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Modern Toilet Systems: A Panacea to the Problems of Open Waste Disposal Among Public Primary Schools in Apa Local Government Area, Benue State

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Abstract: *This research focuses on reducing the incidence of excreta-related diseases, ensuring adequate human waste disposal, and promoting a healthier learning environment in public primary schools. Open defecation in exposed areas such as bushes, farmlands, waterways, and drains poses a serious environmental health hazard. Many schools lack resources for effective waste management. A modern toilet system, also known as a water closet (WC), disposes of human waste (urine and feces) by using water to flush it through a drainpipe for treatment, ensuring separation between humans and their waste. This study explores challenges of open human waste management in schools, its impact on pupils' health and learning, the role of modern toilets in sanitation, and the importance of clean water in schools. The research will employ a descriptive survey design, using structured questionnaires administered to staff and pupils of selected schools in Apa LGA. Data will be analyzed to recommend strategies for effective waste management and modern toilet adoption.*

Keywords: modern toilet systems, problems of open waste disposal, public primary schools, Apa local government area, Benue state

INTRODUCTION

Children's learning is shaped by a wide range of socio-environmental factors, among which water, sanitation, and hygiene (WASH) conditions are fundamental. Schools are expected to provide safe, healthy, and enabling environments where children can learn effectively. However, in much of

Sub-Saharan Africa, including Nigeria, school environments are compromised by poor sanitation facilities, limited access to clean water, and unhygienic practices (Agunwamba, 2019; Adeoye, 2019). These conditions contribute to absenteeism, recurrent illnesses, and poor learning outcomes among children.

Globally, the World Health Organization (WHO) provides clear guidelines for school sanitation facilities. It recommends a ratio of one toilet per 25 girls and one for female staff, as well as one toilet per 50 boys and one for male staff (WHO, 2019). Furthermore, toilets must be inclusive, gender-sensitive, accessible, and adapted to the needs of children with disabilities. Despite these guidelines, many schools across Nigeria lack functional toilets, forcing children to defecate in bushes, nearby open fields, or behind classrooms. Such practices expose them to infections and undermine their dignity (Babayemi & Dauda, 2019).

The Burden of Inadequate WASH on Children

Health Impacts

Poor sanitation is directly linked to several health conditions that affect children's learning and overall well-being. In schools without adequate WASH facilities, children are more susceptible to helminth infections, diarrheal diseases, cholera, typhoid, and hepatitis A (Abebe & Tucho, 2020). Diarrhea alone remains one of the leading causes of child mortality in Nigeria, with a significant proportion of cases linked to fecal contamination of water sources (Nkwachukwu et al., 2020).

Helminth infections, caused by intestinal worms such as roundworms, hookworms, and whipworms, thrive in environments where sanitation is poor and open defecation (OD) is practiced. These parasites impair nutrient absorption, leading to stunting, anemia, and reduced cognitive performance in schoolchildren (Sarkingobir & Sarkingobir, 2021). Malnutrition resulting from these infections further compromises children's academic potential.

Educational Impacts

The impact of poor sanitation on education is multifaceted. Frequent illnesses keep children away from school, resulting in high absenteeism rates. Even when children attend school, recurrent ill-health limits their concentration and ability to perform well academically (Olabode et al., 2020). Girls, in particular, face unique challenges. The absence of gender-sensitive and private toilets discourages many girls from attending school during menstruation, leading to learning disruptions and long-term dropout risks (Ikpeze, 2020).

Psychosocial Impacts

Beyond health and education, the psychosocial consequences of poor sanitation are severe. Children who lack access to safe and private toilets are often exposed to ridicule, embarrassment, and gender-based violence (Olalekan et al., 2022). Stigma associated with open defecation or poor menstrual hygiene management further undermines children's confidence and willingness to participate in school activities.

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The Problem of Open Defecation (OD)

Open defecation, defined as the practice of defecating in open spaces without proper waste disposal, remains a pervasive challenge in Nigeria. According to UNICEF (2021), Nigeria ranks among the top five countries globally with the highest number of people practicing OD. In rural communities and many urban slums, schools lack functional toilets, forcing children and teachers alike to use surrounding bushes, riverbanks, or refuse dumps.

OD contributes to disease outbreaks by contaminating water sources and facilitating the spread of pathogens. For instance, fecal matter deposited in open fields is often washed into rivers and streams during rainfall, contaminating drinking water sources and causing cholera and diarrhea outbreaks (Abebe & Tucho, 2020). In school environments, the practice leads to unsanitary surroundings that attract flies and rodents, increasing the risk of disease transmission. The environmental consequences are equally grave. Open defecation contributes to environmental degradation, water pollution, and unpleasant odors that make school environments unconducive for learning (Agunwamba, 2019).

