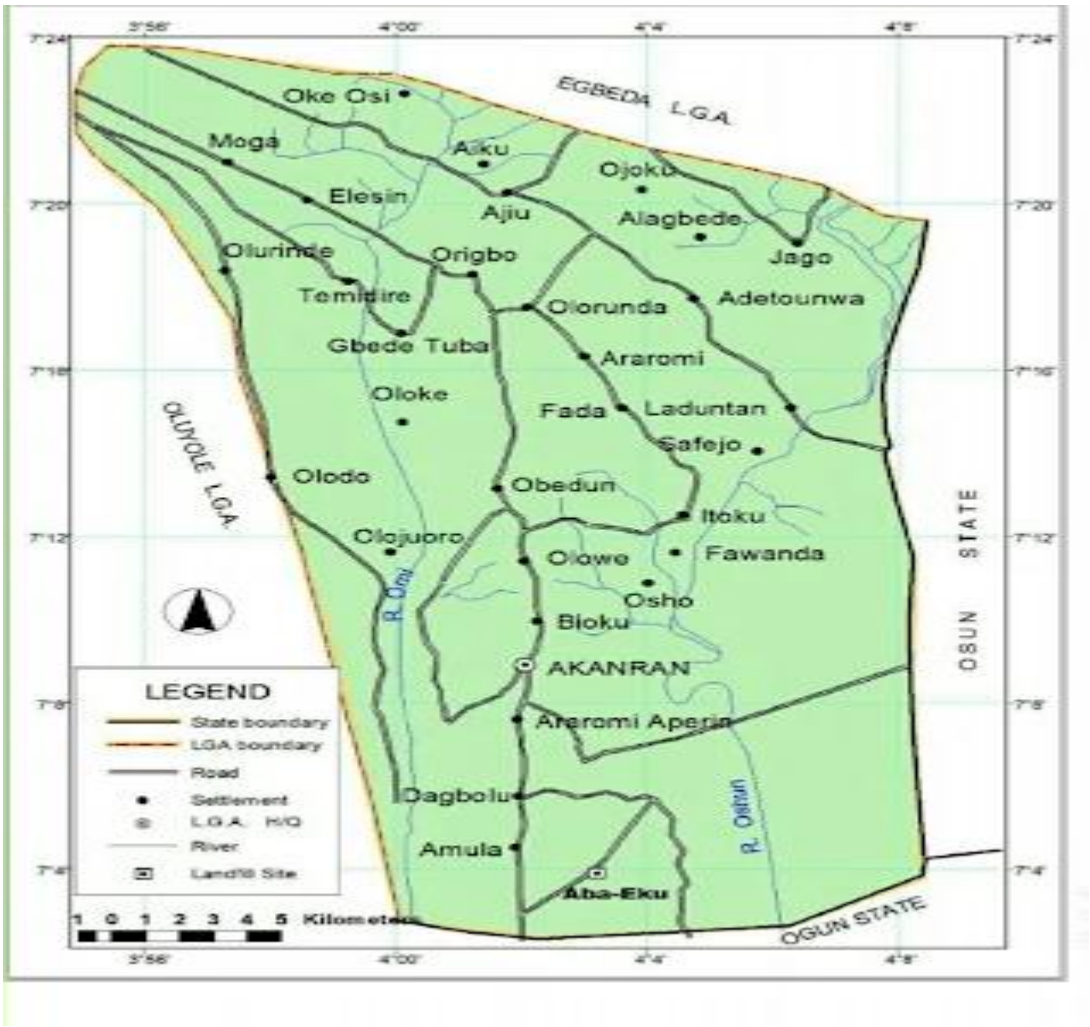

Figure 1: Map Showing Ona Ara Local Government Area, Oyo State, Nigeria

Research Design

The study adopted a quantitative cross-sectional descriptive survey design to assess the post-implementation impact of Community-Led Total Sanitation (CLTS) in Ona Ara Local Government Area. This design was chosen to collect data at a single point in time from households across selected communities, enabling an objective evaluation of the sustainability of Open Defecation-Free (ODF) status and the impact of CLTS on sanitation infrastructure development and maintenance. The cross-sectional approach provides a clear snapshot of current sanitation conditions and community practices, allowing for statistical analysis of the extent of ODF attainment and infrastructure functionality (Omair, 2015).

