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Poor Environmental Sanitation: A Contributory Factor to the Spread of Malaria Infections in Jere Local Government Area, Borno State, Nigeria

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Abstract

This study examines poor environmental sanitation as contributing factor to the spread of malaria infections in Jere Local Government, Borno State, Nigeria. A survey research design was adopted and data were collected using a structured questionnaire. Multi-stage and purposive sampling techniques were used to select 150 community members of Fori-Galtimari and Environs randomly and proportionately in the study area. The analytical tools employed for this study include descriptive statistics and 5-point Likert Type Scale. The finding indicates that most 55% of the respondents were within 21- 30 years of age, 58% were married, 35% had less than 3 persons in their households, 50% had BSc degree, 38% earned ₦51, 000 and above monthly while 51.3% were civil servants in the study area. The result shows that most of the respondents practice ES while stagnant water, lack of proper sanitation and dirty environment were the major factors that contribute to the spread of malaria in the study area. The finding shows that lack of drainages and refuse dumping points as well as lack of proper sensitization measures were among the major challenges faced by the respondents in the study area. The result also shows that poor attitude of people living in the area to ES and lack of visitation by the ES officials to the study area were challenges faced by the respondents on ES in the study area. The study recommends regular community sanitation exercises, increased public enlightenment by environmental agencies, collaboration between health practitioners and local leaders to promote hygiene awareness, and the provision of adequate drainage systems to reduce mosquito breeding

Keywords: Poor Environmental Sanitation, Contributory Factor, Malaria Infections, Jere, Borno, Nigeria

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Introduction

Malaria is one of the most severe public health problems, posing significant risks to the lives of children, especially in sub-Saharan Africa (SSA) (Yang *et al.*, 2020). Although cases of malaria have decreased by an estimated 20 million since 2010 (World Malaria Report, 2018), there was no significant progress in reducing the number of global cases from 2015 to 2017 (World Malaria Report, 2018). Current efforts to prevent malaria mainly include preventive and symptomatic treatment with antimalarial compounds, consisting of artemisinin-based combination therapies (Mathenge *et al.*, 2020), as well as vector control with long-lasting insecticidal mosquito nets (LLINs) and indoor residual spraying (IRS) (Sluydts *et al.*, 2016; Pinder *et al.*, 2015). These methods have resulted in reductions in case incidence and mortality. However, increasing evidence has revealed that these efforts can only go so far (World Malaria Report, 2018; Ghebreyesus and Admasu, 2018). Thus, there is need to determine and invest in additional effective measures to tackle these complex challenges. Good hygiene is universally known as one of the most efficacious and straightforward measures to prevent disease transmission (World Health Organization WHO, 2017).

Malaria is a major public health challenge in many low and middle-income countries (LMICs) Awuah *et al.*, 2018). The increase in morbidity and mortality from malaria in LMICs is partly due to under-resourced health systems and behavioural factors (World Health Organization WHO, 2003). Sub-Saharan Africa has the highest rate of morbidity and mortality from malaria and 2015 estimates showed that about 90% and 92% of the global proportion of malaria cases and deaths respectively were in the region (WHO, 2017).

Malaria is prevalent in most part of Nigeria with transmission affected by climate and geography, increased drug resistance and the lack of adequate vector control measures (Quakyi *et al.*, 2000). The use of protective clothing, insect repellents, bed nets, insecticides or environmental management (Nkuo-Akenji *et al.*, 2006), may achieve reduction in man-vector contact. According to Ihejiria (2022), malaria is an endemic disease in Nigeria, being the leading cause of morbidity and mortality with all Nigerians at risk. The disease, caused by the bites of infected female *Anopheles* mosquitoes, is also the leading cause of school absenteeism, hospitalization and out of pocket expenditure. A recent survey pegged the economic cost of malaria in Nigeria at ₦120 billion annually due to the loss in working hours, hospitalization, and out of pocket expenses as it accounts for more than 60 per cent of hospital visits, over 20 per cent of under 5 mortality and 11 per cent of maternal mortality (Ihejiria, 2022). The World Health Organization (WHO) says that 44 per cent of household out of pocket expenditure in Nigeria is on malaria, adding that malaria causes a significant loss in economic growth and puts a strain on household finances (Ihejiria, 2022). Nigeria continues to bear the disproportionate brunt of the malaria toll accounting for 27 per cent and 23 per cent of global cases and deaths respectively, says WHO. Despite these alarming statistics, many households remain vulnerable to malaria infection due to poor living conditions and economic hardship.

