

The Ambient Toilet (Intervention): Curtailing Open Defecation through Smart Architecture & Art

Stephen Inji Makama ^{1*}, Hamsatu Saleh (PhD) ² & Christiana Omolara Agyeno ³

¹ Stephen Inji Makama, Department of Architectural Technology, M.A. I, Polytechnic, Lafia Nasarawa State, Nigeria.

² Department of Fine Arts, Faculty of Environmental Studies, University of Maiduguri, Borno State. Nigeria.

³ Wendelinusstrasse, Julich NRW(State) Germany

* Stephen Inji Makama, Department of Architectural Technology, M.A. I, Polytechnic, Lafia Nasarawa State, Nigeria.

Abstract:- It is alarming that in the 21st century open defecation is still a worldwide problem. Open defecation (OD) is a major health problem in many parts of the world. In Nigeria this is very prevalent due to the unavailability of toilet facilities. There is also a culture of lack of maintenance and inability to use conventional toilets. The authors of this paper believe that the problem of OD is with the enclosed toilet space in Nigeria. The authors also believe that esthetic toilet design and interior complemented with lighting, colors and ambient music can attract people to use indoor toilets. It is also possible to change this perception by transforming the conventional toilet facility into an experience possibly in the same way people visit a museum appreciate artwork. This paper examines some of these perceptions about indoor defecation and seeks to give answers to why this is the case. The study argues that many who use conventional toilet facilities would rather opt for OD. The methodology used is a Survey Research Method utilizing a closed ended questionnaire. The respondents are randomly selected included students, workers and entrepreneurs. The results indicate that all the respondents considered OD as negative and needs to be stopped.

Keywords:- Ambient, Open Defecation, Indoor Toilet, Conventional.

I. INTRODUCTION

Globally it is estimated that around 2.4 million people die from conditions associated with poor or lack of hygiene, sanitation and water, Sumedh (2018). The practice of OD is responsible for a substantial number of deaths which can be prevented. Sanitation is a high-level health issue with examples in global historical records where it caused havoc in urban areas. An example is the London cholera epidemic in 1853. The key to encouraging people to use indoor toilets instead of resorting to OD is clear and deliberate improvement of facilities. This will change the perceived notions about the enclosed spaces. Meanwhile there are numerous interventions globally and each with its results.

OD is widespread in Nigeria. Nigeria is divided into 6 geopolitical zones of varying landmasses and geographic features. The North Central or Middle belt Zone is shown to have the highest incidence of OD. This is followed by the South West, the South East, the North East, the South, and lastly by the North West zones respectively. According to Abubakar (2018) 32% of Nigerian households practice OD in 2013, with higher percentage found in the rural areas. The factors influencing this range are from household place of residence, geopolitical region and wealth index. Other factors include the education level of the head of the household as well as ethnicity and gender.

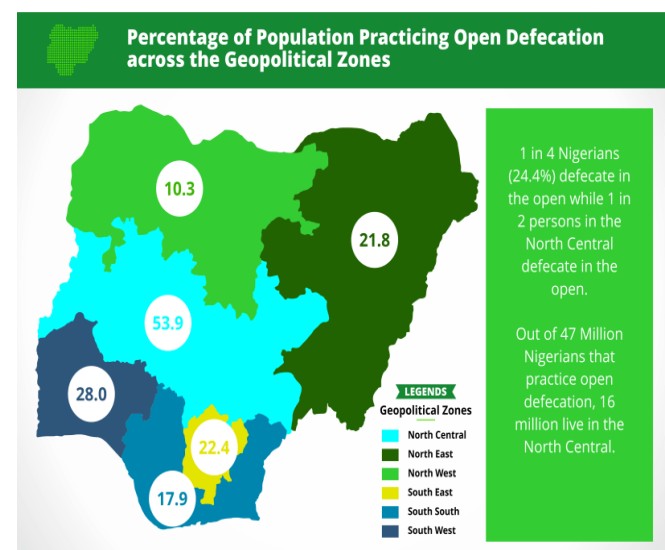


Fig.1 Shows the Geopolitical zones of Nigeria showing the spread and prevalence of open defecation.

www.hopespring.org.uk/world

The 'Clean Nigeria drive to stop OD' by the year 2025 was launched in 2015. The purpose of this campaign is to encourage or dissuade people from the act of OD. According UNICEF 892 million people worldwide still practiced OD (UNICEF.org, 2018). The organization records that between 2000 and 2015, 337 million people stopped practicing OD: about 22 million per year. UNICEF estimates that to end OD successfully at least 60 million need to stop the practice yearly between 2015 and 2030.

Recent data published by (UNICEF.org 2017) shows 122 million people practicing OD in the West & Central Africa Region (WCAR) 2015. This same region accounts for 14% of global OD with 8 countries having more than 5 million people open defecating (UNICEF.org, 2017). Nigeria is shown to be second worldwide and has since moved to first position in OD.

If toilets were better constructed, better maintained and made more attractive in design people would be encouraged to stop defecating in the open. Therefore, we need to ask the question why many people prefer to use practice open defecation. Why is open defecation preferred to using a toilet? This paper argues that the environment or space is a mitigating factor to encourage or discourage open defecation. It encourages open defecation when the perception of the toilet is as a dirty, smelly and disease prone environment, it would discourage open defecation if the toilet was a well-designed and smelling enclosure, without flies with bright and clean walls, with an interior which has a pleasant smell combined with visibly optically engaging aesthetic design. According to Asnodkar et al (2020) public toilets are not maintained and because of this the surrounding area is unclean and there is bad odor. From practical experience this is recurring observation in many public and even private toilet facilities in many parts of the world and in Nigeria. O'Reilly et al (2017) observed that open defecation is seen at the level of the individual who consciously decides not to build or use a toilet. The argument may be made that many people cannot afford to provide a toilet facility for themselves. It may also be due to the fact that the infrastructure facilities such as running water for flushing are not reliable or even available. The latest data published by (UNICEF 2017) shows 122 million people practicing open defecation in the West/Central African Region. This region also accounts for 14% of the world total for open defecation. In 2017 Nigeria ranked 2nd in OD (UNICEF, 2017), by 2019 the position moved to number1 (www.punchng.com ,2019, www.pulse.ng (2019), www.allafrica.com (2019).

