



# **Environmental Health Problems in Displacement: A Case Study of Internally Displaced Persons (IDPS) in Maiduguri Camps Borno State, Nigeria**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. Author ESO designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors AOO and JDI managed the analyses of the study. Author AO managed the literature searches. All authors read and approved the final manuscript.*

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## **ABSTRACT**

The study assessed the environmental health problems of internally displaced persons in Maiduguri camps. The study covered three selected IDPs camps in Maiduguri. The objective of the study was to determine the condition of Internally Displaced Persons (IDPs) camps in Maiduguri on sanitation, overcrowding and the physical structures. Survey research design was adopted in conducting the research with a target population of 23,432 and sample size of 377. Data was collected from adult respondents using purposive sampling technique and a total of 377 copies of questionnaire was administered to the adult Internally Displaced Persons (IDPs) of the three selected camp; 350 (92.8%) copies were retrieved and found valid for analysis. Data collected was analyzed using descriptive statistics of frequency distribution and percentage counts. The result

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revealed that a majority of the respondents strongly disagreed that the sanitary, overcrowding and the condition of physical structures of the Internally Displaced Persons (IDPs) camps in Maiduguri, Borno State was satisfactory. Thus, the study recommends the involvement of Borno State Environmental Protection Agency (BOSEPA) in waste management within the camps. It also recommends that Government and Non-governmental organizations (NGOs) should implement policies and programmes that will enhance environmental health awareness for IDP's based on their gender and age.

*Keywords: Environmental health; camps; internally displaced persons.*

## 1. INTRODUCTION

Health is the most important thing in the life of every living organism for without health, nothing else really matters. It forms the basis for all other activities and achievements. It is defined as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity [1]. This implies that the physical environment plays a vital role in the fullness of one's health.

When there is a negative effect on the sustainability of the environment quality necessary for the wellbeing, environmental health problems emerge. Environmental health problems occur as a result of poor environmental quality. It is estimated that at least 12.6 million deaths each year are as result of unhealthy environments. This accounts for 23% of all deaths and 26% of deaths of children under the age of 5 globally; primarily due to preventable environmental factors [1]. It is worthy to note that poor environmental quality has its greatest impact on people whose health status is already at risk; the vulnerable. Internally displaced persons (IDPs) fall under this category of people as they have been exposed to poor living conditions prior to and even after displacement. Internally displaced persons (IDPs) are people who have been forced or obliged to flee or leave their homes or places of habitual residence, in particular as a result of, or in order to avoid the effects of armed conflicts, situations of generalized violence, violation of human rights or natural or human-made disasters, and who has not crossed an internationally recognized state border [2].

Boko Haram particularly in the Middle East and Sub-Saharan Africa, on the average, 5.2 million people have been displaced in the past 13 years due to insurgency, political instability and terrorist activities of groups such as the Islamic State of Iraq and the Levant (ISIS). As at December 2015, the global estimate of IDPs due to conflict

was 40.8 million [3]. The total number of people displaced in Sub-Saharan region is almost 12 million. The insurgents' activities in North Eastern Nigeria in the past 10 years (from 2009-Date) has forced over a million people to flee their homes resulting to unprecedented humanitarian crises [4]. Borno state continues to struggle due to prolonged humanitarian crises arising from insurgency and counter-insurgency activities in the region in relation to Boko Haram movement. The deteriorating security situation in and around the surrounding villages in the heart of the North-Eastern Nigeria, coupled with a comparatively more stable situation in Maiduguri the state capital, has culminated into a high number of individuals fleeing into the town to seek refuge.

National Nutrition and Health Survey in Nigeria [5] reported over 40% (World Health Organization critical levels) prevalence of malnutrition in women and children in north eastern Nigeria. They also reported low percentages in water and sanitation with only 53% of children between 0 – 3 years have their faeces disposed safely through use of toilet, rinsing into latrine/toilet or burying. Similarly, the north east region recorded the lowest percentile in pentavalent vaccination for children aged 12-23 months (49%) [5].

