



Developing a Contextualised Framework for Addressing Harmful Environmental Health Practices in Kano State Using a Classical Delphi Approach: Material and Methods

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Abstract

Nearly 1 billion people still practise open defecation globally, and a further 1.4 billion use unimproved toilet facilities (United Nation Children Fund/Water Sanitation and Hygiene). The problem is principally severe in India, where 44% of the population still practise open defecation and only 40% use improved sanitation. In sub-Saharan Africa, estimated 215 million people practice open defecation. Up to 105 million Nigerians still do not have access to safe and improve toilets facilities; and out of this figure, nearly 40 million practices open defecation in Nigeria. The overall aim of the study was to develop a contextualized framework for addressing Open Defecation (OD) in Kano State, Nigeria. The study was conducted using a mixed design by combining both quantitative and qualitative techniques. A total of 423 head of households participated in the quantitative study within six (6) LGAs in Kano State. Twelve (12) communities, twelve (12) Adult Almajirai and forty-two (42) Stakeholders participated in the qualitative technique through observation, FGD and Delphi methods respectively. All statistical data were entered in the Statistical Package for Social Sciences (SPSS) version 23.0 and analysed using descriptive and inferential statistics. Qualitative data were transcribed, translated and emerging themes were presented thematically. Agreed upon elements were used to designed the framework using the Delphi technique. The study concluded that there was high level of open defecation in the State. Factors such as distance, time of the day and weather were identified to influenced the practice. It was therefore, recommended that public health nurses, government community leaders and community members have an important role to play in eradication of open defecation.

Keywords: *Contextualised Framework, Environmental Health Practices, Classical Delphi, Open Defecation.*

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Introduction

Non-compliance to basic sanitation is responsible for about 10% of disease burden globally which might lead to the development of diseases such as diarrhoea and other diseases affecting both children and adults (Berkman, Lescano, Gilman, Lopez, & Black,

2002) . These are linked to the inadequate number of basic sanitation facilities which are only readily accessible to about 68 percent of the global population, with approximately 892 million people defecating in public places. Perhaps as a result of these troubling statistics, the United Nations included open defecation

in SDG 6.2 (*Achieve access to adequate and equitable sanitation and hygiene for all and end open defecation*). Though Berkman, Lescano, Gilman, Lopez, & Black (2002) suggests that open defecation is more prevalent in South East Asia arguably due to their large population sizes, notwithstanding it is estimated that 215 million people in Sub-Saharan Africa practice open defecation (John, 2017). The majority of open defecation (OD) practices characteristically associated to defecating in fields, forests, bushes, bodies of water, or other open spaces in national health surveys, occur in rural areas of low-income countries. Also, in Sub-Saharan Africa, reports by the World Health Organization /United Nation International Children Emergency Fund (2014) indicated that the practice of OD varied between urban (8%) and rural (35%) populations.

Several factors have been proposed by O'Connell (2014) as those contributing to open defecation. These include knowledge deficits among those who practice it, non-compliance with rules and regulations related to basic sanitation, non-conformity to values and principles set by communities, poor intention to build latrines by government/local authorities, roles and decision-making conflicts, and community members' beliefs and attitudes. In addition, other factors might include poor accessibility to and non-availability of functional latrines and water supply, social norms surrounding open defecation; perceived latrine affordability; self-efficacy to build latrines; and competing household expenditure priorities. Thus in an effort to develop a conceptual framework for the determinants of OD, Osumanu et al. (2019) further classified the factors as: a) demographic and social factors such as age, sex, marital status, household location, education, and attitudes; b) economic factors such as occupation and income; and c) cultural factors such as traditional beliefs, taboos, norms, and values). No matter what caused or contributed to OD, it has been identified as a health risk in the environment.