Lack of maintenance of toilets in Nigeria is a constant occurrence in public and private toilets. From commercial places to higher institutions, places of religious worship and market places, the maintenance culture is lacking or absent. Lack of maintenance coupled with lack of electricity and pipe borne water is a major hindrance to use of toilets. People are therefore forced to resort to open defecation. Nigeria is beset with major infrastructure and service challenges, particularly electricity and pipe borne are very limited and nonexistent in some entire localities. In some parts of the country terrain and topography have presented challenges to the construction of toilets itself. Slums, informal and squatter settlements are continuously springing around major cities, major highways and sometimes within the cities themselves. 80%-90% of housing being provided is self-help by individuals and groups of individuals. The combination of factors listed forces people to resort to the action of open defecation. It is very common to find very large homes in the typical Nigerian setting, and in most

cases these homes don't have more than one toilet which they all share, maintenance of the facility is difficult.

1.1 Statement of the Problem

According to UNICEF (2020) out of 774 Local Government Areas (LGAs) in Nigeria only eleven are said to be OD free. The same report shows 13,000 improved toilets constructed across 60 LGAs and only 5 States out 36 and the FCT (Federal Capital Territory) account for the number leading the drive for an OD free Nigeria. Worldwide the problem of access to toilets for the human population is an issue of concern. In developed countries this is not much of a problem as the facilities are provided with adequate services to complement use. However, this is not the case in the many developing countries. In Nigeria the problem is symbolized by outright open defecation. The lack of conducive and adequate facilities, inadequate electricity and water and most importantly an inherent aversion to using an enclosed space has worsened the situation. Many prefer to use the open defecation option than use the conventional indoor facility for a variety of reasons. Open defecation is a major health problem in many parts of the world. In Nigeria this is very prevalent due to the unavailability of toilet facilities. There is also a culture of lack of maintenance and a culture of inability to use conventional toilets. Some people who live in 'face me I face you' (a popular term used in Nigeria where the rooms face each other) rented compounds normally have more problems because such houses are built with squat or latrine toilets, and in this case the number of toilets is not enough for the population in the compound. Surprisingly many well-built homes have latrines outside because of the lack of maintenance or lack of water for flushing. If the issues above are addressed then open defecation can be stamped out.

1.2 Objectives

- To examine (specific) factors that influence open defecation
- To identify what physical factors can contribute to discouraging open defecation
- To determine if aesthetic design of an indoor toilet can change perception about open defecation

II. RATIONALE & APPROACH

At the heart of the global attempt to tackle OD is the Community Based Approach or specifically Community-Led Total Sanitation method (Kamal & Robert, 2008). The community led total sanitation (CLT) is an approach that helps the communities to realize the dangers of OD and to take collective efforts and decision to stop the act.

In Nigeria most of the interventions to end OD have been government sponsored. In November 2018 the Nigerian President declared a state of emergency in the Water, Sanitation and Hygiene (WASH) sector. A dialogue, 'Clean Nigeria: Use the Toilet', organized to address the problem of OD and WASH- related issues was described as one of the most ambitious behavior change campaigns in Nigeria. The aim of this campaign is to generate a national

movement with elements of policy advocacy, public advocacy, grassroots mobilization and private sector engagement. This is geared to building up on existing structures in states.

2.1 The Case for Curtailing Open Defecation through Behavior Change

According to Purvis (2015) the conception of 'toilet' to many minds is of 'dark', 'dirty' and 'smelly' places. Toilets need not be seen as such. Toilets can be envisaged as rooms or spaces of happiness where it is clean, there is color and it is not smelly. Another view is that the conversations need to be point blank, hence the use of technical words like sanitation, latrine (WASH – wash, sanitation and hygiene), open defecation do not mean much to the masses. This view holds that to drive action we must be willing to replace our technical grammar with words like 'shitting', and 'shitting outside' Purvis (2015). Purvis (2015) feels the risks associated with OD need to be understood and that people need to understand what the value of investing would translate to in terms of health benefits. Purvis (2015) is of the opinion that the attention or focus should be more on counting communities that are OD free and not just toilets built. The reason is that a supply driven approach of numerous toilets ends up with people converting the facilities into storage areas. Purvis (2015) make a case considering it as an investment with good returns because of the positive impacts on public health, education, gender and personal dignity is worthwhile. Purvis (2015) also opine that even in developed countries no single instance OD profit driven sanitation success has been achieved at scale. Purvis (2015) reiterates that profitability of an intervention is seen from public health and dignity perspectives which require public investment. A radical school of thought feels feces or fecal matter should be thought of as a resource. It argues that when feces are shown to be a resource first, people are then motivated to package their waste, and then one can teach hygiene. This alternative approach goes on to say that OD is not only about toilets that are desirable but support sanitation chains to make feces valuable enough for someone to collect it. Toilets, according to this line of thinking will not be sustainable and OD rather than use an indoor toilet and will continue until they can be emptied.

2.2 The Case for a Well Improved Enclosed Space as a Toilet

According to Abusaada (2020) there is a link between experiencing and inhabiting multi-sensory atmospheres in lived spaces. Abusaada (2020) feels that the experiential character of a space or place is not just a visual perceptual quality. Abusaada notes that we are drawn to specific places by their enticing character, ambience and feeling. "We are drawn to specific places by their enticing character".

2.3 What is the Ambient Toilet?

The ambient toilet is an intervention which is a combination of several approaches. According to the Nigeria Open Defecation Free by 2025 Roadmap, an OD Free country can be achieved using the following different approaches: capacity development, promotion of improved technology options through sanitation marketing, provision

of facilities in public places, CLTS, promotional and media campaigns and creating enabling environment and coordination mechanisms.

