SANITATION FACILITIES AND DISEASES OCCURRENCE: A CASE STUDY OF MALARIA AND DIARRHEA IN ILE-IFE, OSUN STATE, NIGERIA

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Abstract
Malaria and diarrhea are the two major diseases caused by paucity in environmental sanitation facilities and practices. This study therefore seeks to examine the relationship between environmental sanitation facilities and the occurrence of two major diseases (malaria and diarrhea) in Ile-Ife with a view to assessing the available environmental sanitation facilities; and its impact on the occurrence of malaria and diarrhea diseases in the study area in order to suggest positive measures for improved environmental quality in the area. Data used for the study were collected from primary and secondary sources. Multi-stage sampling technique was employed for the study. Hence 228 households were sampled in 12 selected political wards across the residential zones. This forms the sample size. Data analysis was done through the use of tables, graphs and multivariate regression model through the SPSS package version 20. The study revealed that almost all respondents practice environmental sanitation through monthly sanitation exercise and dispose their waste in the community dump sites. It also revealed that majority of the respondents' uses water closet toilet and open drainage system. It also shows that the predominant means of waste storage before disposal was Bucket. Also, this study shows that the environmental sanitation facilities in the study area are few and inaccessible; the available once were not properly managed. Hence there is an urgent need for the government and environmental sanitation agencies to intensify effort on the availability and accessibility of environmental sanitation facilities in order to alleviate the occurrence of malaria and diarrhea in the study area.

Key words: Sanitation Facilities, Unsanitary Environment, Malaria, Diarrhea, Health.

Introduction

The rapid increase of urbanization in developed and developing countries is alarming. In Africa, the dramatic effects of rapid urbanization are very clear in both the cities and peri-urban areas (Nsiah-Gyabaah, 2004). This population surge on the continent is highly felt in Nigeria, the most populated nation with fast growing megacity. The quest for a better quality of life increases

annually due to the economic opportunities and quality of life that the city provides for the residents (Abogan, 2014). Population growth has a negative impact on the quality of the environment (Khan, 2007). Hence there is need for the provision of adequate environmental sanitation facilities and practices so as to regulate the spread of diseases through an unsanitary environment.

Simpson-Herbert, Mayling, Wood, Sara and World Health Organization (1998), declares that environmental sanitation facilities are of several components; it includes facilities for disposal of hygienic management of liquid and solid human waste, facilities for control of diseases vector, washing facilities for personal and domestic hygiene amongst others. In other words, environmental sanitation facilities are the hygienic means of promoting health through prevention of human contacts with hazard of wastes.

Unsanitary environmental conditions are associated with a wide range of health conditions. Some of these diseases as posited by World Health Organization (WHO, 2006) are malaria, diarrhea, cholera, fluorosis, guinea worm, amongst others. Malaria is a mosquito-borne infectious disease that affects both human and animals. It usually begins 10-15 days after being bitten by a female anopheles mosquito. Malaria causes symptoms such as tiredness, headache, fever and vomiting. In severe cases, it can cause yellow skin, seizures, coma or death. Diarrhea is a condition of having at least three loose or watery bowel movement each day. It often last for few days and can result in dehydration due to fluid loss. The infection is often acquired from contaminated food or water. Cholera is an acute bacterial infection of the intestinal tract. It causes severe attacks of diarrhea that, without treatment, can quickly lead to acute dehydration and death. Fluorosis is a serious bone disease caused by high concentrations of fluoride occurring naturally in groundwater. Fluorosis is endemic in at least 25 countries across the globe. Guinea worm (also known as Dracunculiasis) People contract the disease when drinking water contaminated with ranunculus larvae. The larvae mature into large (up to a meter long) adult Guinea worms and leave the body after about a year, causing debilitating ulcers (WHO, 2006).

The risk of these diseases can be reduced through access to safe drinking water, well-built incinerators or dump sites, good toilet system and a hygienic environment. Addressing sanitation issues offers public health practitioners an opportunity to address an important social determinant of health of which sanitation facilities is highly essential. Public health has long been involved in sanitation issues. In a report to the United Nations Development Programme (UNDP), Hutton (2012) estimate that the cost benefit ratio of sanitation interventions in Nigeria is 7.2, Osun State inclusive. Health benefits are realized and accrue to the direct recipients of sanitation interventions and also to their neighbors.

The rapid urbanization in these countries has caused dynamic growth of urban slums and contributed to increasing numbers of informal slum dwellers. The result has been overcrowded living conditions; inadequate sanitation facilities; and exposure of slum dwellers, especially children under five years of age, to a high risk of disease worldwide, about eight million children died in 2010 before reaching the age of five, mainly due to poor sanitation facilities and unhygienic conditions (Adedimeji, 2005).

