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THE CONSEQUENCES OF OPEN DEFECATION PRACTICE IN SOUTH EAST, NIGERIA

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ABSTRACT: This study investigated the consequences of open defecation practices in Southeast Nigeria utilizing a mixed-methods research design. Quantitative data were collected through questionnaires distributed among a broad adult population, while qualitative insights were obtained via in-depth interviews with community stakeholders. This study focused on six communities in the states of Ebonyi, Enugu, and Imo, which were identified as highly affected by open defecation according to the 2019 UNICEF report and the 2011 Multi-Indicator Cluster Survey. A sample size of 1,049 was determined using Taro Yamane's formula, and a multistage cluster sampling technique was employed. Data collection involved structured questionnaires addressing sociodemographic factors and specific research objectives and IDIs providing detailed qualitative insights. Quantitative data were analysed using SPSS version 20, descriptive statistics and inferential statistics were applied, while qualitative data were thematically analysed. The findings revealed that open defecation significantly contributes to waterborne diseases, environmental degradation, social stigmatization, and economic burdens. It also undermines educational outcomes. The study recommended government-led public health campaigns, investment in sanitation infrastructure, and community engagement programs such as Community-Led Total Sanitation (CLTS) to promote behavioural change and improve sanitation practices.

Keywords: Open Defecation, Waterborne Diseases, Environmental Degradation, Sanitation Infrastructure, Community-Led Total Sanitation (CLTS**)**

INTRODUCTION

The issue of open defecation and its associated health consequences has scarcely come to the forefront of most scholarly works on public health matters in Sub-Saharan Africa. This is of great concern because many houses in Sub-Saharan Africa lack improved toilet facilities, leading to the widespread practice of open defecation (UNICEF/WHO, 2015). Open defecation involves the disposal of human faeces in fields, forests, open bodies of water, beaches, or other open spaces, or even with solid waste in open places. Globally, more than 2.4 billion people do not have access to basic sanitation facilities such as toilets or latrines. A recent UNICEF report (2018) indicated that 4.8 billion people worldwide do not have improved sanitation facilities. In Sub-Saharan Africa, India has the greatest number of open defecators, with 564 million people, followed by Nigeria, the most affected nation (UNICEF, 2018).

The practice of open defecation is more prevalent in rural areas than in urban areas in many developing countries, such as Indonesia (Kerstens et al., 2016), India (O'Reilly et al., 2017), Mali, and Tanzania (Gertler et al., 2015). In 2015, only 2% of the urban population practiced open defecation, while 24% of the rural population did (UNICEF/WHO, 2017). Cultural beliefs and religious practices also play significant roles in perpetuating open defecation. For instance, in rural Uttar Pradesh, India, some families demolished their indoor toilets,

preferring fields that they perceived as more hygienic and respectful for worship at home (Tiwari, 2016; WHO, 2010).

Gender dynamics further complicate the issue; in India, men are more likely to practice open defecation than women, even in households with latrines, due to safety concerns and traditional gender roles (Coffey et al., 2014). In rural East Java, Indonesia, men consider open defecation to be normal and beneficial for social interaction and physical comfort, especially when defecating in rivers (Devine & Kullymann, 2011).

In Nigeria, cultural traditions also contribute to the persistence of open defecation. In some riverine areas, such as Bayelsa State, defecation in the open environment is culturally and socially accepted and is passed down from generation to generation (Dittmer, 2009). There is a belief that latrine use causes health issues such as infections leading to infertility in women, making pit latrines appear outdated (Kar & Chamber, 2008, cited in Sample et al., 2016). This is reflective of the situation in Southeast Nigeria, where open defecation is common among rural dwellers. In Ebonyi State, for example, 45.5% of citizens defecate in bushes or open fields close to water sources. Similarly, Enugu has a percentage of 48%, Abia 1.2%, Anambra 14%, and Imo State 15.8% (Multi-Indicator Cluster Survey, 2011).

Economic barriers further exacerbate this situation. Financial constraints often lead households to prioritize other needs over sanitation, resulting in lower motivation to acquire toilets (Jekins & Scott, 2007). This economic factor has been noted as a significant deterrent to latrine adoption in countries such as India, Tanzania, Ghana, and Nigeria (Augsburg et al., 2015).

