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Threats to SDGs 3 and 6: Exploring Historical, Cultural, and Poverty-Related Drivers of Open Defecation in Rural Abuja, Nigeria

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Abstract

This study examines the elements that contribute to open defecation in rural communities of Abuja, Nigeria with emphasis on socio-economic and cultural factors and their implications for Sustainable Development Goals (SDGs) 3 and 6. A mixed methods approach was used, including a survey of 200 households, in-depth interviews and focus group discussions. The quantitative data were evaluated by means of descriptive statistics, Chi-square tests, and logistic regression, whereas the qualitative data were analyzed by thematic analysis. The findings were that 62% of the respondents have practiced open defecation, mainly because of poverty, cultural beliefs and historical reasons. Chi-square analysis showed significant associations between household income (kh2 = 24.67, $p < 0.001$), education (kh2 = 18.42, $p < 0.001$) and sanitation behaviours. Logistic regression analysis also indicated that households with income less than 20,000 Naira (N20,000) were 4.3 times more likely to practice open defecation. The likelihood of engaging in intermarriage was 3.7 times higher among participants with no formal education and the likelihood of sustaining the practice was 2.8 times higher in households that practice traditional beliefs. Health effects such as higher rates of diarrhoea, cholera and childhood stunting were a reflection of risks to SDG 3 (Good Health and Well-Being). The results suggest that income poverty, low level of education and cultural traditions are the most important predictors of open defecation. The paper concludes by saying that integrated approaches that include affordable sanitation technology, targeted poverty alleviation and culturally sensitive behaviour change interventions are needed to address these.

Keywords: *Open defecation; Rural sanitation; Poverty; Cultural beliefs; Chi-square; Logistic regression; SDG 3; SDG 6; Abuja; Nigeria*

1.0 Introduction

Sustainable Development Goals (SDGs) 3: Good Health and Well-being and 6: Clean Water and Sanitation - are complementary and central aspects of human development. In Nigeria, the persistently-reported problem of open defecation (OD) undermines both objectives by creating a conducive environment for pathogen transmission via faecal matter, resulting in high prevalence of diarrheal diseases and also adversely affecting health, education and economic productivity. Despite the promises from national and local stakeholders to end OD (for example, the Clean Nigeria: Use the Toilet campaign and the Open-Defecation-Free [ODF] Roadmap), gains have been uneven (Federal Ministry of Water Resources [FMWR], National Bureau of Statistics [NBS], & UNICEF, 2022; UNICEF, 2016/2019). The Federal Capital Territory (FCT) of Abuja, considered a symbol of national development, continues to retain rural communities in which OD persists for a myriad of historical, cultural and poverty-related reasons. Therefore, understanding these factors in rural Abuja is critical to sustaining progress towards SDGs 3 and 6.

But the extent of the problem is shown by recent studies. Millions of Americans still practice OD. The Nigeria WASHNORM 2021 survey estimated that an estimated 48 million people were involved in OD and there was significantly less access to basic sanitation in rural areas than in urban ones (FMWR, NBS, and UNICEF, 2022). Global monitoring by the WHO/UNICEF Joint Monitoring Programme (JMP) has identified that while the global community has reduced the number of people practising OD from 1.3 billion to 419 million between 2000 and 2022, Nigeria has continued to be one of the countries with high prevalence of this practice (WHO/UNICEF JMP, 2023a, 2023b). More recent analyses have continued to attribute Nigeria's high diarrheal burden to poor water, sanitation, and hygiene (WASH) conditions and point to the direct threats to SDG 3 (Victor et al., 2025). From a public health point of view, poor WASH is associated with a significant proportion of diarrheal morbidity and mortality in low- and middle-income countries (Ijoko et al., 2021), particularly among children under five years of age (Alum et al., 2024; Okesanya et al., 2024). These health consequences result in higher health care costs (Ismail et al., 2024), reduced educational opportunities, lower productivity and greater entrenchment of poverty (Magaji, 2008).

In the rural communities of Abuja the problem of OD cannot be explained as being the result of infrastructural inadequacy alone. History has a major part to play. Urbanization: The spatial pattern of colonial and early post-colonial urban planning with investments concentrated in administrative centers and affluent neighborhoods and rural peripheral areas with little public goods entrenching spatial disparities that remain in the area councils of the FCT today (cf. FMWR, NBS, & UNICEF, 2022). The scattered settlement patterns and the patterns of land tenure further complicate the provision, financing and maintenance of household or community latrines. The result is a patchy landscape of service provision in which certain communities reach ODF status while their neighbors lag. For example, the Zuma-1 community in the Bwari Area Council was declared as ODF in 2023, highlighting both potential and disparity (BusinessDay, 2023).

There are also cultural and behavioural considerations. Open defecation (OD) is a normalised behaviour when a lack of toilet access combined with privacy, cleanliness and convenience norms make toilets feel unsafe, dirty, or socially unacceptable. Studies in Nigeria and other regions have found that households can practice OD in presence of latrines because of preferences for open spaces, beliefs about ventilation or gender-specific safety issues (Alemu et al., 2024; Olagbemide & Oluropo, 2025). Evidence from rural communities in the FCT indicates that social and behavioural change communication (SBCC) is needed to change deep-rooted norms, and in such interventions community leaders, women's groups, and youth organizations are necessary to work with (Tsebee, 2022). Without programming that takes social data norms into account, infrastructure may not result in long-term use.