The quantitative method was adopted to generate measurable and comparable data, ensuring an unbiased assessment of the study objectives and supporting generalization of findings across the target population (Creswell & Poth, 2016). The descriptive survey design is particularly appropriate for identifying patterns, behavioral trends, and challenges affecting the sustainability of ODF status and the upkeep of sanitation facilities in rural and peri-urban communities. This approach provides evidence-based insights that can inform stakeholders and policymakers in strengthening sanitation

programs within Nigeria's CLTS framework (Abubakar, 2018).

Study Population

The study population comprised adult residents (aged 18 and above) in the Akanran and Araromi wards of Ona Ara LGA, where CLTS programs have been implemented. Adults were targeted as primary decision-makers for household sanitation practices, capable of providing reliable data on OD, latrine ownership, and CLTS participation (Casteel & Bridier, 2021). The projected 2025 population of Ona Ara LGA is 347,752, with approximately 60% (208,651) being adults (National Population Commission, 2023). The study focused on Akanran (10,678 adults, 3,231 households) and Araromi (7,974 adults, 2,118 households), totaling 18,652 adults and 5,349 households (Oyo State Government, 2020). The population includes household heads, spouses, community leaders (e.g., ward heads, traditional rulers), and CLTS committee members, ensuring diverse perspectives on sanitation practices (Inah *et al*., 2023).

Table 1: Inclusion and Exclusion Criteria

Category	Criteria	Rationale/Purpose
Inclusion Criteria	Adults aged 18 years and above residing in Akanran and Araromi wards.	Adults are primary decision-makers for household sanitation, providing reliable data on OD and CLTS outcomes (Casteel & Bridier, 2021).
	Households or individuals without access to toilet facilities or practicing OD.	These households are the primary targets of CLTS, ensuring relevance to the study's objectives on ODF status and barriers.
	Community members willing to participate and provide informed consent.	Voluntary participation with informed consent ensures ethical compliance and reliable data (Saito, 2013).
Exclusion Criteria	Individuals under 18 years.	Minors are less likely to make household sanitation decisions, reducing relevance to the study's focus (Gravetter & Wallnau, 1969).
	Households with functional, improved toilet facilities (e.g., flush toilets).	These households are less likely to practice OD, limiting their relevance to assessing CLTS's impact (Gravetter & Wallnau, 1969).
	Non-residents or temporary visitors to Akanran and Araromi wards.	Excluding non-residents ensures focus on the local population affected by Ona Ara's sanitation conditions and CLTS programs.
	Individuals unwilling to provide informed consent or unable to participate due to health or language barriers.	Ensures ethical compliance and data quality by excluding those Unable to provide reliable responses (Saito, 2013).

Sample Size Determination

The sample size was calculated using the Taro Yamane formula for a finite population, given the combined adult population of Akanran and Araromi wards (18,652). The formula ensures a representative sample for quantitative analysis in descriptive surveys, balancing precision and feasibility (Omair, 2015).

$n = \frac{N}{1+N\,(e)^2}$ (Taro Yamane, 1967)

Where:

i. n = sample size
ii. N = Population size (188,713)
iii. e = Margin of error (0.005, corresponding to a 95%)
iv. 1 = Constant

Therefore,

$$n = \frac{188{,}713}{1 + 188{,}713\,(0.05)^2}$$

$$n = \frac{188{,}713}{1 + 188713\,(0.0025)}$$

$$n = \frac{188{,}713}{1 + 471.7825}$$

$$n = \frac{188{,}713}{472.7825}$$

$$n \approx 150.19$$

To compensate 10 % for non-response (attrition rate) (i.e 150×0.1 =15), the total sample size for the study was rounded up to 103 (i.e 150+15)

Sample size was **165.**

Sampling Technique

A multi-stage sampling technique was employed to select 165 respondents, ensuring representativeness and minimizing bias.