The practice of open defecation varies by location, sex, and age. Those near rivers defecate openly in or near the water, while others in mainland areas defecate on land, fields, bushes, or backyards. In some cases, human waste is disposed of in plastic bags and discarded in open places or rivers (Adebayo, 2011; Routray et al., 2015). This practice is more common among rural dwellers, males, young children, and elderly people (WHO, 2012; Demographic and Health Survey, 2010; Kirigia & Kainyu, 2000; Sara & Graham, 2014).

To combat this issue, Nigeria adopted the Community-Led Total Sanitation (CLTS) approach, first developed in Bangladesh, aimed at reducing or eliminating open defecation. This policy was piloted in Benue State in 2004 and scaled up nationally in 2008 (Water Aid, 2011). Despite these efforts, the practice persists, highlighting the need for continued research and intervention.

The practice of open defecation (OD) has severe consequences for environmental and human health in Southeast Nigeria. Open defecation, which involves disposing of human waste in public areas, water bodies, and green spaces, significantly threatens human health and dignity, particularly for women and children (UNICEF/WHO, 2015). This practice exacerbates diseases such as diarrhoea, which is the leading cause of death among children under five years of age in developing countries (WHO, 2016). Stunting, a condition where a child's height is significantly below the median for his or her age and sex, is closely linked to open defecation, leading to long-term cognitive and economic impacts (Spears, 2013; Deiwey & Begun, 2011).

In Southeast Nigeria, high prevalence rates of helminthic infections are reported, contributing to severe health issues such as diarrhoea and typhoid, particularly in rural areas lacking proper sanitation facilities (Taiwo et al., 2016; Wosu & Onyeabor, 2014). Additionally, women and girls face heightened risks of violence when accessing open defecation sites (Hoddinott et al., 2013). The environmental impact is also significant, as open defecation introduces harmful bacteria into ecosystems, adversely affecting aquatic life and overall ecosystem health (UNICEF, 2018). Despite efforts by various agencies to mitigate these issues, open defecation remains a critical public health threat in Southeast Nigeria and beyond. By exploring the correlation between open defecation and the spread of communicable diseases, the study seeks to provide evidence-based recommendations for policy interventions. The research intends to contribute to the understanding of how open defecation affects vulnerable populations and to advocate for sustainable sanitation solutions tailored to the region's unique challenges.

Study objectives

The main objective of this study was to examine the consequences of open defecation practices in Southeast Nigeria.

Research Hypothesis

There is a significant relationship between death in children under 5 years of age and adults alike and open defecation-related diseases in Southeast Nigeria.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Conceptual Issues

Open Defecation

Open defecation involves the disposal of human waste in garbage bins, water bodies, public areas, forests/bushes, farmlands or other open and green spaces (UNICEF/WHO 2015). This practice contaminates food and water. For instance, Choffins and Mark (2014) affirmed that feces and other infectious agents can spread to human beings through fluids, fingers, flies, fields and floors in which people defecate and/or grow crops, and this can be transmitted and contaminate food when hands are not properly washed and keep food in non-hygienic conditions where fingers, fluids and flies contaminate them (WASH APPROACH, 2014).

In a bid to tackle this public health menace in Nigeria, the Community-Led Total Sanitation (CTLS) approach was adopted in 2004 to assist in the reduction or even elimination of the practice in Nigeria. This approach, however, has helped reduce open defecation practices in communities that effectively implemented the policy despite some inherent challenges related to social norms and contextual factors. (Water Aid, 2011).

Regional Studies of Open Defecation within Nigeria

Open defecation remains a prevalent problem in Nigeria, with major disparities across different regions. The North Central and North East regions, where sanitation infrastructure is most lacking, have the highest prevalence rates. In contrast, the South West has seen

improvements due to targeted interventions such as the Community-Led Total Sanitation (CLTS) ap), in proach (Ekpo, Odewale, & Adekunle, 2021). According to Adeyeye and Oyewole (2021 2019, the Nigerian government launched the "Clean Nigeria: Use the Toilet" campaign, which aimed to end open defecation by 2025. This program builds on earlier initiatives by encouraging state-level participation and public-private partnerships.