Furthermore, Borno state has one of the highest number of children under 5 (124) reported with diarrhea cases and the region with the highest level of cases of acute respiratory infection (242) for children under 5 in Nigeria [5]. It is worthy to note that diarrhea is the second leading cause of death in children after pneumonia and a leading cause of malnutrition and mortality in children under the age of 5 in Nigeria. Most of these diseases including diarrhea are as a result of poor environmental conditions. What are really the true living conditions of internally displaced persons? What are the conditions of overcrowding in the camps? What are the conditions of physical structures of internally displaced person camps in Maiduguri? Hence, a

need to assess the environmental health challenges of IDPs in their camps.

### 1.1 Objectives of the Study

The study assesses the:

- sanitary conditions of the Internally Displaced Persons (IDPs) camps in Maiduguri.
- conditions of overcrowding of the Internally Displaced Persons (IDPs) in Maiduguri camps.
- conditions of physical structures of Internally Displaced Persons (IDPs) camps in Maiduguri.

## 2. LITERATURE REVIEW

### 2.1 Sanitary Conditions of the Internally Displaced Persons (IDPs) Camps

ACTED [6] highlighted that improving hygiene and sanitation condition of IDPs in camps is a difficult task as IDP families lack water and knowledge of proper hygiene practices; usually resulting to infections and diseases. This was confirmed in a study conducted by Colin et al. [7] titled 'unimproved water sources and open defecation are associated with active trachoma in children in internally displaced person's camps in Darfur States of Sudan'. The study related environmental sanitation with cases of trachoma disease among children in IDP camps in Darfur, Sudan. The study revealed that trachoma disease was found at levels needing intervention and was as a result of poor environmental sanitation and unhealthy water sources. Similarly, Mohammed, Abram, Mari, Bradley and Matthew [8] conducted a study on the hygienic practices and diarrheal illness among persons living in at-risk settings in Kabul, Afghanistan: a cross-sectional study. The study evaluated the level of knowledge, attitude and practices of hygienic activities and sanitary practices as well as examining its association with diarrhea among IDPs. The study revealed a poor hygienic and sanitary practice among IDPs which contributed to the high number of diarrheal cases.

Furthermore, there was a cholera outbreak (August 2017) in 'Muna garage' IDP camp, Borno state which claimed the lives of at least 61 persons. On this note, Moise et al. [9] conducted a study on cholera in internally displaced person's camps in Borno state. The study

qualitatively assessed the multi-sectorial emergency response to stop the outbreak along with the cause of the outbreak. The findings of the study revealed that poor sanitation; overflowing, licking latrines and open defecations were the underlying cause of the cholera outbreak.

It is worthy to note that the availability and access to environmental sanitation facilities plays a vital role in environmental sanitation. Hence, Oluwole and Oluwaseun [10] examined residents' environmental sanitation practices across different residential zones of Osogbo, Nigeria. The stratified zones were the traditional zone, the transition zone and the sub-urban zones. Findings revealed that there was low level of access to environmental sanitation facilities which resulted to poor environmental sanitation practices among the residents. Similarly, Komolafe [11] conducted a study on household environmental sanitation practices in Katsina Metropolis. The study assessed the level of environmental sanitation amongst Katsina Metropolis residents. The findings of the study revealed that households in Katsina Metropolis dispose their solid wastes in vacant or unused plots of land, back of homes, along road and drainage systems primarily due to few waste disposal facilities and lack of proper health education. The study recommended the introduction of environmental education in primary school curriculum as well as provision of more waste disposal facilities. Thus, it can be deduced that poor sanitation conditions can negatively affect the environmental health of IDPs.

### 2.2 The Conditions of Overcrowding in Internally Displaced Persons (IDPs) Camps

Currently, the number of IDPs in Borno state are 1,434,149 [3]. This figures continue to increase due to frequent attacks by Boko Haram as some local governments are still yet inaccessible. In short, of the 27 local governments, only around 10 are accessible to humanitarian aid (which doesn't necessarily mean liberation from Boko Haram) [12]. This implies that most of these displaced persons are in Maiduguri camps which is the apparently the safest amongst the surviving local governments. Sadly, there are only 11 internally displaced person's camps in Maiduguri metropolis with Bakasi camp having a 10,000 capacity; the highest in Borno State.