The impact of environmental surroundings on malaria prevalence was potentially important as the highest malaria prevalence being recorded in children living in houses surrounded by bushes and swamps (Nkuo-Akenji *et al.*, 2006). High *Anopheles* species populations live in these environments. Malaria is a leading public health problem in Fori-Galtimari and Environs of Jere Local Government, Borno State, contributing to larger proportion of total outpatient department attendance. It is the leading cause of death in children under five despite efforts by both government and NGOs to reduce the spread of Malaria. There appears to be no existing study to the knowledge of the researcher that assess the contribution of poor environmental conditions to the spread of Malaria in the study area. This study thus assessed the contribution of poor environmental condition to the spread of Malaria in Jere Local Government Area of Borno State, Nigeria to bridge the gap in existing literature.

The study was designed to answer the following research questions:

- i. What are the socio-economic characteristics of the respondents?
- ii. What are the environmental sanitation measures practiced by the respondents in the study area?
- iii. What are the major factors that contribute to the spread of malaria in the study area?
- iv. What are the major challenges faced by the respondents on environmental sanitation in the study area?

Statements of the Problem

Poor environmental sanitation has been identified as a significant contributor to the spread of malaria infections in many regions worldwide (Dhimal *et al.*, 2014). Despite considerable efforts to control malaria, its prevalence remains high in areas such as Jere Local Government, Borno State, where environmental sanitation is inadequate. The problem arises from various environmental conditions that favour the breeding and proliferation of the *Anopheles* mosquitoes, which are the vectors for malaria transmission (Dhimal *et al.*, 2014). The study is expected to look at the causes of poor environmental sanitation and the spread of malaria in the Jere local government area of Borno state.

Objectives of the Study

The main objective of the study was to examine poor environmental sanitation as contributory factor to the spread of malaria infections in Jere Local Government, Borno State, Nigeria. While the specific objectives were to:

- i. Examine the socio-economic characteristics of the respondents;
- ii. Examine the environmental sanitation measures practice by respondents in the study area;
- iii. Examine the major factors that contribute to the spread of malaria among respondents in the study area;
- iv. Examine the major challenges faced by the respondents on environmental sanitation in the study area.

Materials and Methods

Study Area

The study area is Jere Local Government Area, one of the twenty-seven Local Government Areas of Borno State. It lies within latitudes 11°40' and 12°05'N and longitudes 13°50' and 12°20'E, it occupies a total landmass of 160 square kilometer (Ministry of Land and Survey, Maiduguri (MLS), 2008). Within the state, it shares boundaries with Mafa Local Government Area to the east, Maiduguri Metropolitan Council to the north and Konduga Local Government Area to the south. The climate of the area is characterized by dry and hot seasons, minimum temperature ranging from 15-20°C, while the maximum temperature ranges from 37-45°C. The annual rainfall ranges from 500mm to 700mm per annum (Nigeria Metrological Agency (NMA), 2008). The rainy season is usually from May to October with low relative humidity and short wet seasons. The topography is generally low land plain, and the soil is generally sandy with short grasses and thorny shrubs. Jere Local Government Area has a projected population of 211, 04 persons with annual growth rate of 2.8% (National Population Commission (NPC), 2006). Majority of the inhabitants are farmers, traders and civil servants. The major ethnic groups are Kanuri and Shuwa-Arab. Others includes Hausa, Bura, Fulani, and many immigrant settlers from within and outside Nigeria

Research Design

The study would employ survey research design and use structured questionnaire to collect data during the survey process.

Sampling Techniques

A Multi-stage sampling technique was used for this study. In the first stage, Jere LGA was purposively selected in the State. In the second stage, communities with poor environmental sanitations within Fori-Galtimari and Environs were randomly selected while in the third stage; one hundred and fifty (150) residents of Fori-Galtimari and Environs were randomly and proportionately selected from these communities as respondents and used for the analysis. The sample size for this study was determined following Yamane (1967). The formula can be expressed as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n = Sample size

N = Population size (sample frame)

e = Level of significance = 5%

1 = constant

The sample size used for this study was 150 respondents. According to Krejcie and Morgan (1970) and Yamane (1967), a sample size of 150 respondents was adequate for this study.

Sources of Data

The primary data were obtained using structured questionnaire administered to 150 residents of Fori-Galtimari and Environs of Jere LGA, Borno State while secondary information were obtained from journals, textbooks, internet, conference papers etc. Data were collected on socio-economic characteristics of the respondents; environmental sanitation measures practice by respondents; major factors that contribute to spread of malaria among respondents; and major challenges faced by respondents on environmental sanitation in the study area.

Method of Data Collection

The primary data were obtained using structured questionnaire administered to 150 residents of Fori-Galtimari and Environs of Jere LGA, Borno State. The researcher alongside with enumerators conducted face-to-face interview for, the illiterate respondents who cannot read and write while results of the interview were interpreted on the questionnaire.