In 2019, a Water Sanitation and Hygiene (WASH NORM) survey conducted by the United Nations Children's Fund (UNICEF) revealed that Nigeria has a high prevalence of OD. This survey ranked Nigeria as the country in Africa with the highest proportion of people who still practice open defecation, and the second-ranked country globally, after India (Adedigba, 2019). In response, the President of Nigeria signed Executive Order 009, which is called "The Open Defecation-Free Nigeria by 2025 and Other Matters Order." As the name suggests, the goal of this order is to stop people in Nigeria from defecating in the open within five years (John, 2017).

In this regards, due to its large population, Kano state reports that the persistent practice of OD in residential areas, commercial areas, industrial areas, and worship areas such as mosques, peripheral areas, and riverine areas within Kano metropolis and rural areas frequently poses grave health risks to a large number of residents and is becoming alarming (Musbahu, 2014). Consequently, a preliminary study conducted by the Kano State Government in 2017 revealed that the city of Kano (with 11,113,605 people) had only 24 public toilets, which were grossly inadequate given the population they were intended to serve. Despite this, evidence currently suggests that there are no researches conducted on open defecation in Kano state.

In 2016, the Federal Government of Nigeria and UNICEF initiated the implementation of a plan to rid Nigeria of Open Defecation by 2025 (Joint Monitoring Programme, 2010) . There are indications, based on current conditions, that the roadmap may not produce the desired results.

In light of this, this paper seeks to develop a contextualized framework using the Delphi method to address the menace in Kano State. Despite the fact that it is important to note that this study is in its infancy, this paper will describe the framework development steps.

Conceptual framework guiding the study

The Focus, Opportunity, Ability, and Motivation (FOAM) framework, which was originally developed to "assist in the development, monitoring, and evaluation of hand washing behavior change programs," can be used to conceptualize OD (Abubakar, 2018; Coombes & Devine, 2010). The World Bank's Water and Sanitation Program created the FOAM framework as a behavioral model (Dreibelbis et al., 2013). The framework consists of four categories of behavior that influence whether or not a person engages in

OD. The categories include internal factors, such as a person's beliefs or knowledge, and external factors, such as the availability of a latrine or societal pressure, which are beyond an individual's control (Abubakar, 2018). Identifying these factors is a crucial component of any intervention program aimed at combating OD, as they are not only fundamental to understanding the causes of OD but also aid in identifying the drivers and barriers to sanitation facility utilisation (Abubakar, 2018; Sara & Graham, 2014).



The FOAM Framework (source: Abubakar, (2018). Exploring the Determinants of Open Defecation in Nigeria Using Demographic and Health Survey Data. *Science of the Total Environment*, 37-638C, 1455-1465)

The first category is focus, which entails identifying both the target population and the target behavior (OD) that must be modified. Identifying the target population and gaining an understanding of their socio-economic, demographic, and geographic characteristics is essential for developing and implementing more effective policies and initiatives aimed at eradicating the practice (Abubakar, 2018). Park et al. (2016) stated that it is important to find people who need latrines and behavioral

interventions to prevent diseases linked to poor sanitation and hygiene.

Second, opportunity includes institutional and structural factors that influence OD practice, such as latrine accessibility and its characteristics, as well as social norms such as family or community tenets that regulate individuals' conduct (Coombes & Devine, 2010). Consequently, religion and ethnicity as subcultures are regarded as significant opportunity factors that influence societal social tenets and view any foreign behavior as abnormal. For example, children are aware of whether or not their parents expect them to use a latrine, a custom reinforced by parental praise or punishment. Also, people may accept OD if they observe others engaging in

the same behavior, necessitating the intervention of a role model or authority figure such as a tribal elder to alter their perception (Abubakar, 2018). Other opportunity factors that influence OD include access to latrines, vegetation, topography, and a rural way of life associated with urban isolation (Kirigia & Kainyu, 2000; Sara & Graham, 2014). Abubakar (2018) revealed that the main features of latrines that discourage OD are their convenience, safety, privacy, comfort, and cleanliness.