The authors however, identified some key challenges militating against the achievement of this ambitious target. They include:

a) Infrastructure Deficit: One of the primary challenges is the lack of adequate sanitation infrastructure, particularly in rural areas. Many communities lack basic latrines and access to clean water, making it difficult to shift away from open defecation.
b) Cultural Barriers: The practice of open defecation is deeply embedded in the socio-cultural habits of some Nigerian communities. The authors note that in many areas, open defecation is not seen as problematic, which presents a challenge for behavior change interventions.
c) Funding Gaps: The funding requirements needed to build sanitation infrastructure, provide education on proper sanitation, and maintain existing facilities has been grossly inadequate. There is a lack of consistent financial investment from both public and private sectors.
d) Policy Implementation: Weak enforcement of sanitation policies is another challenge. While policies exist on paper, their implementation at the local level is often ineffective due to bureaucracy and lack of political will.

They authors also highlighted the potential for success as follows:

1. Community-Led Total Sanitation (CLTS): The authors highlight the potential of the CLTS approach, which empowers communities to take ownership of sanitation issues. This approach has proven successful in parts of South West Nigeria and could be scaled up nationwide.
2. Public-Private Partnerships: Strengthening collaborations between government and private sector players could help bridge funding gaps. The paper suggests that private entities can play a critical role in providing low-cost sanitation solutions and improving access to toilets in underserved areas.
3. Behavioural Change Campaigns: Public awareness and education campaigns that focus on the health risks of open defecation and the importance of hygiene are essential. The authors suggest using local leaders and influencers to spread these messages effectively.

Consequences of Open Defecation Practice

People may choose fields, bushes, forests, ditches, streets, canals or other open spaces for defecation. They do so either because they do not have a readily accessible toilet or because of traditional/cultural or any other determining factors (Conserve energy future report, 2022). If the act of defecation is left in the open, these are often carried by fluid (water), flies, fingers and fields and infect another person through the faecal-oral route. Even hookworms that enter the body through unprotected feet have a direct link with this kind of defecation practice (World Bank Report, 2012). According to the UNICEF (2013) report, 48% of Indian children are stunted as a result of intestinal worm attack that is passed through human refuse

to children, thereby causing loss of appetite and leading to malnutrition among under five (5) children. (Conserve Energy Future Report, 2022). Menstrual hygiene is also challenging for women who do not have access to improved toilet facilities, leading to contracting reproductive tract infections (Dasgupta & Sarkar, 2008; Dhingra, Kumar & Kour, 2009; Water Aid, 2009). This situation, as opined by Coffery and Gerusso in the long run, affects their human capital accumulation.

Other open defecation-related diseases, such as diarrhoea, cholera, dysentery, typhoid, hookworm, and other waterborne diseases, are the leading causes of under-five (5) deaths among children in developing countries such as India, Brazil and Nigeria. (Moor, 2001; WHO, 2016). The long-term consequences of childhood stunting include adverse effects on long-term development, poor school achievement, and poor economies (Deiwey & Begun, 2011). Approximately 1800 Nigerians, including 87,000 children under 5 years, die each year from diarrhoea and nearly 90% of deaths are directly attributed to water sanitation and hygiene factors. The adverse impact of open defecation can be judged by the fact that one gram of faeces contains 10,000,000 viruses, 1,000,000 bacteria, 1,000 parasite cysts and 100 parasite eggs and pathogens (World Bank Report, 2012). Children who are exposed to more faecal germs emanating from open defecation have stunted growth, which is defined as a height that is two or more standard deviations below the normal height of a child for his/her age and sex (UNICEF, 2013). In Edo, Ikado, Ilepa, Iyometa and Orun-un in Ikare-Akoko in Ondo State, southwestern Nigeria, open defecation practices contaminate the drinking water of the community, resulting in acute watery diarrhoea in infants and young children (Begum 2005, Kinge and Mbekwe, 2010). The situation is not far-fetched in some peri-urban communities of South East Nigeria,such as Abakaliki (Ezzangbo), Awka (Amawbia), Enugu (Ngwo) Owerri (Egbu), Umuahia (Ibeku), Okigwe (Uturu), Orlu (Nkwerre), Onitsha (Ogidi), Aba (Umungasi) and Nnewi (Nnobi). It was established that in these peri-urban communities, the level of open defecation is very high, resulting in a high rate of waterborne diseases such as cholera, typhoid and dysentery among the children, as most of the practices are performed close to water bodies (Okedi, 2011 and Onyegocha 2013 cited in Ezenwaji, Ahiadu and Eduputa, 2015).