Stage 1: Purposive Sampling

Akanran and Araromi wards were purposively selected due to their active Community-Led Total Sanitation (CLTS) programs and high prevalence of open defecation, aligning with the study's focus on CLTS impact (Agha et al., 2024).

Stage 2*:* Proportional Stratified Sampling

The two wards were treated as strata. The total sample of 165 respondents was allocated proportionally based on the number of households: Akanran (3,231 households; 60.4%) received 100 respondents, while Araromi (2,118 households; 39.6%) received 65 respondents.

Stage 3: Systematic Random Sampling

Within each ward, households were selected systematically using community household lists obtained from ward heads. Every 32nd household in Akanran (3,231 ÷ 100 ≈ 32) and every 33rd household in Araromi (2,118 ÷ 65 ≈ 33) was chosen after a random starting point was determined (Bhardwaj, 2019).

Stage 4: Random Selection of Respondents

From each selected household, one adult (male or female) was randomly chosen, alternating genders to ensure balance. Additionally, 5–6 community leaders (approximately 2–3 per ward) were purposively included to capture governance perspectives on CLTS implementation and sustainability.

Research Instruments

The primary research instrument was a researcher-designed structured questionnaire titled "Post-Evaluation Impact of Community-Led Total Sanitation (CLTS) in Ona Ara Local Government, Ibadan." Developed based on literature (e.g., Kouassi *et al*., 2023; Okolimong *et al*., 2020) and consultations with the research supervisor, the questionnaire consisted of closed-ended questions using multiple-choice, yes/no, and 4-point Likert scale formats (e.g., Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1). The questionnaire was divided into three sections, aligned with the study's objectives:

***Section 1*:** Demographic Information: Age, gender, household role, household size, occupation, and duration of residence.

Section 2: Open Defecation-Free (ODF) Status: Awareness, practice, and maintenance of ODF status, including barriers and enablers.

Section 3: Sanitation Infrastructure Development: Latrine ownership, type, maintenance, and condition.

Method of Data Collection

Primary data were collected using the structured questionnaire, administered to 165 respondents. No research assistants were employed due to the study's simplicity and manageable sample size. Questionnaires were distributed to households in Akanran (100 respondents) and Araromi (65 respondents) over a four-week period. Explanations were provided in Yoruba and English to ensure comprehension, particularly for respondents with low literacy. Completed questionnaires were collected immediately to achieve a high response rate and minimize data loss. The observation checklist was used during household visits to verify latrine presence, type, and condition, ensuring data triangulation (Sawyerr & Adepoju, 2019).Secondary data were gathered from textbooks, peer-reviewed journals, and government reports (e.g., Federal Ministry of Water Resources, 2019) to contextualize CLTS implementation and sanitation challenges in Ona Ara LGA.

Data Analysis

Data obtained from the 150 retrieved questionnaires were cleaned, coded, and analyzed using the Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics such as frequencies, percentages, and means were employed to summarize respondents' socio-demographic characteristics, ODF status, and the condition of sanitation infrastructure in the study area.

For the first objective, frequencies and percentages were used to determine the extent to which communities had sustained Open Defecation-Free (ODF) status after CLTS implementation. For the second objective, descriptive and inferential analyses examined the impact of CLTS on the development and maintenance of sanitation infrastructure, including household latrine ownership and functionality.

Chi-square tests were conducted to determine associations between CLTS-related factors (e.g., awareness, community participation) and ODF sustainability, while logistic regression analysis identified predictors influencing the maintenance and continued use of sanitation facilities. All statistical tests were conducted at a 95% confidence level ($p < 0.05$). Results were presented using tables, charts, and concise narratives to enhance clarity and interpretation.

Ethical Considerations

The study adhered to ethical standards for human-subject research, guided by the Declaration of Helsinki. Ethical approval was obtained from the Kwara State University (KWASU) Ethics Review Committee. A formal letter was submitted to the Baale of Akanran, Araromi ward heads, and CLTS committees, securing authorization to conduct the study. Participants received clear explanations of the study's purpose, procedures, risks (e.g., privacy concerns), and benefits (e.g., informing sanitation policies). Written or verbal informed consent was obtained, with the option to withdraw at any time without penalty. Anonymity was ensured by excluding personal identifiers, and data were stored securely in password-protected files accessible only to the researcher. Participants were assured of confidentiality, and local norms (e.g., respectful engagement, use of Yoruba) were respected during data collection to build trust (Saito, 2013).