Analytical Techniques, Descriptive statistics and Likert Type Scale

The analytical tools employed for this study include descriptive statistics and 5-point Likert Type Scale. The descriptive statistics such as percentage and frequency were used to examine the socio-economic characteristics of the respondents; examine the environmental sanitation measures practice by respondents; examine the major factors that contribute to spread of malaria among respondents; examine the major challenges faced by respondents on environmental sanitation in the study area. to achieve specific objectives (i), (ii), (iii) and (iv). The 5-point Likert Type Scale was employed in this study. It is expressed as follows:

Key: 1= Strongly Disagreed; 2= Disagreed; 3= Undecided; 4= Agreed; and 5= Strongly Agreed.

Results and Discussion

Socio-economic Characteristics of the Respondents

The socio-economic characteristics of the respondents examine includes age, marital status, household size, household status, educational status monthly income and major occupation. The results are presented in table 1. The finding in table 1 indicates that most 55% of the respondents were within 21- 30 years of age while 8% were 41 years and above in the study area. The shows that most of the respondents were in their youthful age in the study area. The find also shows that most 58% of the respondents were married while 7% were widow in the study area. This shows that most of the respondents were married in the study area. The result in table 1 further indicates that 35% of the respondents had less than 3 persons in their households while 31% had between 4 and 5 persons in their households in the study area. This shows that most of the respondents had reasonable number persons in their households in the study area.

The finding also indicates that male headed 75% of the respondent's households while their spouse in the study area headed 8% of the households. This indicates that males in the study area headed most of the households. The result shows that 50% of the respondents had BSc degree while 32% had Diploma in the study area. This shows that most of the respondents were literate who had attended one form of education or the other. This further reveals that the respondents were aware of the implications of poor environmental sanitation in their area.

Table 1 also reveals that 38% of the respondents earned ₦51, 000 and above monthly while 31% earned less than ₦20, 000 monthly in the study area. This shows that most of the respondents earned reasonable income in the study area. Analysis of the finding indicates that 51.3% of the respondents were civil servants while 22.7% were businesspersons in the study area. This shows that most of the respondents were civil servants who earned reasonable monthly income in the study area.

Environmental Sanitation (ES) Measures Practiced by the Respondents

The environmental sanitation (ES) measures practiced by the respondents were examine and the findings are presented in table 2. The result indicates that 45% of the respondents strongly agreed that they practice ES regularly while 35% disagreed that they practice ES twice in a month in the study area. The finding also shows that 34% of the respondents disagreed that they practice ES only once in month while 43% strongly disagreed that they have never practice ES in the study area. This shows that most of the respondents practice ES in the study area.

Major Factors that Contribute to Spread of Malaria among the Respondents

Major Factors that contributes to the spread of malaria among the respondents in the study area were examine. The findings are presented in table 3. The result in table 3 shows that 65% of the respondents strongly agreed that stagnant water contributes to spread of malaria while 61% strongly agreed that lack of proper sanitation contribute to spread of malaria in the study area. The finding further indicates that 61% of the respondents strongly agreed that dirty environment contributes to spread of malaria in the study area. This shows that majority of the respondents strongly agreed that stagnant water; lack of proper sanitation and dirty environment were the major factors that contribute to the spread of malaria in the study area.

Major Challenges Faced by the Respondents on Environmental Sanitation (ES)

The major challenges faced by the respondents on environmental sanitation were examine. The findings are presented in table 4. The result shows that 38% and 37% of the respondents agreed and strongly agreed respectively that they do not have drainages and refuse dumping point in their areas while 42% and 39% agreed and strongly agreed respectively that they lack of proper sensitization measures in the study area. These show that lack of drainages and refuse dumping points as well as lack of proper sensitization measures were among the major challenges faced by the respondents in the study area.

The result in table 4 further reveals that 47% and 34% of the respondents strongly agreed and agreed respectively that there was poor attitude of people living in the area to ES while 37% and 27% of the respondents strongly agreed and agreed respectively that the ES officials were not visiting their areas. These also show that poor attitude of people living in the area to ES and lack of visitation by the ES officials to the study area were challenges faced by the respondents on ES in the study area.

Conclusion and Recommendation

Malaria is prevalent in most part of Nigeria with transmission affected by climate and geography, increased drug resistance and the lack of adequate vector control measures. The use of protective clothing, insect repellents, bed nets, insecticides or environmental management, may achieve reduction in man-vector contact. In Zambia, multiple control interventions, including environmental management against *Anopheles* larval stages and improvement in hygiene and sanitation reduced the overall malaria incidence and mortality rates by approximately 50%. The study concludes that most of the respondents were in their youthful age, married and had reasonable number persons in their households in the study area. In addition, males headed most of the households and they were literate who had attended one form of education or the other. The result of the study also concludes that most of the respondents civil servants who earned reasonable income in the study area. The result also concludes that most of the respondents practice ES regularly; stagnant water, lack of proper sanitation and dirty environment were the factors that contribute to the spread of malaria in the study area. Lack of

drainages and refuse dumping points as well as lack of proper sensitization measures were among the challenges faced by the respondents in the study area. The study also concluded that poor attitude of people living in the area to ES and lack of visitation by the ES officials were challenges faced by the respondents on ES in the study area.