Review of the Empirical Literature

The impact of open defecation on human health is no doubt enormous across developing countries worldwide. In a study in Polempur village, Western Bengal, India, by Saikat Dey (2018) on the causes and consequences of open defecation and improper sanitation, using a community-based cross-sectional survey with 520 respondents, it was revealed that a large proportion of the villagers suffer due to a lack of access to improved sanitation facilities and defecation in the open region. This generates a large number of flies that act as carriers and spread several types of infections as well as hookworm infections, leading to typhoid (2.6%), diarrhoea (20%), cholera (3%), dysentery (50%), hookworm (6%) and urinary tract infections, mostly by women during their monthly menstruation (17%).

In Nigeria, a cross-sectional study by Fagbamigbe (2017) among households with under five (5) children and 294 respondents showed a clear picture of households with unimproved water sources, and more than half of the households did not have improved toilet systems, making open defecation prevalent, with the Northeast (68.6%) having the greatest percentage compared with the Southwest (9.0%) having the least. The incidence of diarrhoea was significantly greater among rural households than among urban households. Another study by

Taiwo and Sam-Wobo (2016) on the spatial distribution of helminthic infections in Nigeria (2005-2015) and the need for attitudinal and behavioural changes in water sanitation and hygiene intervention using a qualitative report from water sanitation and hygiene (WASH) revealed that the prevalence of intestinal helminths in the country is increasing. Ascaris Lumbricoides is prevalent in the south–west (21%) and south–south (13%) regions. Hookworms are increasing in the southeastern region (19%), while multiple infections are highly prevalent in the north-eastern, north-central and north-western regions (25% in the north-central region and 19% in the north-western and north-eastern regions, respectively).

Theoretical Framework

The Theory of Planned Behaviour

The theory of planned behaviour (TPB) is one of the most widely cited behavioural theories. It is a closely interrelated family of theories that adopts a cognitive approach to explaining behaviour that centres on individuals' attitudes and beliefs. The TPB (Ajzen 1985, 1991; Ajzen and Madden 1986) evolved from the theory of reasoned action (Fishbein & Ajzen 1975), which posited that intention to act is the best predictor of behaviour. Intention is itself an outcome of the combination of attitudes towards behaviour. That is, the positive or negative assessment of the behaviour and its expected results and certain subjective norms, which are the social pressures on individuals resulting from their intention to comply with those things such as open defecation practice.

In relation to this study, the planners of safe excreta campaigns had in mind the kind of behavioural change they expected upon execution of the campaigns. Since it is understood that safe excreta practices among rural people are a function of their beliefs and attitudes, the campaigns were targeted at the people's beliefs and attitudes. It is assumed that intention in itself is an outcome of the combination of attitudes towards behaviour. These assumptions, which might be positive or negative evaluations of the behaviour with its expected outcomes, are products of social pressures (sociocultural and socioeconomic factors) exerted on individuals resulting from their perceptions of what others think they should not or practice, such as open defecation and their inclination or feelings to comply with the pressures. In essence, this theory helps us to understand that open defecation practices are a combination of sociocultural/economic factors influenced by the beliefs and attitudes of individuals.

However, this theory of planned behaviour or reasoned action ignores the fact that every behaviour is not always under rational control and the impact of past behaviours (Stroebe, 2002). The planned behaviour or reasoned action theory ignores the fact that some environmental factors, such as the nature of an environment one lives, can predispose the individual to certain behaviours, such as open defecation in rivers and streams as no land space to construct toilet facilities (Stroebe, 2002). While the theory places more emphasis on behavioural intention and recognizes the place of intervening behaviour (behavioural control such as shame/embarrassment and gender role change), which influences open defecation practices; it places less emphasis on the sociocultural influence and level of awareness of the individual, which influences open defecation behaviour change measures in rural areas that are generally observed to be essential as change approaches (Ajazen & Diver, 1991).