Ability investigates an individual's capability to practice OD and reflects the individual's actual or perceived proficiency in performing the behaviour. (Coombes & Devine, 2010) identified two ability determinants: (a) knowledge, which is the personal belief of the ability to practice OD, influenced by religion, traditions, and educational level; and (b) social support, which refers to the emotional and physical comfort provided by family, friends, or colleagues, such as assisting children to use latrines, praising them for not practicing OD, or helping a neighbor build a latrine.

Finally, motivation refers to the drives, urges, and desires that influence a person's desire to practice OD, given the opportunity and capability to do so. According to (Abubakar, 2018; Coombes & Devine, 2010). First, inappropriate beliefs and attitudes that represent a person's perceptions of OD could impede latrine adoption. Second, outcome expectations are the anticipated approval or disapproval of the behavior by a community leader. Third, threat is the individual's perception of the severity of the negative consequences of OD, including risks to health, safety, privacy, and dignity (Gross & Gunther, 2014). Fourth, intention is a person's plan to defecate in public without being forced to do so, which is one of the strongest predictors of behavior change because repeated intentional OD leads to habit formation. Because they are primarily based on self-interest, these four motivational determinants have a direct impact on behavior. For example, a person

may be close to a public toilet (which is an opportunity), know how to use it (which is an ability), but not realize the risks of overdose (which is a perception) or be motivated (which is a motivation).

While the focus and motivation categories have been viewed as drivers of latrine adoption that discourage OD, the opportunity and ability categories are viewed as barriers to latrine adoption that encourage OD, and all four categories vary from one socioeconomic group to the next (Abubakar, 2018). Therefore, if people have the opportunity, ability, and motivation to engage in OD, it will be difficult to eradicate the practice. However, policies and interventions that inhibit these characteristics may contribute to the elimination of OD (Abubakar, 2018; Sara & Graham, 2014).

Materials and Methods

This study adopted a mixed approach. This Mixed technique involves a procedure in which a researcher combines aspects of qualitative and quantitative research approaches for the wide aims of breadth and depth of comprehension and confirmation of the investigated phenomenon (Schoonenboom & Johnson, 2017). The quantitative part of this study complements the qualitative Delphi (quan-Qual) as stated by Schoonenboom and Johnson (2017). As such the study was divided into 2 phases, comprising of descriptive survey (phase one) and the Delphi phase two.

Phase one

Descriptive design was used to establish the pattern of distribution of open defecation in the three senatorial districts of Kano state, Nigeria and to explore both the cultural and socio-economic determinants of open defecation in Kano state. In this phase 423 respondents were involved at this stage.

Phase two

A classical Delphi approach was used to propose a framework for the eradication of open defecation in Kano state, Nigeria using

four (4) rounds with experts/panellist and other stakeholders derived from different agencies/ministries related to sanitation and adjudged to be adequate because the previous studies reviewed used four rounds and the processes involved in framework development for open defecation eradication are four as stated in similar studies (Muchangos, Akihiro, & Hanashima, 2015). A total of 42 participants were involved at this stage. The purpose of Delphi is to facilitate a discussion that elicits a broad range of responses among selected experts in a given domain or around a particular topic. The classical Delphi method is characterized by four key features: *anonymity, iteration, controlled feedback, and statistical aggregation*. The goal is to move through the process until the discussion shows consensus or it becomes clear that no consensus can be reached. Respondents are asked to answer a number of questions in writing. (Muchangos, Hanashima, & Atsuko, 2015; Skulmoski, Hartman, & Krahn, 2007; Wakefield & Watson, 2014)

The study was conducted in the three senatorial zones of Kano state, North western

open defecation as well as the general community where open defecation is practiced by the residents. Four rounds were Nigeria with projected population of 11,113,605 based on the official 2006 National Population and Housing Census figures. The state is divided into 44 Local Government Areas (LGAs) which form twenty-four federal constituencies and three (3) senatorial zones. The 3 senatorial zones are Kano central with 15 LGAs, Kano north with 14 LGAs and Kano south with 15 LGAs (Citypopulation, 2020).