Poverty issues have an impact on both the supply side and the demand side. At the household level, where OD is driven by the inability to acquire the resources to construct, upgrade, or maintain durable latrines, unstable soils, high water table, or the high cost of construction materials (FMWR, NBS, & UNICEF, 2022; Olagbemide & Oluropo, 2025) contributes to the prevalence of OD. On the service provision front, chronic underfunding and weak rural sanitation markets are restricting the supply of skilled personnel, pit-emptying services and supply chains for critical inputs such as slabs and fittings. Gendered poverty dynamics are also important: women and girls are at greater risk from poor sanitation - including higher risk of harassment and violence during OD, lost time, and difficulty managing menstrual hygiene - perpetuating connections with SDG 5 and directly threatening SDGs 3 and 6 (WHO/UNICEF JMP, 2023b).

These factors form a risk nexus for rural Abuja: open defecation promotes the spread of preventable diseases (cholera, typhoid, helminths), increases the antimicrobial use and resistance, and reduces nutritional benefits via environmental enteric dysfunction - all contradictions to SDG 3 targets on communicable diseases and child mortality (Alum et al., 2024; Victor et al., 2025). At the same time, lack of access to safely managed sanitation and hygiene hinders progress towards SDG 6 targets, with families unable to climb the sanitation ladder without access to affordable technologies, reliable markets and changes to social norms (Jafaru et al., 2024). Despite Nigeria's ODF goal for 2025 (UNICEF 2016/2019), national progress has been incomplete; rural FCT's experience shows that contextualised, multi-faceted approaches are most effective: CLTS integrated with targeted support to most disadvantaged, behaviourally informed outreach, gender-sensitive facility designs and strengthened capacities in local government WASH units (FMWR, NBS & UNICEF, 2022; BusinessDay, 2023; Clean Nigeria Campaign, n.d.).

Thus, the paper assesses the possible interaction of historical influence factors, cultural tradition, and poverty as various factors that produce high open defecation in rural Abuja. By focusing on ground level experiences and structural conditions across the FCT area councils, the analysis aims to bring attention to challenges to SDGs 3 and 6 and the identification of leverage points for sustainable, socially acceptable and equitable sanitation developments. The ability to better understand these overlapping dynamics may help program development, inform budgeting, and enable rural communities in Abuja to move from episodic success in ODF status to sustained sanitation success that truly improves health and wellbeing.

2.0 Literature review

2.1 Conceptual Definitions

2.1.1 Defecation in the Open and the Sanitation Ladder

Open defecation (OD) is commonly defined as the defecation in open fields, bushes, waterbodies, or other public spaces rather than

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in a toilet or latrine (WHO/UNICEF Joint Monitoring Programme [JMP], 2023). In the context of global monitoring and policy discourse, OD is situated on the "sanitation ladder", which is a continuum of sanitation service levels from open defecation (lowest ladder) to unimproved sanitation, shared sanitation, basic sanitation and safely managed sanitation (WHO/UNICEF JMP, 2023). Climbing the ladder represents not just the better access to physical facilities; it is equally the better health outcomes that are due to safe containment, transport and treatment of excreta - key determinants of achieving Sustainable Development Goal 6 (Clean Water and Sanitation).

2.1.2 Relevance to SDG 3 and SDG 6

Sustainable Development Goal 6 (Target 6.2) specifically seeks to ensure that we have access to sufficient and equitable sanitation and hygiene for all and we work to end open defecation by 2030. Similarly, SDG 3 (Good Health and Well-being) has targets focused on the reduction of communicable disease, child mortality and malnutrition outcomes that are directly linked to water, sanitation and hygiene (WASH) conditions (WHO/UNICEF JMP, 2023). Open defecation encourages the faecal-oral spread of diarrhoea, cholera, typhoid and helminth infections, while multiple gastrointestinal infections impair nutrition, cognitive and child development, thus inhibiting achievement of SDG 3 (Alum et al., 2024; Ismail, Musa & Magaji, 2024; Okesanya et al., 2024). Thus, OD is both a sanitation (SDG 6) and public health emergency (SDG 3).

2.1.3 Complexity of OD.

Both academic and sectoral observations point to the fact that OD is not merely an absence of toilets but a complex socio-environmental problem. The reasons for this are inadequate infrastructures, financial constraints, cultural entrenched values, forms of settlement, water availability, soil quality, and governance and service delivery failures (Federal Ministry of Water Resources [FMWR], National Bureau of Statistics [NBS], & UNICEF, 2022; Olagbemide & Oluropo, 2025). Therefore, issues of OD require a holistic conceptual framework that goes beyond hardware provision to include personal behaviours, household economics, social conventions and the political environment.

2.1.4 Poverty and Open Defecation

Poverty is one of the most important determinants of sanitation-related behaviours and outcomes (Alkire and Foster, 2011). In theoretical terms, poverty can be seen not only as an income deficiency, but also as a multidimensional deprivation covering an inadequate access to an appropriate housing, education and health care, and basic services including sanitation (Magaji, 2007). In rural Abuja, a family living below the poverty threshold is challenged financially and lacks the resources needed to construct, maintain, or upgrade toilet facilities, especially when the proper provision of food, shelter, and health care come first (NBS, 2023). There is also a complex of cultural, environmental and behavioural factors in addition to poverty (Yakubu et al., 2025). When families are financially constrained this use of open spaces for defecation for free tends to become normalised and handed down through generations.

The poverty-sanitation nexus is reinforced by a vicious cycle: poor sanitation results in poor health outcomes (e.g. diarrhoea, malnutrition, stunting) which then have a negative impact on productivity, educational achievement and income generating capacity, reinforcing poverty cycles (Shaba et al., 2018). Within the sanitation ladder framework, poverty can constrict households to the lowest rungs (open defecation) or, at most, to unimproved sanitation facilities. Understanding poverty as a structural inhibitor therefore provides invaluable information on why progress toward SDG 6 and SDG 3 is so slow in rural areas like Abuja.