Consequently, this has resulted to overcrowding of the few camps; as they were not set up to accommodate the outrageous number of IDPs. Overcrowding often results in health issues such as; insufficient ventilation in camps leading to respiratory illness, increases the severity and spread of diseases caused by poor water and sanitation systems in the camps, increases the likelihood of accidents in homes and community and negatively impacts on the physical development and psychological wellbeing of disabled IDPs [13].

This was confirmed in a study conducted by Gbakima, Terry, Kanja, Kortequee, Durkuley and Sahr [14] on the high prevalence of bedbugs *Cimex hemipterus* and *Cimex lectularis* in camps for internally displaced persons in Freetown, Sierra Leone. The study aimed at assessing the contributing factors as well as the high level of prevalence of bedbugs in a refugee camp in Freetown, Sierra Leone. The study revealed that more bedbugs were discovered at night when and in rooms with more persons than during the day. In other words, the poor living conditions and overcrowding were the major contributing factors to the high prevalence of bedbug irritation and infection in the camp. Similarly, Winifred et al. [15] related overcrowding and the distribution of humanitarian support to the likelihood of water, food and air related disease contamination in IDP camps. The study titled 'an audit of healthcare provision for internally displaced population camps in Nigeria' aimed at determining the health related resources available to IDPs in camps. The study revealed that there was severe overcrowding in some of the camps due to uneven distribution of humanitarian support and suggested that it could lead to the prevalence of water, food and air-related diseases.

Mona [13] highlighted that overcrowding not only affects the health of IDPs but also poses social and psychological effects on them. This was highlighted in his study titled social and psychological effects of overcrowding in Palestinian refugee camps in the West Bank and Gaza. The study aimed at assessing the social and psychological effects of overcrowding on IDPs in Palestine camps. The findings of the study revealed that overcrowding places a strain on social relations within the home and community, it termed overcrowding as a 'push factor' in choices resulting to early marriage (which leads to serious health and issues for women and children), it leads to lack of privacy

which often results to depression and other negative physiological outcomes, it also reduces the perception of option future for IDPs as the condition is not favorable. Similarly, Makinde et al. [16] also conducted a study on overcrowding as a risk factor for domestic violence and antisocial behavior among adolescence in Lagos, Nigeria. The study examined the relationship between overcrowding, domestic violence and antisocial behavior of adolescents in Ejigbo, Lagos state. The result of the study revealed that adolescents who lived in crowded homes (measured in terms of number of rooms) and environments were often victims of adult aggression, were prone to witness domestic violence, parental negativity and exhibit antisocial behaviours as compared with those living in homes with several rooms. Although this study was not conducted in a camp, it reflects the consequences of overcrowding in homes and as well as on environmental health.

### **2.3 The Conditions of Physical Structures of Internally Displaced Persons (IDPs) Camps**

Physical structures can affect environmental health through their availability and conditions which can surface as health, safety or psychosocial hazard. Physical structures describe buildings or set-ups meant to make IDPs camps conducive and habitable regardless of how long they would stay. Physical structures include shelter, water supply/maintenance board, sanitation facilities and recreational centre. These variables will be reviewed under the physical structures in this study. Jelili and Olanrewaju [17] stressed that physical structures in a camp should be readily accessible and express the customs and culture of the people who live in it.

Among the primary needs of IDPs, the immediate provision of shelter is of optimum importance; this is true as IDPs have been forced to abandon their homes for safety [17]. IRIN [18] reported that IDPs are usually camped in places where there are no mattresses, broken windows and doors with cracked walls and holes which often exposes them to harsh weather and environmental conditions as well as sicknesses and diseases proneness. In short, recent report by Kayode [19] and Okoro [20] reveals that hundreds of people still sleep on Maiduguri streets for fear of Boko Haram as living conditions are not conducive for IDPs. This

implies that shelter is a vital survival mechanism in emergency situations. It is worthy to note that shelter programme designs should be mindful of the environmental factors.