METHODOLOGY

The study used a mixed methods research design, incorporating both quantitative and qualitative approaches. Questionnaires were used to collect quantitative data from a broad adult population, while in-depth interviews with community stakeholders provided qualitative insights into community health issues. The study targeted a population of 19,050 individuals from six selected communities, chosen for their high prevalence of open defecation. The selection was based on a combination of simple random and purposive sampling techniques, influenced by UNICEF's 2019 report on water, sanitation, and hygiene in the region. The study was confined to the states of Ebonyi, Enugu, and Imo, which are identified as the most affected by open defecation according to the 2011 Multi-Indicator Cluster Survey (MICS). A sample size of 1,049 was determined using Taro Yamane's formula.

$$n = \frac{N}{I+N(e)^2}$$

Where; n = the sampling size,

N= Target population

e= error of sample (it could be 0.10 down to 0.01)

I= constant

n = 19,050

Therefore, $1+\frac{19050(0.03)^2}{1+19050(0.0009)}$

$$= \frac{19050}{1+17.145} = \frac{19050}{18.15} = 1049$$

A multistage cluster sampling technique involving simple random and systematic sampling was employed to select urban and rural areas, communities, and households. The study focused on adults, particularly males, who had lived in the community for at least three years. The data were collected using structured questionnaires and in-depth interviews (IDIs). The questionnaire addressed sociodemographic factors and specific research objectives, while the IDIs provided detailed qualitative insights. The questionnaires were distributed with the help of trained research assistants, while the researcher conducted IDIs with assistance. The responses were recorded digitally and through notetaking. Quantitative data were analysed using SPSS version 20, employing descriptive statistics (frequency and percentage tables) and inferential statistics (chi-square tests). Qualitative data were analysed thematically, focusing on comments addressing the research objective and eliminating irrelevant data.

RESULTS AND DISCUSSIONS

Sociodemographic Characteristics of the Respondents

The sociodemographic information of the respondents, such as sex, age, educational attainment, marital status, place of residence, occupation, annual income, and religious affiliation, was statistically analysed using the data obtained from the survey. The information is presented in the table.

Items 1–8 of the questionnaire were used to analyse the respondents' sociodemographic characteristics. The findings are presented in Table 1.

Table 1: Sociodemographic Characteristics of the Respondents

Description	Demographic Variables	Frequency	Percentage (%)
Gender	Male	770	83.3
	Female	156	16.8
	Total	**926**	**100**
Age	18 – 22	148	11.1
	23 – 27	148	12.5
	28 – 32	75	8.1
	33 – 37	318	34.3
	38 – 42	155	16.7
	43 – 47	75	8.1
	48 – 52	77	8.3
	53 and Above	7	.8
	Total	**926**	**100**
Educational attainment	None	7	.8
	Vocational	88	9.5
	Primary	467	50.4
	Secondary	202	21.8
	Tertiary	162	17.5
	Total	**926**	**100**
Marital Status	Married	614	66.3
	Single/Never married	216	23.3
	Separated	7	.8
	Divorced	75	8.1
	Widowed	14	1.5
	Total	**926**	**100**
Place of Residence	Rural/riverine	563	60.7
	Urban/Slum	364	39.3
	Total	**926**	**100**
Occupation	Retired	14	1.5
	Farming/hunting/fishing	467	50.4
	Trading	61	6.6
	Paid employment	148	16.0
	Artisan	88	9,5
	Student	148	16.0
	Total	**926**	**100**
Annual Income	No income	229	24.7
	Below N300,000	102	11.0
	N300,000 – N500.000	588	63.5

	N600,000 – N800 – 000	7	,8
	N900,000 and Above	0	0
	Total	**926**	**100**
Religious Affiliation	Christianity	526	56.8
	Islam	0	0
	African Traditional Religion	400	43.2
	Total	**926**	**100**

Field survey: 2023

Table 1 shows the sociodemographic characteristics of the respondents. The table shows that 770(83.3%) patients were males, while the remaining patients were females. For age, the table shows that 318(34.4%) were 33-37 years of age; 467 (50.4%) were primary school holders, while 7(8%) had no form of education. It can also be observed that 614(66.3%) were married, while 7(8%) were separated from marriage. In terms of place of residence, the study shows that 564(60.7%) reside in rural/riverine areas, and the rest reside in cities. This implies that the population is mostly rural/riverine residents, suggesting that some of the places considered urban do not actually qualify as urban centres. The table also shows that 467(50.4%) were farmers, while 14(1.5%) were civil service retirees. It can also be observed that 588(63.5%) earned 300,000 to 500,000 annually, while none of the respondents earned up to a million naira in a year. The income data imply that a majority of the respondents are at or below average poverty levels. Finally, in terms of religious affiliation, 526(56.8%) respondents were Christians, while the remaining respondents were traditional religious worshippers. This implies that a majority of the respondents are Christians, as the Southeast Region is mostly populated by Christians of different denominations.