To ensure a safe and clean environment, the Osun state government established a board called Rural Water and Environmental Sanitation Agency (RUWESA, 2017) under the watch of Ministry of Water Resources, Rural Development and Community affairs, Osogbo to monitor the environmental quality and to ensure a refuse free environment. However, despite the government efforts at making the environment clean, there are numbers of location in Ile-Ife, Osun State where the said sanitation facilities are found wanting. In lieu of this, people dispose their waste at places considered to be convenient to them.

Indiscriminate disposal of waste due to insufficient of sanitation facilities affect the quality of water and air. It's against this background that this study seeks to appraise the sanitation facilities and occurrence of malaria and diarrhea diseases with consideration to the available sanitation facilities and its utilization in relation to the socio economic background and characteristics of the residents in the study area. Hence, the study sets to provide answers to the following questions: (i) what are the environmental sanitations facilities in the study area? (ii) How functional are the available environmental sanitation facilities in the study area? (iii) What is the level of variation in environmental sanitation facilities available in different residential in the study area? (iv) which environmental related diseases are prominent in Ile-Ife? Also, the working **hypothesis** for this study is:

H_o= there is no positive relationship between environmental sanitation facilities and the occurrence of diseases in the study area.

H_I= There is a positive relationship between environmental sanitation and the occurrence of diseases in the study area.

Study Area

Ile Ife is an ancient Yoruba town currently located in present Osun State southern western Nigeria. In fact, it is the source of Yoruba tribe and first settlement in southern western part of Nigeria. It is located between latitude 7°28'N and 7.467°N and between longitude 4°34'E and 4.567°E. The total area cover is 1,791 km sq (692 sq mi) and a density of 280/km s (740/sq). It has a population of about of 495,997 (NPC, 2017). It has two political local governments with 21 political wards. It home Obafemi Awolowo University (OAU), one of the leading academic institutions in West Africa.