The following recommendations were made based on the finding of the study:

- i. There is need for residents of Fori-Galtimari and Environs to carry out environmental sanitation monthly;
- ii. There is need for Officials of Borno State Environmental Protection Agency (BOSEPA) carryout public enlightenment campaign to educate the public on environmental sanitation as one of the major cause of malaria spread in their community;
- iii. There is need for the Government to organize an awareness campaign towards the detection of outbreak of malaria which will enlighten the public about various method involves in the control of the infection;
- iv. Health practitioners should create awareness in communities with the support of the local leaders (Bulamas and Lawans) on the importance of environmental sanitation;
- v. Government should provide drainages in the communities order to avoid mosquito breeding on stagnant water.

Value Added To Knowledge

- The study contribute valuable insight into the effects of poor environmental sanitation and the spread of malaria infection in Jere Local Government Borno State.
- By identifying the challenging associate with poor environmental sanitation and the need for clean environment.
- It adds to the existing body of knowledge on sanitation in developing country, additional, it offers practical recommendation to policy maker in promotion of good environmental sanitation which can reduce malaria spread in regions where these rate are high.
- The study also highlight the need for intensified awareness campaign and incentive to encourage environmental sanitation

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Tables

Table 1: Socio-economic Characteristics of the Respondents

Socio-economic variables	Frequency	Percentage
Age:		
<20	22	15
21-30	83	55
31-40	33	22
41 and above	12	8
Total	150	100
Marital status:		
Single	53	35
Married	87	58
Widow	10	7
Total	150	100
Household size:		
<3	53	35
4-5	46	31
6 and above	51	34
Total	150	100
Household status:		
Male Headed	113	75
Female headed	25	17
Spouse headed	12	8
Total	150	100
Educational status:		
BSc	75	50
Diploma	48	32
No formal education	1	0.7
Post graduate	12	8
Primary	1	0.7
Religious school	2	1.3
Secondary	11	7.3
Total	150	100
Monthly income(₦):		
<20,000	46	31
21,000-30,000	14	9
31,000-40,000	8	5
41,000-50,000	25	17
51,000 and above	57	38
Total	150	100
Major Occupation:		
Business	34	22.7
Civil servant	77	51.3
Private job	39	26
Total	150	100

Source: Field survey, 2022

Table 2: Various Environmental Sanitation Measures Practiced by the Respondents

Question	Strongly Disagreed	Disagreed	Undecided	Agreed	Strongly Agreed	Total
I do practice ES regularly	12(8)	7(5)	6(4)	58(39)	67(45)	150(100)
I do practice ES twice in a month	12(9)	52(35)	10(7)	45(30)	30(20)	150(100)
I do practice ES only once in month	15(10)	51(34)	10(11)	36(24)	32(21)	150(100)
I have never practice ES	65(43)	32(21)	2(1)	28(19)	23(15)	150(100)

Source: Field survey, 2022; figures in parentheses represents percentage of respondents.

Table 3: Factors that Contribute to Spread of Malaria among the Respondents

Questions	Strongly Disagreed	Disagreed	Undecided	Agreed	Strongly Agreed	Total
Because of stagnant water in the area	2(1)	1(1)	0(0)	49(33)	98(65)	150(100)
Lack of proper sanitation	0(0)	1(1)	2(1)	55(37)	92(61)	150(100)
Dirty environment	0(0)	8(5)	0(0)	50(33)	92(61)	150(100)

Source: Field survey, 2022; Figures in parentheses represents percentage of respondents

Table 4: Major Challenges Faced by the Respondents on Environmental Sanitation (ES)

Questions	Strongly Disagreed	Disagreed	Undecided	Agreed	Strongly Agreed	Total
My area has no drainages and refuse dumping point	15(10)	10(7)	12(8)	57(38)	56(37)	150(100)
We lack of proper sensitization measures	0(0)	26(17)	2(1)	63(42)	59(39)	150(100)
Poor attitude of people living in the area to ES	5(3)	20(13)	4(3)	51(34)	70(47)	150(100)
The ES officials are not visiting my area	4(3)	18(12)	32(21)	40(27)	56(37)	150(100)

Source: Field survey, 2022; Figures in parentheses represents percentage of respondents