2.1.5 Conceptual Framework:

Poverty-Culture-History->Open Defecation->SDG Threats

This conceptual framework maps how open defecation (OD) is perpetuated in rural Abuja by the intersection of historical factors, cultural norms and poverty. In turn, OD is a direct threat to the progress of SDG 6 (Clean Water and Sanitation) and SDG 3 (Good Health and Well-being).

i. Historical Factors - Sanitation gaps were developed by colonial neglect, rural underdevelopment and infrastructural inequality.
ii. Cultural Norms - OD is supported by beliefs about purity, privacy and traditional practices.
iii. Poverty - Resources do not allow household to build and sustain improved sanitation.
iv. Open Defecation - Causes pollution of the environment, spread of diarrheal diseases, cholera epidemics, malnutrition of children, high morbidity/mortality.
v. Threat to SDGs: Directly targets SDG 6.2 (end OD), and indirectly targets SDG 3 targets (reduce child mortality, combat disease).

2.1.6 Table-Based Conceptual Pathway.

Goals (OD) SDG Threats

Historical precedents (colonial neglect, poor rural investment, infrastructural exclusion)

cultural norms (beliefs, attitudes, traditions - favouring OD, opposition to latrines) -> Open Defecation (OD) -> SDG 6 (Sanitation) failure

Poverty (low income, not able to afford/build toilets, inequality) -> SDG 3 (Health) risks (disease, child mortality)

Figure 1: Conceptual Framework: Poverty, Culture and History as Related to Open Defecation and Threats to SDGs 3 and 6

2.2 Theoretical models related to the investigation of OD.

Consideration of OD benefits is approached through theoretical lenses ranging from behaviour-change models of individual and collective action, to social-ecological frameworks that situate behaviour within nested systems, to political-ecological or structural approaches that foreground historical and institutional inequities.

2.2.1 Behavioural and psychosocial models.

A large volume of sanitation research draws on psychosocial models that identify factors that drive hygiene and sanitation behaviours (e.g., knowledge, risk perception, attitudes, norms, self-efficacy, and enabling environments). Key frameworks encompass:

i. RANAS (Risks, Attitudes, Norms, Abilities, and Self-regulation): This conceptual framework employed in WASH programming and research deconstructs the psychological factors that determine water and sanitation-related behaviors and can improve behavior-change interventions (Mosler, cited across WASH literature). RANAS supports the development of tailored social and behaviour change communication (SBCC)

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interventions which address specific belief systems (Venkataramanan et al., 2018; sector evaluations).

ii. Theory of Planned Behaviour (TPB) and Health Belief Model (HBM): These theories have been used in sanitation adoption to explain development of intention (attitudes/norms), vulnerability to disease/perceived severity of illness, perceived benefits and barriers, and instigators to take action.

Behavioural frameworks emphasise that just providing a latrine is necessary but is not sufficient; perceptions of cleanliness, privacy, convenience, gender safety and social acceptability have a great impact on latrine use (Alemu et al., 2024; Olagbemide & Oluropo, 2025).

2.2.2 Social-ecological model

The social-ecological model places sanitation behaviour within a nested context of different levels of influence (individual, household, community, institutional and policy/environmental). This model helps understand how decisions about behavior and household finances (the ability of the house to afford a durable latrine) interact with community norms (the shared acceptance of defecation practices) and government (the capacity of the local government to provide sanitation services) (FMWR, NBS, and UNICEF, 2022). Social-ecological approaches also underpin the importance of multi-level interventions that combine infrastructure investment, community mobilization, governance improvements, and market development.

2.2.3 Structural determinants and political ecology.

Political ecology or structural perspectives are focused on historical contexts, spatial disparities, ownership patterns, and patterns of public investment that determine infrastructure distribution and vulnerability. The general conditions of the urban centers of Nigeria, including both colonial and post-colonial planning, have tended to locate services in administrative or elite zones. Conversely, other or peripheral areas, particularly those which have been included later on in the Federal Capital Territory (FCT), have been less well served (FMWR, NBS, & Unicef, 2022). This perspective contributes in explaining the fact that rural communities, even if close to the capital of Abuja, still regularly suffer from WASH deficits. The reasons may be uneven governance, unequal distribution of resources, and shortfall in institutional capacity (Magaji et al., 2014).

2.2.4 livelihoods framing and market systems.

Sanitation is also examined from the perspective of market systems: latrine slabs, pits and emptying chains; skilled mason supply chains; microfinance, subsidy for latrine slabs; and sanitation marketing for demand creation. This view recognises that effective markets are a fundamental building block for sustainable sanitation. The poorest populations are not able to fund the sustainable improvements by themselves (Enaberue et al., 2024).

2.2.5 Integrative framework for this review

In the evaluation, which is based on a comprehensive framework, not only behavioural (RANAS/TPB), but also social-ecological dimensions with structural and market logics are considered. This triangulated approach facilitates the investigation of proximate determinants (attitudes, access to water, latrine conditions), community norms and more distal determinants (historical planning, public funding, supply chains) that all contribute to OD in rural Abuja.

2.3 Empirical evidence

The empirical literature includes global systematic reviews and randomised/observational studies, national assessments (e.g. Nigeria WASHNORM 2021), programme evaluation of CLTS and sanitation marketing in Nigeria, and localised studies focusing on cultural and poverty-related factors. Below we draw some of the evidence together at these different levels, highlighting evidence relevant to rural Abuja.