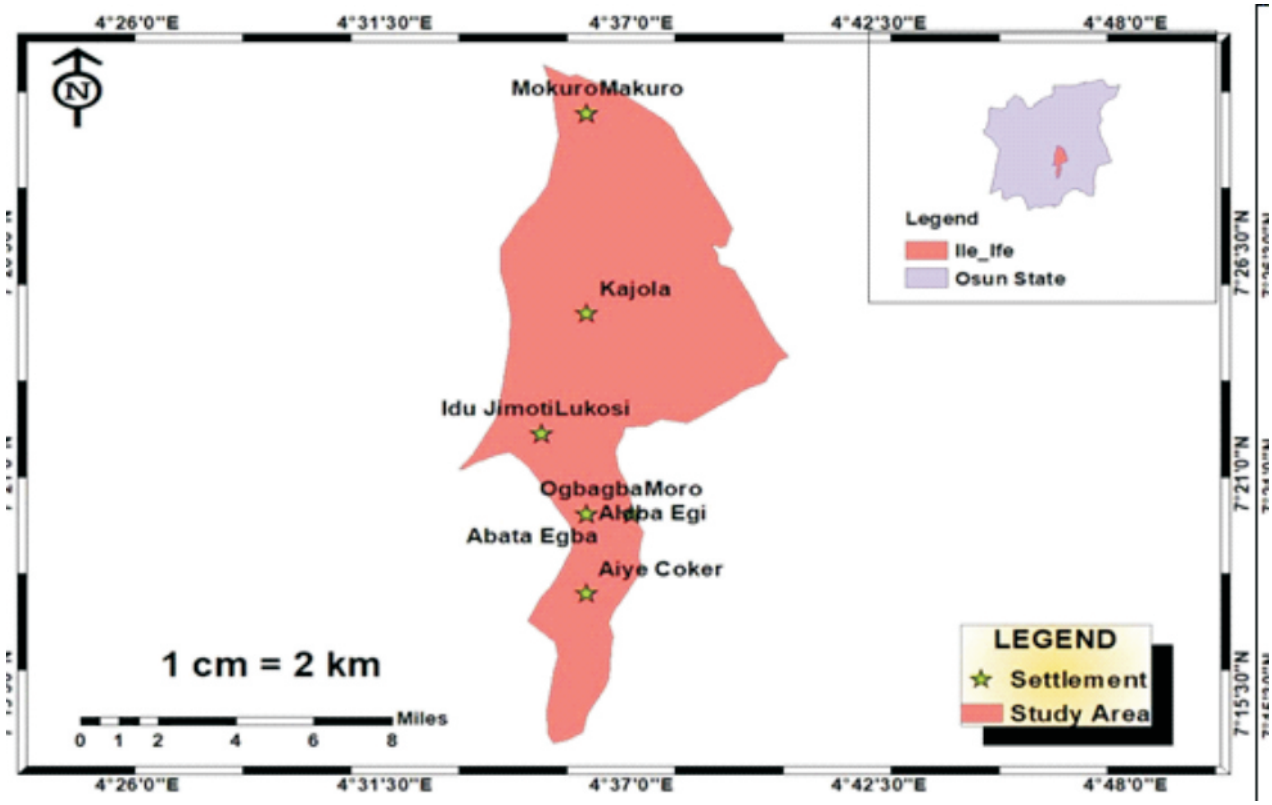


Fig 1. Ile-Ife indicating Ife Central and East Local Government with Osun state as inset
Source: Ministry of Land and Physical Planning Osun State Secretariat Osogbo (2018)

Material and Methods

Both Primary and Secondary sources of data were involved in this study. The primary data are the demographic characteristics of resident, available sanitation facilities in the study area (drainage, pipe borne water and waste storage).Data on selected diseases i.e. diarrhea and malaria for ten (10) years, population of the study area, map of the study area were the secondary data used for this research.

The primary data for this study was obtained through administration of structured questionnaire. Secondary information such as the map of study area, record of selected diseases for ten years (2007 to 2017) and the population of the study area which was derived from record of Ministry of Land and Physical Planning Osun State Secretariat Osogbo, Obafemi Awolowo University Teaching Hospital Complex (OAUTHC) and National Population Commission Ife Zone respectively. The target person for the survey in the sample building is the household head which could either be male or female.

Method of Data Analysis

The study area has two local governments, Ife Central and Ife East. Ife Central and East Local Government has 10 and 11 political wards and a total population of 233,118 and 262,879 people

respectively which made the study area to have a total number of 21 political wards and a population of about 495,997 altogether (NPC, 2007). Due to the nature of the study area, Multi stage sampling technique was employed. Based on the foregoing, the sampling procedure for the study was discussed under four (4) stages.

The first stage involved the stratification of residential areas in Ile-Ife into residential zones. The study area was divided into three; the core, the transition and the suburban. In the second stage, all residential areas identified in the study area were divided into the existing political wards as recognized by Osun State Independence Electoral commission (2015) in the conduct of electoral polls.

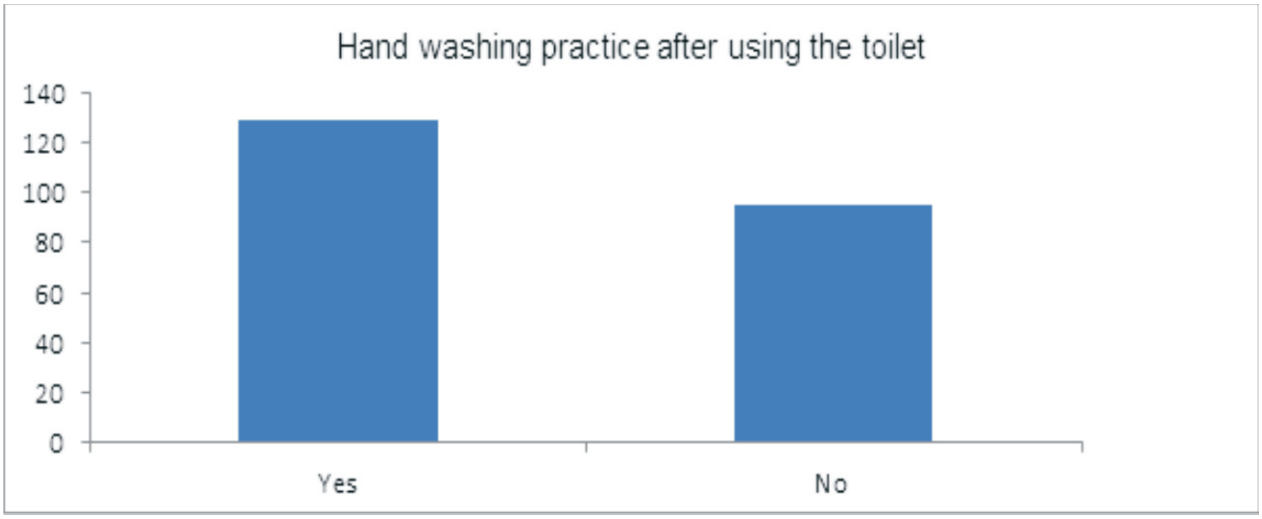
The third stage involved the selection of wards in each residential areas of Ile-Ife. Residents from the 21 political wards were selected and grouped into residential zones, i.e. 7wards from the core, 9wards from transition zone and 5wards from the sub-urban. The wards to be sampled were randomly selected across the three residential zones having a total of 12wards. The fourth and the last stage involved the administration of questionnaire to the residents of the selected wards. Systematic random sampling techniques was adopted in selecting one out of every two hundred (200) buildings whose residents was sampled i.e. 0.5% of all residential buildings. Record from the Osun state Valuation Office indicated that as at 2016 there were a total of 45,412 buildings in Ile-Ife where 20,100, 17,182 and 8,130 were the number of the core, transition and sub-urban respectively. Under this circumstance, with the proposed 0.5% sample size, questionnaire was administered on male or female household heads. In the core, 101 buildings were sampled, 86 in the transition and 41 in the sub urban. Therefore, a total number of 228 questionnaires were administered. This represents the sample size for this research. Both descriptive statistics and inferential statistics was used to analyze the data collected using Statistical Package for Social Scientists (SPSS) Version 20.