For instance, shelter programme designs in places where temperature is low should make provisions for thick walls and heating systems. On the other hand, high temperate regions should have proper ventilation systems. A report compiled by the Global Shelter Coalition [21] affirmed to this statement when it revealed that over 567,495 refugees had received direct shelter assistance from UNHCR. At least 27,709 families also received shelter kits to help them build stronger homes that could resist heavy rains and flooding. The kits included tarpaulins, rope, bamboo and sandals. Similarly, in Chad the displacement of Nigerians due to Boko Haram insurgency has led to the construction of over 3,300 mud-brick houses with thatched roofs to accommodate 16,500 refugees. An additional 6,938 tarpaulins have also been provided around 11 camps to help cope with the weather conditions [21].

Kumamaru and Khayre [22] opined that provision of water supply to IDPs is one of the ultimate challenges for both international community and government institutions. In their study conducted on improving access to safe water for IDPs in Somalia they emphasized that the provision, storage and delivery of *safe water* should be of optimum importance due to the fragile state of IDPs to avoid health complications. A study conducted by Adam, Bardreldin, Jamal, Afrah [23] on water associated diseases amongst children in IDPs camps and their relation to family economics status in North Darfur state, Sudan agrees with this statement. The study aimed to establish a relationship between water associated diseases among children living in the camp and their family economic status. The result revealed that contaminated water leading to diseases among children in the camp is not associated with the source of water but from the transport, storage and handling of the water before use. The study also revealed a significant relationship between the economic status of the IDPs family and the accessibility to portable water.

Diarrheal diseases are the major causes of mortality and morbidity among IDPs in Sub-Saharan Africa. This results from either substandard and/or inadequate sanitation facility, poor hygiene and scarcity of soap [24].

Pit latrine is the most common means of defecation in displaced person's camp. However, in cases of overcrowding it poses a serious health threat especially in women and children; who are vulnerable and constitute over 70% of internally displaced populations. Raymond et al. [25] in their study on sanitation practices and perceptions in Kakuma refugee camp tried to understand why in spite the availability of pit latrines in the camp, displaced persons engaged in open defecation. The study revealed that unavailability of adequate and improved sanitation coupled with a long lasting tradition of open defecation explains the preference of open defecation. Most of the respondents specifically highlighted insufficient number of latrines, foul odour, risk to children, poor construction of latrines, pests and the need for more cleaning supplies as the major contributing factors thus; a cry for new improved sanitation facilities. It is no wonder that ACTED [6] advocated for community-led hygiene projects to reduce health risk in Rays qabobe IDP camp, Somalia which is plagued by substandard fecal waste handling as well as improper use of latrines. The project aimed at mitigating the risk of hygiene related diseases through the integration of community members (as community hygiene promoters) to achieve a long lasting positive effect.

Although the importance of recreational centers and activities in IDPs settings has largely been neglected by researchers and stake holders, its impact on environment health cannot be underrated. Recreational centers encourage participation in recreational activities which has proven to be an effective psychosocial tool over time. For example, Aamir [26] in an article on sports as a recreational tool for IDPs highlighted how sports has been used to address post-traumatic stress disorder (PTSD) amongst IDPs in Pakistani camps. The article also stressed that through recreational activities, children and youth become more sensitive to others' needs, values as well as learning how to handle exclusions, emotional management and self-control. Similarly, Bo, Jean and Peter [27] conducted a study on the role of art in psychosocial care and protection for displaced children. The study aimed at using art, a recreational activity for the improvement of psychosocial health of IDPs. The study revealed that the approach was effective in improving and protecting the psychological health of especially children through expressions via drama, dancing and music, drawing and painting.

### 3. METHODOLOGY

#### 3.1 Research Design

This study adopted a primary cross sectional survey design in assessing the environmental health problems of internally displaced persons. This design was considered appropriate for the study as explained by Akuezuilo and Agu [28], who affirmed that the survey is one in which group of people or items is studied by collecting and analyzing data (using questionnaires and analytical tools respectively) from only a few people or items considered to be representative of the entire group. In addition, Fajonyomi and Fajonyomi, [29] affirmed that survey this design allows the researcher to change description of data collected and relate it to other variables.