Results

What are the consequences of open defecation in Southeast Nigeria? Items 36–42 of the questionnaire were used to answer this research question.

First, the respondents were asked if open defecation was associated with disease. The responses are presented in Table 2.

Table 2: Whether Open Defecation is Associated with Disease

Variable	Frequency	Percentage
Yes	456	67.5
No	220	32.5
Total	**676**	**100**

Field survey: 2023

Table 2 shows that 456(67.5%) respondents said yes that there were diseases associated with open defecation. However, 220(32.5%) said no. This implies that perhaps some of the diseases that suffered within the study area were a result of open defecation practices. The quantitative data provided a divergent opinion stated thus…

> *One thing with being sick or ill is that everything around the person will certainly be affected in one way or the other; open defection leads to*

> *contamination of water and air, which could lead to the spread of disease* (Female, Trader, 56 years of Age, Urban Resident).

Another respondent stated,

> *"Well to be sick is not usually a pleasant experience; I can't truly say if open defecation causes disease, but somehow it might cause it, though there are several other causes, such as malnutrition* **(**Male, Building Engineer, 48 years of Age, Urban resident).

Second, the respondents were asked about the types of diseases caused by open defecation. The responses are shown in Figure 1.

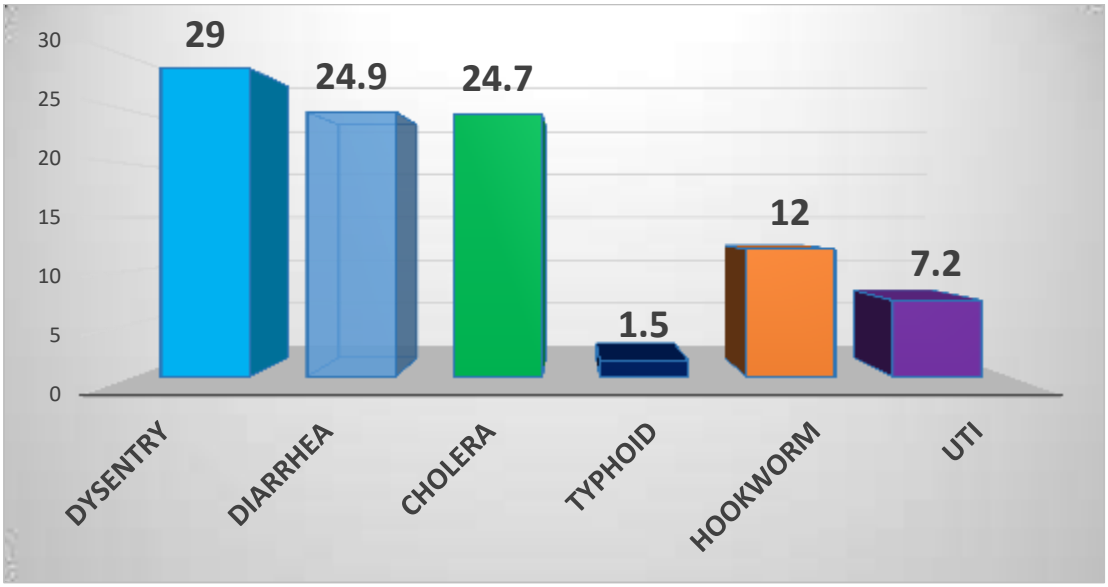

Fig 1: Diseases caused by open defecation

Figure 1 shows that 29% of the respondents identified dysentery as the major disease caused by open defecation, while 1.5% identified typhoid. This implies that open defecation results in certain diseases in addition to dysentery, and this practice is also associated with diarrhoea and cholera. The quantitative data provided more information on the aspects of the diseases.

> *I think there are many diseases this open defecation practice might cause, such as diarrhoea, cholera, and possibly other sicknesses, for which I don't know their names. The practice of open defecation is just so wrong, but people are still doing it sadly* (Male, Artisan, 33 years of Age, Rural Resident).

Another respondent stated the following:

> *Open defecation is not a good practice even if I may not know the particular disease name, but I know it causes disease and that's for sure (Male, Artisan, 38 years of age, urban resident).*

The respondents were asked if open defecation-associated disease leads to low productivity. The responses are presented in Table 3.