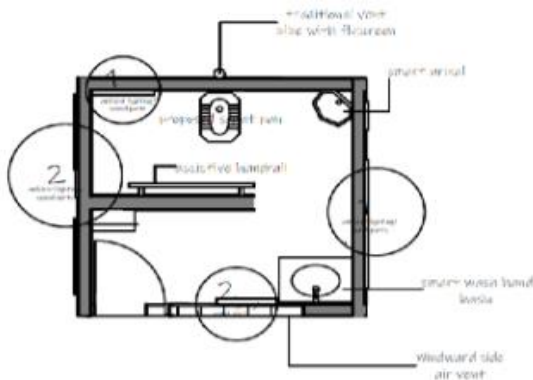
The concept of the 'ambient toilet' is to create or replicate an ambience which would encourage the use of public or private toilets without the disagreeable visual and sensory feelings that come and go with it. Due to the prevalence of unsteady and sometimes nonexistence of power, toilets in many parts of Nigeria cannot be mechanically ventilated and natural ventilation is not a viable option. Therefore, the concept of the 'ambient toilet' is utilizing smart architecture, technology and solar energy to actualize an ambience that would mimic the outdoor, open space most people resort to perform open defecation.



Fig.2, A 3-dimensional representation of a full model of an Ambient Toilet (from the Archives of leading author)

The figure above is a theoretical expression of this concept where the 'geodesic dome' is representative of an artificially created ambience namely: The Sahel Ambient Design, or the Rainforest Ambient Design or the Sahara Ambient Design but not restricted to any of them. The novelty is this is that this would build upon existing smart solutions in use for toilets already in use in many international airports and public spaces. These include automatic liquid soap dispensers, motion sensitive urinal flushers, motion sensitive faucets and many more. The Ambient Toilet is a smart intervention that seeks to tackle a very pressing problem in many parts of Nigeria and implementation of which would drastically curtail open defecating and encourage good sanitary practice all around. The Ambient Toilet is an intervention for the future.

The ambient toilet is a cubical enclosed space 2m x 2m wide, and also a block of 4-6 units of the same dimension.



The Ambient Toilet

Fig.3, Floor Plan depicting the Ambient Toilet (from the Archives of leading author)

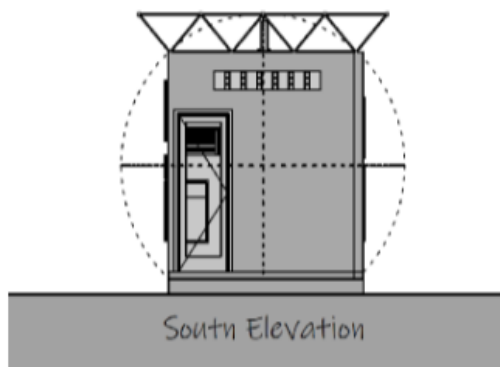


Fig.3a, Elevation or side view of the Ambient Toilet (from the Archives of lead author)

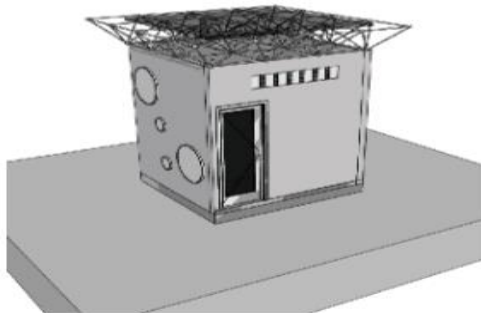


Fig.3b, Axonometric view of a single unit of the Ambient Toilet (from the Archives of lead author)

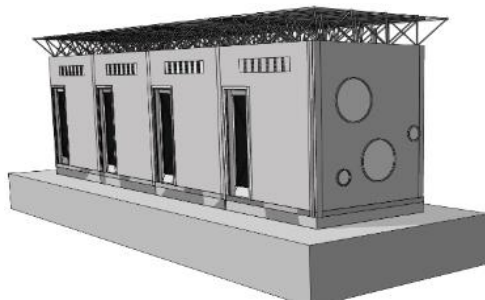


Fig.3c, Axonometric view of multi-unit of the Ambient Toilet (from the Archives of lead author)

2.4 Theoretical Underpinnings

By nature, all Nigerian ethnic or tribal groups have standard cultural behavior norms hence community standards can be enforced much more effectively utilizing social sanctions.

In traditional Nigerian societies standard cultural behavioral norms and values have remained an integral part of every organized society (Garba & Abdullahi, 2018). Practically all traditional Nigerian societies had very organized structures, before the coming colonial interregnum.

These can be applied holistically to sanitation related issues. According to (Wahab, 2004) most of endemic diseases of Africa are best addressed through sanitation and hygiene. Wahab (2004) notes that traditional African societies possessed indigenous knowledge systems, which promoted and facilitated cheap, effective and sustainable community environmental health care delivery and sanitation. Some of the cultural practices which have endured centuries of practice could work if the case is made for a community led sanitation approach. According to Asu et al., (2013) it is not uncommon to think of something crude and bad whenever one talks about cultural practices as it concerns health. They opine that not all traditional practices are bad and that each society or community has its peculiar way of doing things. These norms and practices go a long way in influencing the people’s perception, attitudes, behaviors in the management of diseases and health related problems common to them (Asu et al., 2013)

2.5 Effectiveness & Limitations

Evidence exists of the effectiveness of community led sanitation approaches from literature on studies on countries with similar high human populations, but little or no material exists on the efficacy of CLTS and other related approaches in Nigeria.

2.6 Art and psychology of the mind

Art has generally been known as a forum for personal expression and creative ideas; art has so many ways of reaching the human mind by developing the personality which helps solve so many psychological problems. Creating or viewing arts helps people to explore their emotions, self-awareness, cope with stress; it can also boost the self-esteem and work on social skills. Not only does art help the human in general, but it has a way of affecting the comfort of the environment in which we live. When our surrounding is comfortable, stress less, beautiful, the human mind is free and we can express ourselves without any difficulties. One can say that art is a form of healing because it helps to calm the mind, Yunusa (2010) said that art reflects the trends of a society and it has traditionally been a form for personal expression and creative ideas and it is the personal expression of art that he said forms the psychological basis for art as a treatment tool. One can say that art therapy helps in healing by relieving one from stress, conflict, social or psychological problems. Talking of art in therapy, for an individual, health is very important, our environment is also important, the activities we do matters a

lot like using the toilet to ease ourselves, when we meet an unhealthy environment, the process of defecation becomes a problem and very uneasy therefore can affect the psychology of an individual to defecate at ease. So, because art in therapy reduces stress and health problems, it also improves a comfortable environment which helps one to be more relaxed especially in the toilet. It helps in the connection between the mind and body which plays an important role in our human lives.