#### 3.2 Population and Sample

As at the time of this study, Maiduguri Metropolis had a total of eleven (11) internally displaced person's camps, according to NEMA, (2017). The target population consisted of all the adults in the three selected IDPs camps in Maiduguri out of the eleven camps. The total population was twenty-three thousand four hundred and thirty-two (23,432) and the sample size was based on Krejcie and Morgan [30]. Thus, the total sample size was 377 adult respondents who were selected using purposive sampling technique based on sex, age, marital status and occupation. Bakasi camp had the highest number of registered adults (10,122), Dalori camp had the highest number of different ethnic groups/ tribes with 9,155 adults while EYN/CAN had even age distribution with 4,155 adults (NEMA 2016). Out of the 377 respondents, 150, 150 and 77 adults were selected from Bakasi, Dalori and EYN/CAN camps respectively for the study. The reliability of the instrument was established using test and re-test reliability method. Fifty (50) copies of the research instrument were administered to fifty (50) adult internally displaced persons (based on sex, age, marital status and occupation) in N.Y.S.C camp who were not part of the population of the study. A 4 point Likert scale agreement questionnaire of Strongly Agreed, Agreed, Disagreed and Strongly Disagreed was used to collect data. Strongly Agreed and Agreed indicates satisfaction of services while Strongly Disagree and Disagree indicates dissatisfaction of services. The administration of the questionnaire was done twice with two weeks' interval to test the reliability of the instrument. 27 questionnaires

were considered invalid due to lack of clarity in filling of the forms and thus were not analyzed. Copies of the questionnaire were given identification marks for ease of pairing and matching the first administration with the second one. Using the Pearson Moment Correlation, the co-efficient index of  $r = 0.97$  was obtained, which is a high positive coefficient, meaning that the instrument was highly reliable.

#### 3.3 Method of Data Analysis

Data was gathered and classified using descriptive statistics through frequency and percentage counts. Descriptive statistics simplifies and presents data in a meaningful manner to enable easy interpretation.

#### 3.4 Procedure for Data Collection

An introductory letter was obtained from the Head of Continuing Education and Extension Services, University of Maiduguri, before proceeding to the field. A covering letter was also attached to each of the questionnaire. The content of the covering letter entails the purpose of the research; solicitation for cooperation from respondents to complete the questionnaire, with the assurance of anonymity and confidentiality of all information provided. The questionnaire was administered by the researcher and research assistant who was trained by the researcher on how to administer, interpret and retrieve questionnaire. The presence of the researcher made it possible to explain difficult aspect(s) of the questionnaire to the respondents if it becomes necessary.

### 4. RESULTS AND DISCUSSION

#### 4.1 Analysis and Presentation of Demographic Data

The result from Table 1 indicates that out of the 350 respondents, 149 (42.6%) were male while 201 (57.4%) were female. This implies that majority of the respondents were female (57.4%). The result also reveals that the majority of the respondents 123 (35.1%) were youths who were between the ages of 20-30 years. Similarly, the result from the table indicates that most of the respondents who participated in the study were single; 198 (56.6%). Furthermore, the result revealed that majority of the respondents were farmers 262 (74.9%) who were mostly SSCE holders (139;39.7%).

**Table 1. Demographic information of respondents**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Sex</b>		
Male	149	42.6
Female	201	57.4
Total	350	100
<b>Respondents' age range</b>		
20-30 years	123	35.1
31-40 years	112	32.0
41-50 years	67	19.2
51-60 years	48	13.7
Total	350	100
<b>Respondents' marital status</b>		
Single	198	56.6
Married	31	8.9
Widow/Widower	112	32.0
Divorced	9	2.0
Total	350	100
<b>Respondents' occupation</b>		
Civil Servant	27	7.7
Farmer	262	74.9
Businessman/woman	40	11.4
Student	21	6.0
Total	350	100
<b>Qualification of the respondents</b>		
Degree	15	4.3
NCE/Diploma	23	6.6
SSCE	139	39.7
Pri. Sch. Certificate	95	27.1
Not attended school	78	22.3
Total	350	100

## 4.2 Analysis on Research Questions

**Research Question I:** What are the sanitary conditions of the Internally Displaced Persons (IDPs) camps in Maiduguri?

Table 2 presents the responses of respondents on sanitary conditions of the Internally Displaced Persons (IDPs) camps, there were five statements on the sanitary conditions which comprises of cleaners, water supply, sewage system, toilet system and provision of dustbin/trash cans. The responses of the respondents on the statement there were enough cleaners who always kept the camp clean indicate that 122 (34.8%) strongly disagreed; which implies that there were no enough cleaners who could always keep the camp clean.