Table 3: Diseases Associated with Open Defecation Reduces Productivity

Variable	Frequency	Percentage
Yes	428	63.3
No	204	30.2
I don't Know	44	6.5
Total	**676**	**100**

Field survey: 2023

Table 3 shows that 428(63.3%) of the respondents said yes that open defection reduces their productivity, while 44(6.5%) said no it does not reduce productivity. The qualitative data produced a divergent opinion. A respondent stated thus…

> *One thing with being sick or ill is that everything around the person will certainly be affected in one way or the other, so I can say it affects the productivity of the person* (Females, Trader, 56 years of Age, Urban Resident).

Another respondent stated thus…

> *Well-to-be sick is not usually a pleasant experience; I can't truly say if disease caused by open defecation leads to low productivity, but diseases cause sickness normally* **(**male, building engineer, 48 years of age, urban resident).

This study further sought to understand other consequences of open defecation practices. The responses are presented in Table 4.

Table 4: Respondents by other Consequences of Open defecation

Items	***Options***	***Frequency***	***Percentage***
Open defecation causes stunted growth	Strongly Agree	29	4.3
	Agree	78	11.5
	Undecided	87	12.9
	Strongly Disagree	314	46.4
	Disagree	168	24.8
	Total	**676**	**100**
Open defecation impacts on academic performance	Strongly Agree	297	43.9
	Agree	168	24.9
	Undecided	46	6.8
	Strongly Disagree	78	11.5
	Disagree	87	12.9
	Total	**676**	**100**
Open defecation leads to rape.	Strongly Agree	468	69.2
	Agree	122	18.0
	Undecided	13	1.9

	Strongly Disagree	37	5.5
	Disagree	36	5.3
	Total	**676**	**100**
Open defecation contributes to Environmental pollution	Strongly Agree	367	54.2
	Agree	147	21.7
	Undecided	42	6.2
	Strongly Disagree	78	11.5
	Disagree	27	3.9
	Total	**676**	**100**

Field survey: 2023

Table 4 shows that 314(46.4%) disagreed that open defecation led to stunted growth, while 29(4.3%) agreed. This suggests that the respondents did not associate open defecation with stunted growth in the study area. In terms of academic performance, 297(43.9%) strongly agreed that open defection affects students' academic performance, while 78(11.5%) strongly disagreed. This finding implies that open defection affects academic performance. Perhaps this is due to late entry into schools, as pupils/students might be delayed in going to bushes or streams before preparing for school. With regard to women's susceptibility to rape, 468 (69.2%) strongly agreed that open defecation leaves women susceptible to rape, while 37(5.5%) disagreed. By implication, women who perhaps use the bush for defecation are prone to becoming rape victims.

Finally, regarding environmental pollution, 367 (54.2%) strongly agreed that open defecation leads to environmental decay, while 27(3.9%) disagreed that open defecation leads to environmental decay. This finding implies that open defecation, in addition to defacing the environment, contributes to environmental decay.

> *The qualitative data on stunted growth generally lack knowledge and accurate responses. Most of the respondents reported not being knowledgeable enough to attribute open defecation to stunted growth. For instance, a respondent stated thus…. stunted growth hmmm, I am not a medical doctor to actually say that, so I will say I don't know (female, farmer, 56 years of age, urban resident).*

Another respondent argued thus

> *I have no idea about these particular ones. I think stunted growth is caused by genetics or a lack of good nutrition (male, retiree, 78 years of age, rural resident).*

The qualitative data on academic performance support the quantitative data.

> *I think it affects academic performance truly, some of the students might not get to school early, second, I said at the beginning some of those hoodlums use the schools and other places for their act of open defecation so the students don't feel very comfortable around their school*(Male, Retiree, 78 years of Age, Rural Resident)

Thus, another respondent stated,

> *In regard to school, I am not too sure, but maybe it affects the students too. Yes, it might affect them because in our open compound, sometimes if someone is already using the toilet before the child, it means that the child will have to wait for awhile or run inside the bush before being able to defecate; as such, the student will not go to school early* (female, farmer, 56 years of age, urban resident).

The quantitative data on rape completely affirms the qualitative data with more insights.

> *Yes, this one is something I am certain and aware of very well, I know one lady the boys that smoke weed almost raped inside the bush while she went to defecate, but God saved her* (Female, Retired Teacher, 74 years of Age, Rural Resident).