Global surveillance by the WHO/UNICEF JMP shows general trends: between 2000 and 2022, there has been a significant decrease in OD worldwide, but the progress has been uneven, with a big regional and national disparity (WHO/UNICEF JMP, 2023). Open defecation (OD) continues to occur widely in several countries, including Nigeria, where the absolute numbers of OD practitioners are still high (WHO/UNICEF JMP, 2023). Systematic reviews link poor sanitation including OD with diarrhoeal diseases, child stunting, and parasitic diseases which directly endanger Sustainable Development Goal 3 (Alum et al., 2024; Okesanya et al., 2024). Experimental and quasi-experimental evidence also support health benefits from large-scale sanitation improvement; however, a number of randomised trials of sanitation interventions have shown inconsistent results in terms of child growth and diarrhoea. Insufficient coverage, sustained use, or unaccompanied by improvements in water and hygiene are often underlying such gaps (Abramovsky et al., 2023; Venkataramanan et al., 2018). This is a strong argument for not only building latrines but ensuring that they are accepted and managed well across communities.

The WASHNORM Nigeria 2021 report, collated by the Federal Ministry of Water Resources (FMWR), National Bureau of Statistics (NBS) and UNICEF provides important, up-to-date and evidence-based insights at a national level. Findings show that about 48 million people defecated in public in 2021 in Nigeria; basic sanitation access is lowest in rural versus urban areas (FMWR, NBS, & UNICEF, 2022); access is skewed across wealth quintiles and education levels, with the poorest and least educated having the least access to sanitation facilities (FMWR, NBS, & UNICEF, 2022); service delivery issues include low local government capacity, underfunded WASH units, limited availability of sanitation products in the market, and few pit-emptying services (FMWR, NBS, & UNICEF, 2022).

These national statistics reveal the double nature of OD in Nigeria: it is part of the landscape as a behavioural phenomenon but also a system failure as regards access to services, especially in rural regions (WASHNORM; JMP country reports). Increasing numbers of Nigeria-specific empirical research examine the proximate determinants (toilet absence, unusable facilities, water, maintenance issues), socio-cultural factors (norms, preferences, perceptions about latrines) and economic issues (inability to afford construction or maintenance of latrines). For example, in the rural Nigerian setting, research shows that poor toilet construction, collapsed or unusable latrines, inadequate water for flushing/cleaning, and poor maintenance are common short-term triggers for households to resort to or continue open defecation, even where latrines exist (Adeoti, 2024; Authorea/public health synthesis 2024). When toilets cease to be usable or clean enough, open defecation is increasingly a common response among households because it is seen as easier to use or cleaner (Adeoti, 2024).

On poverty and affordability, several studies and sector reviews point to poverty as a major constraint; the poorest quintiles are

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unlikely to have either the savings or financial access needed to invest in durable latrines, and opportunity costs of using shared or public sanitation are also high (FMWR, NBS, & UNICEF, 2022; Olagbemide & Oluropo, 2025). In some communities, over 50% of survey respondents refuse paying for public toilets, preferring government subsidies or open defecation as the most cost-effective alternative (Tnhjph survey, 2025) on cultural norms and preferences, ethnographic and mixed-methods practices across Nigeria and comparable regions identify cultural beliefs and practices that can reinforce open defecation, such as preference for open spaces for some household members (e.g. old folks), taboos against sharing latrines, and dirty/unsafe latrines (Olagbemide & Oluropo, 2025; These cultural norms interact with material constraints to determine behaviour; in the context of water scarcity and environmental constraints, in water-scarce or soil conditions where pit latrines are likely to collapse or flood, households may find latrine construction impractical or unsafe (WASHNORM, 2021; Authorea, 2024). High water tables can result in higher cost of safe containment and use of alternative technologies; without subsidization or technical support, households can resort to OD; sector assessments point to market and governance failures, such as weak sanitation product supply chains, lack of skilled masons, and challenges in pit-emptying services that limit options for sustainable improvement (IFS/WaterAid, Sustainable Total Sanitation evaluations, FMWR, NBS, Unicef, 2022)

Community-led Total Sanitation (CLTS) and sanitation marketing are the main approaches used in Nigeria rural areas. Evidence of such approaches is varied:

The CLTS approach is based on community mobilization to stimulate feelings of disgust and shame at OD and to catalyse collective action to achieve open defecation-free (ODF) status. While CLTS has been shown to have short-term gains in limited contexts, the long-term sustainability and equity outcomes are debated. Various evaluations and systematic reviews find mixed impacts: CLTS can reduce OD, given strong community participation and follow-up support (including supply chain support); but in many parts of Nigeria, CLTS has been hard to get to drive sustainably behavioural change at poorest households or where there are ongoing structural barriers (water, soil, finance) (Venkataramanan et al. 2018; Sustainable Total Sanitation Nigeria evaluations; Ebonyi & other state research). In addition, unless CLTS is linked with sanitation marketing or financial resources, communities may temporarily attain ODF status only to have it later reversed.

Sanitation marketing and market-driven strategies: Sanitation marketing is intended to increase demand for improved latrines while building supply chains and financing solutions. While evidence from programs (e.g., Sustainable Total Sanitation and WaterAid partnerships) suggests that scale-up can be achieved among those who can afford improved solutions, strategies that depend on subsidies or targeted financing for the poorest to avoid exclusion are more likely to result in inequity (IFS/WaterAid; ISRCTN trial registrations and evaluations).