Results and Discussion

As shown in figure 2, majority 131 (57.6%) of the respondents wash their hands after using the toilet, while 97 (42.4%) do not. It can be observed from these data that a basic toileting sanitation practice is observed by many of the respondents, this thereby reducing the risk of contamination through hands to mouth channel.

Figure 2: Toilet Hygiene Practices adopted Respondents

Source: Author's fieldwork, 2018



Also, the result can be attributed with the quantity of water available for consumption in the different household as it was observed that some respondents does not have access to sufficient water for daily use.

In table 1, majority 146 (64%) of the respondents indicated that there is no incidence of open children's faeces in the study area, while 82 (36%) of the respondents indicated incidence of open children's defecation.

Table 1: Incidence of Open Defecation

Sanitation Facilities	Freq.	%
Yes	82	36
No	146	64
Total	228	100.0

Source: Author's fieldwork, 2018

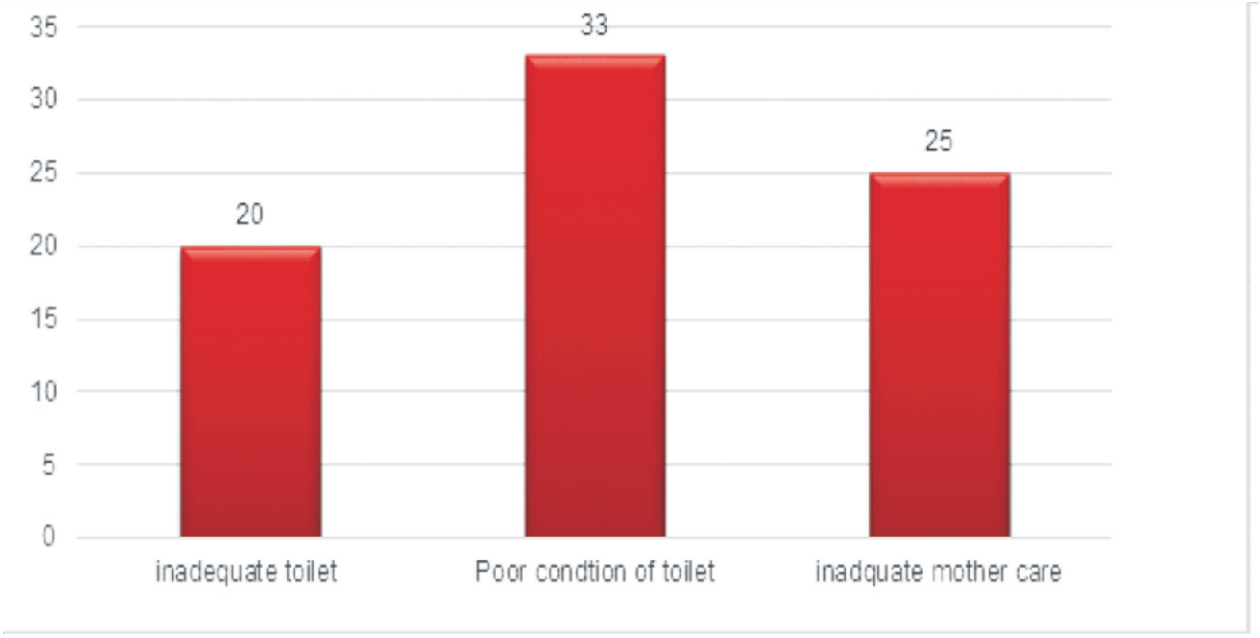
This result was expected given the inadequate quantity of water in the study area which discouraged many of the respondents from practicing good sanitation. The implication of this if not properly addressed on time is that, the respondents and their household's members may be susceptible to unsanitary related diseases such as malaria, cholera, diarrhea etc.