2.7 Scope of the study

The study examines some perceptions about indoor defecation and seeks to give answers to why this is the case; some of the issues made in the study required some specific interaction and as a result are considered beyond the scope of the study. Due to some problems associated with the perception of people not being comfortable in answering such questions about open defecation, the study was restricted to certain areas in the outskirts of Bukuru in the periphery of Jos Plateau State.

III. METHOD

The research design is a survey research, and the tool used is a Questionnaire which helped to answer some of the question asked in this study. The objective of the researchers was to find out individual toilet practices and perceptions, these perceptions were both of individual and of the community or the neighborhood. The Closed Ended Questionnaire was the primary source of collection of data. The rationale of this approach being that visiting the toilet or the practice of defecating is not a topic many people would want to discuss. As a result of this the Questionnaire was designed to be completed anonymously and as a result the responses were deemed to be valid and truthful. The Questionnaire was distributed randomly within the immediate environment; there was no specific category as to how the questionnaire was to be distributed. After the questions were collected for analysis, the authors discovered that the respondents fall into three categories; therefore, questions were placed into three (3) categories. Each of the sets of questions was structured in a way and manner to throw light on the succeeding ones. This enabled the study to elicit appropriate responses critical to the research question and problem stated. The survey could only assume truthfulness as there was no specific way to test it.

3.1 Questions

- (i) Category one: housing and toilet access
- (ii) Category two: open defecation
- (iii) Category three: toilet design

IV. RESULTS

The findings of this research reveal that out of the 38 respondents, 28 were male and 10 females, 23 are employed while 15 are unemployed. It is discovered that the average household comprises of 5 persons. Also observed were those 23 respondents do not live in their own homes while 15 do live in their personal houses. In terms of toilet facilities 21 persons use the flush system, 5 the squat system, 1 the VIP system and 1 the common latrine as toilets. In practice 24 persons do not find it difficult or challenging when using and or maintaining their toilets while 14 indicated that they faced challenges with using and maintaining the toilets they use.

Significantly 22 respondents assert to having defecated outside while 16 answered to the negative. 36 respondents think that people should not defecate outside while 2 persons think that outside defecation should be practiced. 32 people believe that open defecation should be discouraged and 6 think it should not be discouraged. 14 participants deny the use of public toilets while 24 asserts to having used a public toilet.

Finally, the research shows that out of 38 participants only 2 believe that people cannot be encouraged to use indoor toilets. 3 participants do not agree that government can discourage open defecation while the vast majority believes that the government can do it (35 participants).

In summary all respondents think that indoor defecation should be encouraged, all respondents agree that toilet designs should be comfortable and well designed and all respondents agree that improved, comfortable and well-designed toilet would encourage toilet use.

Hence this further buttresses the claim by the authors that if the issues above are addressed then open defecation can be stamped out.

Following the above assertions by the authors of this article, a survey was conducted which utilized a close ended questionnaire. The tool was designed containing twelve questions which were administered to 38 participants mostly living within urban areas. The style of questioning was simple and direct allowing for concise yes or no answers as the case maybe. This was considered to be the best for the caliber of respondents that the authors were certain to encounter. The questionnaire contained an opening section where respondents were asked about their gender, household size and employment status. Responses from the opening section revealed that 73.7% (28 persons) were male while 26.3% (20) were female. The table below shows the gender segregation in percentages while figure 1, illustrates to the reader the gender pool of the respondents that participated in this study. Below is the Demographic Representation of the respondents.

Table 1. Demographic Representation of all the respondents.

s/n	Date	Gender	Employment status	Occupation	Size of household
1	3/8/2021	Male	Employed	Clergy	4
2	3/8/2021	Male	Self Employed	Businessman	10
3	3/8/2021	Male	Self Employed	Student	5
4	3/8/2021	Male	Self Employed	Businessman	5
5	3/8/2021	Male	Self Employed	Student	2
6	3/8/2021	Male	Employed	Civil Servant	3
7	3/8/2021	Male	Self Employed	Student	4
8	3/8/2021	Male	Self Employed	Businessman	2
9	3/8/2021	Male	Self Employed	Businessman	4
10	3/8/2021	Male	Employed	Independent Researcher	2
11	3/8/2021	Female	Unemployed	Student	4
12	3/8/2021	Male	Self Employed	Businessman	5
13	3/8/2021	Male	Self Employed	Businessman	7
14	3/8/2021	Male	Employed	Civil Servant	1
15	3/8/2021	Male	Employed	Civil Servant	5
16	3/8/2021	Male	Employed	Civil Servant	8
17	3/8/2021	Female	Unemployed	Student	2
18	3/8/2021	Male	Self Employed	Businessman	5
19	3/8/2021	Male	Employed	Others	5
20	3/8/2021	Male	Unemployed	Student	1
21	3/8/2021	Male	Employed	Civil Servant	4
22	3/8/2021	Female	Unemployed	Student	3
23	3/8/2021	Male	Self Employed	Businessman	5
24	3/8/2021	Male	Unemployed	Student	6
25	3/8/2021	Male	Self Employed	Businessman	5
26	3/8/2021	Male	Self Employed	Businessman	8
27	3/8/2021	Male	Self Employed	Businessman	7
28	3/8/2021	Male	Employed	Civil Servant	5
29	3/8/2021	Female	Employed	Civil Servant	3
30	3/8/2021	Female	Employed	Civil Servant	3
31	3/8/2021	Male	Self Employed	Businessman	1
32	3/8/2021	Male	Employed	Academic Staff	3
33	3/8/2021	Female	Employed	Civil Servant	3
34	3/8/2021	Female	Employed	Cleaner	3
35	3/8/2021	Female	Unemployed	Student	1
36	3/8/2021	Female	Employed	Civil Servant	4
37	3/8/2021	Male	Employed	Civil Servant	1
38	3/8/2021	Female	Employed	Civil Servant	3

Table II, Gender count of Respondents.

Gender of Participants	Count of Gender (%)
Male	73.7% (28 males)
Female	26.3% (10 females)
Grand Total	100%

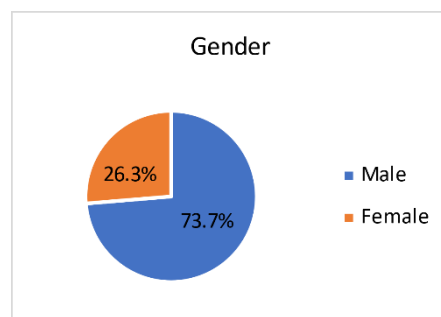


Fig.4, Graphical Representation of Gender Pool.