RESULTS AND DISCUSSION

Table 2: Response Rate

Community	Distributed	Completed	Non response
Akaran	100	91	9
Araromi	65	59	6
TOTAL	165 (100%)	150 (90.9%)	15 (9.1%)

A total of 165 questionnaires were distributed across two rural communities in Ona Ara LGA Akanran and Araromi in line with the proportional allocation of 60.4% and 39.6% respectively. Out of these, 150 questionnaires were successfully retrieved and completed, representing an overall response rate of 90.9%.

Specifically, 100 questionnaires were distributed in Akanran, out of which 91 were completed, yielding a response rate of 91.0%. In Araromi, 65 questionnaires were distributed, with 59 successfully retrieved, corresponding to a 90.8% response rate. The distribution and retrieval process, therefore, maintained the intended proportional spread across the two communities, ensuring fair representation of respondents in the study.

Demographic Characteristics of Respondents

Table 3: Demographic Profile of Respondents

Demographic Variable	Category	Frequency	Percentage (%)
Age group	18–30 years	38	25.3
	31–45 years	56	37.3
	46–60 years	39	26.1
	Above 60 years	17	11.3
Gender	Male	72	48.0
	Female	78	52.0
Marital status	Single	28	18.7
	Married	106	70.7
	Widowed	10	6.7
	Divorced/Separated	6	4.0
Educational level	No formal education	21	14.0
	Primary education	54	36.0
	Secondary education	56	37.3
	Tertiary education	19	12.7
Occupation	Civil servant	18	12.0
	Trader/Business	47	31.3
	Farmer	67	44.7
	Unemployed	18	12.0
Household size	1–3 persons	24	16.0
	4–6 persons	69	46.0
	7–10 persons	43	28.7
	More than 10 persons	14	9.3
Length of stay in the community	< 1 year	9	6.0
	1–5 years	33	22.0
	6–10 years	41	27.3
	> 10 years	67	44.7

Table 3 presents the socio-demographic characteristics of the respondents in Ona Ara Local Government Area, Ibadan. Out of the 150 respondents from Akanran and Araromi communities, the age distribution showed that the majority were within the 31–45 years age group (37.3%), followed by those aged 46–60 years (26.0%), while 25.3% fell within the 18–30 years category and only 11.3% were above 60 years.

In terms of gender, respondents were fairly balanced with males representing 48.0% and females slightly higher at 52.0%. Regarding marital status, most of the respondents were married (70.7%), while 18.7% were single, 6.7% widowed, and 4.0% divorced/separated.

With respect to educational attainment, a good number had at least some level of education: 37.3% attained secondary education, 36.0% had primary education, and 12.7% completed tertiary education. However, 14.0% of the respondents reported having no formal education.

Looking at occupational distribution, the majority were farmers (44.7%), followed by those engaged in trading/business (31.3%). Only 12.0% each were civil servants or unemployed.

For household size, nearly half of the respondents (46.0%) lived in households of 4–6 persons, while 28.7% had 7–10 members. A smaller proportion, 16.0%, had 1–3 persons, and 9.3% reported living in households with more than 10 persons.

Finally, considering the length of stay in the community, the majority had resided there for a long time, 44.7% had lived more than 10 years, while 27.3% had stayed between 6–10 years. Another 2.0% reported staying 1–5 years, and only 6.0% had stayed for less than 1 year.