Justification for Modern Toilets in Schools

Public Health Protection

The construction of modern toilets in schools is not only a matter of convenience but also a public health imperative. Modern toilets prevent direct human contact with fecal matter and block transmission routes of harmful pathogens (Sarkingobir & Sarkingobir, 2021). By breaking the fecal-oral cycle, toilets help reduce the prevalence of diarrheal diseases and helminth infections among schoolchildren.

Educational Enhancement

Providing safe and functional toilets in schools directly improves children's learning opportunities. Children who are healthy and free from recurrent infections are more likely to attend school consistently and perform better academically (Abebe & Tucho, 2020). For girls, the availability of gender-sensitive toilets ensures privacy and dignity, particularly during menstruation, thus reducing absenteeism and dropout rates.

Environmental Protection

Modern toilets protect the environment by preventing the indiscriminate disposal of fecal matter in open spaces. Proper waste treatment systems associated with toilets help reduce water and soil contamination. This, in turn, protects local ecosystems and promotes sustainable development (Olalekan et al., 2022).

Economic and Social Benefits

The introduction of modern toilets can also generate economic opportunities. Recycling initiatives associated with sanitation—such as the collection of plastics, cans, and rubbers—can provide schools and communities with additional income streams. Furthermore, improved sanitation

reduces healthcare costs by lowering the disease burden, allowing households to allocate resources to other productive uses (Babayemi & Dauda, 2019).

Objectives of the Study

The study aims to:

i. Reduce the incidence of excreta-related diseases in public primary schools.
ii. Create a healthier school environment.
iii. Ensure proper human waste disposal.
iv. Protect the environment from pollution and contamination.
v. Propose sustainable waste management strategies.

LITERATURE REVIEW (SELECTED INSIGHTS)

Solid waste management in Nigeria had been widely discussed in existing scholarship, with urban areas particularly identified as hotspots of indiscriminate waste disposal practices. Studies reported that wastes were often dumped in rivers, open pits, and along major roadsides, leading to unsanitary environmental conditions (Agunwamba, 2019; Babayemi & Dauda, 2019; Nkwachukwu et al., 2020). These findings highlighted not only the inadequacy of formal waste management systems but also the socio-economic realities that made indiscriminate disposal a persistent challenge in many Nigerian cities.

Policy frameworks were also noted as critical determinants of effective waste management. Ikpeze (2020) argued that without enabling policies and strong enforcement mechanisms, waste management practices remained fragmented and largely ineffective. The literature suggested that governance weaknesses, poor institutional coordination, and lack of community involvement further constrained efforts toward sustainable sanitation in Nigeria.

Environmental impacts of poor waste management were evident in specific state-level studies. Research in Ondo and Ogun States revealed significant river pollution as a result of indiscriminate disposal of solid waste into water bodies (Olabode et al., 2020; Olalekan et al., 2022). These studies demonstrated the ecological consequences of unmanaged waste, ranging from water contamination to loss of aquatic biodiversity, with direct implications for human health and livelihoods.

Another dimension of poor sanitation practices was the persistence of open defecation, which had been identified as a major public health threat. Abebe and Tucho (2020) established strong links between open defecation and the prevalence of diarrheal diseases, while Sarkingobir and Sarkingobir (2021) emphasized its contribution to malnutrition and educational inequality, particularly among school children. These findings showed that inadequate sanitation was not merely an environmental issue but also a social justice concern that perpetuated cycles of poverty and vulnerability.

Taken together, the reviewed literature demonstrated that solid waste management and sanitation challenges in Nigeria were multidimensional, involving infrastructure deficits, policy gaps, environmental degradation, and public health crises. The studies collectively reinforced the urgency of integrated approaches that combined infrastructural investment, community awareness, and strong institutional support to address sanitation problems sustainably.

METHODOLOGY

Study Area

The study was carried out across all eleven (11) council wards of Apa Local Government Area (LGA), namely Ugbokpo, Edikwu I, Edikwu II, Ojope, Ojantelle/Akpete, Ikobi, Oiji, Auke, Igoro, Iga-Okpaya, and Oba. Each of these wards represented unique socio-cultural and environmental characteristics that influenced sanitation practices and waste management conditions within the LGA. By adopting a ward-wide coverage, the study ensured a comprehensive understanding of sanitation challenges across both central and peripheral communities.