Other areas to note in the opening or introductory section of the questionnaire include the employment status, type of employment as well as the household size of the participants. All these were considered relevant to note because it has been established that the size of a household and whether the key persons in that household are employed or privileged with a source of income sometimes determines their access to, use and subsequent maintenance of indoor toilet systems. Table II and figure II below indicates the types of occupations the respondents are engaged in while table III and figure III depict the average size of each participants household.

Table III, Occupation Count of Respondents.

Occupation	Count of Occupation
Others	2.6%
Student	23.7%
Civil Servant	31.6%
Businessman	31.6%
Academic Staff	2.6%
Cleaner	2.6%
Clergy	2.6%
Grand Total	100%

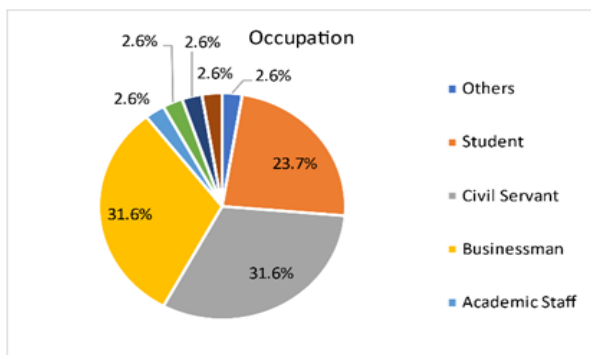


Fig. 5, Graphical Representation of Occupation Respondents are Engaged in.

Table IV, Household Count of Respondents.

Number of Respondents Household	Summation of Household Size
5	29.61%
1	3.29%
4	15.79%
3	15.79%
6	3.95%
8	10.53%
7	9.21%
2	5.26%
10	6.58%
Grand Total	100%

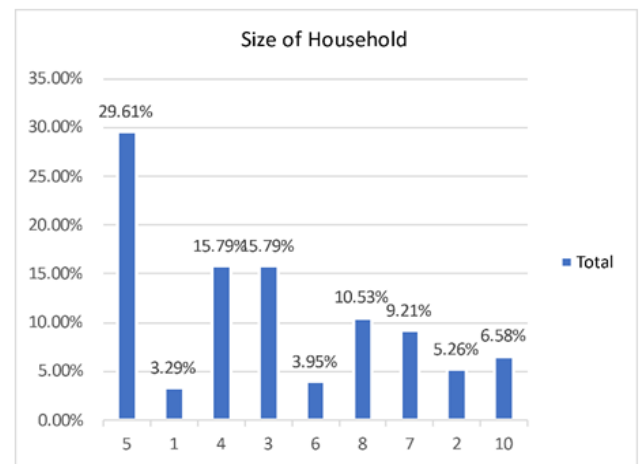


Fig. 6, Graphical Representation of Household Size of Respondents

The questionnaire containing 12 questions can be categorized into three sections. Each section/category has three major themes of this discourse. Categories include the following: Category One: housing and toilet access, Category Two: Open defecation and Category Three: Toilet Design. Analysis of the above listed findings will be made based on the enumerated categories of questions administered. All analysis is supported by statistical and graphical illustrations by what or pie and bar charts showing the percentage numerations of the responses.

(ii) Category One: Housing and Toilet Access

Category one was designed to ascertain the living conditions and the access to various types of toilets by each respondent.

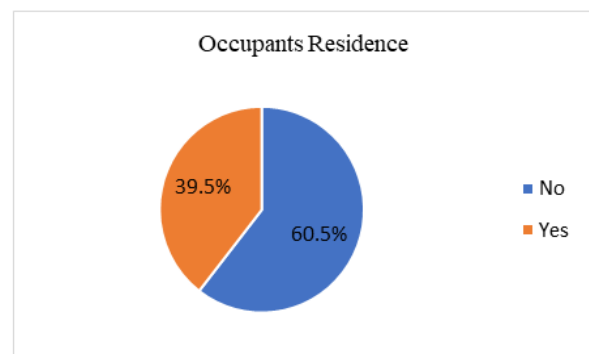


Fig.7, Graphical Representation of House Ownership

Figure VII above indicates that 60.5% of the respondents live in their own houses making it safe to state that access to indoor toilet are most assured. This is further corroborated by the average size of each household. It is the deduction of this study that once people are able to own their own homes, it becomes more likely for them to have access to indoor toilets mainly because they have had a say in the design concept of their abode. Other respondents who do not live in their homes may face more of a challenge because they have not had any say in how the house, they are occupying was built. A critical look at the collected data revealed that those not living in their houses answered yes to

the questions in the second category more than those who do live in their own homes.

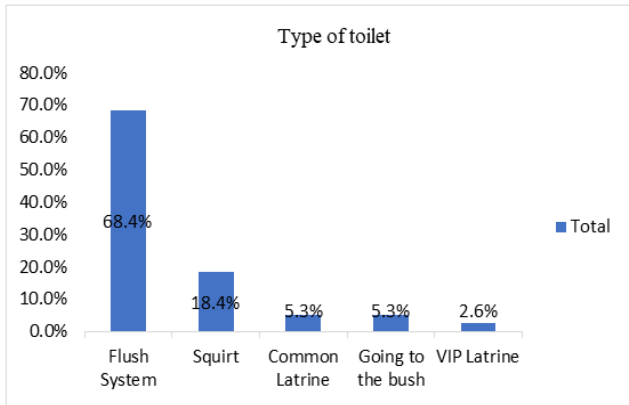


Fig. 8, Graphical Representation of Type of Toilet in Household

To further establish the availability and access to or lack thereof toilets, the participants were asked to identify from a list of options provided for them in the set of questions which type of toilet they had access to. It was discovered that persons living in their own homes had more access to indoor toilets with specific mention to the flush system (68.4%). 18.4% indicated having access to the squatting toilet which is also indoors while an equal number attributed to having access to a common latrine and going to the bush to defecate. Of this last class of people, it was also ascertained that they fell under the same category of those not living in their own homes or having a larger household count than the average five recorded for the majority. This then indicates that, access to toilets may be largely determined by house ownership as well as size of households. The larger the household the more the difficulty for all family members to access the indoor facility even if there is.