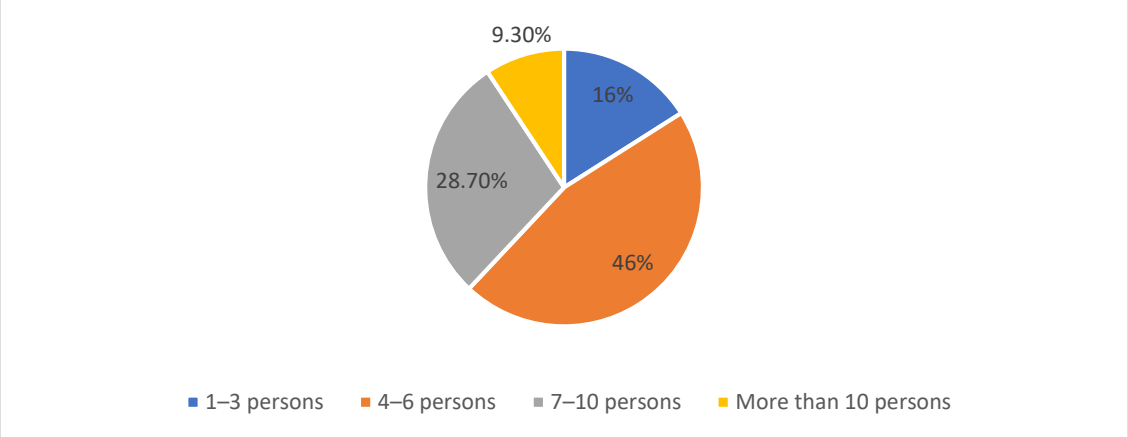

Figure 2: Household Size of the Respondent

Table 4: Sustainability of Open Defecation-Free (ODF) Status (N = 150)

Variable	Category	Frequency	Percentage (%)
Does your household own a toilet/latrine?	Yes	127	84.7
	No	23	15.3
Type of toilet facility used (n=127)	Pit latrine	68	53.5
	Ventilated improved pit	24	18.9
	Water closet	21	16.5
	Shared latrine	14	11.0
If no toilet, where household members defecate (n=23)	Bush	9	39.1
	Open field	6	26.1
	Nearby stream	2	8.7
	Neighbor's toilet	4	17.4
	Public toilet	2	8.7
Since the introduction of CLTS, has your household reverted to open defecation?	Always	3	2.0
	Sometimes	18	12.0
	Never	129	86.0
Do you believe open defecation has reduced in your community since CLTS?	Yes	134	89.3
	No	7	4.7
	Not sure	9	6.0

Table 4 presents the sustainability of open defecation-free (ODF) status among the 150 respondents from Akanran and Araromi communities. Findings show that a large majority, 127 respondents (84.7%), reported that their households own a toilet or latrine, while only 23 households (15.3%) indicated they had no toilet facility.

Among those with toilets (n=127), the most common facility was the pit latrine (53.5%), followed by the ventilated improved pit (18.9%), water closet (16.5%), and shared latrine (11.0%). For households without toilets (n=23), the most common practice was defecating in the bush (39.1%), followed by the open field (26.1%), while 17.4% used a neighbour's toilet, and a small proportion (8.7% each) reported using nearby streams or public toilets.

When asked whether their households had reverted to open defecation since the introduction of CLTS, the overwhelming majority (86.0%) stated they had never reverted, while 12.0% admitted doing so sometimes, and only 2.0% reported reverting always. In terms of perception of community-wide changes, most respondents (89.3%) believed that open defecation had reduced in their communities since the implementation of CLTS. A few, however, felt otherwise: 4.7% reported that open defecation had not reduced, while 6.0% were not sure.