In summary, the evidence base points to combining CLTS to build demand and social norms with sanitation marketing and targeted financial assistance to ensure supply and affordability as more likely to result in equitable and sustained OD reductions (Sustainable Total Sanitation literature, WASHNORM recommendations).

While the broader picture from national data and multi-state analyses is useful, the literature discussing rural Abuja (FCT area councils) is more scarce, but still illuminating. Sector monitoring and local evaluation show:

Spatial inequities in the FCT: In the FCT, WASHNORM profiles show that rural area councils lag behind urban Abuja in terms of access to basic sanitation and hygiene services; service coverage within the FCT is also patchy, with some communities attaining ODF status while others are toilet-less (Allsopp/Faithman, 2022; BusinessDay report on Zuma-1 ODF status).

Historical planning and marginalisation: FCT infrastructure assessments have shown that past planning priorities have guided investments towards administrative/elite core, whereas peripheral/officially rural areas have only received limited public investment in WASH services (WASHNORM; sector studies). These historical trends impact current institutional capacity and allocation of budgets at the area-council level (Magaji, Ismail & Musa, 2025).

Cultural and gendered experiences in rural FCT: Small qualitative studies and practitioner reports indicate gendered sanitary vulnerabilities in rural FCT: women and girls experience greater safety and privacy concerns in practicing OD (with implications for menstrual hygiene and school attendance) while social latrine norms vary among the ethnicities in the FCT (Tsebee, 2022; local project reports).

Programmatic lessons-learned: A BusinessDay article on Zuma-1 becoming ODF points to the success of localised, community-driven approaches within the context of rural FCT when supported by targeted facilitation and follow-up (BusinessDay, 2023). However, monitoring of the sector has shown that simply declaring oneself to be ODF does not by itself ensure long-term and safe sanitation management unless continuous financial investment, access to markets and institutional support are available (WASHNORM).

2.3.1 Comparison of empirical results.

At different scales, studies converge on a number of similar conclusions regarding the threats posed by OD to SDGs 3 and 6:

i. Multiple causes: OD is due to a combination of driving factors--material (absence / inadequate toilets, water scarcity, soil quality), economic (poverty, price), social (cultural norms, preferences), and institutional (weak market systems, low local governance budget). Interventions that are narrowly focused on one or more aspects are unlikely to result in long term success (WASHNORM; Abramovsky et al. 2023).
ii. Equity and the least advantaged: Poverty is one of the main factors affecting the incidence of OD. The poorest income groups have the lowest access to and ability to sustain sanitation services; programme models that do not include financial support or subsidies for such groups may reinforce existing inequalities (FMWR, NBS, & UNICEF 2022; IFS/WaterAid).
iii. Complexity of behaviour: Even in the presence of latrines, their use is influenced by behavioural and societal factors. Thus, interventions need to combine infrastructure improvements with a targeted social behaviour change communication (SBCC) and community engagement strategy that is culturally

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appropriate for local contexts (Alemu et al., 2024; Olagbemide and Oluropo, 2025).

iv. Mixed evidence around CLTS alone: CLTS has motivated the declaration of ODFs but its sustainability and inclusion are inconsistent in the absence of supply and financing programs, emphasizing the need for by programming (Venkataramanan et al., 2018; sustainable total sanitation evaluations).

v. Contextualisation: Hydrogeological conditions, settlement patterns, land tenure and planning histories, gender dynamics are all very different; interventions must be tailored accordingly (WASHNORM; sector studies in Nigeria).

Existence of gaps in research work and implications in rural Abuja

Given the already substantial body of national evidence, there are still some relevant gaps that must be filled for research in rural Abuja:

i. Local longitudinal evidence: Little longitudinal evidence exists to track whether ODF declarations in rural FCT communities lead to long term improvements in sanitation and health. More cohort/panel studies are needed to connect program inputs to long-term outcomes.

ii. Rigorous testing of integrated packages: Rigorous evaluations (quasi-experimental or randomised) of integrated interventions (e.g. CLTS, sanitation marketing, and targeted subsidies) should be carried out within rural Nigerian contexts, and particularly within peri-urban and rural interface types of areas such as the FCT.

iii. Ethnographic and gendered researches: More qualitative research on cultural beliefs, intra-household decision making, and gendered sanitation dynamics in the area councils of the FCT will improve SBCC strategies.

iv. Service-delivery and market studies: Research on local sanitation markets (i.e. mason availability, pit-emptying business models and financing mechanisms), in the FCT will help inform sustainable sanitation management pathways.

These gaps emphasize an interdisciplinary, policy-focused research agenda that combines public health impact evaluation with political ecology and market systems analysis in order to design pro-poor, culturally appropriate interventions that are feasible in the institutional settings. Review of literature indicates that open defecation (OD) is not only a sanitation problem, but also an aspect which contributes to the challenges in relation to Sustainable Development Goals (SDGs) 3 and 6. Open defecation triggers the transmission of communicable diseases, and is detrimental to nutrition and child development (SDG 3), as well as hindering progress towards safely managed sanitation services (SDG 6). In rural Abuja, a complex of past marginalisation, cultural norms, poverty, environmental factors and governance and market deficiencies co-exist to perpetuate the phenomenon of OD. Thus, sustainable development will require integrated and context-specific approaches that link behaviour change to improvements in supply-side services and targeted financial transfers to low income groups, on the basis of improved local governance and continuous monitoring.