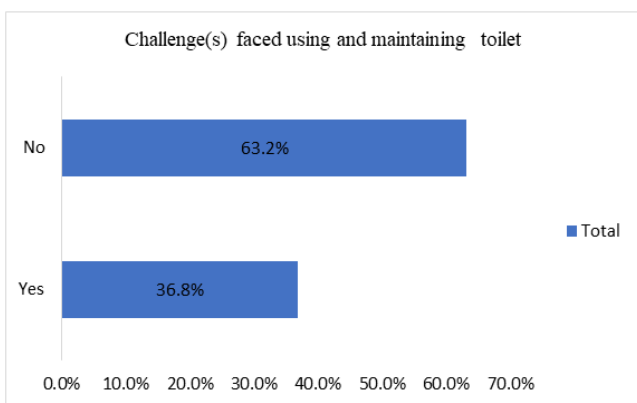


Fig.9, Graphical Representation of Challenges maintaining Toilet

Again, the above chart shows that those with access to indoor toilets which form the majority of the pool of participants subjected to this test have no difficulty with using and maintaining their toilets. The lower percentage of 36.8% comprise of those who are either using the common latrine or use open defecation. These groups of persons find

it difficult to use and maintain their toilets for a plethora of reasons which may or may not include the following:

- i. Overcrowding especially in the case of common latrines and large family size
- ii. Fear of contracting infections from shared facilities
- iii. Laziness or lack of basic amenities such as water, drainage systems and disposable areas for adequate maintenance to be excited.

(iii) Category Two: Open Defecation

Category two treats the issue of open defecation and how frequent it is engaged in. It also looks at ways which it can be discouraged and how indoor toilet use can be encouraged. Conclusively, it questions also the role of the government with regards to open defecation and how the respondents view its capacity to encourage indoor toilet use and discourage out/open defecation.

Out of the 38 persons that the questionnaire was administered to, 76.3% answered No to the question of open defecation. The 23.7% which answered yes also fall within the same category of persons experiencing issues of rented living spaces and large household sizes. The practice of open defecation by the minority group appears to be out of necessity rather than out of preference. Table below indicates the percentage count of the aforementioned deductions.

Table V, Percentage of Respondents who practiced Open Defecation

Respondents who have defecated Outside	Count
Yes	76.3%
No	23.7%
Grand Total	100%

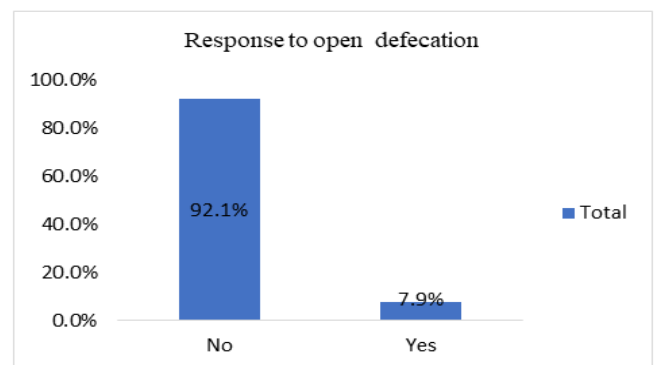


Fig.10, Graphical Representation on Response to Open Defecation

The figure above illustrates the fact that a significant number of the participants (92.1%) think that people should not defecate outside. This again affirms the previous statement that most people defecate outside due to lack of choice or out of necessity. This affirmation therefore indicates that once adequate arrangement is made or provided, the act of open defecation may cease or reduce significantly. The 7.9% of respondents who think that people should defecate outside may be due to lack of alternative defecation areas or simply out of preference.

Table VI, Percentage of Respondent's response to ban on Open Defecation

Respondent's response to ban on Open Defecation	
Yes	84.2%
No	15.8%
Grand Total	100%

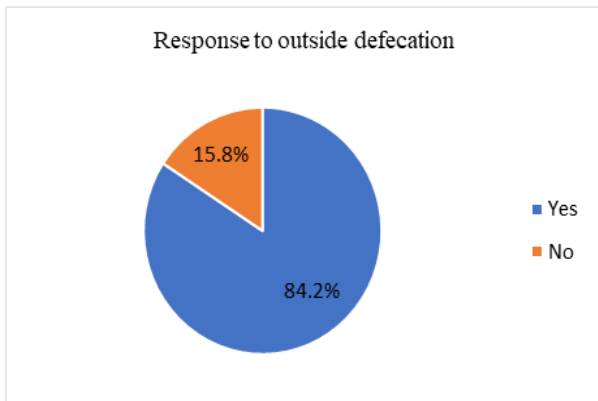


Fig.11, Graphical representation of Response to Open Defecation

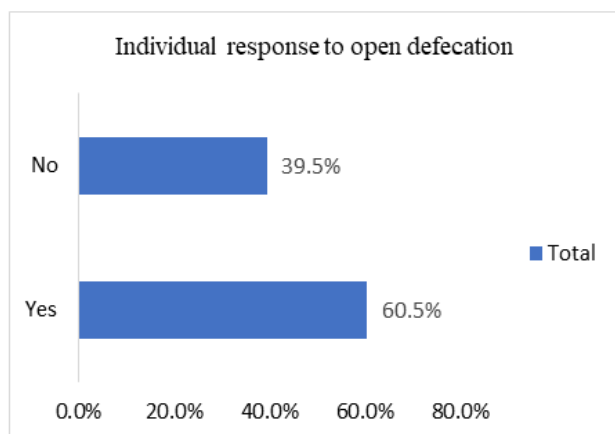


Fig. 12, Graphical Representation on Individual respondents to Open Defecation

The table and illustrations above speak to the questions of discouraging open defecation as well as the use of public toilets. The larger portion of the sample agrees that open defecation should be discouraged while a paltry 15.8% think it should not be discouraged. Here even though there is a replication of the same respondents who fall in the category of those living in rented houses and not having access to indoor toilets, a few though negligible numbers with access to indoor systems affirm also that it should not be discouraged. This may be because of preference or out of empathy to those who are unable to afford having indoor systems installed or over crowded situations. This fact is reiterated in the next question where a large percentage of those who think outdoor defecation should not be discouraged affirm to using public toilets. Therefore, it is proper to assume that where accessible alternatives are provided, open defecation will be a thing of the past.