Table 2: Poor Management of Defecation

Sanitation Facilities	**Frequency**	**Percentage (%)**
Poor Toileting	96	42.1
Poor Management of Defecation	73	32
Inadequate Toileting Facilities	59	25.9
TOTAL	**228**	**100**

In support of Table 1, Table 2 shows major reason for poor management of defecation in the study area. Majority 96 (42.1%) of the respondents indicated poor toileting condition as a causal factor for poor management of defecation, while 73 (32%) and 58 (25.9%) indicated poor parenting and inadequate toilet facilities

Figure 3: Reasons for Incidence of Open Defecation in the Study Area



Source: Author's fieldwork, 2018

As shown in Table 3 all (100.0%) of the respondents have environmental sanitation orientation. Out of the 228 respondents, majority 138 (61.8%) were oriented through monthly environmental sanitation exercise, while 87 (37.1%) and 3 (1.3%) were oriented through environmental education and community participation respectively.

Table 3: Awareness and Sources of Environmental Sanitation Orientation

Awareness	Freq.	%
Yes	228	100.0
No	00	000.0
Total	228	100.0
Source of Awareness		
Monthly Environmental Sanitation Exercise	138	61.6
Environmental Education	87	37.1
Community Participation	3	1.3
Total	228	100.0

Source: Author's fieldwork, 2018

This result is in contrary to the study of Daramola, (2012) which revealed that there were no proper orientations and training given to residents of Ibadan community as to how to keep the environment clean and how best to dispose waste in order to prevent diseases and other health hazards that could result from poor environmental management.

As indicated in table 4 all 228 (100.0%) of the respondents are aware of diseases related to poor sanitation. Also, 89% of these respondents have been diagnosed of at least a disease related to poor sanitation, while 11% had not been diagnosed. This may be linked to poor sanitation condition observed in the study area.

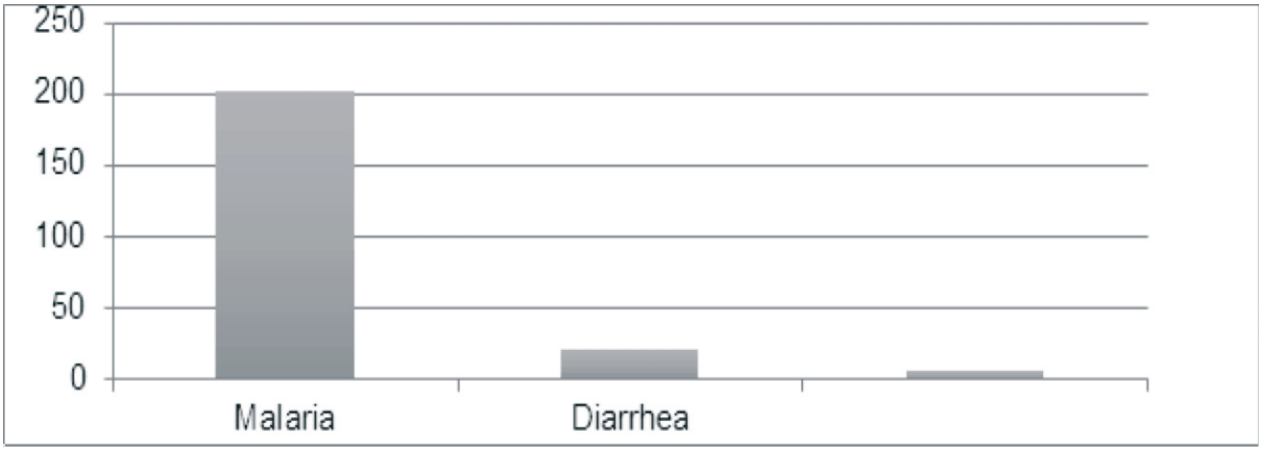
Table 4: Diseases Related to Poor Sanitation

Awareness of Diseases	Freq.	%
Yes	228	100.0
No	0	00.0
Total	228	100.0
Diagnosed of Diseases		
Yes	222	97
No	6	3
Total	228	100.0

Source: Author's fieldwork, 2018

As shown in Figure 4, only 6 (3%) of the respondents had not been diagnosed of diseases while 20 (8.8%) had been diagnosed of diarrhea. Majority 202 (97%) of the respondents have been diagnosed of malaria. This can be attributed to the waste disposal practices in the study area where higher number of respondents with 48.7% frequency uses communal waste dump site, diseases carrier like houseflies and rodent can easily spread diseases through contaminated surface.