The opinion of the respondents on the statement that the water supply in the camp was satisfactory indicates that majority of the respondents 177 (50.5%) disagreed. Thus, this implies that the water supply in the camp was not enough.

Similarly, the responses of the respondents on the statement that there were enough sewage systems in the camp indicates that majority of the respondents 161 (46.0%) strongly disagreed to the statement. It means that there were no enough sewage systems in the camp.

More so, the responses of the respondents on the statement that the toilet system in the camp was satisfactory indicates that majority of the respondents; 113 (32.3%) disagreed to the statement. This implies that the toilet system in the camp was not satisfactory.

**Table 2. The sanitary conditions of the internally displaced persons camps in Maiduguri**

Statements	Response				Total
	Strongly Agreed	Agreed	Disagreed	Strongly Disagreed	
There are enough cleaners who always keep the camp clean.	71 (20.3%)	56 (16.0%)	101 (28.9%)	122 (34.8%)	350
The water supply in the camp is satisfactory.	20 (5.7%)	48 (13.7%)	177 (50.5%)	105 (29.1%)	
There are enough sewage systems in the camp.	82 (23.4%)	11 (3.1%)	96 (27.4%)	161 (46.0%)	
The toilet systems in the camp are satisfactory.	98 (28.0%)	66 (18.9%)	113 (32.3%)	73 (20.8%)	
The provision of dustbin/trashcan within the camp is satisfactory.	98 (28.0%)	59 (16.9%)	99 (28.3%)	94 (26.8%)	

Lastly, the responses of the respondents on the statement that the provision of Dustbin/Trashcan within the camp was satisfactory indicates that majority of the respondents; 99 (28.3%) disagreed. This implies that the provision of Dustbin/Trashcan within the camp was not satisfactory. It can be concluded in this aspect that the sanitary condition of the internally displaced persons (IDPs) camps in Maiduguri, Borno State was not satisfactory.

**Research Question 2:** What are the conditions of overcrowding of the Internally Displaced Persons (IDPs) in Maiduguri camps?

Table 3 presents the responses of respondents on the conditions of overcrowding of the Internally Displaced Persons (IDPs) camps, there were five statements on the condition of

overcrowding, which comprises of availability of tents, size of tents, influx of IDPs, effect of overcrowding on toilet maintenance and effect of overcrowding on control of waste products.

The responses of the respondents on the statement that there were no enough tents to accommodate IDPs in the camp indicates that majority of the respondents; 123 (35.1%) agreed to the statement. This shows that there were no enough tents to accommodate IDPs in the camp.

The opinion of the respondents on the statement that the size of the tents in the camps was not satisfactory indicates that majority of the respondents; 111 (31.8%) agreed to the statement. This implies that the size of the tents in the camps was not satisfactory.

**Table 3. Conditions of overcrowding of IDPs camps in Maiduguri**

Statements	Response				Total
	Strongly Agreed	Agreed	Disagreed	Strongly Disagreed	
There are no enough tents to accommodate IDPs in the camp.	82 (23.4%)	123 (35.1%)	100 (28.6%)	45 (12.9%)	350
The size of the tents in the camp is not satisfactory.	102 (29.1%)	111 (31.8%)	60 (17.1%)	77 (22.0%)	
The influx of IDPs causes overcrowding and easily spread diseases.	220 (62.9%)	60 (17.1%)	12 (3.4%)	58 (16.6%)	
The toilet systems are poorly maintained due to overcrowding.	201 (57.4%)	15 (4.3%)	42 (12.0%)	92 (26.3%)	
The control of waste products become difficult due to overcrowding of the IDPs in the camp.	111 (31.8%)	102 (29.1%)	68 (19.4%)	69 (19.7%)	



Similarly, the responses of the respondents on the statement that the influx of the IDPs caused overcrowding and easily spread diseases in the camp indicates that majority of the respondents; 220 (62.9%) strongly agreed to the statement. It means that the influx of the IDPs caused overcrowding and easily spread diseases in the camp.