Target Population

The target population for this study are adult residents, heads of household, women leaders, youth leaders, Community health officers, heads of Local Government Area (LGA)' health departments, trained PHC CORPS, Kano state Orientation Agency, political leaders and traditional rulers in the three senatorial districts of Kano state Nigeria form the six LGA selected purposively to participate in the study. The 2019 projected population in the six LGAs are as follows:

Table 1: Showing the population of LGA selected for the study

S/No	LGA	Population
1.	Kano Municipal	516,400
2.	Garun Malam	165,000
3.	Gwarzo	255,400
4.	Tofa	137,200
5.	Rano	206,200
6.	Bebeji	266,900

(Citypopulation, 2020)

Sampling Technique

A multi stage sampling technique was used in the study to select respondents for first phase of the study while purposive sampling was used to select participants for the phase two part of the study.

Ethical clearance

An ethical approval with number MOH/Off/7797/TI/1132 was collected prior to the commencement of the study from Kano State Ministry of Health ethical committee.

Method of data collection

Phase 1a: The researcher gave full details about the research objectives to each participant and obtained his/her consent before administering the questionnaire and other tools. The questionnaire was translated in to Hausa as the common language for better comprehension. Data collection using the questionnaire lasted for not more than 30 minutes per respondent, data collection in each LGA lasted for 2 weeks. Each questionnaire was coded with unique code to

ensure confidentiality and ease of sorting process.

Phase 1b: In addition to the researcher administered questionnaires, an environmental observation checklist was used by the researcher to determine the level of open defecation practices in each LGA, such as Open Defecation Free (ODF), Low, moderate, High and very High level of OD practice. This was done concurrently with the questionnaire administration.

Phase 2: The first round of classical Delphi generated minimum of three (3) components/elements of the framework in the four (4) thematic areas (Causes and determinants of OD, Challenges of existing policies, stakeholders' engagement and solutions/action to eradicate OD) from each participant. After each successive round, the questionnaire was reviewed and summarized based on previous round responses; consensus was based on 71% score of the responses. The rounds were conducted through their email addresses where the experts have functional email address and wishes to receives email, while those without functional email or do not wish to receive emails were given the questionnaire to fill face to face with the researcher or research assistant:

Round 1: All the panellists (42) were asked to propose minimum of 3 components (Including Causes/determinants, stakeholders, challenges of existing policies and Actions/solutions to open defecation) of the framework for eradicating open defecation in Kano state through Delphi survey questionnaire mailed to them and face to face. This created a pool of many components at the beginning.

Round 2: The researcher summarized all the components/elements, thematically categorized them, and sent them back to the experts with a request for their agreement, disagreement, and any additional comments. After obtaining the second round of expert opinion, the researcher sorts the components according to their consensus status. These are grouped into three categories in each case:

- a. Agreed-upon components with/without proposed modifications
- b. Added new components
- c. Disagreed-upon components

Round 3: The experts were asked to reconsider their decisions and give their opinions on the disagreed-upon components and the newly added components and give their final agreement on the proposed modifications to previously agreed-upon components. After receiving the third round of feedback, the Researcher prepared a list of consensual components for final evaluation and comments by the experts.

Round 4: They were asked to arrange components of the framework in order of their importance and practicability in Kano communities. The framework designed was shared to all the experts who participated in the study.

Limitations

1. Although some of the Delphi participants are very relevant to the practice and eradication of open defecation, such as Malaman Tsangaya, heads of household and central market chairmen, they showed very limited knowledge and poor understanding of some thematic areas, especially on challenges of existing policies on OD. This could be due to their educational background and/or lack of their involvements in sanitation activities by the government officials.
2. All the 42 stakeholders responded and participated in all the 4 rounds because the researcher used their mails for sending the questionnaires with phone calls follow-ups
3. This study did not test the effect of the developed framework using interventional design method. It was not within the scope of this study because of the design used, limited resources and time to test it effect at community level.

Discussion

As identified earlier, OD is environmental health concern with high risk of negative

health consequences. Thus, in a developing country like Nigeria with high population burden and risk for health, it is important to identify sustainable approaches that will maintain healthy communities. As such a contextualised framework which is developed by the stakeholder in communities using this Delphi approach is expected to ensure compliance to healthy practices and its sustainability in order to achieve the SDG 6.2.