Figure 4: Diseases Associated with Unsanitary Environment



Source: Author's fieldwork, 2018

Also improper maintenance of water were well are found to be too close to latrines and sewage systems, there could be possible leaching of impurities from the latrines into the well and thereby making the water unfit for drinking and other domestic uses and may result to disease infection. Malaria is the predominant disease affecting the population of Nigeria. Many other diseases endemic throughout the country are generally associated with unsatisfactory drinking water supply, poor sanitation conditions and inadequate health education programs. These include diarrhea, dysentery, gastro – enteritis, infectious hepatitis, hook work, guinea worm, scabies and other parasitic infections.

The health consequences of poor sanitation include environmental diseases such as cholera, typhoid fever, and salmonellosis, other gastrointestinal viruses, and dysentery. Water scarcity and poor sanitation have remained daunting challenges for concerned citizens and development partners, despite the endowed resources at the disposal of the most populous black nation, Nigeria.

Table 5: Respondents Diagnosed of Diseases within the Time frame of the study

Diagnosed of poor sanitation related diseases	Within the last 5 months	6-10 months	Not diagnosed within the time frame	TOTAL
Freq	206	7	15	228
Percentage	90.3	3.1	6.6	100

Source: Author's fieldwork, 2018

Figure 5 shows that most 206 (90.3%) of the respondents were diagnosed of diseases related to poor sanitation less than five months ago, while 7 (3.1%) were diagnosed between 6-10 months ago 15 (6.6%) of the respondent have not been diagnosed. None of the respondents were diagnosed between more than 10 months ago. This shows a recent occurrence of cases of poor sanitation related diseases in the study area (see also Table 5).

Figure 5: Duration of Diseases



Source: Author's fieldwork, 2018

As indicated in figure 6, the highest disease recorded within the stipulated period in Ile-Ife is malaria with a figure of 833,772 cases and a mean number of 6,316.5. Malaria is regarded as life a threatening disease which is typically transmitted through the bite of an infected Anopheles mosquito.

Table 6: Descriptive Analysis of the Occurrence of Selected Diseases (2007 – 2017)

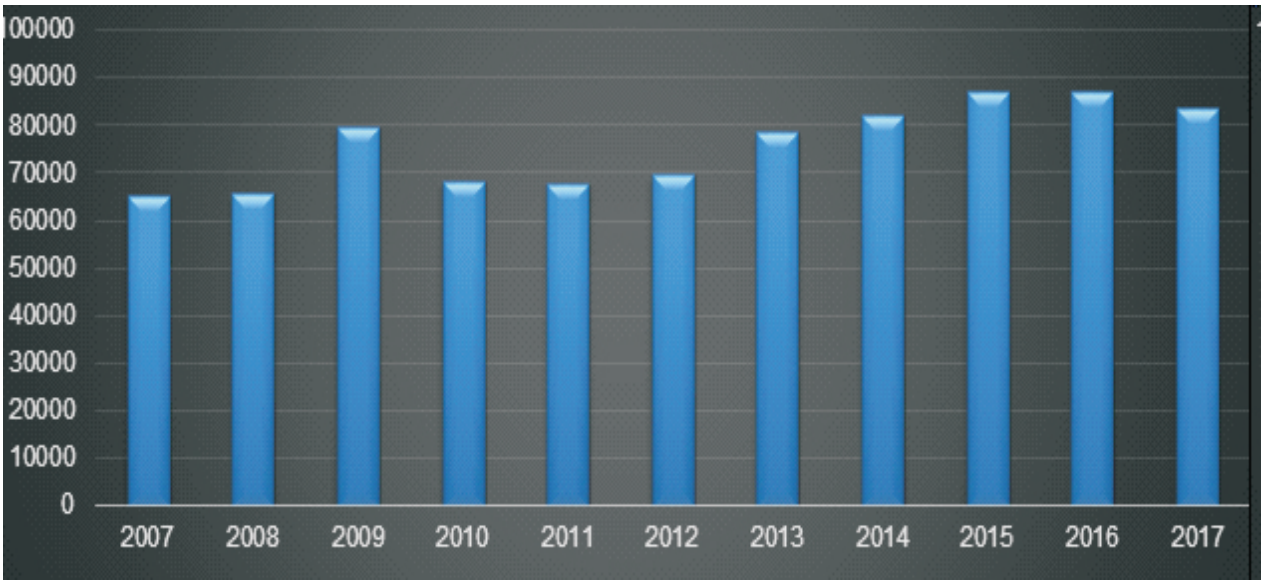
Disease	Total	Minimum	MaximumMean	Std Deviation
Malaria	833,7722,	17110,00	16,316.5	24,169
Diarrhea	8,021	2396	60.8	2,325