More so, the responses of the respondents on the statement that the toilet systems were poorly maintained due to overcrowding indicates that majority of the respondents; 201 (57.4%) strongly agreed to the statement. It implies that the toilet systems were poorly maintained due to overcrowding.

Furthermore, the responses of the respondents on the statement that the control of waste products became difficult due to overcrowding of the IDPs in the camp indicates that majority of the respondents; 111(31.8%) strongly agreed to the statement. This indicates that the control of waste products becomes difficult due to overcrowding of the IDPs in the camp. It can be concluded that the internally displaced persons (IDPs) camps in Maiduguri, Borno State were overcrowded.

**Research Question 3:** What are the conditions of physical structures of Internally Displaced Persons (IDPs) camps in Maiduguri?

Table 4 presents the responses of respondents on the conditions of physical structures of Internally Displaced Persons (IDPs) Camps, there were five statements on the conditions of physical structures, which comprises of location of tents, quality of tents, ventilation, drainage system and recreational centers.

The responses of the respondents on the statement that the camp was situated in a good location for IDPs indicates that majority of the respondents; 201(57.4%) strongly disagreed to the statement. This reveals that the camps were not situated in a good location for IDPs.

The opinion of the respondents on the statement that the tents were well constructed in the camp indicates that majority of the respondents; 205 (58.6%) disagreed to the statement. This implies that the tents were not well constructed in the camp.

Similarly, the responses of the respondents on the statement that there was cross ventilation in each tent occupied by IDP in the camp indicates that majority of the respondents; 173 (49.4%) disagreed to the statement. It means that there was no cross ventilation in each tent occupied by IDP in the camp.

More so, the responses of the respondents on the statement that the drainage systems in the camp were well constructed indicates that majority of the respondents; 143 (40.3%) disagreed to the statement. It means that the drainage system in the camp was not satisfactory.

Lastly, the responses of the respondents on the statement that recreation centers were well constructed in the camp indicates that majority of the respondents; 181 (51.7%) strongly disagreed to the statement. This implies that the recreation centers in the camp were not well constructed. It can be concluded here that the conditions of physical structures for internally displaced persons (IDPs) camps was not satisfactory in Maiduguri, Borno State.

**Table 4. Conditions of physical structures of IDP's camps in Maiduguri**

Statements	Response				Total
	Strongly Agreed	Agreed	Disagreed	Strongly Disagreed	
The camp is situated in a good location.	92 (26.3%)	42 (12.0%)	15 (4.3%)	201 (57.4%)	350
The tents are well constructed in the camp.	51 (14.6%)	56 (16.0%)	205 (58.6%)	38 (10.9%)	
There is cross ventilation in each tent occupied by IDP in the camp.	23 (6.6%)	62 (17.7%)	173 (49.4%)	92 (26.3%)	
The drainage system in the camp is well constructed.	100 (28.6%)	64 (18.3%)	143 (40.9%)	43 (12.3%)	
Recreational centers are well constructed in the camp.	72 (20.6%)	62 (17.7%)	35 (10.0%)	181 (51.7%)	

### 4.3 Summary of Findings

The following are the summary of the findings:

- The sanitary condition of the internally displaced persons (IDPs) camps in Maiduguri, Borno State was not satisfactory.
- The internally displaced persons (IDPs) camps in Maiduguri Borno State were overcrowded.
- The condition of physical structures of Internally Displaced Persons (IDPs) camps in Maiduguri, Borno State was not satisfactory.

### 4.4 Discussion

This study was designed to assess the environmental health problems of internally displaced persons (IDPs) in Maiduguri camps, Borno State. The study focused on sanitary condition, condition of overcrowding and condition of physical structures of internally displaced persons. The result of the study on sanitary condition of the Internally Displaced Persons (IDPs) in Maiduguri camps, Borno state revealed that there were no enough cleaners, the water supply in the camp was not satisfactory, the sewage systems were not enough, toilet system were not satisfactory and the provision of dustbin/trash bins were not satisfactory. With this fact it means the sanitary condition of the internally displaced persons in Maiduguri camps was not satisfactory. This is in agreement with Colin et al. [7], Mohammed et al. [8] and Moise et al. [9] that low level of access to environmental sanitation, poor attitude and awareness can result to the spread of diseases. Similarly, the proportion of residents with environmental sanitation facilities in their homes can result to poor environmental sanitation practices among residents in terms of utilization of available amenities across the residential zones as observed by Oluwole and Oluwaseun [10] and Komolafe [11].