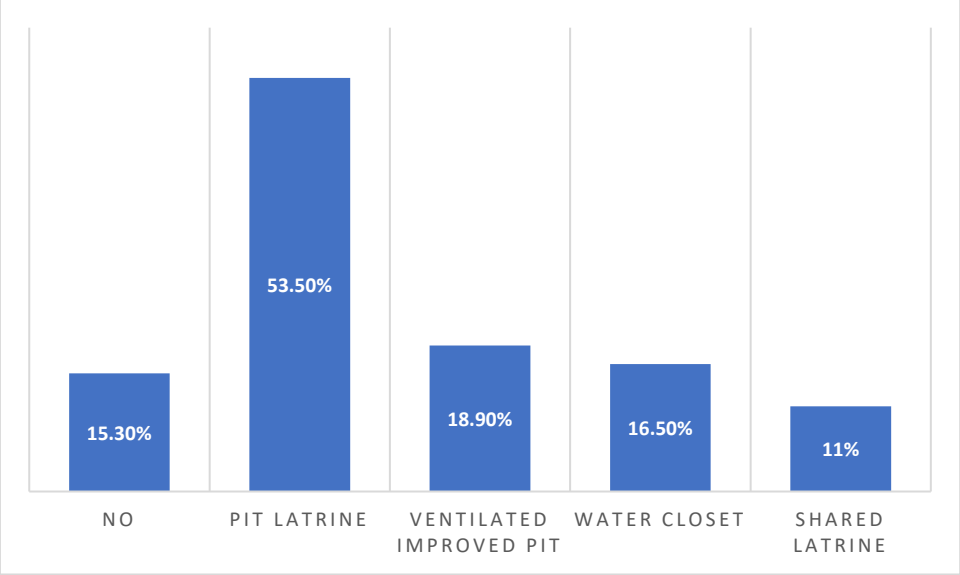

Figure 3: Type of Toilet Facility Used by Respondents

Table 5: Impact of CLTS on Sanitation Infrastructure

Variable	Category	Frequency	Percentage (%)
Did your household construct a toilet as a result of the CLTS program?	Yes	112	74.7
	No	38	25.3
If yes, who financed the construction? (n=112)	Household	73	65.2
	Community effort	14	12.5
	NGO	13	11.6
	Government	12	10.7
How often do you repair or maintain your toilet facility?	Monthly	28	18.7
	Occasionally	64	42.7
	Rarely	35	23.3
	Never	23	15.3
Is your toilet currently in good working condition?	Yes	124	82.7
	No	26	17.3
What challenges do you face in maintaining your toilet?	High cost of repairs	46	30.7
	Lack of materials	41	27.3
	Lack of water	63	42.0

Table 5 presents the impact of the Community-Led Total Sanitation (CLTS) program on sanitation infrastructure in Ona Ara LGA. Findings show that a large proportion of households, 112 respondents (74.7%), reported constructing a toilet as a direct result of the CLTS intervention, while 38 respondents (25.3%) did not.

Among those who constructed toilets (n=112), the majority (65.2%) financed the construction through their own household resources. Other sources of support included community efforts (12.5%), non-governmental organizations (11.6%), and the government (10.7%).

With regard to toilet maintenance, most respondents (42.7%) stated that they maintain or repair their facilities occasionally, while 23.3% reported doing so rarely. Only 18.7% carried out monthly maintenance, and 15.3% admitted that they never maintain their toilet facilities.

In terms of functionality, the vast majority of respondents (82.7%) reported that their toilets were currently in good working condition, whereas only 17.3% indicated otherwise.

When asked about challenges faced in maintaining their toilets, the most common problem cited was lack of water (42.0%), followed by high cost of repairs (30.7%), and lack of materials (27.3%).

Table 6: CLTS and ODF Sustainability

Response (Reversion to OD)	Observed (O)	Expected (E)	$(O–E)^2/E$	χ^2	df	P-value p < 0.05
Always	3	26.5	19.7			
Sometimes	18	34.0	7.5			
Never	129	89.5	17.9			
Total	150	150	45.1	91.60	2	0.001

Table 6 presents the Chi-square test assessing whether Community-Led Total Sanitation (CLTS) has significantly sustained open defecation-free (ODF) status in rural communities of Ona Ara LGA. The results show that only 3 households (2.0%) reported "always" reverting to open defecation, while 18 households (12.0%) admitted to "sometimes" reverting. In contrast, a large majority of 129 households (86.0%) reported that they had "never" reverted to open defecation since the introduction of CLTS.

The Chi-square analysis yielded a test statistic of $\chi^2 = 91.60$ with 2 degrees of freedom and a p-value of 0.01, which is below the 0.05 significance threshold. This indicates a statistically significant association between CLTS implementation and the sustainability of ODF status in the study area.

Therefore, CLTS has been effective in sustaining ODF practices among rural households in Ona Ara LGA, as evidenced by the overwhelming proportion of households that have maintained improved sanitation behaviour.