Source: Author's fieldwork, 2018

Diarrhea as a selected disease for study has a low concentration of number, within the stipulated time, the record of diarrhea is 8021 cases and a mean of 60.8 (see Table 6). The reason for the prevalent diseases can be traced to the level of sanitation practices. As observed in the study area, open lid waste basket was the prevalent waste facilities and it was unable to hold the waste generated properly. This could have provided a habitation for diseases vectors like mosquitoes and flies. In furtherance to this, open drainage causes runoff of water and this could interact with the surface water from overflowing septic tank systems and later percolate into ground water.

As indicated in Figure 6, between 2007 and 2017, most 22 (11%) of the occurrence of malaria was experienced in 2009, followed by 2014, 2015, 2016 and 2017 with 20 (10%) respectively; and 2013 18 (9%). Hence, an increase of 2.2% in the number of malaria occurrence between 2007 and 2017 was observed.

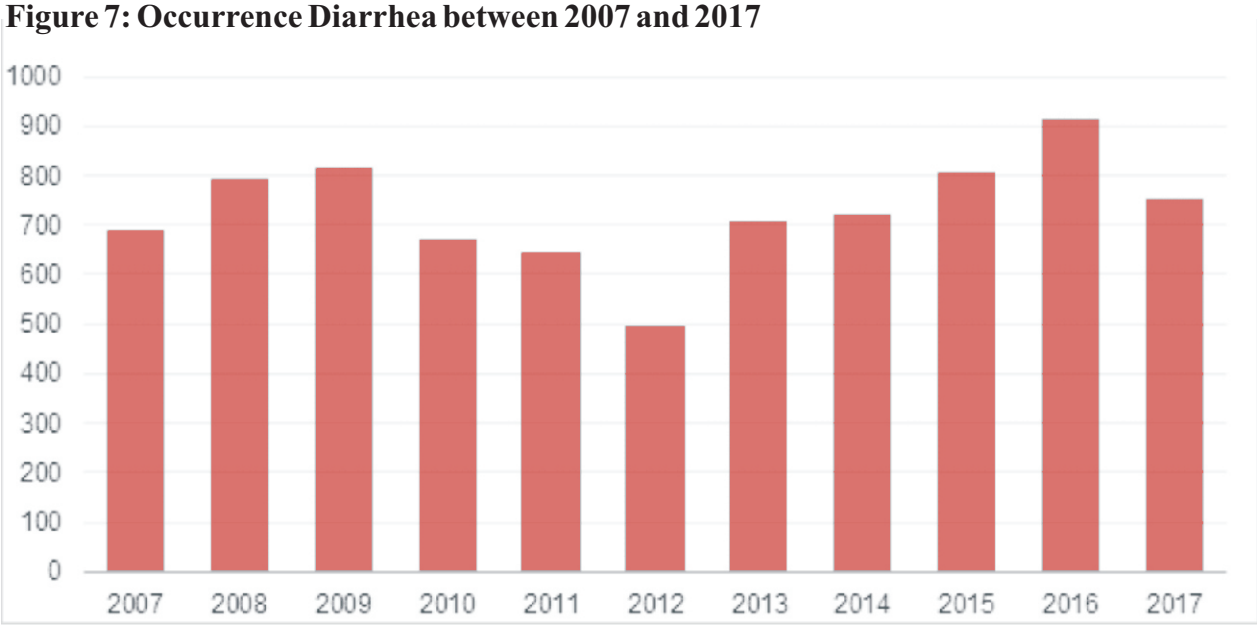
Figure 6: Occurrence of Malaria between 2007 and 2017



Source: Author's fieldwork, 2018

As seen in figure 7, most (11.4%) of the occurrence of diarrhea in the study period was recorded in 2016, followed by 2015 (10.1%). An increase of 0.8% is observed in cases of diarrhea reported between 2007 and 2017

Figure 7: Occurrence Diarrhea between 2007 and 2017



Source: Author's Fieldwork, 2018

Relationship between Environmental Sanitation Facilities and Selected Diseases (Malaria and Diarrhea)

The "Elements of Statistical Methods," states that if the pearson coefficient have an absolute value of 1, it indicates a perfect linear relationship but if the pearson coefficient have a value of 0, it indicates no linear relationship between the variables. Applying the King's interpretation, the result in table 7 shows that the Pearson coefficient value .350 which is greater than 0 but less than 1, this indicate a positive relation between the occurrence of malaria and inadequate environmental sanitation facilities. It revealed that environmental sanitation facilities accounted for 35% of the cause of malaria in the study area and that the more available environmental sanitation facilities, the lower and the possibility of the occurrence of malaria and vice versa. Therefore, the null hypothesis that there is no relationship between availability of environmental sanitation facilities and occurrence of malaria was rejected, the alternative hypothesis that there is a relationship between availability of environmental sanitation facilities and occurrence of malaria was therefore accepted.