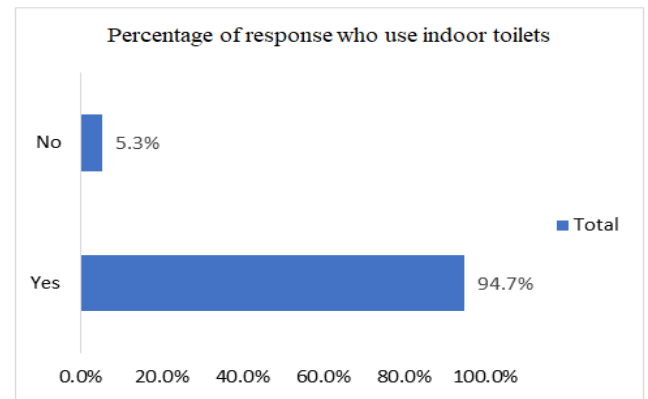


Fig.13, Graphical representation on percentage response who use Indoor Toilets

This was affirmed in the positive by 94.7% of the respondents. 5.3% believe that the use of indoor toilets should not be encouraged. This may be because of the issue of preference and circumstances. Whatever the reason the majority indicate a desire for more use of the indoor toilet which can be safer, private and most hygienic.

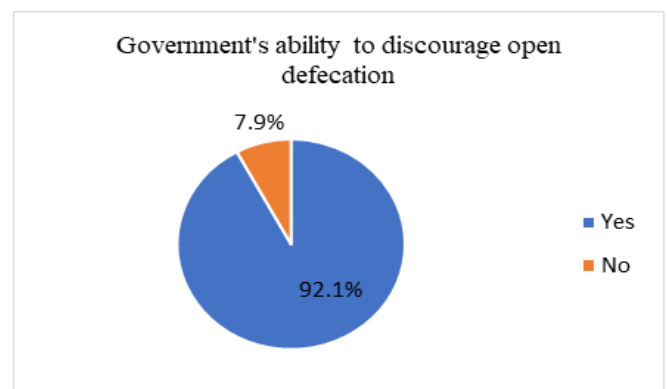


Fig. 14, Graphical Representation of response to 'Ability of government to discourage Open Defecation'

This was met with mostly an affirmative answer. 92.1% of the participants stated that yes; the government could encourage the use of indoor toilets. Further studies in this subject matter can look at ways in which the said government can encourage the use of indoor toilets as well as discourage open or outside defecation. On the matter of whether indoor defecation can be encouraged, majority of the respondents also affirmed in the positive. Ways in which these can be encouraged include campaign awareness on the dangers of open defecation, provision of accessible alternatives such as public rest rooms, insistence on design parameters to be followed by the necessary bodies concerned with the approval of building plans and so on. Though the percentage of those who believe that indoor defecation cannot be encouraged appear higher than in the other sections where negative responses were very low, it is safe to suggest that this rise in number may be as a result of ignorance. It is not easily clear how indoor defecation can be encouraged and thus, the simple response would be No! However, where such knowledge is made available to the doubting or unsure populace, it can be re-educated and mind sets reset.

(iv) Category Three: Toilet Design

Category three delves into the question of aesthetics, functionality and usability. It asks if toilet designs should be a factor to its increased use and vice versa. This is purely from a design perspective where studies have shown that form and function when accompanied by aesthetics attract more attention and interaction. This assertion is further established by the 100% response rate that the design of a toilet should be comfortable and easy on the eye. The pie chart illustrates the participant’s affirmation of the above summation.

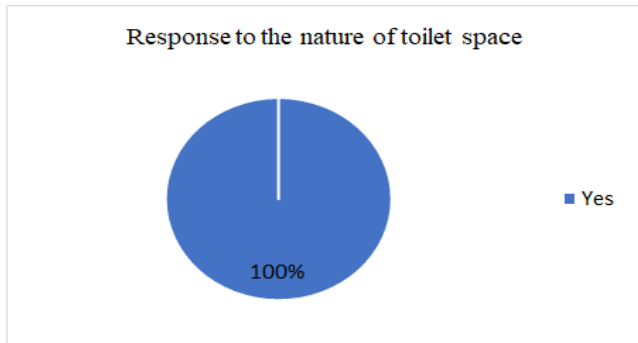


Fig.15, Graphical representation on respondent’s response to nature of toilet space.

The following question also extends the thought process behind form, function and beauty. It asks the respondents if a toilet is well designed and comfortable will it encourage usage. The illustration below shows a 100% affirmation to the believe that design factors if taken into careful account will encourage heightened usage of indoor toilets.

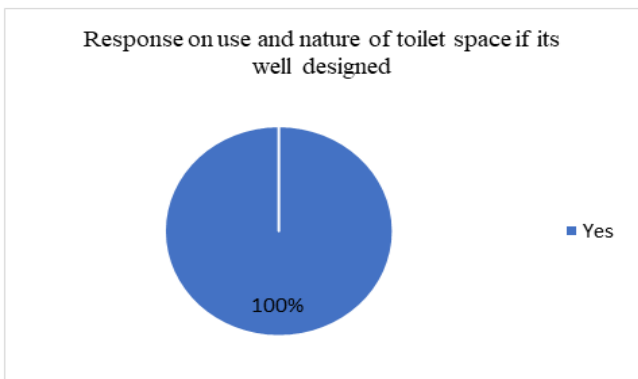


Fig. 16, Graphical representation to response on use and nature of toilet space

V. CONCLUSION &RECOMMENDATIONS

Open defecation could be addressed by injecting some factors that could discourage the practice of it through design and planning. Examples of these factors are:

- (i) Provision of laws that states the compulsory inclusion of toilet spaces in building designs as part of approval requirement fulfillment. In the case of self-built, the community leaders should endeavor to see that the houses or 'structures for living' incorporate conveniences at least with a size of 2m x1.5 (3sqm) per lot.