Table 7: CLTS and Sanitation Infrastructure

Response (Toilet construction due to CLTS)	Observed (O)	Expected (E)	$(O–E)^2/E$	χ^2	df	P-value
Yes	112	75	18.25			
No	38	75	18.25			
Total	150	150	36.50	36.50	1	<0.001

Table 7 presents the chi-square analysis of the impact of Community-Led Total Sanitation (CLTS) on sanitation infrastructure in Ona Ara LGA. The results reveal that 112 households (74.7%) reported constructing toilets as a direct result of CLTS, while only 38 households (25.3%) did not. The expected distribution, assuming no impact, was 75 for

each category. The chi-square test yielded a value of $\chi^2 = 36.50$ with 1 degree of freedom and a p-value less than 0.001, which is highly significant. This indicates that the difference between observed and expected frequencies is not due to chance. Therefore, CLTS implementation has had a significant positive impact on the development of sanitation infrastructure in Ona Ara LGA.

Discussion of Findings

This study assessed the post-implementation impact of the Community-Led Total Sanitation (CLTS) programme in Ona Ara Local Government Area (LGA), Oyo State, with a focus on sustaining open defecation-free (ODF) status and improving sanitation infrastructure. The findings strongly demonstrate that CLTS has had a significant positive effect across these areas, though challenges remain that may affect long-term sustainability.

On the first objective and hypothesis, which examined the extent to which CLTS has sustained ODF status, the results showed that most households (84.7%) owned toilet facilities, while 86.0% reported not reverting to open defecation and 89.3% perceived a community-wide reduction in the practice. Statistical analysis confirmed a significant association between CLTS and sustained ODF status, leading to the rejection of the null hypothesis. This supports earlier findings by Kar and Chambers (2008) and Sara and Katz (2011), who documented the effectiveness of CLTS in reducing open defecation in Asia and Africa. However, the small proportion of households in Ona Ara that admitted to occasional or frequent reversion reflects the sustainability concerns noted by Hanchett *et al*., (2011), suggesting that continuous monitoring and reinforcement are necessary to prevent slippage.

The second objective and hypothesis focused on the impact of CLTS on sanitation infrastructure. The evidence revealed that 74.7% of households constructed toilets as a direct result of the programme, with the majority (65.2%) relying on self-financing. While the Chi-square test showed a statistically significant impact of CLTS on sanitation development, maintenance culture was weak, as only 18.7% reported regular repairs. Lack of water (42.0%) and high repair costs (30.7%) were major challenges. These findings align with Whaley and Webster (2011) and Crocker *et al*. (2017), who found that CLTS often drives large-scale toilet construction, but sustainability is undermined by poor maintenance and inadequate follow-up. Similarly, Sigler, Mahmoudi, and Graham (2014) warned that resource constraints often limit long-term infrastructure functionality in CLTS-driven communities.

However, the findings confirm that CLTS has been highly effective in sustaining ODF practices, stimulating household-led toilet construction. However, the persistence of occasional open defecation and weak infrastructure maintenance, underline the importance of continuous education, improved water access, and stronger institutional support. Addressing these gaps will be critical to ensuring that the sanitation gains achieved through CLTS are sustained in the long term.

CONCLUSION

The findings indicate that the Community-Led Total Sanitation (CLTS) approach has been effective in promoting sustainable Open Defecation-Free (ODF) status and improving sanitation infrastructure in Ona Ara Local Government Area. The majority of households have adopted hygienic sanitation practices, maintained functional latrines, and demonstrated a strong sense of community ownership. These outcomes reflect the positive impact of CLTS on both behavior change and infrastructure development.

However, sustaining ODF status remains a critical challenge. The study reveals that long-term success requires continuous monitoring, community-based maintenance systems, and institutional support. Strengthening local capacity through hygiene education, technical assistance, and affordable sanitation options is essential to prevent relapse into open defecation.

Overall, CLTS has made measurable progress toward improving sanitation and health outcomes in Ona Ara LGA and contributes meaningfully to achieving national and global sanitation targets under SDG 6. To ensure sustained impact, government agencies, NGOs, and communities should prioritize post-ODF follow-up, integrate sanitation with water and hygiene programs, and enhance mechanisms that make sanitation improvements durable and inclusive.

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