In order to determine the condition of overcrowding of the Internally Displaced Persons in Maiduguri camps, Borno State, the study revealed that there were no enough tents in the camp, the size of the tent is small, toilet system poorly maintained, influx of the IDPs caused overcrowding, control of waste product becomes difficult and encourages the spread of diseases. This implies that the internally displaced persons were overcrowded in Maiduguri camps, Borno

State. This is in connection with the study conducted by Gbakima et al. [14], Owoaje et al. [24] and Winifred et al. [15] that the increasing number of IDPs living in inadequate public or private shelters indicates that the coping mechanisms of both IDPs and host communities become overstretched encouraging the spread of diseases. Many of the communal and makeshift shelters are also overcrowded and unsuitable in terms of water, sanitation facilities, cooking and privacy, especially for women. The deficiencies of shelter experienced by IDPs in the camps made them to be overcrowded in the camps with access to small living space which may be attribute of some violent and antisocial behaviors in sanitation and control of waste products. This was also defined by Makinde et al. [16] that overcrowding poses a risk factor for domestic violence and antisocial behavior among adolescence.

Findings on the condition of the physical structure of the internally displaced persons' (IDPs') camp revealed that the camp is not situated in good location, tents are not well constructed, there was no cross ventilation in the tents occupied by the IDPs, drainage systems were not well constructed and recreation centers were not well constructed in the IDPs camp in Maiduguri. This implies that the condition of the physical structures of the Internally Displaced Persons' (IDPs) camps in Maiduguri, Borno State was not satisfactory.

This is in corroboration with Kayode [19] that the facilities in IDPs camp often become overcrowded and some are outdoors, forcing IDPs to sleep exposed to the elements and with no protection from mosquitoes. Okoro [20] also affirmed that living in camps were indeed not pleasant at all to the IDPs, this is against the background that originally most of those structures were not prepared in any way to accommodate the magnitude of people that were housed therein; the housing units and toilet facilities were overstretched, leading to the environmental health problem of the IDPs. This affirms to the findings of Jelili and Olanrewaju [17], IRIN [18], Kumamaru and Khayre [22], Raymond et al. [25]. Initially camp structures, makeshift tents were erected by the IDPs themselves, with zinc, raffia "zana" and other improvised roofing materials. Bush paths and other open places in these camps were initially open structures used for bathing and toileting, but are now used as tents due to insufficient facilities. A Brooking Project on Internal

Displacement (2012) is also in corroboration with this study because it revealed that the conditions of most of the shelter in the IDPs camps in Maiduguri were not "weather friendly" and not in any way good for an average family life thus, Shelter Coalition (2019) stressed the need for consideration of environmental factors in shelter project design. Information collected in this regard suggested that family life in the IDPs' camps were subjected to "non-privacy" as the accommodation space were overcrowded, and furnished mainly with improvised beds. In fact, every aspect of life of these IDPs was affected in these camps.

## 5. CONCLUSION

Based on the finding of this study, it can be concluded that the environmental health of internally displaced persons (IDPs) in Maiduguri camps, Borno State was not satisfactory. This conclusion is based on the findings that the sanitary condition of internally displaced persons, the conditions of overcrowding of the internally displaced persons as well as the conditions of physical structures of the internally displaced persons was not satisfactory.

## 6. RECOMMENDATIONS

Based on the finding of this study, the following recommendations were made. That the:

- Borno State Environmental Protection Agency (BOSEPA) should be involved in waste management within the camps.
- Governmental and Non-governmental organizations (NGOs) should implement policies and programmes that will enhance environmental health awareness for IDP's based on their gender and age.

## CONSENT

As per international standard or university standard guideline participant consent has been collected and preserved by the authors.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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