Affirming the position of the first respondent, the second stated thus

> *I think there is a possibility of that happening because they are exposed to such acts by going inside the bush. You know nobody will follow them there so the bad boys can grab them. I am not aware if it has happened before, but I do know it can happen* **(**male, retiree, 78 years of age, rural resident)

Test of Hypothesis

Open defecation related diseases are most likely to be responsible for the deaths of under-five children and adult alike in South east, Nigeria.

The chi-square test was employed. The findings are presented in Table 5.

Table 5: Cross-tabulation of open defecation-related diseases and deaths of children under-five years of age

Open defecation Related Disease	Open Defecation causes under-five children death					Total	X^2
	Strongly Agree	Agree	Undecided	Strongly Disagree	Disagree		**X^2 = 597.660**
Yes	61(8.9%)	615(90.0%)	7(1.0%)	0(0%)	0(0%)	683	**(N = 926),**
No	0(0%)	0(0%)	0(0%)	0(0%)	14(8.6%)	14	
Don't know	0(0.0%)	74(32.3%)	0(0.0%0	7(3.1%)	148(64.4%)	229	**df = 8,**
Total	**61(6.6%)**	**689(74.4%)**	**7(0.8%)**	**7(0.8%)**	**162(17.5%)**	**926**	***P =.000***

The results of the test show that there is statistically significant p = .000; therefore, the hypothesis is accepted. There is, therefore, a significant difference between open defecation-related disease and the death of infants within the study area.

DISCUSSION

This study investigated the consequences of open defecation in Southeast Nigeria. The quantitative data revealed that 57.8% of the patients associated the spread of disease as a major consequence of open defecation within the study. This study revealed a positive relationship between the spread of disease and the practice of open defecation. Other studies support that open defecation causes the spread of disease. For instance, a study by Saikat Dey (2018) in Polempur village, West Bengal, India, revealed that open defecation generates a large number of flies that act as carriers and spread several types of infections, as well as hookworm infection, leading to typhoid (2.6%), diarrhoea (20%), cholera (3%), dysentery (50%), hookworm (6%) and urinary tract infections, mostly by women during their monthly menstruation (17%).

There was a negative association between open defecation and stunted growth within the study area (74.4%), whereas poor academic performance was associated with open defecation (51.2%). This study revealed a strong positive relationship between the quantitative and qualitative data on rape as a result of open defecation. Although the respondents acknowledged not having personally suffered rape, they had heard of it, and a respondent stated that she was almost raped but escaped by providence. The study also revealed a strong positive relationship between environmental pollution and open defecation (67%). The respondents stated that environmental pollution remained the major issue with open defecation, as it causes a stench on the environment, water pollution and the farms an eye saw.

Conclusion

Open defecation in Southeast Nigeria has profound and far-reaching consequences. It significantly contributes to the prevalence of waterborne diseases such as cholera and diarrhea, which exacerbate public health crises and burden the healthcare system. The environmental impact is severe, with contamination of water sources and degradation of soil quality affecting agricultural productivity. Socially, open defecation perpetuates stigma and impedes progress towards improved sanitation and hygiene standards. Economically, it incurs substantial costs through healthcare expenditures and loss of productivity due to illness. Furthermore, this practice undermines educational outcomes, as children frequently miss school due to related illnesses. Addressing open defecation requires comprehensive strategies, including robust public health campaigns, infrastructure development for sanitation facilities, and community engagement. Promoting behavioral change through education and policy enforcement is essential for mitigating these adverse effects and enhancing overall quality of life in Southeast Nigeria.

Recommendations

1. The government should launch targeted public health campaigns to educate communities about the dangers of open defecation and promote the importance of proper sanitation practices. These campaigns should involve local leaders, healthcare professionals, and educational institutions to ensure widespread awareness and engagement.
2. The government should invest in building and maintaining adequate sanitation facilities, especially in rural and underserved areas. This includes constructing toilets, ensuring

access to clean water, and providing waste management systems to prevent contamination of water sources and soil.

3. The government should foster community involvement through initiatives that encourage local ownership of sanitation projects. Implement programs that focus on behavioral change, such as community-led total sanitation (CLTS), to empower residents to take collective action to improve their sanitation practices and maintain hygienic environments.

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