Table 7: Relationship between Unsanitary Environment and Selected Diseases

	Malaria	Diarrhea
(Availability of sanitation facilities) Pearson Correlation	.350	.239
Sig (2-tailed)	.000	.000
N	228	228

Source: Author's fieldwork, 2018

Essentially, Table 7 shows the relationship between availability of sanitation facilities and the occurrence of diarrhea in the study area between 2007 and 2017. In support of this and as seen in Table 7, the Pearson Correlation value .239 is lower than 1 but greater than 0, this means that environmental sanitation in the area accounted for 23.9% causal factor of diarrhea. Also, when environmental sanitation facilities are not available, there is high possibility of occurrence of diarrhea in the study area. Therefore, the null hypothesis that there is no relationship between occurrence of diarrhea and availability of environmental sanitation and environmental facilities in the study area is rejected. Hence, it can be concluded that there is a positive relationship between environmental sanitation facilities and occurrence of diseases in the study area.

However, this study shows that most of the respondents use bucket to store their wastes most of whom disposed the waste at community dump sites. This answers the first research question showing that there are no adequate sanitation facilities in the study area.

Also, this study revealed that, a greater number of drainages in the study area is uncovered which makes them to be easily blocked. This shows that the few sanitation facilities available in the study area are not in good condition. The study shows malaria as the major poor sanitation related diseases experienced by many of the respondents in the study area, most of whom had experienced malaria within the last five months. Thus, indicating that malaria was the most prominent disease in Ile-Ife.

In addition, the findings of this research revealed that all of the respondents are aware of environmental sanitation through monthly environmental sanitation. Similarly, all of the respondent are aware of poor sanitation related diseases, while most 222 (97%) of them have experienced one diseases or the other. The outcome of this finding reports that there is a positive relationship between availability of environmental facilities and occurrence of malaria and diarrhea diseases in the study area.

The study further reports that, respondents have experienced one or two diseases related to poor sanitation less than five months ago although, it was shown that open defecation was not very common in the study area and poor toileting condition was the major factor affecting open defecation in the study area. This shows that government participation in environmental sanitation facilities practices in the study area was very low. Nevertheless, community members and private individuals have contributed to environmental sanitation facilities in the area through the provision of boreholes and drainages. This is with a view of improving the general wellbeing of the residents as well as the immediate environment in which people live.

Conclusion and Summary of Findings.

- This study showed that poor sanitation facilities and practices were responsible for the spread of diarrhea and malaria in the study area. As shown by scientific researches most disease are caused by unsanitary environment. It is often said that 'treat your environment how you want it to treat you', so being surrounded by a dirty environment increasing the chances of disease causing vectors to be ever-present in such areas.

- The study also reveals that the quantity of water available in the study area was inadequate for proper hygiene and domestic uses.
- Wastes are also not properly disposed in the designated areas therefore causing various health issues.
- In addition, most drainage is also opened creating a breeding and nesting place for mosquitoes, flies and diseases.
- Also, the Governments involvement in waste disposal to the designated points in the study area was poor. They no longer concern themselves with the happening of the area causing an acute set-back in maintaining a hygienic environment at the refuse designation area.

Recommendations for Policy Measures

In view of the findings of this study, it hereby recommends the following measures for policy making. This will help to ensure adequate sanitation facilities in the study area and subsequently regulate the spread of malaria and diarrhea infections.

- The government should ensure that sanitation facilities are properly put in place and its hygienic use should be enforced
- It is also expedient that the government increase the number of available pipe-borne water and boreholes in strategic locations so as to solve the challenges of inadequate water supply.
- Government should as well intensify efforts in providing standard sanitation facilities like incinerators, covered drainages, well equipped public toilets amongst others in order to control the spread of diseases such as diarrhea and malaria.
- In addition, the sanitation enforcement agencies in collaboration with the government should ascertain that the few available sanitation facilities in the study area are properly managed and in good condition.
- The government should also put in place necessary measures to monitor the hygienic condition of the refuse designated area.
- Community participation in the area of monitoring and enforcement of compliance to clean and healthy environment was also recommended.

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