The mixed technique used in this study involves a procedure in which a researcher combines elements of qualitative and quantitative research approaches with the broad purposes of breadth and depth of understanding and corroboration of the phenomenon under investigations. This method becomes relevant in this study because of its ability to explore and reveal stronger evidences that quantitative or qualitative designs when used alone could not as indicated in similar previous studies that couldn't address the problem.

In developing the contextualised framework, four (4) thematic areas were used based on the relevant literatures reviewed: Causes and Determinants of open defecation; Challenges of existing policies on open defecation; Stakeholders engagement and Actions/Solutions needed to eradicate open defecation in Kano State. The data was collected using rounds I, II & III Classical Delphi Survey Questionnaires.

Conclusion

This paper describes how a mixed method approach is adopted in order to address an environmental health concern. The FOAM model served as reference for the development of constructs in data collection for the descriptive survey while a participant-centred approach; the Delphi method was used to elicit consensus (or otherwise) in key areas so as to develop a working framework for the eradication of OD in Kano State, Nigeria.

References

- Abubakar, I. R. (2018). Exploring the Determinants of Open Defecation in Nigeria Using Demographic and Health Survey Data. *Science of the Total Environment*, 37-638C, 1455-1465.
- Adedigba, A. (2019, November 25). Nigeria worst African country in open defecation, second globally. Report" Premium Times .
- Babalobi, B. (2014, November 17). eWASH. Retrieved December 27, 2017, from World toilet day: <http://assemblyonline.info/worldtoiletday/>
- Berkman, D. S., Lescano, A. G., Gilman, R. H., Lopez, S. L., & Black, M. M. (2002). Effects of stunting, diarrhoeal disease, and parasitic infection during infancy on cognition in late childhood: a follow-up study. *Lancet*, 359, 564–571.
- Center for Community Health and Development . (2017, April 09). The Community Tool Box. Retrieved October 1, 2021, from <https://ctb.ku.edu/en/4-developing-framework-or-model-change>
- Champion, V., & Skinner, C. (2008). The health belief model. *Health behavior and health education. Theory, research, and practice.*, 4, 45-65.
- Citypopulation. (2017, November 07). Nigeria: Federal states and major cities- statistics and maps on city population. Retrieved August 19, 2018, from [citypopulation.de: http://www.citypopulation.de/Nigeria-Cities.html](http://www.citypopulation.de/Nigeria-Cities.html)
- Citypopulation. (2020, November 07). Nigeria: Federal states and major cities- statistics and maps on city population. Retrieved August 19, 2018, from [citypopulation.de: http://www.citypopulation.de/Nigeria-Cities.html](http://www.citypopulation.de/Nigeria-Cities.html)
- Coombes, Y., & Devine, J. (2010). Introducing FOAM: a framework to analyze handwashing behaviors to