3.0 Methodology

3.1 Research Design

This research uses mixed-methods approach, which includes both quantitative and qualitative research to provide a broad understanding of the factors leading to open defecation in rural communities of Abuja. The quantitative portion is based on survey questionnaires that produce statistically significant data. On the other hand, the qualitative component refers to interviews and focus group discussions in order to capture cultural, historical, and behavioural aspects of sanitation practices. The study should be considered to have employed mixed-methods approach justified because open defecation is a complex socio-cultural and economic phenomenon which cannot be sufficiently examined using numerical data alone (Creswell & Plano Clark, 2018).

Through the use of quantitative and qualitative data, this study will enhance validity and reliability, so that the findings will be both context-rich and generalizable. A cross-sectional design is used, whereby data are collected at one point in time from selected communities which is appropriate due to resource and time constraints.

3.2 Study Area

The study was undertaken in the rural areas of the Federal Capital Territory (FCT) in Abuja, Nigeria and specifically the Bwari, Kwali and Kuje Area Councils. These localities were selected based on high prevalence of open defecation and lack of access to sanitary systems while considering the culture that influences sanitation behaviors (National Bureau of Statistics [NBS], 2021).

As Nigeria's capital city, Abuja is a rich illustration of the paradox: as the urban core enjoys modern sanitation facilities, the rural areas remain plagued with problems of insufficient water supply, poor sanitation infrastructure, and deeply entrenched custom. This rural-urban dichotomy provides a unique frame of reference to explore the threats to SDG 3 (Good Health and Well-being) and SDG 6 (Clean Water and Sanitation).

3.3 Study Population

The population of the study consists of:

i. Heads of Households - adults who have a say in decisions related to family sanitation practices.

ii. Community Leaders - Traditional, Village and Religious leaders who influence social and cultural norms.

iii. Health Workers and NGO Staff - Any person working on health and sanitation in the community.

This typology ensures a robust coverage of perspectives at the household, community and institutional levels.

3.4 Sampling Method and Size

A multistage sampling design was used:

i. Stage One: Selection of Area Councils - Three rural councils (Bwari, Kwali, Kuje) will be purposively selected on the basis of high prevalence of open defecation.

ii. Stage Two: Community Selection - Two communities will be randomly selected from each of two councils, making a total of six communities.

iii. Stage Three: Household Sampling - 50 households will be randomly selected from each community to a total of 300 households.

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Qualitative component: key informant interviews (KIIs) will be conducted with 15 stakeholders (five from each council). At the same time, focus group discussions (FGDs) will be carried out with 6-8 participants in each, and two FGDs per council (one for males and one for females).

The sample size of 300 households has been determined using the Yamane's formula (1967) for determining sample size in finite population to ensure representativeness and statistical power.

3.5 Research Tools

The study relied on three main tools:

i. Structured Questionnaire - Designed for household heads, covering demographic data, sanitation, cultural attitudes, indicators of poverty and health outcomes. The majority of questions will be closed, using Likert scale to measure attitudes and perceptions.
ii. Research Guide - Semi-structured for community leadership, health and NGO representatives to explore historical and cultural drivers behind open defecation.
iii. FGD Leader's Guide - Intended to stimulate discussions between different groups of men and women, exploring attitudes towards dignity, cultural taboos, limits imposed by poverty and sanitation preferences.

All tools will be built in English and translated into Hausa and Gwari (commonly spoken languages in the rural Abuja) for better comprehension.

3.6 Data Collection Process

Data collection will be done in three phases:

i. Pre-Test - Tools were trialled in a rural community outside the sample area (Abaji Area Council) in order to identify unclear items and improve questions.
ii. Survey Conduct - The questionnaires will be given to respondents by trained research assistants taking into consideration the level of illiteracy in rural areas.
iii. Qualitative Interviews & FGDs - These will be at community centres and neutral locations, audio recorded (with consent) and supplemented by note-taking

The data collection period will last six weeks (one week training for the enumerators, four weeks of fieldwork and one week for data cleaning and analysis).

3.7 Methods of Data Analysis

Two different ways were used to analyze the data. The quantitative data analysis was carried out by coding and entered into SPSS Version 27. Descriptive statistics such as frequencies, means and percentages were used to describe socio-demographic characteristics and sanitation practices. Inferential statistics (Chi-square tests and logistic regression) were used to investigate the relationships between poverty, culture and open defecation-related behaviours. Furthermore, the probability of open defecation according to socio-economic and cultural characteristics was estimated using a multivariate logistic regression model.

In the case of qualitative data analysis, data was analysed through thematic analysis (Braun & Clarke 2006), using transcripts of interviews and focus groups. The data were coded inductively to identify common themes, such as historical contexts, gender roles and societal attitudes to sanitation. NVivo software was used to assist with the systematic coding and development of themes. A combination of quantitative and qualitative results gave a deeper insight into the drivers of open defecation.

3.8 Validity and Reliability Instrument:

The instruments were carefully discussed in terms of validity and reliability. Content validity was checked for validity by asking experts in the fields of public health, sociology, and development studies to review the instruments. Construct validity was enhanced by pilot testing. Reliability was assessed through internal consistency by assessing each item of the questionnaire using Cronbach Alpha with a coefficient of 0.70 or more as acceptable.

For the qualitative data, credibility was maintained in a number of ways: Member checking helped to strengthen credibility, whereas detailed descriptions ensured transferability. This reliability was built through careful documentation of the work performed in the field.

3.9 Ethical Considerations

The study was conducted in full accordance with ethical concepts. After adequate information about the aims of the study, informed consent was gathered. Data were anonymised and all identifiers were removed to ensure that confidentiality was maintained. Respondents were assured of their right to withdraw at any time without consequence and participation was voluntary. As sanitation is a very sensitive subject area, privacy and cultural sensitivity were respected during data collection. Ethical clearance was given by the Ethical Review Board of the University of Abuja and permission was granted by the appropriate community leaders.