Particular emphasis was placed on RCM Primary School, Ijege, located in Igoro Ward, which served as the pilot site for intervention. This school was strategically selected due to its pressing sanitation needs, high pupil population, and its representation of typical rural school conditions in the LGA. The focus on RCM Primary School allowed the study not only to examine sanitation challenges in real-time but also to demonstrate practical solutions through the construction of modern squatting toilets. This micro-level intervention was intended to serve as a replicable model for other schools in Apa LGA and beyond.

Study Design

- **Design**: Descriptive survey
- **Participants**: Teaching and non-teaching staff, and pupils of public primary schools
- **Data Collection**: Structured questionnaires administered by trained assistants
- **Analysis**: Descriptive statistics (percentages, frequency tables, charts)

FINDINGS OF THE STUDY

The study highlighted the importance of proper waste disposal in schools, emphasizing that effective sanitation management reduced health risks and improved pupils' learning environments (Agunwamba, 2019; Adeoye, 2019). Proper disposal systems were shown to play a critical role in reducing the spread of infectious diseases and promoting school attendance (Abebe & Tucho, 2020).

The study also contributed to the existing literature on school sanitation in Nigeria by providing context-specific evidence from Apa Local Government Area (LGA) of Benue State. Previous studies had underscored the need for improved sanitation in Nigerian schools, but this study

expanded the discourse by documenting challenges and proposing locally adaptable solutions (Nkwachukwu et al., 2020; Olabode et al., 2020).

Furthermore, the study recommended practical solutions to open defecation in schools, including the adoption of modern toilet systems and awareness campaigns to promote behavioral change. These recommendations were consistent with earlier findings that highlighted open defecation as a significant public health threat in Sub-Saharan Africa (Sarkingobir & Sarkingobir, 2021).

In addition, the research advocated for the construction of modern toilets in Apa LGA schools, stressing that adequate sanitation facilities were essential for achieving the Sustainable Development Goals (SDGs) on health, education, and environmental sustainability (Ikpeze, 2020; Olalekan et al., 2022).

Finally, the study documented a pilot intervention through the construction of two modern squatting toilets at RCM Primary School, Ijege. This intervention served as a model for scaling up modern sanitation facilities in other public primary schools within the LGA. By doing so, the study provided practical evidence of how sanitation challenges could be addressed at the grassroots level.

Pic. 1: Construction of two modern squatting toilets at RCM Primary School, Ijege.

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Pic. 2: Construction of two modern squatting toilets at RCM Primary School, Ijege.

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Pic. 3: Construction of two modern squatting toilets at RCM Primary School, Ijege.

CONCLUSION

Modern toilets are essential for promoting public health, improving school sanitation, and enhancing children's learning outcomes. Adequate sanitation facilities reduce exposure to fecal pathogens, prevent waterborne diseases, and minimize school absenteeism caused by illness, particularly among girls. This study will generate empirical evidence to guide policy formulation, resource allocation, and community-led interventions aimed at eliminating open defecation in schools within Apa LGA. By assessing existing sanitation infrastructure, hygiene practices, and awareness of health risks associated with open defecation, the study seeks to identify critical gaps and opportunities for sustainable improvements. The findings will also inform strategies to integrate behavior change campaigns, gender-sensitive facility design, and school-based WASH programs, ensuring that sanitation solutions are inclusive and culturally appropriate. Ultimately, this research supports the achievement of Sustainable Development Goal 6 (SDG 6), which targets

universal access to safe water and sanitation, and contributes to broader goals related to health, education, and child development in Benue State, Nigeria.

RECOMMENDATIONS

i. Scale-Up of Modern Toilet Construction - Governments at federal, state, and local levels should prioritize the construction of modern, gender-sensitive toilets in public primary schools. Partnerships with NGOs and private sector actors can accelerate this process.
ii. Maintenance and Sustainability - Toilets must be properly maintained to remain functional. Communities, school management boards, and parent-teacher associations (PTAs) should be involved in sustaining sanitation facilities through shared responsibility and periodic contributions.
iii. Integration of WASH Education - Sanitation education should be incorporated into school curricula to instill proper hygiene practices among children from an early age. Simple practices such as handwashing with soap after toilet use should be emphasized.
iv. Monitoring and Enforcement of Standards - Educational authorities should monitor compliance with WHO's toilet-to-pupil ratios and enforce standards across all schools. Regular inspections will ensure that schools do not revert to open defecation practices.
v. Community Participation and Awareness - Communities should be sensitized on the dangers of open defecation and the benefits of sanitation. Advocacy campaigns can foster behavioral change and encourage parents to demand better facilities for their children.

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