- design effective handwashing programs. Geneva: Water and Sanitation Program, World Bank.
- Gross, E., & Gunther, I. (2014). Why do households invest in sanitation in rural Benin: Health, wealth, or prestige? *Water Resources Research* , 50, 8314–8329.
- Humphrey, J. H. (2009). Child undernutrition, tropical enteropathy, toilets, and handwashing. *Lancet* , 374, 1032–1035.
- Iiffe, J. (2007). *Africans: The History of a Continent*. Chicago: Cambridge University Press.
- John, C. a. (2017). Open Defecation in Newly Created Kenyan Counties: A Situational Analysis. *Journal of Health Care for the Poor and Underserved* , 28 (1), 71–78.
- Joint Monitoring Programme. (2010). Progress on sanitation and drinking water: 2010 update, WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation. Retrieved April 29, 2018, from http://www.who.int/water_sanitation_health/publications/9789241563956/en/index.html
- Kirigia, J. M., & Kainyu, L. (2000). Predictors of toilet ownership in South Africa. *East African Medical Journal* , 77 (12), 667-672.
- Mondal, P. (2020, May 09). Rural-Urban Differences: Demographic and Socio-Cultural Characteristics. *Your Article Library* , pp. 1-3.
- Muchangos, L. d., Akihiro, T., & Hanashima, A. (2015). Application of the Delphi Method to the Identification of Barriers to a Waste Management Policy in Maputo City, Mozambique. *Journal of Sustainable Development* , 8 (6), 146-157.
- Muchangos, L. d., Hanashima, A. T., & Atsuko, D. (2015). *Journal of Sustainable Development* , 8 (6), 146-157.
- Musbau, R. (2014, November 26). Breaking the silence on open defecation. Lagos, Lagos, Nigeria: The Nation.
- News Agency of Nigeria, N. (2020). Open defecation: Nigeria ranks No. 1 in the world. Abuja: Punch.
- O’Connell, K. (2014). What Influences Open Defecation and Latrine Ownership in Rural Households?: Findings from a Global Review. Washington DC: WSP.
- Park, M. J., Clements, A. C., Gray, D. J., Sadler, R., Laksono, B., & Stewart, D. E. (2016). Quantifying accessibility and use of improved sanitation: towards a comprehensive indicator of the need for sanitation interventions. *Scientific reports* , 6 (30).
- Sadiq, A. A. (2017, May 04). Kano State Govt committed to curbing open defecation. (D. Trust, Interviewer)
- Sara, S., & Graham, J. (2014). Ending open defecation in rural Tanzania: which factors facilitate latrine adoption? *International Journal. Environ. Res. Public Health* , 11 (9), 9854-70.
- Sinead, K., Felicity, H., & McKenna, H. (2011). *The Delphi Technique in Nursing and Health Research*. Chichester, United Kingdom: A John Wiley & Sons, Ltd.
- Skulmoski, G. J., Hartman, F. T., & Krahn, J. (2007). The Delphi method for graduate research. *Journal of Information Technology Education* , 6.
- Skulmoski, G., Hartman, F., & Krahn, J. (2007). The Delphi method for graduate research. *Journal of Information Technology Education* , 6.
- UN. (2014, May 18). Open Defecation. Retrieved September 18, 2016, from United Nations: <http://www.unmultimedia.org/tv/unifeed/2014/05/un-open-defecation>.
- UNICEF. (2012). *Pneumonia and diarrhoea - Tackling the deadliest diseases for the world’s poorest children*. New York: : United Nations Children’s Fund.
- UNICEF. (2015). *Child Nutrition Interactive Dashboard – 2015 Edition*. UNICEF. New York, NY, USA.

- UNICEF. (2020, February 10). Open Defecation: UNICEF supports 10 LGAs in Kano. Vangurd , pp. 2-4.
- UNICEF/WASH. (2017). Access to improved sanitation in Nigeria. New york: UNICEF.
- United Nations Sustainable Development. (2016). Goal 6: Ensure access to water and sanitation for all. Retrieved February 18, 2018, from United Nations Sustainable Development: <http://www.un.org/sustainabledevelopment/water-and-sanitation/>
- Water and Sanitation Programme. (2004). The case for marketing sanitation. Field Note, August 2004. Water and Sanitation Programme. Retrieved April 29, 2018, from http://www.wsp.org/wsp/sites/wsp.org/files/publications/af_marketing.pdf
- Watson, J. (2012). Human caring science (2nd ed ed.). Sudbury: MA: Jones & Bartlett.
- WHO and UNICEF. (2015). Joint Monitoring Programme for Water Supply and Sanitation. Progress on sanitation and drinking water – 2015 update. Geneva: WHO/UNICEF.
- WHO. (2015). Child Growth Standards: Length/height for Age. World Health Organization. Retrieved February 13, 2018, from www.who.int/childgrowth/standards/height_for_age/en/
- WHO/UNICEF. (2014). Progress on Drinking Water and Sanitation Report 2012. New york: WHO/UNICEF.