3.10 Methodological Limitations.

Although the methodology was sound, there were some limitations that were predicted. As the study used self-reporting, it is possible that the respondents had under-reported the number of instances when they engaged in open defecation due to the social drivers. Cultural sensitivity was another issue, as defecation in some places is considered taboo, which could have limited disclosure. Logistical constraints including rugged rural terrain and accessibility issues were also a threat to delay data collection. The study was cross-sectional in the sense that behaviour was only recorded at one point in time and did not take seasonal variations in sanitation practices into consideration.

Notwithstanding these limitations, the methodology was so robust that the results generated systematic and valid insights into the challenges of SDG 3 and SDG 6 in rural Abuja.

4.0 Results and Discussion

4.1 Respondent Characterisation

The profile of respondents provides key information on the socio-economic context in which open defecation still thrives in rural Abuja. A total of 200 household respondents were interviewed from a wide range of selected rural communities.

Table 1 Socio-demographic characteristics of respondents (N = 200)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	108	54.0
	Female	92	46.0
Age	18–30	54	27.0

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Variable	Category	Frequency (n)	Percentage (%)
	31–50	86	43.0
	51 and above	60	30.0
Education Level	No formal	72	36.0
	Primary	68	34.0
	Secondary	42	21.0
	Tertiary	18	9.0
Monthly Income (₦)	<20,000	112	56.0
	20,001–50,000	58	29.0
	Above 50,000	30	15.0

Interpretation:

Most respondents were men (54%) and 43% were aged between 31 and 50 years. The study also showed that 36 percent of the people had no formal education and 56 percent had an earning of less than N20,000 per month, which means that there is a high level of poverty. These socio-economic challenges are critical to understanding why many rural residents lack access to improved sanitation facilities for reasons of affordability or accessibility.

4.2 Prevalence and Determinants of Open Defecation

The survey revealed that 62% of the respondents defecated in the open while the remaining 38% reported using some sort of latrine or toilet facility.

Table 2: Respondents by Sanitation Practices.

Sanitation Practice	Frequency (n)	Percentage (%)
Open defecation	124	62.0
Shared pit latrine	42	21.0
Household-owned toilet	34	17.0

Interpretation:

Open defecation remains the dominant practice and the number of shared/private latrines is low. Interviews indicated that many latrines were not well constructed and their condition deteriorated, and people were therefore not using them regularly.

Key Factors Identified:

Historical context - Elders in the community stated that open defecation has been a traditional practice of communal life, and part of the concept of "freedom of the bush."

Cultural beliefs - Some respondents reported that latrines could cause health issues and/or infertility and others associated latrines with "urban life" that they feel is inappropriate for rural contexts.

Poverty and affordability - Cost of constructing latrine (N50,000-N150,000) was estimated to be unaffordable by 72% of households.

4.3 Health Impacts (Link to SDG 3)

The continued use of open defecation was linked to an increase in diarrheal disease, cholera epidemics and cases of childhood stunting in the communities studied.

Table 3: Health Problems Reported to be Linked to Poor Sanitation

Health Condition	Frequency (n)	Percentage (%)
Diarrhoea (within 6 months)	84	42.0
Cholera outbreak (past 2 yrs)	26	13.0
Typhoid fever	72	36.0
Malnutrition/Stunting	38	19.0

Interpretation:

Clinical evidence of Diarrhoea has been reported in over 40% of households within the last six months and the majority of cases are reported among children under five. This is also in line with WHO (2023) research that shows that open defecation is a great contributor to the high levels of waterborne diseases in undeveloped regions.

4.4 Cultural Attitudes and Resistance.

Qualitative interviews help explain underlying cultural values. For example, when discussing the future of a remote Indigenous area, one elder stated: "For us, using the bush is the natural way; building a toilet is for city people." This perspective is consistent with the Social Norms Theory, which suggests that cultural identity and the expectations of the community play a crucial role in shaping behavior. The toilet aversion was also associated with taboos; some families did not have a shared toilet for all genders or with in-laws, and preferred open fields instead.

4.5 Economic Status and Access to Better Sanitation (Link to SDG 6)

The analysis showed a significant relationship between income levels and sanitation habits. The findings also showed that families with an income of less than N20,000 per month were 4.5 times more likely to defecate openly than those with higher income.

Table 4: Correlation Between Sanitation Practices And Household Income

Income Category (₦)	Open Defecation (%)	Use of Latrine (%)
<20,000	78.6	21.4
20,001–50,000	51.7	48.3
>50,000	23.3	76.7

Interpretation:

The data reveal a clear and positive association between poverty and sanitation. It was also shown that in rural Abuja, higher income households were more likely to have or use a latrine, suggesting that cost is an important barrier to achieving SDG 6.

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Table 5: Chi-Square Tests of Association Between Socio-Economic Factors and Open Defecation (N = 200)

Variable	χ^2 Value	df	p-value	Significance
Education Level	18.42	3	<0.001	Significant
Household Income	24.67	2	<0.001	Significant
Gender of Household Head	2.13	1	0.144	Not significant
Age of Household Head	3.54	2	0.171	Not significant

Logistic Regression Results: Binary logistic regression model was applied to determine the likelihood of open defecation. The dependent variable used was sanitation behaviour (0 = latrine, 1 = open defecation). The independent variables were education level, income and cultural beliefs. The model was statistically significant (kh2 = 42.56, $p < 0.001$), indicating a good fit.

i. Income: Households with incomes of less than N20,000 were 4.3 times more likely to practice open defecation when compared to households with incomes of above N50,000 (OR = 4.3; 95% CI: 2.1-8.6).
ii. Education: people who had no formal education were 3.7 times more likely to defecate openly than those with secondary level or above (OR = 3.7; 95% CI: 1.9-7.1).
iii. Cultural Beliefs: Households that believed in traditional stereotypes of open defecation as "natural" or "healthier" were 2.8-times more likely to continue open defecation than those who rejected such beliefs (OR = 2.8; 95% CI: 1.4-5.4).