(ii) Ideal toilet (Open or Private) Prototype

Open (Public Toilet) Design should be community oriented; meaning participation of the community members will be a driving tool in desensitizing the community members about OD. By incorporating the members into this planning stages, such as:

- (a) Provision of Space
- (b) Design Process
- (c) Provision of Materials

This could indirectly capture the minds of the participants. In terms of using what is locally available, sourcing the materials needed for the realization of the project locally is also a tool that promotes individuality with a collective sense of ownership. Creating an instance, where individuals of the community feel a part of the ownership could encourage active participation in maintaining the toilet as a collective property. As proper use and maintenance is one aspect of the many challenges involved in the success of what could be termed a good toilet.

(iii)Water as a key factor in the use and maintenance of Public toilets should be actively considered, using the following parameters:

- (a) Source: Which should satisfy the question, what form? Either Bore hole or Well etc.
- (b) Availability: In this case, location in relation to proximity
- (c) Mechanism of accessing it and its storage must and should be carefully considered.
- (d) Lighting: Proper lighting of the spaces, especially at night times encourages continuity in its use. What forms of lighting source could be adopted? In this vein, a consideration of Solar-run system wouldn't be out of place, as dependence on the Hydro-Electric source, which is what is mostly available in Nigeria, with its imminent power outages, would be a hindrance to effective use of the toilet at night times.
- (e) Ventilation: As an important design parameter, toilets either the ones in private homes or public spaces, should be properly ventilated. Bad air should at all times be eliminated. It should be done through design in such a way that the air exchange would flow seamlessly and bad air gets diffused without bringing any form of discomfort to its surroundings. Natural means of Air Purification could be employed. An example is the use of Plants in the door spaces, and outdoor spaces in the form of landscape objects.

(iv) Running Cost: Another factor that should be adequately considered during the planning process of the Public Toilet facility is its Running Cost. For optimization, there is the need for employable hands to be drafted into its maintenance procedure and this is where the community's active involvement comes into play. Toilets don't clean up after themselves but would need people to do that bit, outside teaching users on proper ways of use. In a nutshell, hands are required to keep the toilet usable.

In highlighting the maintenance requirements, these provisions readily come to mind:

- (i) Water (constant supply through channels (i) are locally sourced. Must be readily available)

(ii) Soap, Air Fresheners and other cleaning agents and tools

Who makes these provisions? Communal effort should be emphasized here and the importance is adequately highlighted, hence the following are needed:

(i) Personnel for cleaning /Inspections

(ii) Personnel for Administration: These could lead to job creation if the community actively participates and contributions are channeled towards this. The leaders of the community could make these positions rotational, as this might psychologically gear people towards having the sense of ownership towards such collective investment.)

The above-mentioned positions could either be achieved as volunteer services or Paid Jobs as it all depends on how the community would like to run it and its capacity plays a huge role here. The aspect of maintenance should never be underemphasized and must be given priority during Project consultation meetings.

The authors of this paper also recommend deliberate architectural design which will take into consideration sustainable materials and sustainable operation. The authors recommend that such practical interventions be tried as pilot projects in various localities both in rural and urban areas. Finally, the authors of this paper present a prototype design of a prototype ‘ambient toilet’ for construction. It is the intention of the authors to follow up with an investigation into constructed prototypes to collect and collate data on use, acceptability or otherwise and future prospects as part of further research.

REFERENCES

- [1]. Abdullahi, G. et al, 2018, Traditional Institution and National Integration for sustainable Development in Nigeria,
- [2]. Abubakar I. R, (2018) Explaining the Determinants of Open Defecation in Nigeria Using Demographic & Health
- [3]. Abubakar, I. R. & Doan, P. R. (2017). Building New Capital Cities in Africa: Lessons for New Satellite Towns in
- [4]. Abusaada, H. (2020) Experiencing & Inhabiting Space: Multisensory Atmospheres in Lived Spaces
- [5]. Abusaada, H. et al (2020), Reconstructing Urban Atmosphere in Smart Public Places, ResearchGate (Accessed online 3/25/21)
- [6]. Asnodkar, M. et al (2020) Futuristic Technologies for Smart Toilets in Smart Cities, International Journal of
- [7]. Asu, T O, et. al., 2015, African Cultural Practices & Health, Implication for Nigeria Rural Development
- [8]. Defecation in Rural India: Theory, Evidence and Policies, www.orfonline.org, Developing Countries. African Studies, 76(4), 1-20, Engineering and Technical Research V9 (07), European Journal of Business and Management, Vol 10, No 33
- [9]. Kamal, K. & Robert, C. (2008) Handbook on Community-Led Total Sanitation
- [10]. O'Reilly, K, et al (2017), Exploring “The Remote” and “the Rural”: Open Defecation and Latrine Use in
- [11]. Okuku, M.O., (2020), Policy Brief: Ending Open Defecation in Nigeria, Research Gate
- [12]. Purvis, Katherine (2015) 10 Steps to End Open Defecation by 2030/Global Development, www.gaurdian.com, accessed online 3/25/21
- [13]. Related Issues Vol. 2. Pp 146www.inanet.org
- [14]. Sumedh, M.K., (2018) Community-Based Approaches to Tackle Open Defecation Survey Data
- [15]. UNICEF, Making Nigeria Open Defecation Free by 2025: A National Road Map, unicef.org/Nigeria/report
- [16]. UNICEF.org/WCAR/ending-open defecation, http://www.unicef.org>wca>endi... accessed online 3/25/21
- [17]. UNICEF_Game_plan_to_end_open_defecation_2018, Uttarakhand, India, accessed online 3/25/21
- [18]. Wahab, B, 2004, African Traditional Religious Environmental Health & Sanitation in Rural Areas, Research Gate
- [19]. Why Nigeria’s campaign to end open defecation is failing /Devex, http://www.devex.com>news, accessed online
- [20]. www.allafrica.com (2019), accessed online 3/25/21
- [21]. www.pulse.ng (2019), accessed online 3/25/21
- [22]. www.punchng.com (2019), accessed online 3/25/21
- [23]. Yunusa M. (2010). An Anthropology of Modern Nigerian Art. A Journal of Visual Arts
- [24]. Zachariah, F. et al (2018), Evaluation of a Smart toilet in an emergency camp, Science Direct, accessed online 3/25/21