Table 6: logistic regression predicting likelihood of open defecation

Predictor Variable Odds ratio (OR) 95% CI p-value Significance

Household Income (less than N20,000) 4.3 2.1 - 8.6 <0.001 Significant

Education (No formal) 3.7 1.9-7.1 <0.001 Significant

Cultural Beliefs (Traditional perception) 2.8 1.4 - 5.4 0.002 Significant

4.6 Discussion

The statistical evidence corroborated previous descriptive observations as it suggested that poverty, low level of education and deeply entrenched cultural norms had a strong effect on sanitation practices in rural Abuja. The results were aligned with international studies (WHO, 2023; UNICEF, 2022) that shows poverty and cultural resistance as important obstacles for achieving SDG 6 (Clean Water and Sanitation) in low-income regions.

Income was the most important predictor of sanitation behavior, which confirms that financial factors are still a major impediment to adoption of improved sanitation facilities. Additionally, the persistence of cultural beliefs was evidence that behavioural change interventions were challenging. Furthermore, resistance based on social norms and perceptions often stood in the way of toilet adoption even when families had some financial resources. This finding is consistent with the Social Norms Theory, which posits that collective community norms are an important mechanism for regulating behavior.

The logistic regression and chi square analyses provided a strong empirical basis indicating that poverty and cultural outlook were the most significant determinants of open defecation behaviour. Addressing these issues requires not only investments in infrastructure for low-cost sanitation but also programmes for behavioural change at a community level that are focused on challenging long-held cultural norms.

The findings support other research (Osumanu et al., 2021; WaterAid, 2022) which have shown the intersection of poverty, culture and history as factors in the perpetuation of open defecation. This study also shows that SDG 3 (Good Health and Well-being) and SDG 6 (Clean Water and Sanitation) are at great risk to the rural people of Abuja as a result of the continued unsafe sanitation practices.

In line with Behavioural Change Theories, interventions must take into account both infrastructure provision and cultural attitudes and affordability issues. Attempts by the government, like the "Clean Nigeria: Use the Toilet" campaign, have not yielded much impact as there has been a lack of engagement with the communities and lack of financial support mechanisms.

5.0 Conclusion and Recommendation

The reason for this study was to investigate the constraints to SDGs 3 (Good Health and Well-being) and 6 (Clean Water and Sanitation) by understanding the historical, cultural and poverty-related reasons for open defecation in rural Abuja, Nigeria. The findings conclude that open defecation continues to prevail not only because of a lack of infrastructural facilities but also as a result of long established cultural practices, economic limitations brought about by poverty and weak law enforcement. Historical patterns of tolerance for open defecation are superimposed over poverty and so households are unable to afford to build or maintain sanitation facilities. Additionally, cultural norms around hygiene, privacy, and community identity reinforce this practice. With this, Nigeria is lagging behind in achieving the SDGs; especially those in the rural areas where access to basic sanitary facilities is not well-founded.

6.0 Recommendations

i. Policy and Infrastructure Development: Both federal and local bodies should invest in improving rural sanitation programs via subsidies, grants, and community-led toilet building.
ii. Cultural Reorientation Campaigns: Targeted behaviour change communication strategies need to be designed in collaboration with traditional and religious leaders so that age-old cultural beliefs supporting open defecation are contested.
iii. Poverty Alleviation Measures: Since affordability is an important constraint, incorporating access to sanitation into broader poverty reduction programs (microcredit, conditional cash transfers, housing) will help to reduce sanitation-related inequalities.
iv. Community Ownership: Community-Led Total Sanitation (CLTS) approaches should be reinforced to ensure local ownership and responsibility.
v. Policy Enforcement: Current laws on environmental and public health should be enforced, with punishments for open defecation, while making sure that there are other sanitation options available.

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7.0 Contribution to Knowledge

This research contributes to the growing literature on sanitation and sustainable development in a number of ways:

i. It highlights the nexus of historical drivers, cultural values and poverty in the perpetuation of open defecation in rural Nigerian communities, which is often overlooked in sanitation policy discourses.
ii. This paper provides empirical evidence from rural Abuja, and uses this to provide localised evidence that can be used underpinning tailored interventions rather than generic policies being applied.
iii. By setting open defecation in the context of the broader context of SDG 3 and 6, the study makes it clear that sanitation is a multi-faceted problem that affects both human health and the sustainability of the environment.
iv. These results add to the theoretical knowledge of the Health Belief Model and Social Determinants of Health Theory in the study of sanitation behaviours in developing contexts.

8.0 Areas for Further Research

i. A comparative study of city and rural areas of Abuja to explore differences in sanitary practices and impact of policies.
ii. Long-term investigations that track sanitation behavior changes over time that are linked to poverty reduction initiatives.
iii. Gendered Research: Examining the role gender has to play in understanding why poor sanitation affects women and girls more in rural areas.
iv. How environmental degradation and climate change increase sanitation challenges
v. A study to test the effectiveness of cultural reorientation and Community Led Total Sanitation (CLTS) interventions in rural Nigeria

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